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MACROECONOMICS

Theory and Policy

Third Edition

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Third Edition

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Preface

The objective of writing this book has been to provide a comprehensive and authentic textbook on macroeconomics for undergraduate and postgraduate students. The way the earlier editions of this book have been received by the students and teachers of the subject shows that my efforts have been largely successful. However, no book is perfect for all times and for all purposes. There is always a scope and need for improving the treatment and presentation of thoughts and theories with the objective of making the subject easily comprehensible. Besides, feedback, suggestions and comments about the usefulness of the book from subject experts, teachers and students provide a good guidance for widening the scope and improving the treatment of the subject matter. Not only that, the importance of macroeconomics as a subject of study has increased immensely over the past two decades, most probably due to the persistence of macroeconomic problems—achieving and maintaining a reasonably high growth rate, preventing growth of unemployment and promotion of employment, restricting inflation to a desirable rate, and stabilising the financial market. The recent global recession and the problems that it created for both developed and developing economies proves the point. In view of these facts, it was realised that there was a need for expanding the scope of the book by adding discussions of some other important aspects of macroeconomics. These factors prompted me to bring out the third edition of the book.

WHAT IS NEW IN THIS EDITION

Three New Chapters

- Chapter 2 – **Macroeconomic Issues, Concepts and Model Building**—has been added with the objective of (i) giving the readers an overview of major macroeconomic issues that constitute the subject matter of macroeconomics (ii) equipping them with some basic concepts used in macroeconomic analysis and (iii) giving an idea of the need for and the purpose of macroeconomic models.
- Chapter 21 – **Theories of Economic Growth**—has been added to this edition of the book. Most macroeconomic theories discussed in the earlier editions of the book were presented generally in a static equilibrium framework. In reality, however, most economies pass

regularly through dynamic conditions and have a tendency to grow in the long run. What was missing in the earlier editions was the answer to the questions 'what factors make the economy grow' and 'what determines the growth rate'. In their effort to answer these questions, economists have formulated their own theories of economic growth. A brief discussion on the main theories of growth is the subject matter of this chapter.

- Chapter 22 – **Theories of Business Cycle and Global Recession.** Growing economies are always open to the risk of economic downturn followed by recovery of the economy. This has been proved by the India's economic crisis of late 1960s and the early 1990s, the Asian crisis of 1980s, the US economic recession in 1980s and again in 2008-09 which caused a global recession. The regular uptrend and downturn in the economy is called ***business cycle***. Economists have attempted to explain why business cycles take place and what measures can be adopted to control the business cycles. Their efforts have lead to the emergence of the ***theories of business cycle***. The theories of business cycles and a brief discussion on the recent global recession constitute the subject matter of this chapter.

New Sections Added

- Chapter 1 – Two new sections have been added to this introductory chapter: (i) **What is Economics?** containing a detailed explanation of what economics is about just to introduce the subject to the students from non-economics disciplines and guide them to the study Macroeconomics, and (ii) **Use of Macroeconomics for Business Management** for the benefit of management students.
- Chapter 5 – The classical theory of demand for labour is the most important element of the classical theory of employment, which was ignored in the earlier editions of the book. For the sake completeness, therefore, a new section on the **classical theory of demand for labour** is added in this edition.
- Chapter 9 – A new section on **Consumption under Uncertainty: Robert Hall's Random Theory** has been added to this chapter. Besides, empirical evidence based on Indian data has been added to explain the concepts of *average propensity to consume* and *average propensity to save*.
- Chapter 10 – The **Introduction** of the chapter to the theory of investment has been reinforced with Indian data on trends in savings and investment as percentage of *GDP*. In addition, a new section on the **Rental Cost of Capital and Investment** has been added to this chapter.
- Chapter 12 – A new section **RBI Measures of Money Supply** has been added to show how money supply is measured in India. Besides, the discussion on money supply has been elaborated upon, with additional examples of empirical evidence.
- Chapter 15 – The section on the **Baumol-Tobin Theory of Transaction Demand for Money** has been discussed in a much greater details with additional numerical examples. Also, the discussion on most other theories of demand for money has been elaborated upon with additional examples and algebraic treatment.
- Chapter 17 – Three new sections have been added to this chapter: **(i) *IS-LM* model of a simple economy, (ii) Derivation of the *IS-curve* with the government sector, and (iii) an alternative graphical method of deriving *IS-curve*.**

- Chapter 18 – A new section—**Derivation of the *IS* Curve: An alternative Method**—has been added as an alternative algebraic method of deriving the curve. Besides, Sections 18.3 and 18.4 have been added with additional examples and explanation.

In addition, the discussion on **India's Monetary Policy** in Chapter 30 and **India's Fiscal Policy** in Chapter 31 has been updated with recent monetary and fiscal data, respectively.

HOW THIS BOOK IS DIFFERENT FROM OTHER BOOKS

This book is different from other books in two important ways—one, in *organisation of the subject matter*, and two, in *explanation of macroeconomic theories*. In most other books the organisation of the subject matter is issue-based, i.e., based on such macroeconomic issues as economic growth, monetary theory, government debt, inflation, employment, business cycles, etc. This kind of approach gives an incoherent picture of macroeconomics. This approach sometimes does not give the reader a comprehensive and complete view of macroeconomics as a separate branch of economic science. It does not tell how economists' thoughts have changed over time and how changes in their thoughts and theories have led to the growth of macroeconomics. This kind of treatment of the subject seems to assume that students have the basic knowledge of macroeconomics.

In contrast, the subject matter has been organised in this book on the basis of the different stages of growth of macroeconomics—classical, Keynsian, post-Keynsian and then the issue related theories. It begins with an introduction of macroeconomics as a subject of study and then proceeds to deal with subject matter in chronological order. First it deals with classical views on macroeconomic issues and its failure to explain the origin of Great Depression. This gives the background in which macroeconomics was born. Then it proceeds to deal with the Keynesian macroeconomics which marks the foundation of macroeconomics. The explanation of the Keynesian macroeconomics is followed by the post-Keynesian developments in macroeconomics. Next it deals with theories of economic growth and business cycle problems. Finally, it discusses the policy measures of macroeconomic management by the government, *viz.*, monetary policy and fiscal policy. This approach was adopted to give a complete and comprehensive view and clear understanding of growth of macroeconomics as a subject of study, and the methods of macroeconomic management.

Secondly, this book is different from other books in respect of explanation and presentation of macroeconomic theories. In exposition of the macroeconomic theories, it does not presume any prior knowledge of macroeconomics. It begins with the basics and proceeds to explain macroeconomic theories step-by-step by using graphics and algebraic examples.

I express my gratitude to all those who have contributed directly and indirectly to the preparation of the third edition of the book. I acknowledge once again the guidance and suggestions that I have received from Shri Rama Rao Suresh of Ramjas College (retd.), Dr. Ramji Narayanan of PGDAV College, and Mrs. Kusum Gupta of Lady Sriram College, all of Delhi University. I am thankful also to Mr. Tapas Kumar Maji of Tata McGraw Hill, for his feedback and inspiration for revising the book. Comments and suggestions are always welcome and will be duly acknowledged.

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PART 9 Macroeconomic Policies: Monetary and Fiscal Policies

Part 1

Introduction

This introductory part of the book lays down the foundation and presents a basic framework for the study of Macroeconomics. Since Macroeconomics is a branch of economic science, Chapter 1 begins with a brief introduction of Economics, to familiarise the students with *Economics* as a subject of study. This is followed by a detailed discussion on the definition, origin, and growth of Macroeconomics as a separate branch of Economics. Besides, it introduces the variables used in macroeconomic analysis and points out the importance and limitations of this subject. Chapter 2 presents a brief discussion on (i) the major macroeconomic issues which constitute the scope and subject matter of macroeconomics, (ii) the basic concepts used in macroeconomic analysis, and (iii) the process of macroeconomic model building—just to illustrate how economists build the model to study a specific macroeconomic issue. Chapter 3 presents a graphical view of the circular flows of products and money, to show the working of the economy at its macro level.

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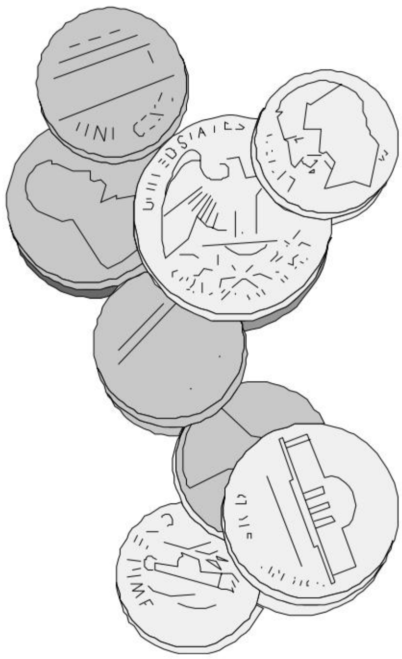
Chapter 1

Introduction to Macroeconomics



INTRODUCTION

The modern *economic science* has two major branches: (i) ***microeconomics***, and (ii) ***macroeconomics***[1]. Compared to microeconomics, macroeconomics is a younger branch of economics. Until the Great Depression of 1930s, the subject matter of economic science was broadly limited to what is now known as microeconomics. Macroeconomics emerged as a separate branch in 1936 with the publication of John Maynard Keynes' revolutionary book, *The General Theory of Employment, Interest and Money,* generally referred to as *The General Theory*. This book is said to be the foundation of macroeconomics. The subsequent growth of literature on the interpretation of Keynesian economic thoughts and theories, their empirical verification and application all over the world, over a period of three decades, culminated in the emergence of *Macroeconomics.* This book deals with *macroeconomics*.

However, before we commence our study of macroeconomics, a brief introduction to ***economics*** as a discipline would be very helpful in comprehending the nature and the subject matter of ***macroeconomics***, especially for those who have ventured to study macroeconomics for the first time.

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1. The terms 'microeconomics' and 'macroeconomics' were coined and used first by a Norwegian economist, Ragnar Frisch, in 1933, in his paper "Proposition Problems and Impulse Problems in Dynamic Economics", published in *Economic Essays in the Honour of Gustav Cassel* (London, 1933). The prefix 'micro' and 'macro' are Greek words meaning 'small' and 'large', respectively.

1.1 WHAT IS ECONOMICS?

Although economics is regarded as the oldest discipline, as students of economics might be aware, it could not be defined precisely. Economists, right from Adam Smith, the father of economics[2], down to the early 20th century economists, have defined economics differently, depending on their own perception of this discipline. For instance, Adam Smith defined economics, in 1776, as 'economics is the science of wealth'. Nearly one and half century later in 1920, Alfred Marshall, one of the all-time-great economists, defined economics with a wider scope. According to him, "Economics is the study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment, and with the use of the material requisites of well being". John Robbins, a contemporary economist, defined economics in 1932 more precisely. According to him; "Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses". Although Robbins' definition of economics is more precise, his definition limits the scope of economics to a part of what is known today as *microeconomics*. The scope of economics goes far beyond the study of the 'choice making behaviour' of the people.

There are many other definitions of economics. But none of the definitions captures the entire scope of economics as it stands today. Economics could not be defined precisely. Economists have given varying reasons for this. Zeuthen[3] has remarked, "Economics is an unfinished science" and Schultz has observed, "Economics is still a very young science". It is perhaps for this reason that modern economists avoid defining economics. For example, William J. Baumol, a Nobel Laureate, and his co-author, A. S. Blinder, write, "Many definitions of economics have been proposed but we prefer to avoid any attempt to define the discipline in a single sentence or paragraph." … "Let the subject matter speak for itself".[4] This seems to be the best approach to know what economics is about. Nevertheless, it is essential for a beginner to have a basic understanding of the nature and scope of the subject matter of 'economics'. This would help them in comprehending economics and macroeconomics as a branch of economics.

1.1.1 Understanding Economics

To begin with, let us recall Marshall's definition of economics, which is closest to the central theme of economics. According to Marshall, "Economics is the study of mankind in the ordinary business of life". What is the 'ordinary business' of mankind? Obviously, the ordinary business of mankind is *production* and *consumption.* He adds, "[Economics] examines that part of the individual and social action which is most closely connected with the attainment, and with use of the material requisites of well being". In their action of production and consumption, people make use of 'material requisites', i.e., the resources. In making use of their resources, people have to make a number of choices with the purpose of maximising their 'well being', i.e., their welfare, from their

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2. The origin of economics as a separate discipline is traced in Adam Smith's book *An Enquiry into the Nature and Causes of the Wealth of the Nations* (1776). That is why, perhaps, he is called 'father of economics'. However, some economists call him 'founder of economics' and not 'father of economics'. In their opinion, economics originated much earlier before Adam Smith's *Wealth of Nations*.

3. *Economic Theory and Method* (Longmans, Green & Co., London, 1955), p.2.

4. Baumol, William J. and Blinder, Allen S., *Economics: Principles and Policy,* 4th Ed. (Harcourt Brace Jovanovich, New York, 1988), p.2.

limited resources. Their choice-making behaviour is *economic behaviour. Economics studies economic behaviour of the people and its consequences.* What is economic behaviour? *Economic behaviour is essentially economising behaviour. Economising behaviour* is conscious effort of the people to derive maximum gains from the use of their limited resources.

Why Do People Economise? The need for economising arises because of the following basic facts of economic life of the human beings.

(i) ***Human wants, desires and aspirations are endless***. Human wants and aspirations have ever since been growing and continue to grow endlessly due to inventions and innovations of new consumer goods. Fifty years ago, pen and paper were sufficient to write a book, but now a PC has become a necessity; 25 years ago, a telephone was a sufficient means to communicate all over the world, but today, a cell phone is a necessity; and so on. People are now aspiring to have a house on the moon[5], or in space. At present, the overall consumer demand far exceeds the availability of resources. According to a UN Report, United Nations Environmental Programme: Global Environment Outlook 4, 'In October 2007, world population consumed 40 per cent more than what earth can afford. This is a clear evidence of growing human need'.

(ii) ***Resources are limited and scarce***. Resources available to satisfy human wants at a point of time are limited. The resources—be it natural resources or man-made (capital and technology)—available to an individual, a household, a business firm, or a nation, at a point of time, are limited. The resources available to even the richest men of the world—be it Mukesh Ambani of India, Carlos Slim of Mexico, or Bill Gates of the US—and to multinational corporations are also limited.

Although resources are scarce, they can be put to alternative uses. This property of resources widens their scope of usability. For example, land can be used for cultivation, construction of a building, setting up of a factory or a shopping mall or a school or hospital. Similarly, a labourer (given his physical strength, skills and knowledge), can use his/her labour, time and skills for different kinds of jobs, for example, as a farm labour, as a factory labour, as a teacher, manager, consultant, etc. But the earning expected from different occupations will be different. In the economic sense, it means that productivity of resources varies from use to use.

(iii) ***People are of optimising nature.*** By nature, people want to derive maximum gains out of the available resources, i.e., people are of economising nature. Economising means maximising gains at a given cost, or minimising cost for a given amount of gain. No hunter wants to shoot two arrows if the deer can be killed by one; no firm employs 100 labourers if 99 can deliver the same output; you do not spend 6 hours a day for studies if you can score your target marks (90%), with 4 hours of study each day.

The conditions apply to both, the individuals and the nation as a whole. Given these basic facts of economic life, both individuals and the nation need to economise on the use of their resources to achieve their goals, be it maximising income, maximising profits, raising standards of living, accumulation of wealth, or any other.

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5. According to a report, land prices in the US were affected by land prices on the moon. "Internet searches for lunar land prices show that the cost of buying an acre on the moon's surface has risen by 40% since the start of 2007", which serves as an indicator of the US house prices (*TOI*, 20/12/2007).

1.1.2 The Subject Matter of Economics

The basic subject matter of economics is the study how people—individuals, households, firms, and nations—maximise their gains from their limited resources and opportunities. In other words, economics is the study of how *people* allocate their resources to their alternative uses for deriving maximum possible *gains* from limited resources. For the purpose of economic analysis, 'people' are classified under different categories of decision-makers. They are: (i) consumers—the users of all final goods and services, (ii) firms—the producers of all goods and services, and (iii) owners and users of resources. The term 'gain' has different connotations for different sections of economic decision-makers—consumers, firms, and resource users. For *consumers,* 'gain' means the *total utility or satisfaction* they derive from the consumption of goods and services; for *producers,* it is *production and profit* that they make from the use of resources at their disposal; for resource users, especially *labour,* it means wage income or earning per unit of time; and for a *nation,* 'gain' means national output, total employment, high standard of living, and economic welfare of the society.

Economics studies how different kinds of decision-makers maximize their gain from their limited resources. For example, economics studies how ***individuals and households as consumers*** decide 'what to consume', and 'how much to consume', and how to allocate their limited income to various goods and services they consume, so that their total utility is maximised. Similarly, economics studies how ***firms as producers*** decide 'what to produce', 'how much to produce', and 'how to produce', so that the total output is maximised from the use of their limited resources (land, labour, capital, technology, etc.). Also, economics studies how firms decide 'what price to charge' so that their *total profit* is maximised. *Thus, economics, as a behavioural science, studies how* ***consumers*** maximise their total *utility; how* ***producers*** achieve the goal *of profit maximisation; and how* ***resource owners*** *maximise returns or earnings from the use of their resources.*

Note that the subject matter of economics is not confined to the study of economising behaviour. In addition to economising behaviour, ***economics studies also the working mechanism of the market system and the behaviour of the market forces—demand and supply***—and how these forces determine the *price* of a product. Consumers' decision creates *demand* for goods and services and producers' decision creates *supply* of goods and services. Demand and supply together create market for a product. Market demand and supply—the two market forces—determine the price of the product. Economics studies how prices are determined in the market. This is the ***theory of price determination.***

Furthermore, *economics* studies the *input-output relationship,* i.e., how production of a good or a service responds to the increase in inputs (labour and capital), and also it studies the *cost-output relationship,* i.e., how the cost of production responds to the increase in production of a product. Besides, it analyses how the price of a product and the price of a factor of production are determined under *different market conditions*. Likewise, resource owners supply the resources and the producers demand the resources, creating a demand for the factors of production. *Economics also studies how factor prices (wages, rent, etc.) are determined.*

When the optimising or maximising behaviour of the people—consumers, producers, and resource owners—is analysed at the ***individual level,*** it constitutes a part of ***microeconomics***. The study of price and output determination at individual commodity level is also the subject matter of microeconomics. Therefore, all studies made at the level of the individual decision-makers and individual products constitute the subject matter of ***microeconomics.***

The subject matter of economics does not end at microeconomics. It goes far beyond. Economics studies also the working of the economy as a whole. In fact, when all such economic phenomena as aggregate consumption, production, price level, and employment are studied at the national aggregate level, it constitutes ***macroeconomics***. In simple words, the study of the behaviour of, and structural changes in, aggregate or national production, aggregate consumption, aggregate savings, aggregate investment, general price level, total exports and imports, and country's balance-of-payments position are the subject matter of macroeconomics.

For the purpose of macroeconomic studies, all microeconomic variables are converted into macroeconomic variables. Let us see how ***microeconomic variables*** are converted into ***macroeconomic variables***. The amount that an individual consumer decides to spend on consumer goods and services is individual consumption expenditure. This is a microeconomic variable. When the expenditure made by *all the individual consumers* on *all the goods and services are summed up,* it gives *aggregate consumption expenditure,* which is a macroeconomic variable. The study of the behaviour of the aggregate consumption expenditure and its determinants is the study of a ***macroeconomic variable***. Similarly, the study of how an *individual firm* decides how much to produce an *individual good,* say, a PC, is a *microeconomic* study. But when one analyses the behaviour of the total *output of all the goods and services* produced by *all the firms* over a period of time, one studies the trend in ***aggregate production*** or *national output.* This makes a macroeconomic study. Note that, by nomenclature, micro and macro variables are the same—consumption, production, demand, supply, price and employment of resources. When determination and behaviour of these variables are studied at the level of individual product, individual consumer, or individual producer, it makes a *microeconomic study.* When the same economic phenomena—the determination of changes in demand, supply, production, price, etc.—are studied at their aggregate level, it makes a *macroeconomic study.*

In addition, there are many economic phenomena and related problems which cannot be studied at the micro level. For example, the microeconomic approach does not provide the framework for the study of the behaviour of some aggregate variables at the economy level, such as level of national income, growth of national income, determinants of consumption and investment, the general price level (inflation and deflation), the effect of total money supply on the economy and the general price level, and the effects of taxation and government spending on the economy, and so on. Another kind of economic variables which are studied at the aggregate level are the foreign trade, foreign investment and the balance of payments and their effect on the economy as a whole.

In this book, we are concerned with ***macroeconomics***. Let us, therefore, take a detailed view of the nature and scope of macroeconomics, and look at the major macroeconomic issues that constitute a part of macroeconomics at both the theoretical and the policy levels.

1.2 WHAT IS MACROECONOMICS?

As noted above, defining economics has been a difficult proposition. So is the case with macroeconomics, or any other branch of economics, for that matter. However, some economists have attempted to define macroeconomics according to their own perception of its subject matter. A look at some relatively comprehensive definitions of macroeconomics would give a broad view of what macroeconomics is about. Look at the following definitions.

Gardner Ackley Macroeconomics "concerns the over-all dimensions of economic life. .... More specifically, macroeconomics concerns itself with such variables as aggregate volume of an ecconomy, with the extent to which its resources are employed, with size of the national income, with the 'general price level".[6]

Kenneth E Boulding "Macroeconomics is the study of the nature, relationships and behaviour of aggregates of economic quantities.... Macroeconomics ... deals not with individual quantities as such, but with aggregates of these quantities … not with individual incomes, but with the national income, not with individual prices, but with the price levels, not with individual output, but with the national output".[7]

J. M. Culbertson "Macroeconomic theory is the theory of income, employment, prices and money".[8]

P. A. Samuelson "Macroeconomics is the study of the behaviour of the economy as a whole. It examines the overall level of a nation's output, employment, prices, and foreign trade."[9]

Although these definitions are fairly comprehensive, they do not reveal the exact nature and scope of modern macroeconomics, nor do they fully capture its subject matter. Since "macroeconomics is [still] a young and imperfect science" (Mankiw, *Macroeconomics*, 2003, p.3), it is difficult to define it precisely. However, the definitions quoted above do give an idea of the central theme of theoretical macroeconomics, and this is what matters in economics. The central theme that emerges from the above definitions may be stated as follows. *Macroeconomics is essentially the study of the behaviour and performance of the economy as a whole. More importantly, it studies the relationship and interaction between the 'factors or forces' that determine the level and growth of national output and employment, general price level, and the balance of payments positions of an economy.* This definition too should be treated only as a working definition of macroeconomics.

To comprehend better the subject matter of macroeconomics, look at the kinds of questions that macroeconomics seeks to answer.

- What determines the levels of economic activities, total output, the general price level, and the overall employment in a country?
- How is the equilibrium level of national income determined?
- What causes fluctuations in the national output and employment?
- What determines the general level of prices in a country?
- What determines the level of foreign trade and trade balance?
- What causes disequilibrium in the balance of payments of a country?
- How do the monetary and fiscal policies of the government affect the economy?
- What economic policies can steer the economy on the path of growth?

These are some major theoretical questions that macroeconomics seeks to answer.

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6. Gardner Ackley, *Macroeconomic Theory*, (Macmillan, NY, 1961) p.4.
7. Kenneth E. Boulding, *A Reconstruction of Economics*, (NY, John Wiley & Sons, Inc., and Chapman & Hall, London, 1950). p.171.
8. J. M. Culburtson, *Macroeconomic Theory and Stabilization Policy*, (NY, McGraw-Hill, 1968). p.7.
9. Paul A Samuelson and William D. Nordhaus, *Economics*, McGraw-Hill, 1995, 15th Edn., p.381.

1.3 MACROECONOMICS IS BOTH A THEORETICAL AND A POLICY SCIENCE

A question may be asked at this juncture: Is macroeconomics a theoretical science or a policy science? Macroeconomics has both *theoretical* and *policy* orientations. *Macroeconomics* as a theoretical science uses macroeconomic models to explain the behaviour of macroeconomic variables (national output, employment, money supply and demand, general price level and balance of payments, etc.) and specifies the nature of relationship between them in a logical way and an orderly fashion. The most important aspect of macroeconomic theories is that they provide framework and analytical tools to analyse the macroeconomic phenomena. Macroeconomic theories that explain the determination of national income, aggregate level of consumption, saving and investment, employment and growth rate, behaviour of the general price-level, determination of product-and-money market equilibrium, exchange rate and balance of payments constitute the main body of theoretical macroeconomics. Macroeconomic theories, though not perfect, do provide a great deal of understanding of, and insight into, the working of the economy, and in identifying the factors and forces that cause adverse or desirable effects on the economy. A clear understanding of macroeconomic dynamics is a necessary condition for the formulation of appropriate macroeconomic policies to achieve predetermined goals.

As regards its policy *orientation*, macroeconomics provides a sound theoretical framework for investigating the causes and effects of economic problems—unemployment, inflation, recession and depression, stagflation, etc.—and provides guidelines for finding appropriate policy measures to solve the problem. Also, macroeconomics analyses the working and effectiveness of macroeconomic policies, especially the monetary and fiscal policies, on the economy. The knowledge of working and efficacy of these policies are extremely useful in devising appropriate policy measures for controlling and regulating the economy so as to achieve the desired goals. It is, perhaps, for this reason that Dornbusch, *et. al.,* hold the view that "Macroeconomics is an applied science". But they add (in the very next paragraph), "Macroeconomics is very much about tying together facts and theories"[10]. It means that there are macroeconomic 'theories' which can be tied together with 'facts' to make macroeconomic studies. However, the policy aspect of macroeconomic studies has assumed such a great importance in modern times that in the opinion of some economists, "Macroeconomics is first and foremost a policy science"[11]. Macroeconomics as a policy science provides an analytical framework and guidelines for devising appropriate policy measures for controlling or eliminating undesirable factors in the economy and to guide it on the path of stable growth.

It may, thus, be concluded that macroeconomics has both theoretical and policy orientations. In fact, the origin of macroeconomics can be related to the search for means and measures to solve such economic problems as the Great Depression and unemployment. But, for finding an appropriate feasible solution to such economic problems, it is indispensable to develop analytical frameworks and economic models to understand the working of the economy, and interaction and interdependence of macro variables. Any random choice and application of policy measures to solve

[10] Rudigar Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics* (Tata McGraw-Hill, New Delhi, 9th Ed., 2004), p.4.

[11] Dernburg, Thomas F., *Macroeconomics—Concepts, Theories and Policies* (McGraw-Hill Book Company, NY, 7th Ed., 1985), p.4.

big economic problems can do more harm than good to the economy. Building analytical framework and models represents the theoretical aspect of macroeconomics. However, macroeconomic theories are not abstract theories: they have been developed on the basis of facts of economic life. Therefore, macroeconomic theories, though imperfect, have a good deal of application in policy formulation. In case of macroeconomics, theories and policies go together.

1.4 MICROECONOMICS VS. MACROECONOMICS

Before we proceed, let us have a glance at how economists distinguish between microeconomics and macroeconomics to help us in comprehending the subject matter of the two branches of modern economics.

1.4.1 Units of Study

The first distinction between the two branches of economics is made on the basis of the **unit of study**. As mentioned above, microeconomics studies economic behaviour of **individual decision-making units** (individuals as consumers and producers), and how price of an individual product is determined in the market. It analyses how an individual household decides on what to consume, how much of it to consume, and how to allocate its total consumption expenditure on various goods and services so that its total utility is maximised. Similarly, microeconomics analyses how individual firms decide on what to produce and how to price its product so that its total profit is maximised, given its resources. Also, microeconomics analyses the working of markets for individual goods or services and explains how individual prices are determined in the market.

In addition, microeconomics explains how inter-firm and inter-industry shift of resources—labour and/or capital—affects the firm's and the industry's output. In simple words, microeconomics takes a microscopic view of economic system and studies how the system works at the micro level. According to Lerner, "Microeconomics consists of looking at the economy through a microscope, as it were, to see how the millions of cells in the body economic—the individuals or households as consumers, and the individuals or firms as producers—play their part in the working of the whole economic organism."[12]

In contrast, the **unit of study** in macroeconomics is the **economy as a whole**. Macroeconomics is concerned with the nature, relationships, and the bebaviour of such economic aggregates as national income, total consumption expenditure, savings and investment, total employment, and the general price level. As Boulding has put it, "Macroeconomics… deals not with individual quantities as such, but aggregate of these quantities—not with individual incomes, but with the national income, not with individual prices, but with the [general] price level, not with individual output, but with the national output"[13]. In brief, macroeconomics studies the working and performance of the economy as a whole. As mentioned above, macroeconomics seeks to answer such questions as (a) how the level of aggregate production (GDP or GNP) is determined; (b) what determines the growth rate of an economy; (c) how the level of employment is determined; (d) how the general level of price is determined in an economy; (e) why some times price level rises at a high rate of

12. Lerner, A. P., "Macroeconomic Theory" in *Perceptions in Economics: Economists Look at Their Field of Study,* (ed.) by A. A. Brown, E. Neuberger, and Palmatier, (McGraw-Hill Book Company, N.Y.), p.36.

13. Boulding, K. E, *A Reconstruction of Economics*, (John Wiley and Sons, Inc., NY and Chapman and Hall), London, 1950, p.171.

10–12 percent and at another at 5–6 percent; and (f) how government's monetary, fiscal and income policies affect the aggregate level of output, employment and prices.

1.4.2 Basic Assumptions of Micro and Macro Economics

Another factor that distinguishes the two branches of economics is the **basic assumption** on which microeconomic and macroeconomic studies are based. Microeconomics assumes all the macro variables to be given. That is, it assumes the level of total production (national income), consumption, saving and investment, employment, and the general price level, etc. to remain constant. In contrast, macroeconomic treats them as variables. Instead, it assumes economic decisions of households and firms, prices of individual products to be given. Briefly speaking, *what microeconomics treats as constants, macroeconomic treats them as variables and what macroeconomics treats as constants, microeconomics treats them as variables.*

1.4.3 Machlup's View on Micro-Macro Distinction

Machlup's View on micro-macro distinction of economics must be borne in mind. According to him, it is difficult to draw a sharp line between microeconomics and macroeconomics or to put the two branches of economics in watertight compartments. Fritz Machlup has examined four criteria proposed by various authors for making a distinction between microeconomics and macroeconomics, viz, (i) how one looks at the economy, (ii) whose actions are analysed, (iii) what is being aggregated, and (iv) what role is given to price relationships. He has concluded that 'there is no agreement on the meaning and scope of the concepts of micro and macro theory'[14]. Some authors are also of the opinion that the division of economics between micro and macro economics "often contributes more to fuzzy confusion than to rigorous understanding". The confusion might arise because there is a large area of economic issues and studies that overlap with the boundaries of the two branches. For instance, study of a particular industary, say, IT industry, is generally treated as micro study. But if the scope of study is extended to capture its effect on employment, GDP, balance of payments, etc., it enters the area of macroeconomics. Similarly, a study of change in banks' prime leading rate (PLR) confined to tracing change in PLR over time and its effect on banks' loans and advances can be treated as a microeconomic study. However, if the scope of study is enlarged to cover the effect of changes in PLR on the overall financial market and its repercussions on the aggregate investment, the study enters the area of macroeconomics.

However, notwithstanding the disagreement of some economists on the division of economics between micro and macro economics, there are certain issues like economic growth, unemployment, inflation, stagflation, etc., often faced by both developed and developing economies, which cannot be analysed and tackled simply by individual markets and individual products, or even by analysing a segment of the economy. Microeconomics and Macroeconomics are, in fact, recognised by most economists as the two major branches of economics studies for both analytical and practical purposes. Boulding[15] has justified macroeconomics as a separate branch of economics on the basis of 'macroeconomics paradoxes' or more appropriately, micro-macro paradoxes. The micro-macro paradoxes refer to paradoxical facts that are true in case of individual economic units and quantities but are not true in case of economic aggregates and for the economy as a whole.

14. For details, see "Micro and Macro-economics: Contested Boundaries and Claims of Superiority" in Machlup, F., *Essay in Economic Semantics*, (W. W. Norton, NY, 1977), pp.98-103.

15. Boulding, *op. cit.,* p.174.

Micro-Macro Paradoxes

Boulding[16] has pointed out the following three important **Micro-Macro Paradoxes**.

1. An important paradox pertains to ***cash holding***. If all the individuals decide to hold a larger amount of cash, the total individual cash holding increases. But the stock of money remains the same for the economy as a whole.
2. The second paradox is related to ***saving and investment***. If an individual saves and invests more, his/her income increases. But this is not true for the economy as a whole. The reason is if all the individuals with given incomes decide to save more and more, the consumption expenditure will decrease by the same amount. Decrease in consumption expenditure reduces the aggregate demand. This reduces the prospect for investment. The aggregate investment may even decrease which will reduce the level of aggregate income.
3. The third paradox pertains to ***profit and wages***. At micro level, one tends to accept the proposition that the distribution of national income between wage incomes and profits depends on the relative bargaining power of the labour and the employers. According to Boulding, however, it depends on "a combination of other factors, the most important of which are decisions of management to invest, i.e., to accumulate real assets, and the complex of the decision of the whole society about liquidity preference". Boulding concludes, "It is these paradoxes, more than any other factor, which justify the separate study of the system as a whole, not merely as an inventory or list of particular items".

Let us now have a glance at the origin and growth of macroeconomics as a separate and major branch of economics.

1.5 ORIGIN AND GROWTH OF MACROECONOMICS

Macroeconomics is of relatively recent origin. As already mentioned, the foundation of macroeconomics, as a separate branch of economics, was laid down by a British economist, John Maynard Keynes (1883-1946) in his revolutionary book *The General Theory of Employment, Interest and Money* (1936). This should however not mean that the economists of the pre-Keynesian era had not given thought to the macroeconomic problems of the economy. The use of macro approach to certain economic phenomena can be traced back to the writings of the 16th century economists called 'mercantilists'[17] and those of the later era. We give here a brief review of growth of

16. Boulding, K. E, *A Reconstruction of Economics*, op. cit., p.174.

17. The economists of the 16th and 17th century, called 'mercantilists' were the first to use macro approach to the economic problems of those days. According to Keynes, the mercantilism made "a contribution to statecraft, which is concerned with the economic system as whole and with securing optimum employment of the system's entire resources …" (*Keynes, General Theory*, p. 340). The 18th century economists, called 'physiocrats' analysed the 'circular flows of wealth' in an economy in an aggregative framework. Quesnay's *Tableau Economique* (1758) is regarded as one of the most remarkable macro models of the early days. The circular flow model was later developed and used by Walras, Wicksell, Bohm Bawerk and Schumpeter to analyse the flows of national income and expenditure. During the 18th century, Malthus contributed greatly to aggregative economic analysis in so far he pointed out the deficiency in the Say's law and showed that aggregated demand might fall short of the full employment level and this may result in stagnation in demand for capital and subsequent stagnation in demand for labour. In the 19th century, Karl Marx used macro approach to economic analysis of the society.

macroeconomics beginning with classical thought on macroeconomic issues. This section is divided under three sub-sections: (i) classical macroeconomics, (ii) 'Keynesian Revolution' and macroeconomics, and (iii) post-Keynesian developments.

1.5.1 The Classical Macroeconomics

The school of economic thoughts that dominated the economic world before the 'Keynesian Revolution' is called the 'classical school'. The classical economists had not developed any coherent macroeconomic theory or model. Their macroeconomic thoughts were in the form of certain 'postulates' which can be summarised as follows.

According to classical school of thought, if market forces of demand and supply are allowed to work freely, then

(i) there will always be full employment in the long run, and unemployment, if any, will be a short-run phenomenon;

(ii) there will be neither over-production nor under-production at the aggregate level; and

(iii) the economy will always be in equilibrium in the long run.

The Great Depression of 1930s. however, proved all the classical postulates wrong. It exposed the 'inadequacy of the *theoretical* foundations of the classical *laissez-faire* doctrine'. During the period of Great Depression, there was large scale unemployment in most free-market industrial economies and their GNP declined disastrously. In the United States, for example, unemployment increased from about 3 percent in 1929 to 25 percent in 1933; production of goods and services declined by 30 percent; price level fell by 23 percent; and business investment dropped to almost nil[18]. The classical economics could offer neither an explanation nor a solution to the economic problems created by the Great Depression. This marked the collapse of the classical macroeconomics.

1.5.2 The Keynesian Revolution

The collapse of classical economics necessitated a fresh look at the working of the economic system and devising corrective policy measures against the failures of the market economy. This task was performed by J. M. Keynes[19] in his *General Theory* which laid the foundation of macroeconomics. Keynes's departure from the classical school was caused by his realisation that the classical economics was not capable of predicting, explaining and providing solution to economic problems resulting from economic debacles like the Great Depression. In fact, Keynesian macroeconomics was born out of the Keynes's attempt to find solution to economic problems associated with the Great Depression.

The Keynesian macroeconomic theories are associated mainly with (a) employment, (b) growth, and (c) stability. The central theme of the Keynesian macroeconomics may be summarised as follows.

- The level of output and employment in an economy is determined by the aggregate demand given the resources.

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18. Baumol, W. J., *Economics*: *Principles and Policy*, (Harcourt Brace Jovanovich, Publishers, N. Y., 4th Edn. 1988), p.83.

19. It may be interesting to note that, until the Great Depression, Keynes was as much a part of the classical school as other neoclassical economists. As he says, he 'was brought up' on classical economics and had taught "classical economics" at Cambridge University untill the Great Depression.

- The unemployment in any country is caused by lack of aggregate demand and economic fluctuations are caused by demand deficiency.
- The demand deficiency can be removed through compensatory government spending.

Keynesian economics stresses the role of *demand management* by the government for the stable growth of the economy. "Perhaps the most fundamental achievement of the Keynesian revolution was the reorientation of the way economists view the influence of government activity on the private economy"[20]. Contrary to the classical view that government spending 'crowds out' private investment, Keynesian economics stresses the favourable macroeconomic effects of the government spending[21] on national income and employment through its multiplier effect. The dominance of Keynesian thought banished the classical view for some time, at least.

The period between the late 1930s and the mid 1960s is called the period of "Keynesian Revolution" or the "Keynesian era". During this period most economists were Keynesian and most governments, especially in developed countries, had adopted Keynesian policies. The Keynesian thoughts had pervaded also the underdeveloped countries as most less developed countries struggling to emerge out of their 'low-equilibrium trap' adopted Keynesian approach to their economic development. In fact, India's Development Plans are largely based on the Keynesian theory of growth and employment. So all pervasive was the Keynesian economics till the 1960s.

However, the real economic world has never conformed to any particular economic thought or principle, idea or ideology. It goes through a continuous process of evolution. It passes from one system to another, rendering prevailing thoughts, ideas and laws redundant and forcing economists to examine the relevance of existing theories and to find new explanation to emerging economic conditions. This is what happened with Keynesian revolution also as it gave way to new kinds of revolutionary thoughts which are discussed below.

1.5.3 The Post-Keynesian Developments in Macroeconomics

The Keynesian economics started showing signs of its failures in the early 1970s. Keynesian economics, especially Keynesian fiscal measures, failed to provide solution to economic problems of low growth, high unemployment and high rate of inflation faced by most developed countries, especially by the US. It could offer neither a reasonable explanation nor an effective solution to the problem of "stagflation" faced by the US in the early 1970s. This lead to the growth of a new school of macroeconomic thoughts, called "monetarists". This was subsequently followed by the emergence of other schools of macroeconomic thoughts. The post-Keynesian developments in macroeconomics include the following kinds of macroeconomic thoughts and theories.

(i) *Monetarism: A Counter Revolution,*
(ii) *Neo-classical macroeconomics*,
(iii) *Supply-side* economics, and
(iv) Neo-Keynesianism.

Let us have a brief look at the origin and central theme of these schools of macroeconomics.

20. Alan S. Blinder and Robert M Solow, "Does Fiscal Policy Matter ?" *in Macroeconomics Under Debate*, ed by Alan S. Blinder, (Harvester Wheatsheaf, NY, 1989), p.1.

21. Alan S. Blinder and Robert M. Solow, *op. cit*.

(i) *Monetarism: A Counter-Revolution* As mentioned above, the Keynesian economics started showing the signs of its failure during the 1970s as it failed to provide answer to economic problems of those days. This raised the doubt about the relevance and applicability of Keynesian economics to the problems of growth and stability. A group of economists, called "monetarists", led by Milton Friedman claimed that Keynesian theory had failed to predict national output, price level, rate of employment and unemployment, and interest rate. The monetarists came out with a new revolutionary thought. According to the monetarists, the *role of money* is central to the growth and stability of national output, not the role of aggregate demand for real output, as Keynesians believe. In their opinion, *money supply is the main determinant of output and employment in the short run and price level in the long run*. The monetarists added a new dimension to both macroeconomic theory and policy. At the theoretical level, the emphasis shifted from the analysis of the role of aggregate demand for real output to the aggregate demand for and supply of money, and at the policy level, the emphasis shifted from demand management to monetary management.

The monetarists' view led to a prolonged debate between the monetarists and Keynesians, the central theme of debate being 'what determines the aggregate demand'. "While mainstream theories point to a number of different forces that influence aggregate demand—monetary and fiscal policies, investment spending, net exports and so forth—monetarists hold that changes in the money supply are far more important than all other forces in affecting nominal GNP in the short run and prices in the long run"[22]. The debate remains inconclusive.

(ii) *Neo-classical Macroeconomics* While the debate between the Keynesians and monetarists continued, Keynesian economics was attacked in the 1980s by another group of economists, called 'radicalists'. Their macroeconomic propositions are called *neo-classical macroeconomics*. The new classical macroeconomics is the creation of virtually one economist, Robert E. Lucas, the Nobel Laureate of 1995. In the opinion of Lucas, Keynesian orthodoxy has turned redundant not only from economic policy point of view but also from theoretical and methodological points of view. The neo-classical school emphasises the role of individual's *rational expectations* about future economic events, especially those taking place on the supply side of the economy and the expectations about future government policies. The core of the radicalist thought is that people's rational expectations about government monetary and fiscal policies determine the behaviour of aggregate supply and aggregate demand curves in such a way that real output remains unaffected, though prices and wages go up. For instance, suppose anticipated changes in monetary and fiscal policies cause a forward shift in aggregate demand curve and an immediate and equal backward shift in the aggregate supply curve. These kinds of shifts in aggregate demand and supply curves do not cause any change in the real output but cause rise in wages and prices. However, the neo-classical macroeconomics too remains a matter of debate.

(iii) *Supply-side Economics* While the issue of what determines the aggregate demand continued to be debated, there emerged another school of macroeconomists, called "supply-side economists". Recall that the Keynesians and the monetarists had both built their argument for 'what determines the aggregate demand' on the basis of the factors operating on the demand side of the market. In contrast, the "supply-side economists", led by Arthur Laffer, emphasised the role of the factors operating on the supply side of the market. They attempted to provide an alternative to the

[22] A. Vercelli, *Methodological Foundations of Macroeconomics,* (Cambridge, 1991), p.4.

Keynesian theory of employment and output. While Keynesian economists emphasise the role of shift in aggregate demand in changing employment and output, supply-siders stress the role of shift in the aggregate supply curve. Arthur Laffer, widely known for his famous "Laffer curve"[23], argued that a cut in tax rate shifts aggregate supply curve rightward and leads to a rise in output and employment. Note that both Keynesians and supply-siders consider fiscal policy as the main instrument of economic management.

(iv) *Neo-Keynesianism* In spite of several path-breaking contributions made to macroeconomic thoughts over the past four decades, Keynesian economics remains the focal point of reference for all the schools of macroeconomists either for attack or for its reconstruction. In the process, there emerged another school of thought called "Neo-Keynesians"[24]. Contrary to the new classical group, the Neo-Keynesians argue that market does not clear always, in spite of individuals (households, firms and labour) working for their own interest. They give reason that 'information problem and cost of changing prices lead to some price rigidities' which cause fluctuations in output and employment[25].

As it appears, macroeconomics is still in the process of developing as a perfect science. Nevertheless, the macroeconomic theories and policies as developed so far have gained wide recognition and application. This gives credence to macroeconomics.

1.6 IMPORTANCE OF MACROECONOMICS

With growing macroeconomic complexities and macroeconomic challenges, macroeconomics has emerged as the most challenging and fascinating branch of economic science. As Samuelson puts it, "…no area of economics is today more vital and controversial than macroeconomics"[26]. Samuelson's opinion has been strongly proved by the current policy debate on fighting 2008-09 recession in the US economy. The importance of and interest in macroeconomics has increased tremendously over the past four decades for both practical and theoretical reasons. Let us now look at some specific factors that have contributed to the growth of importance of macroeconomics in the recent past.

(1) *Growing Importance of Macroeconomic Issues*[27] Macroeconomics is important because macroeconomic issues are important. Macroeconomic issues of a country need to be resolved effectively as they pertain to the economic fate of a country and its people in the world of today. As Samuelson has put it, "The political, social, and military fate of the nations depends greatly upon their economic success"[28]. The internal security, law and order situation, social harmony also depend to a great extent on the economic condition of the common man of a country.

23. The 'Laffer Curve' shows that raising tax rates raises tax revenue only up to a certain extent beyond which total tax revenue begins to fall.

24. Including George Akerlof, Jennet Allen and David Romer of the University of California, Oliver Blanchard of MIT, Greg Mankiw and Larry Summers of Harvard University and Ben Bernanke of Princeton University.

25. Dornbusch, R. and Fischer, S., op. cit., p.7.

26. Samuelson, P. A, *Economics,* 1989, p.76.

27. Recall the issues elaborated in section 1.3.

28. Samuelson, P. A., *Economics*, 1989, p.76.

The macroeconomic issues have received increasing attention of the economists, politicians, governments, and international organisations like the World Bank and the IMF. This is, perhaps, the most important reason why macroeconomics has gained high importance in recent years.

(2) *Persistence of Macroeconomic Problems* As noted above, both the developed and the developing countries are constantly confronted with some or other kind of macroeconomic problems, e.g., recession and depression, unemployment, persistent inflation or stagflation, balance-of-payment deficits, outflow of capital, mounting debt burden or a country falling into debt trap, and so on. These problems have to be solved if eventual economic collapse like the Great Depression of 1930s has to be averted. Although economic catastrophe of this magnitude has not taken place over the past six decades, macroeconomic problems like intermittent recession, unemployment, inflation and increasing external debt burden continue to plague the world economies. For example, the economic recession which originated in the US economy has plagued many developed and developing economies including British, Euro, Japanese, Indian and Chinese economies. This has led to global recession which is being rated as second worst to the Great Depression. A reasonable solution to such problems has to be found because they have serious socio-political implications for the country in general and the government in particular. To look at the macroeconomic issues more closely, let us look at some major macroeconomic questions that may be asked in the context of the Indian economy.

- Why could Indian economy grow at only 3.4 percent p.a. in real terms during the period from 1950 to 1975 in spite of the government's planned development efforts to achieve an annual growth rate of 5-6 percent?; what factors increased the growth rate to around 5 percent during the 1980s?; and what factors have pushed the growth rate up to 8-9 percent in the first decade of the 21st century?
- Why are there about 13.10 million people still unemployed[29] in India despite five decades of continuous efforts to provide jobs to unemployed labour force?
- Why does about one-third—27.8 percent[30], to be precise—of the population of India still subsist below the poverty line?
- Why had inflation rate risen from 5-6 percent during 2001-06 to 12-13% in 2008?
- Why did the Indian economy, having achieved an annual average growth rate of 5.6 percent during the 1980s, suddenly sunk deep into an unprecedented economic crisis in 1990-91?
- What factors made the Indian economy grow at 8-9 percent during 2001-07?
- How and to what extent has global recession affected the Indian economy?
- Why have fiscal and monetary policies of India been unsuccessful in achieving their goals?

A reasonable answer to these and such other questions and a feasible and effective solution to such macroeconomic problems cannot be obtained through microeconomics because the behaviour of and the nature of relationship between economic aggregates or macro variables "cannot be

29. Unemployment rate comes to 3.06 percent of the labour force – quoted from *Economic Survey*—2006-07 (p.208). Figure given by the Minister of State, Planning, to the Rajya Sabha on the 21 September, 1996—was 18.7 million.

30. An expert group appointed by the Planning Commission estimated poverty ratio at 39.3 percent for the year 1987-88 and 27.8 percent for the year 2004-05. Quoted from *Economic Survey*—1993-94 (p.148) and 2006-07 (p.207), Government of India, Ministry of Finance.

obtained simply by generalising from the character and behaviour of individual components". It is therefore essential to understand the working of the economy and the mechanism of interaction between the 'factors and forces' that determine the level of aggregate production, employment, saving and investment, growth rate, demand for and supply of money, and international flows of goods, services and finances. As noted above, macroeconomics provides a theoretical framework for the analysis of these aspects of the economy. Theoretical models of macroeconomics provide guidance for ascertaining and collecting the relevant data and for analysing data to find answer to the kind of macroeconomic issues listed above.

(3) *Growing Complexity of Economic System* The modern economic system has grown extremely complex due to (i) expanding horizons of insatiable human desire to consume more and better goods and services, (ii) increasing economic interaction between the nations and globalisation of economic activities, (iii) increasing international flows of capital, manpower and technology, (iv) growing interdependence of the economies, and (v) growth of international economic unions and their effect on other nations. To cope with the problems arising out of the changing world economic order, a clear understanding of the economic system is an indispensable condition. The study of macroeconomics helps to study the system as a whole, to explain the behaviour of the macro variables and the relationship between them requires identifying and measuring the forces that are both the cause and effect of the economic activities. Macroeconomics provides powerful tools to understand the working of the complex economic system.

(4) *Need for Government Intervention with the Market System* The need for government intervention with the market system and management of the economy by the government has arisen out of the failures of the market mechanism to ensure efficient allocation of resources, to achieve socially optimum production and distribution patterns of goods and services, and to bring stability in growth, employment, price levels and exchange rates. Economic history reveals that capitalist economics have often suffered from business cycles. These issues received a greater attention, as a matter of necessity, during the post World War II period. The economists of the Keynesian tradition recommended government intervention in the market system to control, regulate and direct the economy with a view to achieving a sustainable high growth rate with a high rate of employment. While the government intervention with the market system has proved helpful in preventing business cycles and controlling inflation, it has created new kinds of problem like inefficiency, corruption, reducing growth rate, creating parallel economy, etc. These may be consequences of the misconceived and inappropriate economic policies of the government. Formulation of appropriate policies and their effective implementation requires a clear understanding of the economic system at the macro level. A very important purpose that macroeconomics serves is that it provides the logical framework for devising appropriate tools of intervention and for formulating suitable macroeconomic policies to direct and regulate the economy towards the desirable goals.

(5) *Use of Macroeconomics in Business Management* There was a time when the study of macroeconomics was the concern of mainly the economists and the government policy-makers, for example, the central bank and the Ministry of Finance. In recent times, however, understanding the macroeconomic structure of economy and the application of macroeconomic concepts and theories in managerial decisions have gained great importance, especially in case of managerial decisions regarding ***future business plan***, and those having long-run implications. All kinds of business decisions regarding future business plans are taken in view of the current and future ***business environment*** of the country. Business environment of a country is constituted of the economic, political and social conditions prevailing in the country. Given the political and social conditions, macroeconomic conditions of the country play a very important role in business decisions, especially those pertaining to future business plans. Macroeconomics provides the basis for assessing the business environment of the country and judging its likely effect on planned business.

Future business plans include conceiving new business ventures, giving them a concrete shape, planning future business actions, and their implementation. New business ventures may take any or many of the following business plans.

- Expanding production infrastructure and increasing production of goods and services currently produced, as most medium and large scale firms and business corporations are doing in India.
- Establishing new units or production plants of the company in different areas/regions of the country, for example, Mahindra & Mahindra are planning to set up a new plant in Chennai.
- Adding new brands to the existing products and buying foreign brands, etc., for example, as most car and mobile phone companies are doing in the country—most of them are adding new brands to the existing brands with the objective of retaining and increasing their market share. Also, all major car companies are adding new brands to their production line.
- Diversifying business, i.e., entering other areas of business, like Tatas diversified from textiles, to steel, to truck production, to tea business, to passenger cars, and now to *lakhtakia* car (one-lakh-rupees car), etc.; Ford is planning to enter small car business for India; and motorcycle giant Bajaj is planning to enter the four-wheel segment of the market.

Whatever the area of business decisions, the current and the future business environment of the country are very important considerations in all kinds of business decisions. The business environment of the country is assessed on the basis of the following factors:

(i) ***The current and future trend in GDP/GNP*** High sustainable growth in *GDP/GNP* offers a promising prospect for all kinds of modern goods and services and, therefore, a good business environment. On the contrary, low growth rate or decline in *GDP* reduces business prospects. For example, a 9 percent growth in India's *GDP* in 2007-08 had provided a high business prospect and scope for all kinds of modern industries. On the other hand, a recession-like situation in the later half of 2008 in the economy had led to deterioration in the business environment in the country. But the fast revival of the economy in 2009 brightened the business prospects.

(ii) ***The trend in the aggregate demand for consumer and capital goods*** Increasing demand for consumer and capital goods indicates expansion in the economy and a good business prospect. Stagnated or declining aggregate demand, even with increasing *GDP,* reduces business prospects.

(iii) ***Trend in the rate of savings and investment*** Rising rate of total savings indicates high availability of business finance and investible funds. Low rate of savings creates financial scarcity leading to rise in the interest rate. Rising interest rate is a big constraint on the business prospect in the country. Note that even a low rate of interest in a country facing recession, as in the US, fails to promote the business prospect and, therefore, investment.

(iv) *The general price level and expected future trends* The general level of price in a country may show three kinds of trends: (i) rising at a high rate resulting in ***inflation***, (ii) declining rapidly showing ***deflation***, and (iii) remaining stable, may be with minor fluctuations. Both inflation and deflation at high rates affect business prospects adversely—recall the effects of 12-13% inflation in 2007-08 and deflationary trend in 2008-09 when inflation rate turned out to be negative in June-July 2009. A *moderate rate of inflation* and also *price stability* provide a good business environment and business prospects.

(v) *The level of employment and the likely trend* Although trend in overall employment does not appear to be a direct concern of the business managers, it has an important and serious implication for business management. Growing employment indicates not only a better social environment in the country but also a better business prospect, for, the rise in employment shows rise in wage incomes which leads to increase in demand for consumer goods, as a major part of wage incomes is spent on consumer goods and services. Rising unemployment reduces demand for consumer goods, on the one hand, and creates social problems and social crimes like kidnapping of businessmen for ransom, on the other, which affect business environment of the country adversely.

(vi) *International aspects of the economy* In today's world of globalisation, economic transactions across the border have serious implications and repercussions for domestic business. International economic transactions include (i) international flows of goods and services—exports and imports, (ii) international flows of capital—inflows and outflows of capital, and (iii) international flows of labour—in and out migration of labour and income remittances. All these aspects of international economic relations effects on the economy, both favourable and unfavourable. For example, large scale foreign investment has increased the level of investment in India, but it has lead to appreciation of the rupee, which is adversely affecting the exports of some kinds of goods and services, especially textiles and leather goods. So, the business managers, especially those involved in foreign trade and investment, have to take into account international trends and their impact on the domestic economy and on their business.

(vii) *Government's macroeconomic policies* Government's macroeconomics policies—*monetary* and *fiscal*—play a very important role in creating a favourable or an unfavourable environment in the country. A liberal monetary policy indicated by lower rate of interest and easy availability of funds promotes business environment and *vice versa*. The fiscal policy, i.e., government's taxation and expenditure policy, is devised to meet the need of the country to control its business cycle, high inflation and deflation, restructuring of industrial sector in favour of the society as whole, etc. For example, RBI adopted a stringent monetary policy to control double-digit inflation in India in October-November 2008, but it adopted a liberal, easy money policy in December 2008 when both growth rate and inflation rate started sliding down. The Finance Minister announced an expansionary fiscal policy including reduction in VAT and CST rates and additional public expenditure of Rs. 17,000 crore. The kinds of monetary and fiscal policies that are adopted by the government have to be taken into consideration by the business managers while making their future plans.

Given the important elements of business environment, business managers have to make their future plans in conformity with the likely business conditions in the country. However, understanding and crystallising business environment is not an easy task. The knowledge of macroeconomic concepts, theories, and their relevance to business decisions contribute towards appropriate business decision-making and creating safeguards against any unfavourable eventuality. For example, knowledge of macroeconomics helps in understanding how an increasing bank rate, or an increasing tax rate, affects the consumption and saving behaviour of the people, and the economy as a whole, and how it will affect the industries.

1.7 LIMITATIONS OF MACROECONOMICS

In spite of its great merits and usefulness, macroeconomics has certain limitations which must be borne in mind while making its application in policy formulation and business decision making. Some of its major limitations are described below.

First, an important limitation of macroeconomics is that ***it ignores the structural changes*** in the constituent elements of the aggregate. Therefore, the conclusions drawn from the analysis of the behaviour of the aggregate variables may be misleading. For example, economic growth over time may lead to the conclusion that the economy is performing well and any intervention with the economy might prove counterproductive. But, high growth might be accompanied by such structural changes as (i) excessive substitution of capital for labour resulting in labour unemployment, and (ii) transfer of income from low-income to high-income sections, thus widening income disparities. Economic growth accompanied by growing unemployment and income disparities would not be considered a healthy economic trend in the long run as it may ultimately limit the growth prospects. Besides, such a trend is socially undesirable.

Similarly, data on general price level may show stable price situation in the country. Despite this price stability, however, there may be major sectoral changes in the price structure. Prices of agricultural products may be decreasing while prices of industrial products are increasing. The rise in the industrial prices is so compensatory, that the overall price level remains unchanged. But, such changes in price structure may be undesirable requiring government intervention and corrective measures.

Second, macroeconomics deals with national aggregates and ***"aggregates are not a reality but a picture or approximation of reality"***[31]. The individual components of the aggregates are, in fact, the reality. The individual quantities are heterogeneous and have heterogeneous measures. The aggregation of heterogeneous quantities is beset with problems. A major problem in estimating the aggregates, e.g., national income, arises in respect of non-marketed goods and services. Often a large number of products and services do not have market value and are evaluated on the basis of a presumed values, i.e., their imputed value. This leads often to under- or over-estimation of the key aggregate values. The conclusion based on such data may be misleading.

Third, some economists consider macroeconomics only as an "intellectual attraction" without much practical use. In the opinion of J. R. Hicks, "most of the 'macro' magnitudes which figure so largely in economic discussions (Gross National Products, Fixed Capital Investment, Balance of Payments, Employment—and so on) are subject to errors and (what is worse) to ambiguities"[32]. Erroneous and ambiguous aggregates present a wrong or misleading picture of the economy.

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31. K. E. Boulding, *A Reconstruction of Economics, op. cit.*, p.175.

32. *Capital and Growth*, (Clarendon Press, 1965), p.90.

These critical views, however, should not lead to the conclusion that macroeconomics is of little use in real life economic situations. Macroeconomics does add a great deal to the understanding of the working of the economy and in formulation of appropriate macroeconomic policies for managing the economy with the purpose of achieving growth and stability.

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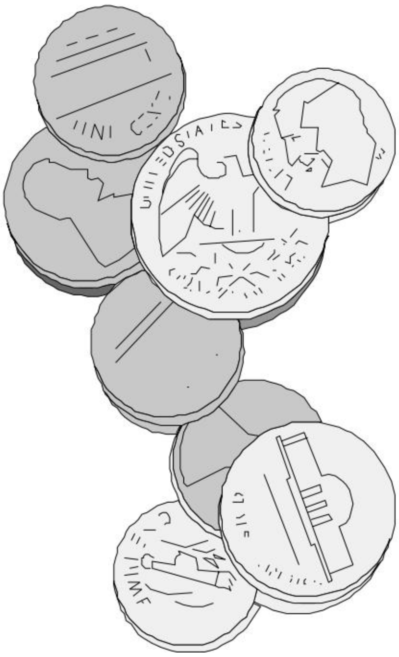
QUESTIONS FOR REVIEW

1. What is economics? Describe the nature and scope of economic science.
2. What is macroeconomics? What is its subject matter? How is it different from microeconomics?
3. Distinguish between microeconomics and macroeconomics. What is Machlup's view on micro and macro distinction?
4. Macroeconomics is both a theoretical and a policy science. Comment.
5. What are micro and macro paradoxes? Explain with examples.
6. How do micro- and macroeconomic paradoxes limit the applicability of microeconomics to explain the behaviour of macroeconomic variables?
7. Which of the following do not constitute the subject matter of macroeconomics?
   (a) Performance of the entire economy.
   (b) Determination of the level of economic activities.
   (c) Price and output determination of a commodity.
   (d) Factors and forces of economic fluctuations.
   (e) Balance of payment deficits.
8. Write a short note on the origin and growth of macroeconomics, highlighting the conditions and the factors that led to the emergence of new macroeconomic theories.
9. Why is the study of macroeconomic theory important for finding solutions to macroeconomic problems related to business decision making?
10. Describe the conditions that led to the emergence and growth of monetarism. What are the major developments during the period marked as Keynesian revolution? Did monetarism succeed Keynesianism successfully?
11. What are the limitations of macroeconomics? What is the usefulness of macroeconomics in spite of its serious limitations?

Chapter 2

Macroeconomic Issues, Concepts and Model Building



INTRODUCTION

In Chapter 1, we introduced macroeconomics. The objective of this Chapter is to present macroeconomics in perspective, i.e., to give a broader view of the subject matter and the method of analysis, prior to commencing the study of macroeconomic theories. The main aspects highlighted here include:

(i) ***Macroeconomic issues***—The macroeconomic issues are the economic problems that have often been confronted by different countries at different points of time;

(ii) ***Macroeconomic concepts***—The analytical concepts that are used in macroeconomic studies;

(iii) ***Macroeconomic model building***—Construction of a framework for analysing macroeconomic phenomena.

2.1 MACROECONOMIC ISSUES

In the preceding section, we described briefly what macroeconomics is about and gave its broad definition. However, the central theme and the subject matter of macroeconomics can be comprehended better by looking at the ***macroeconomic issues***, or the ***problems*** that most countries have faced over time and have been the cause of concern for the macroeconomists and the government policy makers. The following are the main macroeconomic issues.

1. Achieving and maintaining a high rate of economic growth,
2. Preventing business cycles when symptoms come up,

3. Controlling inflation and stabilising price level,
4. Solving the problems of unemployment and poverty,
5. Containing growing budgetary deficits, and
6. Managing international economic issues.

These macroeconomic problems continue to plague most of the countries, and continue to remain a major concern for the policy makers of the country. In spite of spectular growth of theories, thoughts, tools and techniques of macroeconomic management, the world economy is currently facing global recession. In this section, we discuss briefly the nature and magnitude of these macroeconomic problems which continue to remain the major concern of both the policy makers and the macroeconomits.

2.1.1 Growth Related Issues

Achieving and maintaining a high rate of economic growth has been a matter of great concern for both the developed and the underdeveloped countries, especially after the Second World War. The reason, as Samuelson has pointed out is, "The political, social, and military fate of the nations depends greatly upon their economic success"[1]. After the Second World War, therefore, the war-affected nations concentrated on reconstruction of their war-devastated economies, and most underdeveloped countries started formulating and implementing development plans. India implemented her First Five Year Plan of economic development in 1951 and continues with the Eleventh Five Year Plan for economic development.

Now look at the nature of the ***growth related issues***. While industrially advanced countries succeeded, to a great extent, in achieving and maintaining a fairly high growth rate (4-6 percent per annum), less developed countries (LDCs) continued to strive for long to achieve a reasonable growth rate. For example, India had planned to achieve a growth rate of 5 percent but could achieve an average annual growth rate of 3.5 percent over a period of 25 years—from 1951 to 1975. So the question arises: why could target growth rate not be achieved? Besides, while the Indian economy registered an annual growth rate of 3.5 percent duing 1951-75, growth rate in China and Pakistan during this period was much higher (5-6 percent). It has been generally observed that though India and the other two countries made similar efforts to achieve a high growth rate, China and Pakistan succeeded in achieving it, India failed. So the issue arises: Why do some countries grow at a high rate and some countries at low rate, their growth efforts being the same?

Also, look at the growth problems that DCs and LDCs faced during the period from 1950 to mid-1970s. The major problem that DCs faced was how to maintain the high growth which had started showing signs of decline. On the other hand, LDCs faced the problems of how to accelerate the pace of their growth rate, how to generate adequate savings from the low level of incomes, how to increase the rate of capital formation, how to promote investment opportunities, and so on.

Since the mid-1980s, however, the nature of *growth related issues* faced by the DCs and LDCs have changed, rather reversed. Look at the changing nature of dilemma being faced by DCs and LDCs. Many LDCs, especially India and China—now referred to as *fast* developing countries—have succeeded in achieving a very high growth rate—India 9 percent and China 11 percent. India is predicted to be the world economic power by 2020, so fast is the growth rate of the Indian

[1] Samuelson, P. A., *Economics,* 1989, p.76.

economy. But the main macroeconomic issues that countries like India and China are currently faced with are:

(i) How to maintain the current high growth rate;

(ii) How to prevent the overheating of the economy—a problem often associated with fast growing economies; and

(iii) How to keep inflation under control within its tolerable and desirable limits.

On the other hand, growth rate in *developed countries* has come down to 2-3 percent per annum; investment opportunities have reduced drastically; their financial capital is flowing out to countries like India and China in the form of FDI and FII. Countries like US and Japan are currently facing recession. While US growth rate has come down to around 2 percent, growth rate in Japan declined to 1.3 percent during 2000-05[2]. Both the countries are currently facing strong recessionary trend. Besides, there are indications of growing unemployment in developed countries. So the macroeconomic issues facing the developed countries are: (i) how to combat the recessionary trend in the economy, and (ii) how to accelerate the growth rate.

To conclude, achieving and maintaining a sustainable growth rate has for long been, and continues to be, one of the *main macroeconomic issues*. The growth related issues are becoming more and more complex with the rapid globalisation of the world economy and the consequent growing complexities.

2.1.2 The Issue of Business Cycles

Business cycle refers to high magnitude of fluctuation in the economy—high growth in GDP/GNP in one period followed by a sharp decline in the next period. Thus, business cycle is also referred to as the period of economic boom and depression. During boom and prosperity, there is high rate of growth in GDP and high rate of employment, and during depression, there is fast decline in GDP and high rate of unemployment. The recurrence of this kind of growth and depression in the economy is called ***business cycle***.

The economic history of the world economy is, in fact, the history of business cycles—ups and downs, booms and slumps, prosperity and depression. Business cycle, like the Great Depression of 1930s, has not repeated itself over a period of 75 years. It is, perhaps, for this reason that some economists hold the view that 'business cycle is obsolete' or 'business cycle is the thing of past'. The current global recession has proved them wrong. The global recession of 2008-09 is second only to the Great Depression of 1930s. Besides, business cycles of moderate magnitude continue to take place in modern times in most countries. For instance, "There have been three major recessions in the United Kingdom during the past four decades (1973-75, 1979-81, and 1990-92), and most major countries have experienced a similar pattern"[3]. One can find many such cases. If business cycles of high magnitude have not taken place frequently, it is mainly because economists have devised policy measures to control the business cycle, and governments have used suitable economic policy measures, especially monetary and fiscal policies, to control the factors causing fluctuations in the economy.

2. The World Bank Report 2007, *Development and Next Generation*, Table 4, p. 294…

3. Richard G. Lipsey and Alec Chrystal, *Economics* (Oxford University Press, 11th Ed. Indian Edition, 2007), p.333.

Nevertheless, the fact remains that factors and forces that cause a business cycle are always present in the growing ecconomies. For instance, during the 1980s, some East Asian Economies, often referred to as 'Newly Industrial Countries (NICs)' and 'Asian Tigers' had achieved a very high growth rate. But, after a decade of high growth, these economies become so overheated that a situation of economic collapse had become imminent. The emerging conditions might have led to depression had the governments not adopted economic policies to control the downtrend.

Let us look at some other country-cases to understand the nature of the problem. Until the 1990s, the US economy had continued to grow at a fairly high rate, but its growth rate declined thereafter. The US economy is currently facing a strong economic recession. The Indian economy has also faced economic ups and downs over the past 40 years. If one looks at the annual average growth rate of real GNP in the Indian economy, one finds that India had a negative growth rate in 1964-65 (– 3.7 percent) and 1979-80 (– 5 percent), and a very low growth rate in 1991-92 (1.1 percent). These, however, constitute short-run decline in growth rate below the normal rate of around 5 percent. The downslide of the economy remained short term mainly because of the government adopting measures to prevent a big and prolonged downfall in the economy. The Indian economy attained a growth rate of 9.0 percent in 2007-08, which declined to about 7 percent in the last quarter of 2008. On the one hand, the Indian economy is predicted to emerge as the world economic power by 2020, while on the other, suspicions are being raised about a reasonably high growth rate in the economy in the coming years.

In brief, the fact remains that the forces of business cycles are always present in growing economies, and the government and the policy makers of the country have to be on their guards at the first indication of downslide in the economy and take action, if necessary, for preventing the business cycles. To quote Burns, "[The] men who wish to serve the democracy faithfully must recognise that roots of business cycles go deep in our economic organisations, that the ability of government to control depressions adequately is not yet assured, that our power of forecasting is limited, and that true foresight requires policies for coping with numerous contingencies". Burn's statement implies that business cycles remain a major macroeconomic issue. Although the issue of business cycle has been put on the back burner by the macroeconomists at higher theoretical level, at practical level, it continues to remain an important issue. It is gaining more attention due of globalisation of the economy and its effects.

2.1.3 The Issue of Inflation

Inflation is another and equally important macroeconomic problem faced by the countries at different points of time, especially by the fast growing economies. ***Inflation*** is defined as persistent and considerable increase in the price level over a long period of time. A moderate rate of inflation is considered to be desirable for the economy—2-3 percent for developed countries and 4-5 percent for developing economies. But the annual rate of inflation has hardly ever been confined to these limits in DCs and LDCs. Inflation in excess of these rates is economically and also socially undesirable, and is rather dangerous for the economy. Historical time series data on price level show that inflation has been off and on affecting almost all countries. Look at the annual inflation rate in some countries (Table 2.1) based on the data published by the World Bank. In November 2007, inflation rate in Eurozone was reported[4] to have hit 6-year high at 3.1 percent, as compared to the earlier rate of around

[4] *Business Standard*, 17/11/2007

2 percent. Though this rate is comparatively lower, it has become a matter of great concern for the European Central Bank. In some countries, the rate of inflation has been unimaginably high in modern times. For instance, in Zimbabwe, inflation rate had shot up to 8,000 percent in September 2007, caused mainly by rise food and fuel prices, causing economic collapse in the country. The IMF had forecast inflation rate for Zimbabwe to hit 100,000 percent by the end of the year[5]. In order to meet the 'cash crisis' in the country, the government of Zimbabwe issued currency notes of Z$ 500,000 denomination.

Table 2.1 Inflation Rates in Some Developed and Developing Countries during 1980s

Country	*Period*	*Rate of Inflation*
Australia	1980-90	7.2
China	1980-90	5.6
India*	1980-90	8.1
	1990-2000	8.0
Indonesia	1980-90	8.6
Nigeria	1980-90	16.7
Pakistan	1980-90	6.7
Sri Lanka	1980-90	11.0
UK	1980-90	5.7

* Based on GDP Deflator.

Inflation in India has off and on been a serious problem for the economy, and also for the policy makers. During the early 1970s, annual inflation rate had shot up to 24 percent. In April-September 2008, the inflation rate had varied between 10 percent and 13 percent despite a high growth rate of 9 percent in *GDP*. This had become a matter of great concern for both the RBI and the Finance Ministry.

In fact, inflation is generally associated with, and is often caused by, the high growth rate itself. Sometimes, high rate of inflation is the result of high growth rate, especially when there is a long gestation period—time lag between investment spending and generation of output. Whatever might be the reason—be it demand-pull, cost-push, or a combination of the two, or any other factor, like rise in oil price—inflation creates economic, social, and political problems in the country, leading sometimes to the fall of the government. Therefore, inflation is considered to be a serious macroeconomic problem necessitating formulation of suitable policy measures and effective implantation of policy for controlling price rise and maintaining inflation at a reasonable level.

2.1.4 The Issue of Unemployment and Poverty

Unemployment refers to that part of the *labour force*, or workforce, which is willing to work at the prevailing wage rate and is looking for a job but is not getting employment. The level of unemployment in a country is measured in terms of percentage of out-of-job labour force to total labour force. Labour force is that part of manpower which is willing to work at the on-going wages

5. Reported in *Times of India*, 23 December 2007.

and salaries. According to ILO definition, manpower of a country consists of its population in the age-group of 15-65 years. Unemployment over a period of time—over a period of six months in a year or for a longer period—results in poverty of the unemployed people.

Unemployment and poverty have been a perennial problem in both DCs and LDCs—but prominently in LDCs—at different stages of their economic growth. Although, most industrial countries consistently had very low unemployment in the 1950s and the 1960s, they had a high rate of unemployment[6] in the 1980s and the 1990s. For example, unemployment in UK had peaked at 12.2 percent in 1986 and 10.8 percent in 1993. France and Germany had unemployment of 12.5 percent and 11.7 percent, respectively, in 1997. Even Japan, a country which had never had unemployment after the Second World War, experienced unemployment of 5.4 percent in 2002. According to World Development Report (2004), unemployment rate in some countries was relatively very high, e.g., USA (5.8 percent), Japan (5.4 percent), and Australia (6.3 percent). Unemployment rate in Pakistan was very high (7.8 percent).

As regards unemployment in India, according to NSSO estimates, unemployment rate was 3.06 percent of the labour force. This estimate is highly questionable. If one goes by National Sample Survey estimates of population below the poverty line, it was 27.8 percent in 2004-05. Although questionable, the poverty estimate can be taken as the level of unemployment and underemployment in India. In spite of 60 years of growth and development efforts made by the country, the problems of unemployment and poverty continue to remain the most important macroeconomic issues of the country. A high rate of unemployment has remained a dominant and persistent *macroeconomic issue* not only in India but in most LDCs. Now this problem is also being faced by the DCs.

2.1.5 The Issue of Budgetary Deficits

The ***government budget*** refers to the annual revenue and expenditure of the government of a country. In the post-World War II period, government budget emerged as a powerful tool of macroeconomic management, control, and regulation of the economy. The use of government revenue and expenditure as weapons to solve macroeconomic problems of the country and to control and regulate the economy is called *fiscal policy. **Fiscal policy*** is used to accelerate the process of economic growth, to stabilise the economy, to reduce income inequalities, to promote employment opportunities, and so on. As stated in *Economic Survey*—2006-07, "Fiscal policy is the building block for an enabling macro-environment, which not only provides stability and predictability to the policy regime, but also ensures that national resources are allocated in terms of its defined priorities" (p.18). Economic functions and also the economic responsibilities of the governments have increased over time. This is a universal phenomenon.

With the increase in government's economic role and other functions, the size of the government budget has increased and so have the magnitude of the budget related problems. The most important budget related problems are managing budgetary deficits. In India, the total expenditure of the central government has increased from Rs 98,272 crore in 1990-91 to Rs 5,63,991 crore in 2006-07 (BE)—a six-time increase over a period of 16 years. However, government revenue over the same period has increased from Rs 54,954 crore to Rs 4,03,465 crore. Although, revenue has increased at a faster rate, *budget deficit* has risen from Rs 3,48,511 crore to Rs 4,65,791 crore during the same period. In fact, *budgetary deficit* of the central government has been increasing

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6. For details, see Lipsey and Chrystal, *Economics*, *op. cit.,* p.334.

almost continuously. The fiscal deficit of the government had risen from Rs 43,318 crore in 1990-91 to Rs 1,60,526 crore in 2006-07. Fiscal deficit of the government has crossed 6 percent of the GDP. The Finance Ministry has been trying unsuccessfully to bring it down to below 4 percent. The budgetary deficit and budget management have emerged as the major macroeconomic problems for the government in India.

Not only in India, the problem of persistent budgetary deficit is being faced by both the developed and the developing economies. The reason is that the government expenditure has been rising much faster than revenue. For instance, since the 1970s through the mid-1990s, the US economy faced a persistent problem of budgetary deficit[7] and with exception of 1970 and 1988-89 and UK has had budget deficit throughout after the Second World War. The problem of budgetary deficit is common to most countries using fiscal policy as a tool of macroeconomic management. Although budgetary deficits can be managed simply by cutting down public expenditure and increasing the tax rate, this measure too has serious adverse implications for the economy as a whole. So, this method cannot be adopted straightaway. Thus, the most important and common macroeconomic problem related to government budget is the growing ***budgetary deficits***.

2.1.6 The International Economic Issue

International trade has been going on since time immemorial. With the passage of time, however, the volume, the pattern, and the nature of international transactions have expanded at a tremendous speed, especially over the past two decades. As a result, the world economy is getting globalised very fast, so much so, that it is now being treated as a 'village economy'. Globalisation increases economic interdependence of the countries. With growing global interdependence, the economies are being exposed to the risk of getting adversely affected by the changes, especially by inflation, recession, and financial instability in countries of the trading partners. For instance, the economic recession in the US economy, born out of the subprime crisis, had caused global recession in 2008. Furthermore, the US dollar, the most stable and powerful currency of the world after the Second World War, depreciated in the last quarter of 2007 against virtually all major currencies, especially against the euro and the pound, and to lesser extent, against the rupee and Asian currencies. Dollar depreciation has nearly created a global problem, especially for those countries which have accumulated its large reserves. The major international economic issues that figure in the management of the economy are:

(i) Growing balance of payments deficits,
(ii) Exchange rate fluctuation, and
(iii) Excessive inflow or outflow of capital.

Let us look at the implication of these international economic issues in context of the Indian economy. India has faced and is currently facing all such problems. Let us begin with ***balance-of-payments (BOP) deficits***. Although India had off and on faced the problem of balance-of-payments (BOP) deficits since 1950-51, the country faced an unprecedented BOP deficit and foreign exchange crisis[8]. The foreign exchange crisis had brought the economy on the verge of

7. Rudigar Dornbusch, Stanley Fisher and Richard Startz, *Macroeconomics,* 9th ed. (Tata McGraw-Hill, New Delhi, 2004), p.33.

8. In general, a country needs forex reserves that are sufficient to meet payment for 90 days imports. But India had forex reserve to finance only 10 days imports.

economic collapse in 1990. Thanks to the financial help from the IMF and the World Bank, the crisis could be averted.

As regards the ***exchange rate problem***, India had pursued a fixed exchange rate policy, going intermittently for devaluation of the currency to adjust it to rupee depreciation. After 1991-92, India adopted a flexible exchange rate policy, and exchange rate remained fairly stable until 2005. Since 2006, however, rupee started showing signs of appreciation. According to India's Finance Minister, Chidambaram, rupee-dollar exchange rate is market determined. In 2007, the market determined rupee rate appreciated against dollar by about 25 percent. India is currently facing some economic problems due to rupee appreciation, and also due to sub-prime lending crisis in the US.

There is similar problem with inflow of capital. The inflow of funds in the form of FDI and FII and the sub-prime crisis in the US have lead to appreciation of the Indian currency. Appreciation of rupee has affected India's exports adversely, especially of handicrafts, IT products, and motor parts. Decline in exports has affected employment adversely. A large number of people are reported to have become jobless. About 200,000 workers have lost their jobs mainly because of decline in exports of handicrafts. Thus, rupee appreciation has become a matter of concern for the policy makers of the country.

The sub-prime crisis in the US has affected the economy in the same way. While addressing the National Development Council, the Prime Minister, Dr. Manmohan Singh, an ex-economist, said that with global integration, India could not remain immune to sub-prime lending crisis of the US which had hit global financial markets, and had also caused a global slowdown. These are a few examples from the Indian economy which show that international economic linkages expose countries to the risk of being adversely affected by international economic changes and ups and downs. With increasing globalisation, international economic issues are gaining more and more importance.

1.2.7 Conclusion

To conclude, the major macroeconomics issues that macroeconomists and policy makers have to address include: (i) achieving and maintaining a high growth rate, (ii) preventing business cycles, (iii) controlling inflation and stabilising price level—a major problem these days, (iv) finding a solution to the problems of unemployment and poverty, (v) managing the growing budgetary deficits, and (vi) managing international economic issues, such as BOP deficits, devaluation and appreciation of domestic currency, and inflow and outflow of capital. Finding solution to these economic problems requires an in-depth, logical, and systematic analysis of inter-relationships and interdependence of macroeconomic variables. The macroeconomists analyse these issues at both the theoretical and the empirical levels and formulate *macroeconomic theories*. Macroeconomic theories, on the other hand, provide analytical framework and guidelines for the formulation of appropriate economic policies for solving macroeconomic problems of the country. This is what ***macroeconomics*** is all about.

2.2 SOME CONCEPTS USED IN MACROECONOMIC ANALYSIS

Before we proceed to discuss macroeconomic theories, it will be useful to get acquainted with some of the basic concepts and approaches widely used in macroeconomic studies.

2.2.1 Stock and Flow Variables

Macroeconomics uses certain economic aggregates, called **macroeconomic variables**, to assess the performance and to analyse the behaviour of an economy. Macroeconomic variables that figure in macroeconomic studies are generally grouped under (i) **stock variables,** and (ii) **flow variables**. Another kind of variables used in macroeconomic analysis are called **rates**, expressed in terms of percentage rates, e.g., percentage rate of economic growth, inflation, savings, investment, interest, etc. A brief description of stock and flow variables is given below.

The **stock variables** refer to the quantity or value of certain economic variables given at a *point in time*, e.g., on 31st March 2006 or 31st December 2007. In other words, the variables that are measured with reference to a point in time are stock variables. For example, the water stored in a tank at a point in time is a stock variables and number of books in a library on a particular date is a stock variable. In economics, the stock of capital in a country, the number of persons employed, the total money supply, all at a point in time, are some examples of macro stock variables.

The **flow variables**, on the other hand, are the variables that are expressed per unit of time, e.g., per hour, per week, per month, or per year. For example, *GDP*, aggregate consumption, aggregate saving, aggregate investment, aggregate exports, aggregate imports, etc. are ***macro flow variables.***

To understand the distinction between stock and flow variables, see the following examples. The water accumulated in a lake is a stock variable but the quantity of water flowing in or flowing out per unit of time (per day or per week) is a flow variable. Similarly monthly provision of sugar in a household, i.e., the quantity of sugar stocked for monthly consumption, is a stock variable and quantity of sugar consumed per day is a flow variable. A fixed deposit with a bank is a stock variable and interest earned on the deposit, e.g., monthly or annual interest income, is a flow variable. The stock of capital in terms of plant, building, machinery, stocks, etc. is a stock variable and the annual investment is a flow variable. The macroeconomic stock and flow variables are listed in Table 2.2.

Table 2.2 Macroeconomic Stock and Flow Variables

Stock Variables	*Flow Variables*
Stock of Capital (K)	Gross National Product (GNP)
Supply of Money (M)	Consumption Expenditure (C)
Business Inventories (BI)	Savings (S) and Investments (I)
Accumulated savings	Exports (X) and Imports (M)
Labour force	Change in inventories
Total employment	Government revenue (R)
	Government expenditure (G)

Some flow variables are functionally related to their stock counterpart and *vice versa*. For example, 'investment' is the flow counterpart of 'stock of capital' and 'change in inventories' is the flow counterpart of 'inventories'.

It is important to note that the classification of stock and flow variables, as given above, is a matter of convenience and practice. Conceptually, it is difficult to make an all-purpose classification of macroeconomic variables between stock and flow. For, given the purpose of analysis, a flow variable can be interpreted as a stock variable and *vice versa*. For example, national income is a flow variable, but it can be treated as stock for the year of reference. Similarly, employment is a stock variable, from head-count point of view, but from the view point of work effort in terms of man-hours, it can be treated as a flow variable.

Furthermore, macroeconomic variable are open to different interpretations. Therefore, it is difficult to make a clear distinction between the two kinds of variables. This causes a 'dangerous' confusion with regard to stock and flow variables. According to Gardner, "… almost no other single source of confusion is more dangerous in economic theory—not only to beginners, but sometimes also to advanced students in the field."[9] He cites some examples of certain variables which are open to such confusion. 'Money is stock variable' but when exchanged for goods, it become 'flow'; 'income is flow, wealth [accumulated income] is stock'; 'saving is a flow' but accumulated saving is a stock; and investment is a flow' but accumulated investment 'is a stock'. He has suggested, "Upon encountering any variable, the student should spend a moment determining for himself whether it is a stock, a flow, or a ratio concept. … Much confusion will be saved by this exercise."

2.2.2 Equilibrium and Disequilibrium

The concepts of equilibrium and disequilibrium are widely used in both microeconomic and macroeconomic analyses. While microeconomics uses, in general, partial equilibrium analysis, macroeconomic analysis is largely of general equilibrium nature[10]. In macroeconomics, the partial equilibrium concept is applicable only to sectoral analysis, when the macroeconomic analysis is confined either to the product sector or to the monetary sector. Here, we describe briefly the concepts of equilibrium and disequilibrium as applicable to macroeconomic analysis.

Equilibrium In economic sense, equilibrium refers to a state or situation in which opposite economic forces, e.g., demand and supply, are in balance and there is no in-built tendency to deviate from this position. Machlup defines equilibrium as "a constellation of interrelated variables so adjusted to one another that no inherent tendency to change prevails in the model which they constitute."[11] At macro level, an economy is said to be in equilibrium when *aggregate demand* equals *aggregate supply*. Aggregate demand is the sum of demands for all consumer and capital goods and services, given the aggregate demand for money. Aggregate supply is the sum of the supply of all consumer and capital goods and services, given the aggregate supply of money. As long as equilibrium is not disturbed by internal or external disequilibrating factors, the economy remains in equilibrium.

Disequilibrium This is the state in which the opposite forces (e.g., demand and supply) are in imbalance. The factors causing disequilibrium arise out of the working process of the economy.

9. Gardner Ackley, *Macroeconomic Theory*, (Macrnillan, 1961), p.6.

10. For a detailed discussion on the concepts of equilibrium and disequilibrium, see author's *Principles of Economics*, (Vikas Publishing House, Delhi, 2004), ch.3.

11. Fritz Machlup, "Statics and Dynamics : Kaleidoscopic Words" in his *Essays in Economic Semantics*, (NJ, Prentice-Hall, 1963).

The working of a market economy is governed by such a large number of interrelated and interacting forces that a continuous balance between market forces—demand and supply—cannot be expected. In fact, imbalances between economic forces are a routine matter in a market economy. The reason is that economic activities are undertaken by millions of decision makers—consumers, producers, workers, bankers, exporters, importers, and the government, and their decisions need not always coincide. The result could be disequilibrium in the economy.

2.2.3 Partial Equilibrium and General Equilibrium Analysis

Two other concepts which are often used in macroeconomic analyses are partial equilibrium and general equilibrium.

Partial Equilibrium Analysis Conceptually, partial equilibrium analysis is the analysis of a part of the economy, isolated and insulated through assumptions from the influence of changes in the rest of the economy. In simple words, when only a part of the economy or economic phenomenon is analysed in isolation of the rest of the economy, the analysis is partial equilibrium analysis. Partial equilibrium analysis is widely used in **microeconomic analysis**. Partial equilibrium analysis is based on *ceteris paribus* assumption, i.e., it assumes that all other things or variables, specially the related ones, remain constant. The entire analysis of determination of equilibrium price and output and input prices is based on partial equilibrium analysis. For example, analysis of car price determination simply on the basis of its demand and supply, assuming all other factors supposed to affect the car prices to remain constant, is partial equilibrium analysis. It assumes all other factors affecting demand for car, e.g., prices of car substitutes (e.g., public transport system), petrol price, income of the consumers, excise duty and sales tax, etc. to remain constant. Partial equilibrium analysis is used fruitfully where 'feedback' and 'spillout' effects, if any, are not of great consequence.

In macroeconomics, partial equilibrium analysis is used when equilibrium conditions of *product sector* and *money sector* are analysed separately in isolation of one another. For instance, John Meynard Keynes analysed *product sector* equilibrium and *monetary sector* equilibrium separately, though both the sectors are interconnected and interdependent. Therefore, his macroeconomic analysis of product and money sectors is generally treated as partial equilibrium analysis.

General Equilibrium Analysis General equilibrium analysis is carried out where the objective is to analyse the economic system as a whole without using the restrictive assumptions of the partial equilibrium analysis. General equilibrium analysis is carried out by taking into account the interrelationships and interdependence between the various elements of the economy. It allows all the interrelated factors to vary in reaction to one another and seeks to analyse the simultaneous equilibrium of all the prices and output all the related goods and it shows how equilibrium of all related sectors or markets is simultaneously determined. General equilibrium analysis takes a comprehensive and realistic view of the economic system. From a practical point of view, the general equilibrium analysis is of immense importance in identifying and explaining the causes and effects of the economic disturbances and in the formulation of the theories of economic growth, employment and income determination. It examines economic problems from the macro angle and in macroeconomic perspective.

It must however be borne in mind that macroeconomics does not use the Walrasian type of general equilibrium analysis wherein it seeks to analyse the equilibrium of each and every element of economic system. Macroeconomics uses highly aggregated variables like aggregate demand, aggregate supply, the *GNP*, overall employment, stock of capital, total demand for and total supply of money, etc. As mentioned above, it studies the interrelationships and interdependence of these variables and seeks to determine the general equilibrium of the economy.

2.2.4 Static, Comparative Static and Dynamic Analysis

Static and dynamic analyses[12] refer to two ways of analysing a subject matter of macroeconomics. When an economic phenomenon is analysed under static conditions, i.e., as it stands at a point in time, the analysis is called 'static analysis' and when the subject is analysed under changing conditions, the analysis is called 'dynamic analysis'. Macroeconomics studies an economic phenomenon under both static and dynamic conditions. The nature of static and dynamic economic analyses is described below.

Static Analysis In general sense of the term, 'static' means in a 'state of rest' or in 'a state of motionlessness'. For example, a table placed in a room, a book lying on the table, and a car parked on the road is in the state of rest or motionlessness. But an economy is never in the state of rest. People in an economy are continuously engaged in economic activities—production, exchange, consumption, etc.—with or without changing the size of the economy. However, for the purpose of analysing an economy at a point in time, economists assume a 'static economy'. "Static economy does not mean an economy in which no activity is taking place or no one is doing anything at all". In real world, "No economic system is ever at rest in anything like the mechanical sense."[13] A static economy means an economy or in which normal activities go on but there is no change in the size of the economy or in the level of national output, stock of capital, prices and employment.

A static economy as described above may not exist in reality. However, economists create such a static economy—an abstract economy—for the purpose of theoretical analysis. According to Schumpeter, a static economy refers to "an economic process that merely reproduces itself."[14] When an economy is studied under static conditions, it is called *static analysis*. For static analysis, a static model is used. A model of an abstract economy is created by a "rigorous formulation of conditions [assumptions] under which it is possible to make generalisations about the factors determining economic equilibrium."[15] A static economy is insulated from the influence of possible external changes. A static macro-model assumes that there is no change in the size of the economy, no change in national output, prices and employment. In a static economy, the basic forces of change, like stock of capital, technology, population, nature of business organisations, and tastes and preferences of the people remain unchanged over the reference period. The economic process in a static economy merely produces itself year after year. Such an economy is said to be in a state of *static equilibrium*. "… a static equilibrium by no means implies a state of idleness, but one in

12. The terms 'statics' and 'dynamics' are derived from Greek words '*statikos*' meaning 'causing to stand still' and '*dynamikos*' meaning 'causing to change', respectively. For a detailed discussion on the concepts of 'static' and 'dynamic' see author's *Principles of Economics* (Vikas Publishing House, New Delhi, 2004), ch. 4.

13. Hicks, John R., *Capital and Growth*, (Oxford University Press London, 1965), p.6.

14. Schumpeter, J. A, *History of Economic Analysis*, (Oxford University Press, NY, 1970), p.964.

15. N. Kaldor, "The Determinateness of Static Equilibrium", *Rev. of Eco. Stud., February* 1934, reproduced in his *Essays on Value and Distribution*, (London, Gerald Duckworth & Co., 1960), p.13.

which works is steadily going forward day by day and year after year but without increase or diminution".[16]

Another important feature of static analysis is that the *variables used in this kind of analysis have no past or future and all variables belong to the same point in time*, i.e., past value and predicted future value of the variables are ignored. Thus, a static model is the construction of a timeless economy. In such a model, the values of all the interrelated variables are simultaneously and instantaneously determined. In other words, there is no time lag in the adjustment of the dependent variables to the change in the independent variables. This kind of approach to the study of an economic phenomenon is essentially a theoretical approach. The prime objective of constructing a static model is to make generalisations or theoretical propositions regarding the relationship between the related variables under static conditions.

Comparative Statics Comparative statics is a comparative study of economic conditions at two static equilibrium positions at two different points in time. In a comparative static analysis, in fact, "… we are comparing the equilibrium values of the system corresponding to the two equilibrium positions with one another. This sort of comparative analysis of two equilibrium positions may be described as comparative static analysis …"[17] A comparative study of this kind assumes a great significance where the objective of the study is to predict the future course of the economy on the basis of the past experience. A comparative analysis of the relationships between the variables at two equilibrium positions at two different points of time is helpful in tracing the change in the relationships. This approach has a great predictive power, especially when changes are few and small and the economy treads smoothly from one equilibrium position to another.

Dynamic Analysis In contrast to static approach, dynamic approach is adopted to study an economy in motion. When a macroeconomic phenomenon is analysed under changing or dynamic conditions, it is called **dynamic analysis**. Dynamic analysis is adopted to study an economy under dynamic conditions. In a dynamic economy, the economic factors and forces keep changing. An economy in motion raises certain issues which cannot be handled through static and even comparative static approaches. The following are two such major issues:

(i) Does a dynamic economy, when displaced from one equilibrium, ever reach another equilibrium position?
(ii) What path is a dynamic economy likely to take to move from one equilibrium position to another?

The merit of dynamic analysis lies in its power to predict the future course of the economy. A static analysis, by its very nature, has no power to predict the path a dynamic economy follows while moving from one equilibrium point to another, nor it can be used to predict whether the economy will ever attain another equilibrium position. Dynamic approach does the job.

Economic dynamics studies the 'factors and forces' that set an economy in motion and lead it to a new equilibrium at a higher or lower level. It studies the actions of, and interactions between, the factors and forces of change. The interaction between the factors and forces of change is not instantaneous and simultaneous. It involve a *time-lag*, i.e., the time that a change in any economic

16. R. F. Harrod, in his *Towards Economic Dynamics*, (Macmillan, London, 1960), p.3.
17. Eric Schneider, *Pricing and Equilibrium*, (London, Allen & Unwin, 1962), p.236.

variable takes to affect the other related variables, and the time that other variables take to adjust themselves to the change. Dynamic analysis takes into account the time lag involved in the process of adjustments. It studies the nature and the magnitude of changes and finds whether they are oscillatory or dampening—if oscillatory, then whether divergent or convergent. If they are convergent, the economy may reach another equilibrium. If changes are divergent, the economy may not attain another equilibrium position—it may keep oscillating constantly.

2.2.5 Distinction between Economic Statics and Dynamics

The distinctive features of static and dynamic analyses can be summarised as follows.

(i) Economic statics is an abstraction from reality whereas economic dynamics is the study of the real world.

(ii) All the variables in a static analysis are *undated* in the sense that they are taken at a point or unit of time whereas in dynamic analysis, all variables are dated, i.e., their movement on time scale is known.

(iii) Economic statics is a timeless analysis whereas in economic dynamics, time is used as one of the variables because time works as a determinant of other variables. For example, national income of a country in time t depends on its value in time t_{-1}.

(iv) In static analysis, fundamental economic conditions are assumed to be given and known, but in a dynamic analysis, they continue to change over time.

(v) Dynamic analysis has predictive power which static analysis does not have, though comparative statics can be used for the purpose.

2.3 MACROECONOMIC MODEL BUILDING

Macroeconomics, like any theoretical branch of economics, uses a set of theoretical formulations derived on the basis of some macroeconomic models. Macroeconomists have devised and developed, over time, a set of 'elegant and remarkably powerful' models for the purpose of analysing the behaviour and performance of the economic system as a whole. The 'economy as a whole' is an extremely complex and intricate system because each and every element and variable of the economy is interrelated, interlinked, interdependent and interactive. To analyse such a complex system systematically and scientifically is an extremely complex and a rather impossible task.

However, in order to study a macroeconomic phenomenon, macroeconomists divide the entire system under different sectors with common features and characteristics, and develop a simplified model to study the selected macroeconomic phenomenon. This process is called *model building*. A macroeconomic model, or any economic model for that matter, is an abstraction of a macroeconomic phenomenon from the real world, with the purpose of creating a manageable hypothetical world. The model so created is used as a basic tool of analysis to describe, explain and derive the relationship between any two or more macroeconomic variables. Precisely, *a macroeconomic model is the representation of the economic phenomenon in terms of a set of behavioural assumptions, definitions, simultaneous equations, and identities.* Practically, the model works as a road map for the purpose of study. It shows the path to be followed to reach the destination.

A macroeconomic model is constructed by the following process:

(i) Specifying the subject of study and segregating it from the rest of the system;

(ii) Specifying and defining the chosen *macroeconomic variables;*

(iii) Making assumptions regarding the behaviour of selected variables;
(iv) Specifying the relationship between the selected variables in the form of equations, if possible; and
(v) Specifying the criteria for drawing conclusions.

The choice of relevant economic variables is a very important aspect of building economic models. So is the case with macroeconomic models—the choice of relevant macroeconomic variables is essential for building a purposeful macroeconomic model. Macroeconomic variables are generally classified as:

(i) Endogenous variables, and
(ii) Exogenous variables.

(i) *Endogenous Variables* are those whose value is determined within the model. Some typical endogenous variables used in macroeconomic models are national income, consumption, savings, investment, market interest rate, price level, and employment.

(ii) *Exogenous Variables* are those that are determined outside the model, e.g., money supply, tax rates, government expenditure, exchange rate, etc. However, depending on the objective of analysis, endogenous variables are converted into exogenous variables, and exogenous variables can be endogenised.

For example, let us consider Keynes' model of income determination. The Keynesian model of income determination assumes that the equilibrium level of income is determined where

$$\text{Aggregate Demand } (AD) = \text{Aggregate Supply } (AS)$$

Aggregate demand and aggregate supply are defined, respectively, as follows.

$$AD = C + I + G + X \text{ and}$$
$$AS = C + S + T + M$$

where C = aggregate consumption expenditure; I = investment spending; G = government spending; X = exports; S = savings; T = taxes and M = imports.

Now, national income equilibrium (Y) can be redefined as

$$Y = C + I + G + X = C + S + T + M$$

This is the final form of the Keynesian model of determination of the equilibrium level of income. What is now required is to define the macro variables and specify the relationship between the variables. The variables and their interrelationship are specified in function form along with the *relevant assumption,* as follows.

(i) Aggregate consumption (C) may be the function of many variables, like wealth, return on investment, advertisement, demonstration effect, snob effect, age factor, etc. However, Keynes defined aggregate consumption function as $C = f(Y)$. This function is based on the assumption that, in the short run, consumption depends on income only, and not *on any other factor*.
(ii) Variables I, G, T and X are determined exogenously, i.e., these variables are determined outside the framework of the model.

(iii) Although imports (M) of a country depend on a number of factors, e.g., price of domestic substitutes of imported goods, foreign price of the products, exchange rate, etc., the Keynesian model assumes that M is the function of income only, i.e., $M = f(Y)$.

What one needs now is to collect data on the variables included in the model and test the validity of the model. This is called empirical testing of the model. If the model stands the empirical tests against income and expenditure data from several counties, the validity of the model is established. The macroeconomic models so developed are used to make economic generalisations, leading to the formulation of macroeconomic theories.

2.3.1 How Relevant are the Models to the Real World?

Economic models are only an approximation of a part of the real world chosen for the purpose of study. The relevance and applicability of an economic model to the real world depends on:

(a) how realistic are the assumptions of the model,
(b) how consistent are the assumptions with one another,
(c) how accurate and relevant are the data to validate assumptions, and
(d) how logical and realistic are equations of the model.

The economic models based on realistic assumptions and internally consistent with one another have a greater degree of relevance to the world. The validity of the conclusions drawn from the models, and their usefulness in policy formulation, depends on the validity of the model. The relevance and validity of a model is tested through its statistical or empirical verification. A model tested and verified against the data obtained from a number of different countries has greater acceptability and reliability. Such a model is then used to formulate a macroeconomic theory, unless proved otherwise.

In fact, an internally consistent model has a high predictive power. It can explain and predict the approximate future values of endogenous macro variables and also the course that an economy is expected to take when some changes take place in the economy. This may not be true in real life but this is what economic models are aimed at and most model builders believe to be.

It must however be noted that the conclusions derived from the model hold within the framework of the model. *Economic models can never be perfect* because the real economic life is so complex and fast-changing that it is immensely difficult, if not impossible, to capture the behaviour of all macro variables and to predict the future course of an economy. This is evident from the experience gained in the post-Second World War period. The formulation of economic models in this period has been very high. But, if the post-war economic problems of the world are any test, most models are hardly worth the paper they are written on. This should not mean, however, that model building is a futile exercise.

2.3.2 Why Economists Build Models

The real economic world is extremely complex. Millions and millions of economic players—consumers, producers and workers—act, interact and react to the behaviour of one another in a constantly changing world, often in an unpredictable manner. In reality, an economic system looks like a maze of chaos. Nevertheless, there is a uniformity in the economic behaviour of the people which is predictable with a fair degree of accuracy. The economic behaviour of the people needs to be studied with the purpose of both understanding and devising corrective measures whenever required. It is for this purpose that economists create a kind of imaginary or hypothetical world, approximating to the real world.

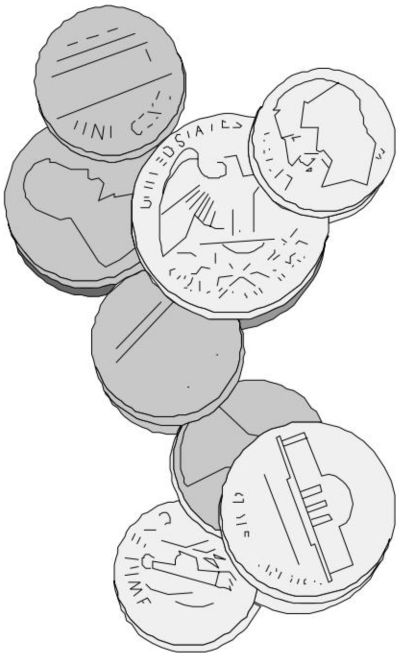
A model serves like a laboratory for experimentation or for testing hypothesis. The use of economic models in the study of an economic phenomenon is an attempt to create an order in the chaotic world. It proves helpful in understanding and explaining the complex real life situation, albeit under constrained or controlled conditions. The *purpose* of economic models is not to replicate the real world or to produce exact economic laws but to develop and use a framework to understand better the economic system and its working. The purpose of a model is not to create an imaginary world to be followed by the world later or to create a machine to produce infallible results, but to create a framework for organised and orderly method of understanding the real world. And, the use of models has paid, in spite of their imperfectness.

QUESTIONS FOR REVIEW

1. What are the major macroeconomic issues which make the subject matter of macroeconomics? What are the major issues related to the growth issue?
2. What is the nature of the inflation problem faced by different countries? What kind of the inflation problem is being currently faced by the Indian economy?
3. Why do the problems of poverty and unemployment often persist in even the fast growing economies? Write your answer in the context of the Indian economy.
4. What are the international economic issues pertaining to macroeconomics? Why and how is the recession in the US economy affecting the Indian economy?
5. (a) Define the stock and flow variables used in macroeconomics.
   (b) State whether the following are flow or stock variables.
   (i) GNP, (ii) Aggregate expenditure, (iii) Investment, (iv) Capital, (v) Employment, and (vi) Government expenditure.
6. A stock variable is related to which of the following?
   (a) unit of time,
   (b) duration of time,
   (c) per unit of time, or
   (d) none of these.
7. Explain the concept of economic statics and dynamics. How does static analysis differ from dynamic analysis? Which of the two approaches, in your opinion, is superior and why?
8. Explain the difference between static analysis and comparative static analysis. Which of the two approaches will you adopt when you compare the Indian and the Chinese economy in the years 2004 and 2007?
9. Explain the uses and limitations of partial and general equilibrium analyses. What kind of analysis will you use to find market clearing price for automobiles in India?
10. What purpose do macroeconomic models serve in economic analysis? How relevant are the models to the real world?
11. Distinguish between (i) exogenous and endogenous variables, and (ii) stock and flow variables. What purpose does this distinction between variables serve?
12. What do you understand by macroeconomic policies? What are their objectives in general? List macroeconomic policies and the relevant policy instruments.

Chapter 3

The Circular Flow Models of Economy



INTRODUCTION

In Chapter 1, we have introduced macroeconomics as the study of economy as a whole. In this chapter, we introduce the economy and explain how an economy works in the form of circular flows of products and money.

An economy can be defined as an integrated system of production, exchange, and consumption. In carrying out these economic activities, people are involved in making transactions—they buy and sell goods and services. Economic transactions generate two kinds of flows: (i) product or real flow, i.e., the flow of goods and services, and (ii) money flow. Product and money flow in opposite directions in a circular fashion. The product-flow consists of (a) factor flow, that is, flow of factor services, and (b) goods flow, that is, flow of goods and services.

In a monetised economy, the flow of factors of production generates money flows in the form of *factor payments* which take the form of factor *income flows*. Factor incomes are spent on consumer and capital goods, which take the form of *expenditure flow*. Expenditure flow is in the form of *money flow*. Both product and expenditure flow in a circular fashion in opposite directions. The entire economic system can therefore be viewed as circular flows of factor incomes and expenditure. The magnitude of these flows, in fact, determines the size of national income. Since the forthcoming part of this book deals with the theory of income determination, it is useful to understand the mechanism of income and expenditure flows. How these flows are generated and how they make the system work are the subject matter of this chapter.

It may be noted at the outset that the mechanism of income and expenditure flows is extremely complex in reality. The economists, however, use simplified models to illustrate the *circular flows of income and expenditure*. To present the flows of income and expenditure, the economy is divided into four sectors: (i) household sector; (ii) business sector or the firms; (iii) government sector; and (iv) foreign sector. These four sectors are combined to make the following three models for the purpose of illustrating the circular flows of income and expenditure, and of product and money.

(i) Two-sector model including the household and business sectors;
(ii) Three-sector model including the household, business and government sectors; and
(iii) Four-sector model including the household, business, government and the foreign sectors.

3.1 CIRCULAR FLOWS IN A TWO-SECTOR MODEL

The two-sector model consists of only households and firm sectors. This model represents a private closed economy in which product and money flows generated by the government and the foreign sectors are ignored. A two-sector model is obviously an unrealistic model. However, to begin with, a two-sector economy provides a convenient starting point to analyse the circular flows. Before we analyse the circular flows, let us look at the basic features and functions of the households and the firms.

Households The *households* are assumed to possess certain specific features: (i) households are the owners of all factors of production—labour, land, capital and entrepreneurship, (ii) their total income consists of returns on their factors of production—wages, rent, interest and profits, (iii) they are the consumer of all the consumer goods and services; and (iv) they spend their total income on goods and services produced by the firms—if they save any part of their income, it flows to the firms in the form of investment.

Business Firms The *business firms,* on the other hand, are assumed to have the following features and functions: (i) firms own no resources of their own, (ii) they hire the factors of production—land, labour and capital—from the households, (iii) they use factors of produce and produce[1] and sell goods and services to the households; and (iv) they do not save, that is, there is no corporate saving.

Assumptions The following assumptions are made to specify the circular flow models.

(i) Households spend their total income on consumer and capital goods produced by the firms. They do not hoard any part of their income.
(ii) Firms produce goods and services only as much as demanded by the households. They do not maintain any *inventory*.
(iii) Firms make factor payments to the households as rent, wages, interest and profits.
(iv) There is no inflow or outflow of income or of goods and services from any outside source.

Having specified the model, we now describe and illustrate the circular flows of income and expenditure in two-sector model.

1. The households do produce and consume certain goods and services. In their capacity as producers, they belong, functionally, to the category of firms.

3.1.1 The Circular Flows in a Two-Sector Economy: A Graphic Presentation

The working of a two-sector economy and the circular flows of incomes and expenditure are illustrated in Fig. 3.1. The households are represented by the rectangle labelled 'Households' and the business sector by the rectangle labelled 'Firms,' with their respective characteristics. A line drawn from the 'Household' to the 'Firms' divides the diagram into two parts—the upper half and the lower half. The upper half represents the ***factor market*** and the lower half represents the ***commodity market***. Both the markets generate two kinds of flows—***real*** or ***product flows*** and ***money flows***. Let us first look at the real and money flows in the factor markets.

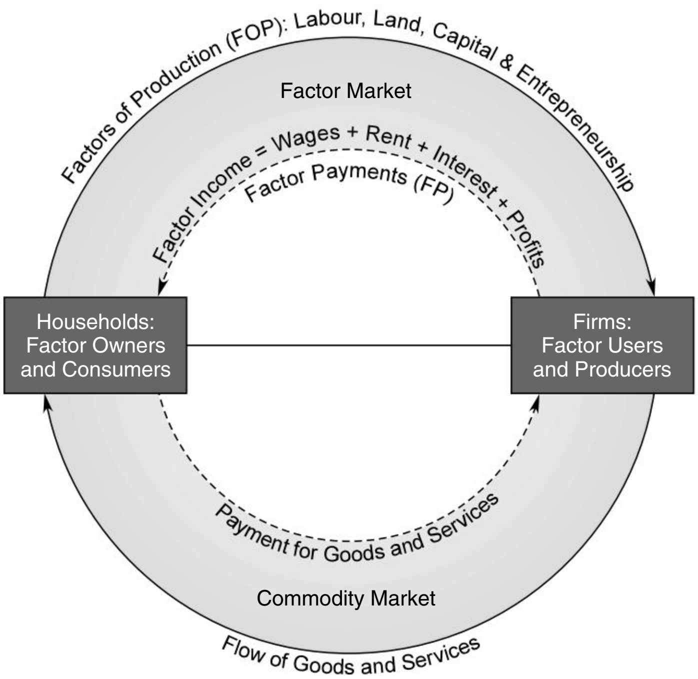


Fig. 3.1 The Circular Flows of Income and Expenditure: Two-Sector Model

In the factor market (the upper half), the arrow labelled 'FOP' shows the flow of factors of production (FOP) from the households to the firms. This makes the real or factor flow shown by a continuous arrow. The real or factor flow causes another and a reverse flow, that is, the flow of factor incomes (wages, interest, rent and profits) from the firms to the households. Since all factor payments (PF) are made in terms of money, the flow of factor incomes represents the money flow. The money flow, shown by a dashed arrow, comprises the total income (Y) of the households. Note that factor services and money flow in the opposite direction.

Let us now look at the commodity market (the lower half of the diagram). As shown in the diagram, the goods and services produced by the firms flow from the firms to the households. The payment made by the households for the goods and services creates money flow. Note again that real (goods) and money flows in the commodity market too flow in opposite direction.

When we combine the goods and money flows in the factor and goods markets and look at the flows in continuity, we find a *circularity* in the flows. By combining the continuous arrows in the goods and factor markets, we get the circular flow of goods. By the same process, we get the circular flow of money. As Fig. 3.1 shows, *goods and money flow in the opposite directions*.

Important Identities One striking feature of income and expenditure flows is that the *values* that flow are *equal*. For example, *factor payments* are equal to *factor income* and *household expenditure* equals the *value of output*. These equalities take the form of *identities* as follows.

$$Y \equiv FP$$
$$FP \equiv w + r + i + p$$
$$w + r + i + p \equiv V \equiv M$$
$$\therefore \quad V \equiv Y \equiv M$$

where Y = household income, FP = factor payments, w = wages, r = rent, i = interest, p = profits, V = value of output, and M = Money flows (at constant prices).

In the final analysis, household income = factor payments = the money value of output, i.e.,

$$Y \equiv FP \equiv V$$

This identity is important for national income determination.

3.1.2 Withdrawals, Injections and the Size of Income Flows

The magnitude of income and expenditure flows is determined by the size of the society's income and expenditure: the larger the size of income (or expenditure), the larger the size of flows and *vice versa*. In reality, however, there are ***leakages*** from and ***additions*** to the circular flows of income and expenditure. The leakages and additions are also called as ***withdrawals*** and ***injections***,[2] respectively.

In the two-sector model, *a withdrawal is the amount that is set aside by the households and firms and is not spent on the domestically produced goods and services over a period of time.* For example, if households set aside a part of their income as a provision for old age or as a provision against the loss of job, and so on, and do not spend it unless required, it is a *withdrawal*. It is important to note that *saving is a withdrawal.* But when savings are ultimately spent in the form of investment, they take the form of injections. The withdrawals are comparable to the concept of hoarding.[3] Similarly, firms may also withhold a part of their total receipts and may not return it to the circular flows in the form of factor payments, say, in anticipation of depression. *Such withdrawals reduce the size of the circular flow.*

On the other hand, *an injection is the amount spent by households and firms in addition to their regular incomes and receipts.* An injection by the households is the expenditure that they make in addition to what they receive from the firms as factor incomes. The injections by the households may be in the form of spending inherited savings, own hoardings, or by borrowing and spending

2. The terms 'withdrawals' and 'injections' were perhaps used first by R. G. Lipsey in his text, *An Introduction to Positive Economics,* 3rd edn., 1963.

3. Hoarding has been a practice prevalent in backward countries for lack of institutional facilities like banking system for liquidity and safety of money.

on consumer goods. And, an injection by the firms is the expenditure which they make in addition to what they receive from the sale of goods and services. Firms can inject money into the economy by spending their past savings or by borrowing from the outside of the model economy. *Injections increase the size of the flow.*

The withdrawals and injections in the two-sector model are illustrated in Fig. 3.2. The lower half of the figure shows the withdrawals and injections by the households and the upper half shows the withdrawals and injections by the firms.

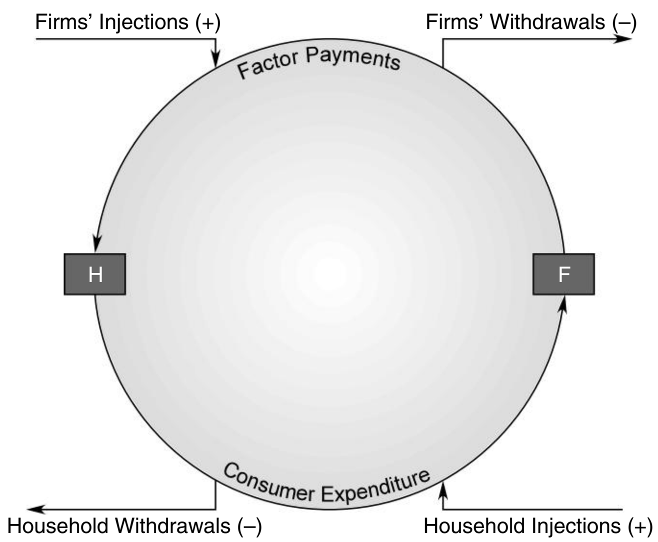


Fig. 3.2 Withdrawals and Injections in the Circular Flows

The Two-Sector Model with Savings We have hitherto assumed that households supply finances directly to the firms. In reality, however, household do save a part of their income for investment. In order to explain the role of saving on the circular flows, we assume that *all savings are made by the households* and extend the two-sector model to include the financial sector. The financial sector (known also as financial market and capital market) is constituted of a large variety of institutions involved in collecting household savings and passing it on to the business sector. In our simplified two-sector model, however, the financial sector includes only banks and financial intermediaries (FIs), like insurance companies, industrial finance corporations, which accept deposits from the households and invest it in the business sector in the form of loans and advances. The circular flows of income and expenditure in a two-sector model with the capital market is illustrated in Fig. 3.3.

Note that the flow of factors of production and factor payments in Fig. 3.3 are the same as in Fig. 3.1. In Fig. 3.3, a new sector, labelled as 'Capital Market' has been added. The movement of the dashed arrow, labelled *S,* shows the flow of household savings to the capital market, i.e., to the banks and financial intermediaries (FIs) in the form of deposits. The banks and FIs use the deposits to buy shares and debentures of the firms which is investment (*I*). The investment flow is shown by the dashed arrow labelled *I.*

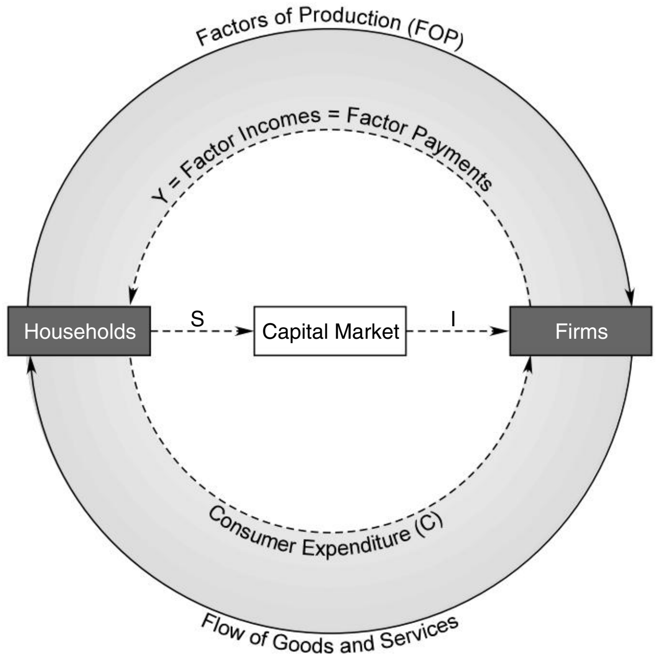


Fig. 3.3 Circular Flows in Two-Sector Model with the Capital Market

With the inclusion of the financial sector, the households incomes (Y) is divided into two parts: (i) consumption expenditure (C), and (ii) savings (S). As shown in Fig. 3.3, C and S take different routes to reach the business sector. The consumption expenditure (C) flows directly to the firms, whereas savings (S) are routed through the financial sector. Note that savings (S) take ultimately the form of investment (I). In the final analysis, we find that the entire money income generated by the firms flows back to the firms which flows back again to households as factor payments.

3.2 CIRCULAR FLOWS IN THREE-SECTOR MODEL: A MODEL WITH GOVERNMENT INCOME AND EXPENDITURE

The three-sector model is formed by adding the government sector to the two-sector model. A three-sector model depicts a more realistic economy as it includes the government which plays an important role in the economy. The economic role of the government has increased tremendously during the post-World War II period. In India, for example, the percentage of central government expenditure to *GDP* increased from around 5 percent in 1950-51 to 17.2 percent in 1990-91, and then 18.7 percent in 2007-08. The percentage of tax revenue of the central government increased from 5 percent in 1950-51 to nearly 10 percent in 2007-08 (RE). The ratio of the total government (central and state) expenditure to *GDP* has risen from about 8 percent in 1950-51 to over 40 percent in the early 1990s, and the percentage of tax revenue to *GDP* increased from 7 percent to over 20 percent during this period. These ratios are much higher in many developed countries.

The inclusion of the government into the model requires adding and analysing the effects of government's fiscal operations—taxation and expenditure. However, in our simple analysis here, we will include only two fiscal transactions to the circular flows, *viz.* (i) taxation—direct and indirect taxes, (ii) government expenditure on goods and services, subsidies and transfer payments. These fiscal transactions have different kinds of effects on the income and expenditure flows.

Taxes are withdrawals from the income flows because they reduce private disposable income and, therefore, consumption expenditure and savings. On the other hand, government expenditure is an injection into the income stream. The government expenditure adds to the aggregate demand in the form of government purchases of factor services from the households and goods and services from the business sector. The transfer payments by the government (e.g., old age pensions, subsidies, unemployment allowance, etc.) are injections to the circular flows. They add to the household income which leads to increase in household demand for consumer goods.

The circular flows of incomes and expenditures in three-sector model are shown in Fig. 3.4. This figure presents only the money flows to and from the government. The real (or goods) flow from and to the government has been excluded in order to avoid overcrowding of the diagram. It must be borne in mind that each money flow (except transfer payments) has a counterflow in the form of goods flow.

In Fig. 3.4, the circular flows of income and expenditure are the same as in Fig. 3.1. However, it is important to bear in mind that the magnitude of flows between the households and the firms

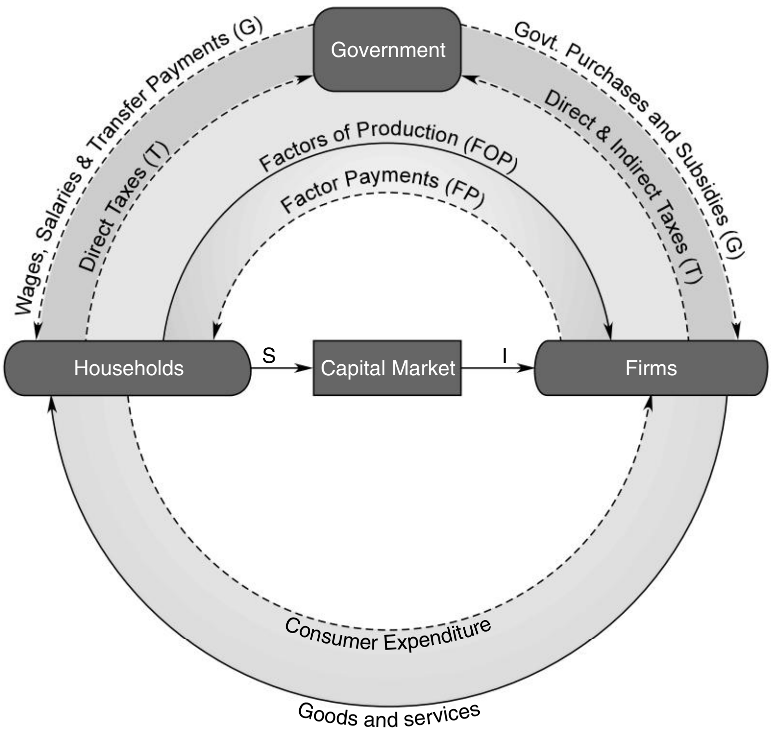


Fig. 3.4 Circular Flows of Incomes in a Three-Sector Model

gets reduced because a part of their incomes flows to the government sector. As the figure shows, a part of the household income is claimed by the government in the form of direct and indirect taxes. Similarly, a part of the firms' earning is taxed away in the form of corporate income tax. The indirect taxes are collected by the firms from the households and passed on to the government. The government spends a part of its tax revenue on wages, salaries and transfer payments to the households and a part of it on purchases from the firms and payment of subsidies. Thus, the money that flows from the households and the firms to the government in the form of taxes, flows back to these sectors in the form of government expenditure.

Is the government tax revenue (T) always equal to the government expenditure(G)? In Fig. 3.4, total tax revenue is assumed to be equal to the total government spending. In reality, however, the two variables may not be necessarily equal. It depends on the government budgetary policy. If the government adopts a *balanced budget policy*, then $G = T$. If the government adopts a *deficit budget policy,* then $G > T$. And, if the government follows *surplus budget policy,* then $G < T$. A *deficit budget policy implies* ***net injections*** into the economy. Therefore, these kinds of budget policies expand the circular flows. On the contrary, a *surplus budget policy amounts to* ***net withdrawal*** from the economy which reduces the size of the circular flows.

3.3 CIRCULAR FLOWS IN A FOUR-SECTOR MODEL: A MODEL WITH THE FOREIGN SECTOR

In this section, we describe the circular flows of income and expenditure in four-sector model. The four-sector model is formed by adding foreign sector to the three-sector model. The foreign sector consists of two kinds of international transactions: (i) foreign trade, that is, exports and import of goods and services, and (ii) inflow and outflow of capital. The inter-country transactions make a complex system. For simplicity sake, however, we make the following assumptions.

(i) The external sector consists of only exports and imports of goods and services;
(ii) The export and import of goods and non-labour services are made only by the firms; and
(iii) The households export only labour.

The circular flows of income and expenditure in a four-sector model is illustrated in Fig. 3.5. Like Fig. 3.4, this figure too shows only the money flows. It must be borne in mind that each money flow has its counterpart goods flow in the opposite direction. The lower part of this figure shows circular flows of money in respect of foreign trade. Exports (X) make goods and services flow out of the country and make money (foreign exchange) flow into the country in the form 'receipts from export.' This is, in fact, flow of foreign incomes into the economy. ***Exports (X) represent injections into the economy***. Similarly, imports (M) make inflow of goods and services and flow of money (foreign exchange) out of the country. This is flow of expenditure out of the economy. ***Imports (M) represent withdrawals from the circular flows.***

Another inflow of income is generated by the 'export of manpower' by the households. The export of manpower brings in 'foreign remittances' in terms of foreign exchange. This is another inflow of income. These inflows and outflows go on continuously so long as there is foreign trade and export of manpower.

So far as the effect of foreign trade on the magnitude of the overall circular flows is concerned, it depends on the *trade balance*, which equals $X - M$. Recall that X represents injections and M

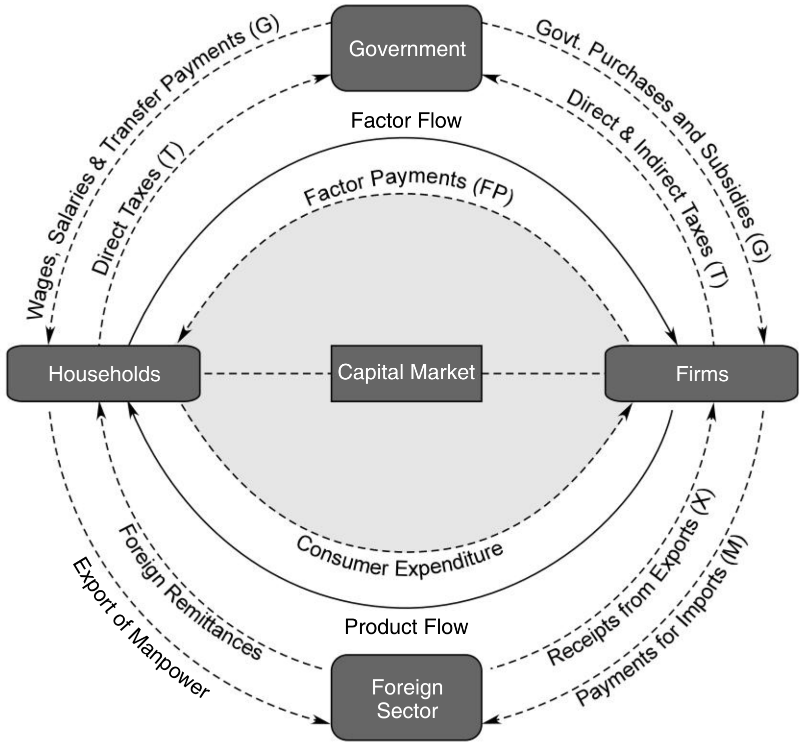


Fig. 3.5 The Circular Flows of Income and Expenditure in Four-Sector Model

represents withdrawals. If $X > M$, it means inflow of foreign income is greater than the outflow of income. It means that there is a net injection into the economy arising from foreign trade. The net gain increases the magnitude of circular flows of income and expenditure. By the same logic, if $X < M$, there is net withdrawal from the economy and it decreases the magnitude of circular flows. And, if $X = M$, inflow and outflows of incomes are equal. This leaves the circular flows unaffected.

SUGGESTED READINGS

LIPSEY, RICHARD G., *An Introduction to Positive Economics* (ELBS and Weidenfeld Nicholson, 3rd Edn.), Chap. 7.

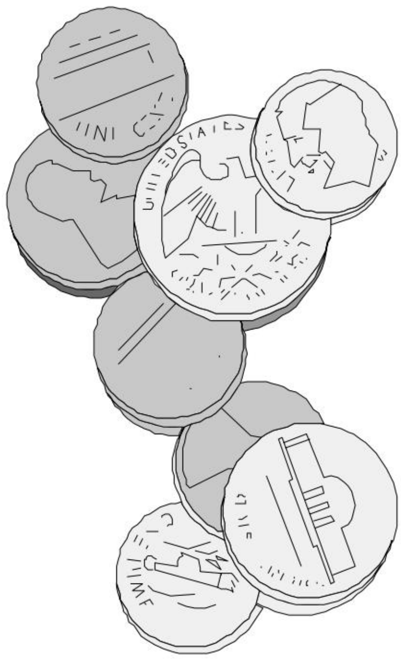
QUESTIONS FOR REVIEW

1. What are the two main flows in an economy? How do they arise? What do they signify?
2. Describe an economy as circular flows of income and expenditure. What determines the magnitude of the circular flows?

3. How does the addition of the government sector to the two-sector model change the structure of the model and of the circular flows?
4. What is meant by withdrawals and injections? How do they affect the size of the circular flows of income and expenditure in an economy?
5. What is the effect of change in personal taxes and the government expenditure on the circular flows of income and expenditure? Does a balanced budget policy result in expansion or reduction in the circular flows?
6. Illustrate graphically the circular flows of income and expenditure in a four-sector model. Explain also the effect of adverse and favourable balance of trade on the size of the circular flows.

Chapter 4

Measurement of National Income



INTRODUCTION

As noted in Chapter 1, macroeconomics is the study of the economy as a whole. National income is the single most important macro variable that represents the 'economy as a whole'. The level of national income determines the level of all other macroeconomic variables—aggregate consumption, savings and investment, employment and the price level. Therefore, a systematic and reliable estimate of national income is indispensable for the study of economy as a whole. In this chapter, we give a brief account of the importance of national income estimates, the various concepts and the methods of measuring national income.

Although, the practice of estimating national income had started long ago, it remained confined to estimating the value of aggregate output. The various concept of national income and practice of 'national income accounting', also known as 'social accounting', was developed and adopted by Simon Kuznets[1] of Harvard University in 1941, and he was awarded Nobel Prize for this work. In fact, making a detailed estimate of national income was thought to be necessary after the publication of Keynes' *The General Theory* in 1936. The analytical framework that Keynes had adopted in his

1. For details see, Simon Kuznets, *National Income and Its Composition* (New York, National Bureau of Economic Research, 1941). This book is treated to be a path-breaking work on measurement of national income.

macroeconomic analysis required detailed accounting of various components of the national income, including aggregate demand and aggregate supply, aggregate consumption expenditure (private and public), aggregate savings and investment, total exports and imports, net balance of foreign transactions, etc. National income accounting or the 'social accounting' is, in fact, a detailed accounting of total national product resulting from different kinds of economic activities, classified under different sectors and industries, and also the intersectoral flows of goods and services. It also takes into account the net effect of inflows and outflows of goods and services to and from foreign countries.

The ***importance of national income accounting*** lies in the fact that the performance and behaviour of an economy are studied on the basis of the performance of its macroeconomic variables including national income (estimated as Gross National Product or Gross Domestic Product), aggregate consumption, aggregate savings and investment, total labour employment, general price level, total supply of money and total demand for money, and balance of payments (*BOP*). Incidentally, of these aggregates, national income is the 'most macro' of all macroeconomic variables. All other macro variables are either the components of or are the result of, national income (*GDP/GNP*). For instance, the level of employment depends on the level of *GDP*, aggregate consumption expenditure and aggregate savings and investment are the components of *GDP*, and their level depends on the level of *GDP*. Given the money supply, the general level of price depends on the *GDP*, and so on.

National income is the most important variable from both the *theoretical* and the *practical* points of view. At the *theoretical* level, a major part of macroeconomic theories seeks to explain the determination of national income, the interrelationship and interaction between its various components, and growth of, and fluctuation in, national income. From the *practical point* of view, a country's national income data is used for (i) measuring the standard of living and economic welfare of its people, (ii) formulation of economic policies for the management of the economy, and (iii) making international comparisons about the status of the economy.

Besides, a major part of macroeconomic theories deals with the performance and behaviour of *GDP* or *GNP*. Given the importance of *GDP/GNP,* one needs to have a clear understanding of the national income concepts and their measurement.

4.1 SOME CONCEPTS RELATED TO NATIONAL INCOME

In general sense of the term, 'national income' refers to the aggregate money value of all final goods and services resulting from the economic activities of the people of a country over a period of one year. Going by definition, it appears that measuring national income is an easy task. However, making a reliable measure of national income is an extremely complex and difficult task. Measuring national income involves many conceptual problems. Besides, the term 'national income' is used in a variety of senses depending on (i) what is productive and what is a non-productive activity, (ii) within the productive activities, what is economic and what is non-economic production, (iii) what is to be included in, and what should be excluded from, the national income concept, and (iv) what method, or methods, are to be used to measure national income. Therefore, prior to discussing the methods of measuring national income, it is essential to have clarity regarding the various concepts used in its measurement.

4.1.1 Economic and Non-Economic Production

All productive activities of human beings create goods and/or services, but all goods and services produced by human activities are not included in national income accounting. For the purpose of national income accounting, production of goods and services by human beings are classified under two categories: (i) economic production, and (ii) non-economic production. Let us understand the differences between the two.

Economic Production In economic-sense, *economic production* refers to the production of those goods and services which are meant for sale and have market value, and those goods and services which are produced and provided jointly to the people by the government and public organisations, for which people pay indirectly through tax payment. Thus, economic production includes both *marketable* and *non-marketable* production. Goods and services produced by farmers, firms, factories, shops, hoteliers, tailors, lawyers, medical practitioners, etc., fall in the category of *marketable production.* And, goods and services produced and supplied by the government, public institutions, social organisations, NGOs, social service clubs, charitable societies, etc., fall in the category of *non-marketable production.* The Government provides administrative services, law and order, judiciary services, national defence, educational and medical services, etc. These services (except medical and educational services) cannot be provided individually, and they do not have a market and market price. But, all these services use national resources—land and labour—which have an economic cost, and they add to the production capacity, and to the welfare of the society. Production of all such goods and services falls in the category of Economic Production. It must, however, be noted that *all marketable production is economic production but all economic production is not marketable.* But all the goods and services of this category are included in national income accounting.

Non-Economic Production Non-economic production includes the production of goods and services that are not meant to be sold, nor is there any market for them, nor do they have a market price. To this category belong mainly the following services:

(i) Services rendered to self, e.g., exercising, eating, shaving, washing one's own clothes, and entertainments, hobbies, cooking for self, etc.
(ii) Services provided to the family members, e.g., housewives cooking for the family and looking after the household, parents teaching their own children, mothers rearing the children, providing nursery help, doctors treating their own family members, gardening in one's own house campus, etc.
(iii) Services provided by the neighbours to each other, e.g., helping each other on festival and marriage occasions, etc.

Although these services contribute to human welfare, as any economic good, and can be valued at an imputable rate, these services are not included in the measurement of the national income as these cannot be marketed.

4.1.2 Intermediate and Final Products

In national income accounting, the goods and services produced in a country are classified as *intermediate* and *final products.* National income includes the value of only final products—be it a good or service. Therefore, it is vital to make a distinction between intermediate and final products. Let us first understand the distinction between *intermediate* and *final goods.* The case of *services* will be discussed later.

Intermediate and Final Goods In the process of production, certain goods, called *material inputs,* pass from one stage to another, with their form changing, till the product reaches its final stage. Such products are called ***intermediate products***. Thus, the goods that flow from one stage to another in the process of production of a good, with their form changing, are called ***intermediate products.*** The goods that reach the final stage of production and flow to their ultimate consumers/ users are called ***final products.*** Practically, a product sold by one firm to another for resale, or for further processing or value addition, in the process of production is called ***intermediate product***, and a product that is sold finally to the consumer or to the investor is ***final product***.

Final goods are classified under two categories: (i) final consumer goods, and (ii) final producer goods or capital goods. *Final consumer goods* are those that flow to the ultimate consumers. *Final capital goods* (machinery, plant and equipments) are those that are finally used by the firms in the process of production. Final capital goods are also called as '***Investment goods***'.

The distinction between intermediate and final products, in case of consumer goods, can be clarified further with an example. Let us consider the production of sandwiches. Initially the sandwich was in the form of wheat. In the process of sandwich production, wheat flows from the farmers to flour mills, from flours mill to bakeries, and from bakeries to restaurants, where bread is converted into sandwiches – the final product – which are sold finally to the consumers. Note that in the process of sandwich production, wheat flows from one stage to another but its form keeps on changing – from wheat to wheat-flour, from wheat-flour to bread, from bread to sandwich, the final product. In this case, wheat, wheat flour and bread are *intermediate products* and sandwich is the *final product.*

The need for distinction between the intermediate and final products arises because of the problem of ***double counting,*** i.e., the value of the same product counted more than once in national income accounting. In our example of sandwich production, wheat is converted into flour, wheat-flour is converted into bread, and bread into sandwich. At each stage of production, the products—wheat, flour, bread and sandwich—are priced differently. Wheat price is included in the price of flour, in the price of bread, and in the price of sandwiches. Therefore, if the total value of all these products—wheat, wheat-flour, bread and sandwich—is taken into account in national income counting, wheat price would be counted *four times.* This is called ***double counting***, even though it is counted four times. Double counting leads to overestimation of the national income.

Consider the example of the production of cotton shirts. If one traces back the process of shirt production, one finds that the shirt was initially in the form of cotton. In shirt production, cotton flows from cotton growers to threading mill, from threading mill to cotton textile mill, from cotton textile mill to shirt manufacturing company. The product keeps changing its form—from cotton to cotton thread, to cotton cloth, to shirts. Each of these products has a different price. If the product is treated as the final product at each stage of production, then the cotton price will be counted four times in this case also. This double or fourfold counting of cotton value would lead to overestimation of the national income. Therefore, avoiding *double counting* is a necessary condition for estimating national income correctly.

Intermediate and Final Services Whether the service provided by the private firms, like courier, mobile phone, and transport services, and by the government or government departments is an intermediate product or a final product is a rather ticklish issue. The classification of services under the intermediate and final product categories depends on the purpose of their use. For example, services provided by the government, like transport, postal, water, communication, etc., at a cost are used for both production and consumption purposes. When used for production purpose, these services are treated as *intermediate products* and when used for private consumption, they are treated as *final products*. For example, the part of railway services used for transporting production materials are treated as intermediate service product, and that used for travelling from one place to another for personal purposes is treated as final service product. Similarly, postal services provided to business firms are intermediate products and those provided to households are treated as final products. Bus services are regarded as final products as they are used for commuting from one point to another. However, there is a difference of opinion among the economists on the issue of treatment of services as intermediate and final products. It all depends on the practice adopted by the authority assigned the task of estimating national income.

4.1.3 Transfer Payments

Transfer payments are the payments made by people to the people, and by people to the government, without corresponding transfer of goods and services or addition to the total output. In other words, transfer payment refers to the flow of money without a reverse flow of goods or services. For example, when a person gifts some money to a relative or friend, or he/she donates an amount to a poor person or to a charitable organisation, without receiving anything in return, it is a ***transfer payment***. When people pay taxes to the government and government pays old-age pension to the people, these are treated as *transfer payments* in national income accounting.

It is important to note here that *transfer payments* are not taken into account while counting the national income because such payments do not result in any addition to the total production nor do they add any additional value to the society.

However, the concept of *transfer payment* at times becomes disputable. To use Beckerman's example[2], when a father pays some money to his son as pocket money, it is transfer payment. But, if the son cleans his father's car in return, the question arises 'should father's payment to the son be treated as a transfer payment or as a payment in return for son's service. In such cases, an arbitrary approach is adopted or a value judgment is used. Therefore, practice varies from country to country. " … the dividing line between what is and what is not productive activity is arbitrary in any system of national accounts, including the system adopted by nearly all Western countries."[3]

4.1.4 Consumer and Producer Goods

All *final products*, as discussed above, can be classified under two categories: (i) consumer goods, and (ii) producer goods, or capital goods. The goods and services that are consumed by the people to directly satisfy their needs and yield utility to the consumer are ***consumer goods***. For example,

2. Wilfred Beckerman, *An Introduction to National Income Analysis* (Universal Book Stall, New Delhi, 1993), pp. 7-8.

3. Beckerman, *op. cit.,* p.8.

food, clothes, house, personal cars, household goods, petrol, books, etc., consumed or used by the people of a country are all *consumer goods.* Also, the total annual expenditure by the government on staff salary, education, health care and law and order represent government consumption expenditure, and thus, the services created are consumer goods.

As regards the ***producer goods,*** they are the category of final products which are not used for their own sake or as consumer goods but are used for enhancing the production capacity of the national economy with the purpose of increasing the flow of income in the future. Such goods are also called ***capital goods.*** Capital goods are the man-made means of production, including machinery, tools and equipments; corporate office, educational, hospital and factory buildings, roads, railways, airports and airplanes, etc. All such final products are *producer goods.*

4.2 NATIONAL INCOME MEASURES

Different kinds of national income measures are used in national income analysis and in income policy formulations. Also, different concepts of national income are used in economic analysis depending on (i) what is and what is not included in the national income estimates, and (ii) what method is used for estimating the national income. In this section, we describe briefly the main concepts and measures of national income.

4.2.1 Gross Domestic Product (*GDP*)

The Gross Domestic Product (GDP) can be defined as the sum of market value of all *final goods and services* produced in a country during a specific period of time, generally one year. It is important to note here that in estimating *GDP,* the income earned by the foreigners in the country are *included* and the income earned by residents abroad and remitted to the home country are excluded. In simple words, *GDP* includes income earned by the foreigners in the country and excludes income earned abroad by the residents.

The market value of domestic product is obtained at both *constant* and *current prices.* Accordingly, *GDP* is known as '*GDP* at constant prices' and '*GDP at current prices*', respectively.'

Measuring *GDP* as 'the market value of all final goods and services' is beset with a number of problems:

(i) determining what is 'final' and what is not, to avoid the problem of double counting,
(ii) evaluation of non-marketed goods and services, e.g., farm products produced and consumed by farmers themselves and rental value of owner-occupied houses, etc.,
(iii) accounting for incomes from illegal activities and professions, e.g., smuggling, production and sale of prohibited goods, like narcotics and arms, etc.,
(iv) unsold stocks and inventories, and
(v) distortion of prices due to indirect taxes.

In practice, these problems are resolved by the national income estimating agency. For instance, in India, the Central Statistical Organisation (CSO) finds ways and means to account for these problems.

Alternatively, the *GDP* can also be defined and measured as the *sum of all factor payments* (wages, interest, rent, profit and depreciation). It is then called ***'GDP at factor cost.'***

4.2.2 Gross National Product (*GNP*)

The Gross National Product (*GNP*) is another measure of national income which often figures in macroeconomic analysis and policy formulations. The concept of *GNP* is similar to that of *GDP* with a significant difference, of course. *The concept of GNP includes the income of the resident nationals which they receive abroad, and excludes the incomes generated locally but accruing to the non-nationals.* In case of *GDP*, however, it is just the otherway round. *The GDP includes the incomes locally earned by the non-nationals and excludes the incomes received by the resident nationals from abroad.* A comparative definition of *GNP* and *GDP* is given below.

GNP = Market value of domestically produced goods and services
plus incomes earned by the residents of a country in foreign countries
minus incomes earned by the foreigners in the country.

GDP = Market value of goods and services produced by the residents in the country
plus incomes earned in the country by the foreigners
minus incomes received by residents of a country from abroad.

4.2.3 Net National Product (*NNP*)

Net National Product (*NNP*) is another concept of national income often used in macroeconomic analyses. The concept of *NNP* is closely related to the concept of *GNP*. The concept of *GNP* includes the output of both final consumer and capital goods. However, a part of capital goods is used up or consumed in the process of production of these goods. This is called *depreciation* or *capital consumption*. While *GNP* is gross of depreciation, *NNP* is net of depreciation. *NNP* is obtained by subtracting depreciation from *GNP*. That is,

$$NNP = GNP - \text{Depreciation or capital consumption}$$

The *NNP* is the measure of national income which is available for consumption and net investment to the society. The *NNP* is, in fact, the actual measure of national income. The *NNP* divided by the population of the country gives the per capita income.

4.2.4 Personal Incomes (*PI*)

Personal income (PI)* can be defined *as the sum of all kinds of incomes received by the individuals from all sources of incomes. Personal income includes wages and salaries, fees and commission, bonus, fringe benefits, dividends, interest earnings and earnings from self-employment. It also includes transfer incomes like pensions, family allowances, unemployment allowances, sickness allowances, old age benefits and social security benefits. Personal income also includes the incomes earned through illegal means, e.g., bribe, smuggling, cheating, theft, prostitution, at least for the taxation purpose.

Personal Income and NNP It is important to note here that the sum of personal incomes is not exactly the same as *NNP*. The reason is that *NNP* excludes certain items included in personal incomes and it includes some other items not included in personal incomes. *NNP* does not include many items of personal income, for example, transfer payments like social security benefits, pensions, old age allowances, and such other benefits. And, it includes undistributed profits of private companies, surpluses of public undertakings, and rentals of the public properties. However, *NNP* can be measured by making some additions to *PI*.

$$NNP = PI + UDP + SPU + RPP$$

(where *UDP* = undistributed company profits; *SPU* = surplus of public undertakings; *RPP* = rentals of public properties and ***PI*** excludes items not included in NNP).

4.2.5 Some Other Income Concepts

There are some other income concepts in addition to the national income concepts discussed above, which are used in the analysis of national income. Two of such important income concepts are briefly discussed below.

1. Disposable Income In wider sense of the term, *disposable income* refers to personal income of the income earners against which they do not have any legally enforceable payment obligations. Legally enforceable payment obligations include such payment obligations as income tax, payment due against government loans, and fines and penalties imposed by legal authorities. In specific terms, however, disposable income can be defined as follows.

Disposable income = Personal income – (personal income tax + fees + fines)

2. Private Income Broadly speaking, all personal incomes are private incomes. However, the term *private income* is used in contrast to *public income.* For the purpose of national income accounting, *NNP* is generally divided into two parts: (i) private income, and (ii) public income. Public income is that part of *NNP* which accrues to the public sector, including administrative units of the government and the government commercial undertakings. Thus, income accruing to the public sector is called *public income.* In contrast, incomes accruing to the individuals, including private sector earnings, transfer payments and undistributed profits of private companies are called *personal income.* By definition,

Total Private Income = Net Domestic Product – Public Income

National Income Concepts Summarised

1. *GNP* = Market value of final goods and services (including both consumer and capital)
plus incomes earned by the national residents in foreign countries
minus incomes earned locally but accruing to foreigners

2. *GDP* = Market value of goods and services produced by the residents in the country
plus incomes earned locally by foreigners
minus incomes received by the nationals from abroad.

3. *NNP* = *GNP* – Depreciation (or Capital Consumption)

4. *PI* = *NNP* – (Undistributed Company Profits + Surplus of Public Undertakings + Rentals of Public Property)

5. Disposable income (Y_d) = *PI* – Personal Taxes

Some Accounting Relationships

1. *GNP* at factor cost *plus net* indirect taxes *less* depreciation = *GNP* at market price

2. *GNP* (at market price) *less* depreciation = *NNP* at market price

3. *NNP* at market price *less* indirect taxes *add* subsidies = *NNP* at factor cost

4. *NNP* at factor cost *less/add* domestic income accruing to non-residents = *NDP* at factor cost
5. *NDP* at factor cost *less* surplus of public undertakings
   less rentals/profits of statutory corporations
   less profit tax
   less income accruing to non-residents
   add interest on national debt
   add transfer payments
   = Personal income
6. Personal income *less* direct taxes, fees, fines, etc.
   = Disposable income

4.3 NOMINAL AND REAL GNP[4]

The *GNP*, and also *GDP,* are estimated at both current and constant prices. The *GNP* estimated at current prices is called ***nominal GNP*** and *GNP* estimated at constant prices in a chosen year (called 'base year') is called ***real income.*** Similarly *GDP* estimated at current prices and constant prices is called ***nominal GDP*** and ***real GDP***, respectively.

The need for estimating *GNP* (or *GDP*) at constant prices arises because *GNP* at the current prices produces a misleading picture of economic performance when prices are continuously rising or decreasing. In a country having a high rate of inflation, the nominal *GNP* produces an inflated estimate of the national income and creates false sense of richness or economic growth. *GNP* valued at current prices shows rise in *GNP* even under the following conditions.

(i) *Actual production is decreasing but prices are rising.* For example, production of food-grains had declined in India by 4.2 percent in 1991-92 compared to 1990-91 and food-grain prices had increased by 20.7 percent. Food-grains production valued at current prices showed increase in foodgrains supply whereas it had actually declined.

(ii) *Actual production remains constant and prices are rising.* For instance, India's industrial production had remained almost constant (increasing at an insignificant rate of 0.6 percent) between 1990-91 and 1991-92, whereas industrial prices had risen in this period by 12.6 percent. This showed a rise in the industrial production at current prices.

The kind of misleading picture of an economy that *GNP* estimated at current prices creates can be seen in Table 4.1. This table presents India's *GNP* and its annual growth rates estimated at both current and constant prices for the period from 1999-2000 to 2007-08 (QE). The *GNP* data given in Table 4.1 shows the difference between the nominal and real *GNP* of India. More obvious is the discrepancy between the annual growth in the nominal and real *GNP*. The table shows clearly that nominal *GNP* presents an inflated measure of India's *GNP*.

In order to avoid this kind of misleading estimates of national income. *GNP* is also estimated at *constant* prices of a chosen base year. The *GNP* estimated at constant prices of the base year is called *real GNP*: it gives national income estimates free from distortion caused by inflation or

4. It is the *GNP*, not the *GDP*, which is available to the people of a country for consumption and investment. Therefore, our discussion on 'nominal' and 'real' income concepts is based on *GNP*. However, the analyses carried out in this section applies exactly to *GDP* also.

Table 4.1 India's Nominal and Real *GNP*: 1999-2000 to 2007-08 (At Factor Cost: New Series at 1999-2000 prices)

Year	GNP (*Billion Rs*)		*Annual Growth Rate* (%)		*GDP*	
	*Nominal**	*Real*	*Nominal*	*Real*	*Real Billion Rs*	*Growth Rate* (%)
1999-00	177109	177109	10.6	6.4	178653	6.4
2000-01	190228	184176	7.4	4.0	186430	4.4
2001-02	207766	195194	9.2	6.0	197261	5.8
2002-03	224473	202948	8.0	4.0	204829	3.8
2003-04	251992	220491	12.3	8.6	222276	8.5
2004-05	285533	236689	13.3	7.3	238877	7.5
2005-06	325627	259544	14.0	9.6	261610	9.5
2006-07	374961	284986	15.2	9.8	287112	9.7
2007-08 (Q)	429705	311486	14.6	9.3	312972	9.0

Source: Government of India, Ministry of Finance, *Economic Survey* – 2008-2009, Appendix – Statistical Tables 1.1, 1.2 and Table 4.10 (p.68)

*At current prices; Q = Quick Estimates

deflation. However, estimating *GNP* at the prices of the base year is not an easy task. The economists use a simple adjustment factor called *GNP Deflator* or *National Income Deflator* to eliminate the effect of rising prices on the *GNP* and to work out real *GNP* at the base year prices. Let us now see how '*GNP* deflator' is worked out and applied to estimate the real *GNP*.

4.3.1 The GNP Deflator and its Application

The GNP deflator is essentially an adjustment factor used to convert nominal GNP into real GNP. The GNP deflator is the ratio of price index number (PIN) of a chosen year to the price index number (PIN) of the base year. The *PIN of the base year* = 100. The chosen year is the year whose real *GNP* is to be estimated. The method of working out *GNP* deflator is given below.

$$GNP \text{ Deflator} = \frac{PIN \text{ of the chosen Year}}{100}$$

The formula for converting nominal *GNP* of a year into real *GNP* may be written as follows.

$$\text{Real } GNP = \frac{\text{Nominal } GNP}{GNP \text{ Deflator}}$$

or

$$\text{Real } GNP = \frac{\text{Nominal } GNP}{PIN_{cy}/100}$$

(where PIN_{cy} is the price index number of the chosen year).

For application of *GNP deflator* concept, let us consider an example. Suppose *nominal GNP* of a country, i.e., *GNP* estimated at current prices, in year 2000 is given at Rs 500 billion and Price Index Number (*PIN*) is given as base year 2000 = 100. Now let the nominal *GNP* increase to Rs 600 billion in year 2005 and *PIN* rises to 110. Given this data, *GNP deflator* for the country can be obtained as follows.

$$GNP\ Deflator = \frac{PIN_{2005}}{100} = \frac{110}{100} = 1.10$$

Given the *GNP Deflator* at 1.10, the *Real GNP* for the year 2005 can be worked out as follows.

$$Real\ GNP = \frac{\text{Rs 600 bill.}}{1.10} = \text{Rs 545.45 billion}$$

Note that Nominal *GNP* increases from Rs 500 billion to Rs 600 billion, i.e., by 20 percent over a period of five years or at an annual average rate of 4 percent. Since *PIN* increases from 100 to 110, i.e., by 10 percent over a period of 5 years, *real GNP* increases at a lower rate, i.e., at 9.1 percent or at an annual average rate of 1.8 percent.

4.3.2 GNP Implicit Deflator

Another variant of *GNP* deflator is *GNP implicit deflator*, also called *implicit price deflator*. It is the ratio of nominal *GNP* to real *GNP*, i.e.,

$$GNP \text{ Implicit Deflator} = \frac{\text{Nominal } GNP}{\text{Real } GNP}$$

The *GNP* implicit deflator can be used for the following purposes:

(i) to construct price index number, and
(ii) to measure the rate of change in prices, i.e., to measure the rate of inflation or deflation.

For instance, in our example, the nominal *GNP* in year 2005 is Rs 500 billion and the real *GNP* is Rs 545.45 billion. In that case,

$$GNP \text{ Implicit Deflator} = \frac{\text{Rs 600.00 billion}}{\text{Rs 545.45 billion}} = 1.10$$

The *GNP* Implicit Deflator multiplied by 100 give the ***Price Index Number*** (*PIN*) for the year 2005. That is,

$$PIN_{2005} = \text{GNP Implicit Deflator} \times 100$$
$$= 1.10 \times 100 = 110$$

Thus, 110 is the price index number for the year 2005. The same procedure can be adopted to calculate *PIN* for other years.

Once *PINs* for different years are calculated, the same can be used to calculate the rate of change in price, i.e., the rate of inflation or deflation. For example, the rate of inflation between the year 2000 and 2005 can be worked out as follows.

$$\text{Rate of Inflation} = \frac{PIN_{2005} - PIN_{2000}}{PIN_{2000}} \times 100$$

$$= \frac{110 - 100}{100} \times 100 = 10 \text{ percent}$$

This means that inflation over a period of 5 years was 10 percent or at an annual average rate of 2 percent.

4.4 METHODS OF MEASURING NATIONAL INCOME

Given the important uses of national income estimates, estimating national income is an indispensable task of the government. However, estimating national income is an extremely complicated and gigantic task. The reason is that the process of income generation in a modern economy is extremely complex and, therefore, collecting necessary data on sources and levels of income is beset with conceptual and data availability problems. The economists have, however, devised different methods of estimating national income. The basic approach in measuring national income is to measure the two kinds of flows generated by the economic activities of the residents of the country. As we know from the circular flows of income, the income generating process creates two kinds of flows:

(a) Product flows, and
(b) Money flows.

The money flows can be looked upon from two angles.

(i) Money flows as factor payments, and
(ii) Money flows as payments for goods and services.

Given the product flows and two ways of money flows, the economists have devised *three methods of measuring national income.*

(i) Net Product Method or the Value Added Method,
(ii) Factor Income Method, and
(iii) Expenditure Method.

Any of the three methods can be adopted to measure *Gross Domestic Product* (*GDP*) of the country provided required data is fully available. Where a single method cannot be adopted due to nonavailability of required data, or due to conceptual problems as to what should be and what should not be included in national income accounting, a combination of the three methods is used to measure *GDP*.

All these methods are, in fact, used to measure the gross domestic product (*GDP*). The estimated *GDP* is then adjusted for net income from abroad to arrive at *GNP*. The three methods of measuring *GDP* based on three approaches are briefly described here. The treatment of net income from abroad is discussed in the following section. The three stages of estimating GDP are described here briefly.

4.4.1 Net Product Method—The Value Added Method

The ***net product method*** is also called the ***value added method.*** This method consists of three stages: "(i) estimating the gross value of domestic output in the various branches of production; (ii) determining the cost of material and services used and also the depreciation of physical assets; and (iii) deducting these costs and depreciation from gross value to obtain the net value of domestic output..."[5]

Measuring Gross Value For measuring gross value of domestic product, output is classified under various categories. The classification of products varies from country to country depending

[5] Paul Studenski, *The Income of Nations–Part Two: Theory and Methods,* (New York University Press, 1958).

on (i) the nature of domestic industries, (ii) their significance in aggregate economic activities, and (iii) the availability of requisite data. For example, seventy-one divisions and sub-divisions were sometime ago used in the US to classify the national output; in Netherlands the classification ranges from a dozen to a score; and only half-a-dozen classifications were used in Russia. According to the CSO publications, twentyone sub-categories of products are currently used in India.

After classifying the output in appropriate categories, the gross value of output of each category is computed by any of the following two alternative methods: (i) by multiplying the output of each category or sector by their respective market prices and adding them together, (ii) by collecting the data on gross sales and inventories from the records of the companies and adding them up. If there are gaps in data, necessary adjustments in estimates are made therefore through interpolations.

Estimating Cost of Production The next step in estimating the net national product is to estimate the intermediate cost of production including depreciation. Estimating cost of production is often a complicated and difficult task because of non-availability of necessary cost data. Much more difficult is the task of estimating depreciation as it involves both conceptual and statistical problems. For this reason, many countries adopt factor income method for estimating their national income.

However, countries adopting net product method find some ways and means to compute the deductible costs. The costs are computed either in absolute terms (where input data are adequately available) or as an overall input-output ratio. For estimating depreciation, the general practice is to adopt the practice followed by the business firms in general. Conventionally, however, depreciation is estimated as some percentage of original cost of capital, permissible under the taxation laws. In some countries, it is estimated as some percentage of total output rather than as percentage of cost of capital. Once depreciation is estimated by a suitable method, it is deducted from the estimated *sectoral gross output* to arrive at net sectoral product, i.e., sectoral *NNP*. The *NNP* of different sectors of the economy are then added together to arrive at the aggregate *NNP*.

Value Added Method The product method, described above, can be understood better through the ***value added method*** of estimating national income. In the net product method, a serious problem is often confronted, i.e., the problem of **double counting**. Value added method is used to avoid *double counting*, i.e., counting the value of a commodity more than once. To understand the problem of double counting, recall the definition of national income (*GDP*). National income is defined as the money value of all *final* goods and services produced in a given period of time. The problem of double counting arises because of the conceptual and practical problem of defining what product is final and what is considered intermediate product. In the process of production, some material products pass from one stage to another. But, at each stage of production, it is transformed into a final product. However, the same final product is used as material input at the next stage in the production process of another commodity. Therefore, the value of the same product is likely to be counted twice, or more than twice, in estimating national income. For example, wheat is the final product for the farmer, Kisanchand. But wheat is an input (raw material) for a flour mill, say, Shaktibhog Atta. Wheat flour is the final product for Shaktibhog Atta company. But wheat flour is used by the bread manufacturer, Britannia Bread Company, as raw material. For Britannia, bread is the final product. But bread is an input for sandwich-maker, the Tastyfood Restaurant. Now, if all these products—wheat, wheat flour, bread and sandwich—are treated as final products, then the value of wheat will be counted at four stages—wheat production, flour production, bread production and sandwich production. This is called *double counting* in national accounting jargon. Double counting results in overestimation of national income. Therefore, in order to avoid the problem of double counting, a method called *value added method* is used to estimate the national income.

The method of calculating *value added* to a product (wheat flour) can be illustrated as follows. Suppose Shaktibhog Flour Mill buys one quintal wheat for Rs 1000 and sells the flour to bread manufacturing company, Britannia, at Rs 1500. This means that Shaktibhog has added a value of Rs 500 to the wheat. Let us suppose that value addition includes the cost components as given below.

Value Addition by Flour Mill (per quintal)

Cost of wheat (intermediate input)	Rs	1000
Transportation cost	Rs	50
Labour Charge	Rs	150
Electricity charge	Rs	100
Storage cost	Rs	50
Depreciation	Rs	50
Profit margin	Rs	100
Sale price	Rs	1500
Less cost of wheat (raw material)	Rs	1000
Value added	Rs	500

For the purpose of estimating national income, the valuation process related to the final product, sandwich, is illustrated below.

Method of Measuring Value Added

(Rs per quintal)

Product	Value of Inputs	Value of Final Output	Gross Value Added (3-2)
1	2	3	4
Wheat	Nil	1000	1000
Flour	1000	1500	500
Bread	1500	2000	500
Sandwich	2000	3000	1000
Total	4500	7500	3000

As the table shows, the gross value added in case of sandwich production turns out to be Rs 3000 per quintal. This per quintal value multiplied by total production of sandwiches gives the total value of the final product, the sandwiches.

This method avoids counting value of wheat, a material input, more than once. The same method of value added is followed for each enterprise producing goods and services within the territory of a country. For the purpose of estimating value added, the following steps are generally followed.

(i) Identifying the production units and classifying them under different industrial activities.
(ii) Estimating net value added by each production unit in each industrial sector.
(iii) Adding up the total value added of each final product to arrive at *GDP*.

4.4.2 Factor Income Method

The factor income method is also known as *factor share method*. In this method, the national income is treated to be equal to all the "incomes accruing to the basic factors of production used in producing the national products." The factors of production are traditionally categorised as land, labour, capital and organisation. Accordingly, the national income is treated as the sum of factor payments, *viz*., rent, wages, interest, and profits, respectively, plus depreciation. Thus,

$$\text{National Income } (GDP) = \text{Rent} + \text{Wages} + \text{Interest} + \text{Profit} + \text{Depreciation}$$

In a modern economy, however, it is conceptually very difficult to distinguish between earnings from land and capital and between the earnings of ordinary labour and entrepreneurial efforts. For the purpose of estimating national income, therefore, factors of production are broadly grouped as labour and capital. Accordingly, the national income is supposed to originate from two primary factors—labour and capital. In some productive activities however, labour and capital are jointly supplied by the same person and it is very difficult to separate the labour and capital income contents from the total earning of the supplier. Such incomes are, therefore, termed as *mixed incomes*. Thus, the national income is considered to be comprised of three components : (i) labour incomes, (ii) capital incomes, and (iii) mixed incomes. These factor incomes have some specific connotation discussed below.

Labour Incomes Labour incomes include: (a) wages and salaries (including commission, bonus and social security payments) paid to the residents of the country; (b) supplementary labour incomes including employer's contribution to social security and employee's welfare funds and direct pension payments to retired employees[6]; and (c) supplementary labour incomes ***paid in kind***, for example, free-of-cost health care, education, food, clothing, accommodation, and servant facility, called perks.

Transfer payments like old-age pensions, service grants, compensation to war-affected people, etc. are not included in labour incomes and labour incomes from incidental jobs, gratuities, tips, and so forth are ignored for lack of data.

Capital Incomes According to Studenski[7], capital incomes include: (a) dividends excluding inter-corporate dividends, (b) undistributed before-tax profits of corporations, (c) interest on bonds, mortgages and saving deposits (but not on war bonds and consumer credits), (d) interest earned

6. Conventionally, pension to the retired employees is considered to be a 'transfer payment' and is excluded from labour income and the national income accounting. In the US, however, this item is included in national income. For details, see Studenski, *op. cit.,* pp. 11 and 118–20.

7. Paul Studenski, *op. cit.,* pp. 118–20.

by insurance companies and credited to the insurance policy reserves, (e) net interest paid out by commercial banks, (f) net rents from land and building, including imputed net rents on the owner occupied dwellings, (g) royalties, and (h) profit of the government enterprises.

The data for the first two items are obtained mostly from the books of accounts submitted by the corporations to the tax authorities for tax assessment purpose. Incidentally, the definition of profit used for national accounting purposes differs from one used by the tax authorities. Some adjustment in data, that is, some additions and some deductions, are made in the assessment of profits in regard to **(i)** the excessive allowance of depreciation, if any, made by the tax authorities, **(ii)** elimination of capital gains and losses because these items do not reflect the change in the current output; and **(iii)** elimination of under- or over-valuation of inventories on book values.

Mixed Incomes Mixed incomes include earnings from: (a) farming enterprises, (b) sole proprietorship (not included under profit and capital incomes), (c) other professions, including legal and medical practice, consultancy services, trading and transportation, and (d) mixed incomes of those who earn their living from various sources, including wages, rent on own property, interest on own capital and so forth.

All the three kinds of incomes, *viz.*, labour incomes, capital incomes, and mixed, are added together to obtain the estimate of the national income by factor-income method.

4.4.3 Expenditure Method

The expenditure method, also known as the ***final product method,*** measures national income at the final expenditure stage. In order to estimate the aggregate expenditure, any of the following two methods may be followed.

(i) *Income Disposal Method*. Under this method, all the money expenditures at market prices are added up together to obtain the total final expenditure.

(ii) *Product Disposal Method*. Under this method the value of the products finally disposed of are computed and added together. This gives a measure of the total final expenditure and, hence, a measure of the national income by expenditure method.

Under the *first method,* the items of expenditure that are taken into account are: (i) private consumption expenditure, (ii) direct tax payments, (iii) payments made to the non-profit institutions and charitable institutions like schools, hospitals, orphanage, etc., and (iv) private savings (or investments). Under the *product disposal method,* the following items of expenditure are included (i) private consumer goods and services, (ii) private investment goods, (iii) public goods and services, and (iv) net investment abroad.

The product disposal methods is far more extensively used compared to the first method because the data required by the second method can be collected with greater ease and accuracy.

4.5 TREATMENT OF NET INCOME FROM ABROAD

As mentioned above, the three methods of estimating notional income give the measure of *GDP* pertaining to a closed economy. In reality, however, most modern economies are, ‘open economies’ in the sense that they have trade relations and other economic transactions with the rest of the world. In the process, some countries make net gains and some net losses. The net gains and losses are, in fact, additions to or deductions from the national income stream. Therefore, in estimating the national income, net incomes from abroad are added to *GDP* and net losses are subtracted from *GDP* to arrive at the national income figure of an open economy. It is important to note here that *GDP* adjusted for net income from abroad is called Gross National Income (*GNI*).

In practice, all the exports of merchandise and of services like shipping, insurance, banking, tourism and gifts are added to the national income. All the imports of goods and services like shipping, insurance, banking, tourism and gifts are subtracted from the national income. The final outcome of these adjustment is a measure of the national income.

4.6 DOUBLE ENTRY SYSTEM OF ACCOUNTING

Another method which is often used in national income accounting is *double entry of book keeping system.* National income accounting is a systematic recording of all economic transactions carried out by different sections of the society and the resulting output. Economic transactions involve at least two 'transactors': one who pays and the one who receives. Note that in the process of earning and spending, each person works as a payer as well as a receiver. He receives money when he sells a product or service and he pays money when he buys a product or service. So each person can be allocated an account containing two sides – credit and debit. What a person receives is recorded on the 'credit' side and what he pays is recorded on the 'debit' side of the account. Thus, a double entry accounting system is one in which both receipts and payments are recorded—receipts on credit side and payments on debit side of the account.

Another aspect of the double entry accounting system is that the account of a person need not balance. A person may spend less than what he receives. Then he or she has a saving. His/her savings are recorded on the debit side to balance the account. That is, account of each person is always in balance, as it is done in double entry book-keeping system of business accounting. Similarly, if a person spends more than what he/she receives, he/she has a debit balance. His/her debit is recorded on the debit side as borrowings and his/her account is balanced. In overall accounting, the sum of savings is equal to the sum of borrowings.

In double entry accounting system many types of accounts can be imagined and operated. Accounts may be based on individual transactors or on the basis of sectoral transactions—consumption and investment. In national income accounting system, the main types of transactions and their accounting include the following.

(i) Private Consumption,
(ii) Government consumption,
(iii) Investment (savings converted into capital),
(iv) Government taxes and spending,
(v) Inventories, and
(vi) Net of foreign transactions (exports and imports).

These sectoral transactions can be shown as the circular flows of incomes and can be converted into equations. For instance, refer to the circular flows of income in two-sector model in Ch. 2. From the two-sector model of circular flows of incomes, the following equations can be derived.

$$Y = C + I = C + S$$

where Y = national income; C = consumption expenditure by households; I = capital spending by firms; and S = savings by households.

In the three-sector model, the national income equation is given as follows.

$$Y = C + I + G = C + S + T$$

where G = government spending, and T = tax revenue of the government.

In four-sector model of circular flows, the equation takes the following form.

$$Y = C + I + G + (X - M) = C + S + T$$

where X = exports and M = imports.

We have described above the method of estimating national income used in India. Let us now look at India's national income estimates and trends.

4.7 MEASUREMENT OF NATIONAL INCOME IN INDIA

Before we discuss the method of measuring national income in India, let us have a brief look at the history of measurement of national income in the country.

4.7.1 History of National Income Measurement in India

The history of measurement of national income in India can be divided under two phases: (i) pre-independence phase, and (ii) post-independence phase. In the **pre-independence phase**, the first attempt ever to measure national income of India was made by Dadabhai Naoroji[8] in 1867-68. Subsequently, several attempts were made by the economists and government officials to estimate India's national income[9]. Most of these estimates had their own methodological and data limitations and, therefore, had doubtful reliability. The first systematic attempt to estimate India's national income was made by Prof. V.K.R.V. Rao for the year 1925-29 and again for the year 1931-32. The estimate of national income made by Prof. Rao is considered to be superior in many respects. By 1949, some other agencies had also estimated India's national income. But all these estimates had serious limitations.

In the **post-independence phase,** the first official estimate of India's national income was made in 1949 by the Ministry of Commerce, Government of India. For the purpose of devising a comprehensive method of data generation and measuring national income, a National Income Commission (*NIC*) was set up in 1949 with P.C. Mahalnobis as Chairman, and D. R. Gadgil and V.K.R.V. Rao as its members. The *NIC* made the first official estimate of the national income for the year 1948-49, and then for the year 1951-52. The methodology developed by the *NIC* was followed till 1967. Since 1967, however, the task of estimating national income has been assigned to the Central Statistical Organisation (*CSO*). The *CSO* had adopted *NIC's* methodology till 1967. Thereafter, *CSO* devised an improved methodology and procedure which could be possible due to

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8. In his book *Poverty and Un-British Rule in India* published in 1867-68.

9. Some widely referred names include Atkinson (1875 and 1895), Major Baring (1881), Digby, W. (1898-99), C. N. Vakil and S.K Mujumdar (1891-94 and 1911-14), Curzon (1901), Home, E. A. (1911), K. T. Shah and K.J. Khambata (1900-1914 and 1921-22), Findlay Shirras (1911 and 1921), V. K. R.V. Rao (1925-29) and *Commerce Journal* (1938-39, 1942-43 and 1947-48).

availability of more comprehensive data. The methodology developed and used by the *CSO,* which is still followed, is described below.

4.7.2 Methodology

An economy comprises of a variety of economic activities resulting in different sources and nature of income. For systematic and reliable accounting of national income, it is essential to classify different types if economic activities and sources of income. It provides conceptual clarity and comprehensiveness to national income estimation. Therefore, the sources and types of national income are classified under different categories. The purpose of classifying different sources and types of economic activities under different sectors is to make national income accounting systematic and analysis of national income data easy and comprehensive. The groups so formed are generally called 'sectors' of the economy. This is called *sectoral accounting of national income.*

For sectoral classification of economic activities, transactors falling under different sectors are classified on the basis of (i) nature of economic activity, also called functional classification, and (ii) the use of the national income. The basis of classification is chosen in accordance with the purpose and method chosen for estimating national income. In mixed economies, economy is often classified as (i) private sector, and (ii) public sector.

(i) Sectoral Classification of Economy For the purpose of estimating national income, the *CSO* uses the following sectoral classification of economy.

(i) ***Primary sector,*** including agriculture and allied activities, forestry, fishing, mining and quarrying;
(ii) ***Secondary sector,*** including manufacturing industries, and
(iii) ***Tertiary sector or service sector,*** including banking, insurance, transport and communication, trade and commerce.

Depending on the purpose and data availability, these broad sectors of the economy are sub-classified under their sub-categories. For the purpose of estimating national income, the broad sectors are further divided under sub-sectors as given below.

I. *Primary sector*

1. Agriculture,
2. Forestry and logging,
3. Fishing,
4. Mining and Quarrying.

II. *Secondary sector*

1. Manufacturing,
2. Registered manufacturing,
3. Unregistered manufacturing,
4. Construction,
5. Electricity, water and gas supply.

III. *Tertiary sector*

A. Transport, Trade and Communication

1. Transport, storage and communication
2. Railways,
3. Other means of transport,
4. Communication,
5. Trade, hotels and restaurants.

B. Finance and Real Estate

1. Banking and insurance
2. Real estate for residential and business purposes

C. Community and Personal Services

1. Public administration and defence
2. Other services.

(ii) *Methods of Measuring National Income* It may be noted at the outset that, given the nature of the Indian economy and the paucity of reliable data, it is not possible to use any single method, or to estimate the national income by using each method separately. For example, income method cannot be used for the agricultural sector because of unavailability of reliable data, and income of household enterprises cannot be estimated by the expenditure method. Therefore, a combination of different methods, especially of *value added method* and *income method,* is used for estimating national income.

Given the sectoral and sub-sectoral classification of the economy, let us now look at the methods adopted by the *CSO* for estimating income of the different sectors.

Production method, what is also called ***net output method* or *value added method,*** is used to estimate income or domestic product of the following production sectors.

1. Agricultural and allied services,
2. Forestry and logging,
3. Fishing,
4. Mining and Quarrying,
5. Registered manufacturing.

Income method is used for estimating domestic income of the following sectors.

1. Unregistered manufacturing,
2. Gas, electricity and water supply,
3. Banking and insurance,
4. Transportation, communication and storage,
5. Real estate, ownership of dwellings and business services,
6. Trade, hotels and restaurants,
7. Public administration and defence,
8. Other services.

For the sake of comparison of estimates and to check their reliability, *CSO* estimates national income also on the basis ***expenditure method.*** Under the ***expenditure method*** of estimating national income, sectoral division of the economy is based on the use pattern of the national income. In India, the sectoral accounting of *GDP*, based on the expenditure method, follows the following classification of the national income given below.

1. *Private final consumption expenditure* including expenditure on (a) durable goods, (b) semi-durable goods, (c) non-durable goods, and (d) services.
2. *Government final consumption expenditure*
3. *Gross fixed capital formation* including construction, machinery and equipments,
4. *Change in stocks,* and
5. *Net export of goods and services.*

What kind of sectoral division of economic activities is made depends on the uses of income and the method chosen for the purpose of estimating national income. Often all the three methods are chosen for the sake of completeness and comparison.

Incidentally, a combination of ***expenditure method*** and ***commodity-flow approach*** is adopted for estimating income generated in the ***construction sector.***

(iii) Methods of Measuring National Income Aggregates Estimating national income – more appropriately gross national product (*GNP*) – is not the end of the story. Once *GNP* of the country is estimated, it provides the basis of measuring other national income aggregates. The process of generating macroeconomic aggregates other than *GNP* is shown below in tabular form.

National Products and Related Aggregates

Items	Amount (Rs)	G. Total (Rs)
1. Gross National Product (at factor cost)		–
Plus Indirect Taxes	–	
Less Subsidies	–	
= Gross National Product at market price		–
2. Gross National Product at market price		–
Less Consumption of fixed capital	–	
= Net National Product at market price		–
3. Net National Product at market price		–
Less Net Factor Income from abroad	–	
= Net Domestic Product at market price		–
4. Net Domestic Product at market price		–
Less Indirect Taxes	–	
Add Subsidies	–	
= Net Domestic product at factor cost		–

5. Net Domestic Product at factor cost		–
Less Income from properties and departmental Administrative enterprises	–	
Less Savings of non-departmental enterprises	–	
= Private Sector Domestic Product		–
6. Private Sector Domestic Product		–
Add National Debt Interest	–	
Add (or deduct) Net factor Income from abroad	–	
Add Transfers from Administrative Departments	–	
Add Other Net Transfers from the rest of the world	–	
= Private Income		–
7. Private Income		–
Less Private Corporate Savings net of retained earnings of foreign companies	–	
Less Corporate Income Tax	–	
= Personal Income		–
8. Personal Income		–
Less Direct Taxes paid by Households	–	
Less Miscellaneous Payments to government departments (fees, fines, penalties, etc.)	–	
= Personal Disposable Income		–

4.7.3 Estimates of India's National Income

Having described the method of measuring national income used in India, we present in this section the actual estimates of some major aspects of India's national income and its growth rate. The national income estimates are presented here in terms of absolute numbers and growth rates. Let us first look at the estimates of national income in absolute numbers.

Table 4.2 presents estimates of India's *GNP, NNP* and per capita income, all at factor cost at current and constant prices of 1999-2000. National figures are shown first for Plan-end years till 2000 and in annual years. As Table 4.2 shows, *GNP, NNP* and per capita income in India have been increasing almost continuously over the last 55 years, as estimated at current and constant prices of 1999-2000. In fact, national income of India increased at a higher rate, and almost continuously, after economic liberalisation in 1990-91. However, the income growth accelerated over the past decade. National income data given in Table 4.2 gives a long-term view.

4.7.4 Growth Rates

A better view of the performance of the economy can be had by looking at plan-wise annual average growth of *GNP, NNP* and per capita *NNP*. The plan-wise annual average growth rate of *GNP, NNP* and per capita *NNP* are given in Table 4.3 at both current and constant prices.

Certain important conclusions can be drawn from the data given in Table 4.3. *First,* as the table shows, India's *GNP, NNP* and per capita *NNP* have registered positive growth rates – low and high – throughout the Plan period, except in 1979-80 when *GNP* registered a *negative* growth rate of 5.0 percent, *NNP* a negative growth rate of 6.0 percent and per capita *NNP a negative* growth of 8.2 percent.

Table 4.2 Estimates of India's GNP, NNP and Per Capita Income at Factor Cost

Year	*Gross National Product (Rs in Crore)*		*Net National Product (Rs in Crore)*		*Per Capita NNP (Rs)*	
	At Current prices	*At 1999-00 prices*	*At Current prices*	*At 1999-00 prices*	*At Current prices*	*At 1999-00 prices*
1950-51	9678	223899	9153	204924	225	5708
1955-56	10508	268105	10027	254412	255	6474
1960-61	16440	328373	15593	309045	359	7121
1965-66	25883	375098	24479	350374	505	7224
1970-71	42697	470254	40135	437719	742	8091
1975-76	76816	548232	70736	504138	1165	8305
1980-81	132865	641919	121129	583548	1784	8594
1085-86	252998	809521	227703	733029	3016	9709
1990-91	507487	1067694	456409	967773	5440	11535
1995-96	1069805	1380321	958679	1243724	10331	13402
1999-00	1771094	1771094	1589632	1589672	15881	15881
2000-01	1902284	1841755	1700467	1647903	16688	16172
2001-02	2077658	1951935	1849360	1743466	17782	16764
2002-03	2244725	2029482	1994248	1805830	18885	17101
2003-04	2519921	2204913	2239939	1963544	20895	18317
2004-05	2855331	2366886	2526408	2104520	23199	19325
2005-06	3256269	2595441	2875958	2308015	26003	20868
2006-07	3749607	2849856	3112569	2533450	29524	22580
2007-08 (Q)	4297047	3114864	3787596	2764795	33283	24295

Q = Quick Estimates

Source: Central Statistical Organisation, Data reproduced in *Economic Survey*-2008-09, GOI, MOF, Economic Division, Statistical Appendix, Table 1.1.

Second, the growth rate of India's national income was the lowest (2.8 percent) during the Third Plan period (1961-66) and its growth rate was the highest in the Tenth Plan period (2002-05). During this period, per capita income at constant prices of 1999-00 prices had increased at 6.1 percent which was the highest ever.

Third, a comparison of income growth rates at current and constant prices shows that *GNP, NNP* and per capita *NNP* at current prices have grown at a much higher rate than at constant prices. It means that Indian economy has been constantly under the pressure of inflation—sometimes low and sometimes high.

4.7.5 Recent Growth in India's National Income

It is useful to have a look at the growth in India's national income in the recent past. This gives an idea of the likely growth in Indian economy. The growth rates of India's *GNP, NNP* and per capita *NNP* are given in Table 4.4.

Table 4.3 Annual Growth Rate of India's *GNP, NNP* and Per Capita *NNP* (At Factor Cost)

(Percent)

Plan	GNP		NNP		*Per Capita* NNP	
	At current prices	*At 1999-00 prices*	*At current prices*	*At 1999-00 prices*	*At current prices*	*At 1999-00 prices*
First Plan (1951-56)	1.8	3.7	2.0	4.4	0.2	2.6
Second Plan (1956-61)	8.8	4.0	8.7	3.8	6.5	1.7
Third Plan (1961-66)	9.6	2.8	9.6	2.6	7.2	0.4
3 Annual Plans (1966-69)	12.3	3.9	12.3	3.9	9.9	1.6
Fourth Plan (1969-74)	11.1	3.4	10.8	3.1	8.3	0.8
Fifth Plan (1974-79)	10.7	5.0	10.3	4.9	7.9	2.6
Annual Plan (1979-80)	9.4	–5.0	8.3	–6.0	5.7	–8.2
Sixth Plan (1980-85)	15.4	5.4	15.2	5.4	12.8	3.1
Seventh Plan (1985-90)	14.1	5.5	13.8	5.5	11.4	3.3
2 Annual Plans (1990-92)	15.7	3.2	15.6	3.1	13.3	1.0
Eighth Plan (1992-97)	16.4	6.6	16.5	6.7	14.2	4.5
Ninth Plan (1997-2002)	10.8	5.5	10.6	5.3	8.5	3.3
Tenth Plan (2002-07)	12.6	7.8	12.5	7.8	10.8	6.1

Source: *Economic Survey*-2008-09, GOI, MOF, Economic Division, Statistical Appendix, Table 1.2.

As can be seen in Table 4.4, growth rate of India's real *GNP* has almost continuously increased over the last 6 years from 4.0 percent per annum in 2000-01 to 9.7 percent in 2006-07 (based on quick estimates). A similar trend can be observed in case of *NNP* growth rate. More significantly, per capita real income too has increased almost continuously, though rates have been varying. However, over the period from 2003-04 to 2007-08 (Q), the growth rate of real per capita income has registered an unprecedented increase at about 9 percent. However, due to global recession, it is predicted that India's *GDP* is likely to grow at about 7.0 percent in 2008-09.

Table 4.4 Annual Growth Rate (%) of India's *GNP, NNP* and Per Capita *NNP* – 2000-01 to 2007-08 (All at Factor Cost)

Year	*Gross National Product*		*Net National Product*		*Per Capita NNP*	
	At Current price	*At 1999-00 prices*	*At Current prices*	*At 1999-00 prices*	*At Current prices*	*At 1999-00 prices*
2000-01	7.4	4.0	7.0	3.7	5.1	1.8
2001-02	9.2	6.0	8.8	5.8	6.6	3.7
2002-03	8.0	4.0	7.8	3.6	6.2	2.0
2003-04	12.3	8.6	12.3	8.7	10.6	7.1
2004-05	13.4	7.5	12.9	7.3	11.1	5.6
2005-06	14.3	9.6	13.8	9.6	12.1	7.9
2006-07	15.2	9.8	15.2	9.8	13.5	8.2
2007-08 Q	14.8	9.3	14.3	9.1	12.5	7.6

P = Provisional Estimates Q = Quick Estimates

Source: *Economic Survey*-2008-09, GOI, MOF, Economic Division, Statistical Appendix, Table 1.2.

SUGGESTED READINGS

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QUESTIONS FOR REVIEW

1. Distinguish between economic and non-economic production in national income accounting. Why is non-economic production excluded from national income estimates?
2. Distinguish between:
   (a) *GNP* and *GDP*
   (b) *NNP* and *NDP*
   (c) Nominal *GNP* and Real *GNP*.
3. Explain the difference between final products and intermediates. How does the inclusion of intermediates affect the measure of national income?
4. What are the methods of measuring national income? What conceptual problems are confronted in estimating national income?

5. What is meant by double counting? How does it affect the measure of *GNP*? What is the method used to avoid double counting?
6. Explain the concept of *value added* and the value added method of measuring *GNP*.
7. Suppose wheat costs Rs 10 per kg., wheat-flour costs Rs 12 per kg., and price of bread is Rs 8 per 500 grams. Find value added at different stages of bread production.
8. Suppose A sells a product to B at Rs 100 and B sells it to C at Rs 150. Finally, C sells the product to D, the final consumer. What is the total value added?
9. How does the *GNP* estimate of a closed economy differ from that of an open economy? How is net income from abroad treated in *GNP* and *GDP*?
10. Distinguish between net product and factor-income methods of measuring national income. Why do the two methods yield the same measure?
11. State in case of each of the following items whether they are included in *GNP*, *NNP* and personal income.
    (a) Depreciation
    (b) Old age pensions
    (c) Unemployment allowance
    (d) Social security payments
    (e) Excise revenue
    (f) State sales tax revenue
    (g) Salary of the government officials
    (h) Unsold stock of the finished goods
    (i) Capital gains.
12. What is meant by *GNP* deflator? What purpose does it serve in national income analysis?
13. From the following data, compute (i) real *GNP*, (ii) *GNP* deflator, and (iii) implicit *GNP* deflator, and (iv) rate of inflation.

Year	*Nominal GNP* (*Rs crore*)	*Wholesale PIN* (1993-94 = 100)
2002-03	2248614	166.8
2003-04	2531168	175.9

14. Explain factor income method of estimating national income. How is this method different from expenditure method?
15. What are the methods of estimating national income in India? Name the sectors which are used in estimating national income in India?
16. What is double accounting system of accounting? What are the accounts used in national income accounting?
17. Write a note on the sectoral and sub-sectoral division of economy for estimation of national income in India.
18. From the data given below, calculate (i) GDP at market price, (ii) GDP at factor cost, and GNP.

Household consumption expenditure	Rs 550 billion
Government consumption expenditure	Rs 250 billion
Gross fixed capital formation	Rs 100 billion
Depreciation	Rs 150 billion
Indirect taxes	Rs 160 billion
Subsidies	Rs 40 billion
Exports	Rs 200 billion
Imports	Rs 250 billion
Net Income from abroad	Rs 150 billion

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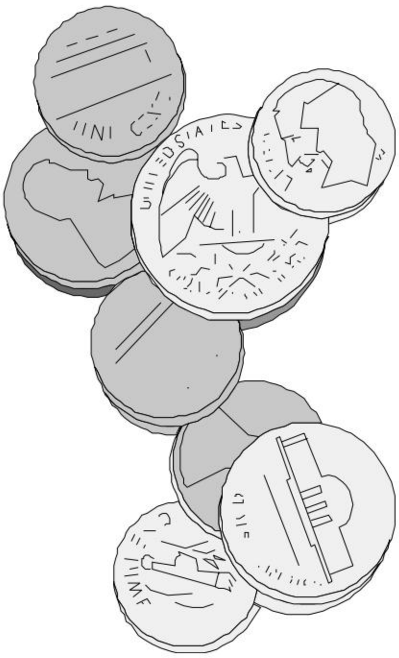
Part 2

Product Market Analysis: Theory of National Income Determination

This part of the book commences with the study of macroeconomic theories. It begins with a detailed discussion on the theory of national income determination. It deals first with classical theory of output and employment determination in Chapter 5. This is followed by a detailed discussion on the Keynesian theory of national income determination. The theory of income determination has been discussed in three models: (i) a simple economy model, i.e., an economy without government and foreign transactions in Chapter 6, and the multiplier effect of the change in investment expenditure, (ii) a closed economy model, i.e., an economy without foreign sector in Chapter 7, and (iii) open economy, i.e., an economy with including foreign sector, in Chapter 8.

Chapter 5

The Classical Theory of Output and Employment



INTRODUCTION

In Part 1 of the book, we have introduced macroeconomics, discussed certain concepts and the methods of estimating national income. In this Part, we begin our study of macroeconomic theories. The study of macroeconomic theories commences, generally, with the theory of national income determination. A formal theory of national income determination was first propounded by John Maynard Keynes in his *General Theory*. So the study of national income determination should begin with the Keynesian theory of national income determination. However, before we proceed, let us have a look at, what is called, the classical theory of output and employment.

It should be noted at the outset that the classical economists[1] had not expounded any single, monolithic theory or thought which can be referred to as classical macroeconomics[2]. There is no coherent macroeconomic theory or model developed by the classical economists, nor a theory of

1. The term 'classical economists' has been used in economic literature to refer to different groups of economists. Karl Marx, for instance, used the term 'classical economist' to refer to the economists from Adam Smith to David Ricardo whereas Keynes used the term in his *General Theory* to refer to virtually all the pre-Great Depression economists, including David Ricardo, J. S. Mill, Alfred Marshall and A.C. Pigou. In modern literature, Marshall and Pigou are classified among the neo-classical economists. However, the term 'classical economics' has been used here in the Keynesian sense.

2. Brooman, F.S., *Macroeconomics*, (London, George Allen and Unwin, 1970), p.371.

national income determination. Therefore, in the opinion of some economists, it is 'somewhat inaccurate to talk about the macroeconomic theories' of the classical economists[3]. This however should not mean that the classical economists had not given any thought to the issue of how aggregate output is determined in an economy. They had, in fact, made certain *postulates* about the macroeconomic issues. The modern economists have, however, reinterpreted macroeconomic thoughts of the classical economists and constructed the classical macroeconomics by piecing together the classical thoughts related to macroeconomic issues. The classical macroeconomics constructed by Keynes consists broadly of the classical theories of output and employment and the quantity theory of money. This chapter deals with the *classical theories of output and employment determination*. The *classical theory of money* will be discussed in Part V of the book. Let us begin with a brief review of the classical postulates.

5.1 THE CLASSICAL POSTULATES

The classical economists had, in their approach to macroeconomics issues, assumed certain macro aspects of the economy to be given. They provided deductive logic but little empirical support to their views on macroeconomic issues. Their views were called by Keynes as 'postulates of the classical economics'. The main postulates of the classical economics are described below.

1. There is Always Full Employment The classical economists postulated that all employable resources—labour and capital—of a country are always fully employed in the long run. If there is unemployment at any time, then there is a tendency towards full employment, provided there is no external or government interference with the functioning of the economy.[4] In the classical view, full employment does not mean that all the resources are fully employed—there might be frictional and voluntary unemployment in the state of full employment.

2. The Economy is Always in the State of Equilibrium The classical economists postulated that an economy is always in the state of equilibrium. They believed that full employment of resources generates incomes, on the one hand, and goods and services, on the other. The value of goods and services is always equal to incomes generated through the process of production. The income earners spend their entire income on goods and services produced. This implies that the entire output of goods and services is sold out. There is *no general overproduction* and there is *no general underproduction* over a period of production. To put it in the Keynesian terminology, in the classical system, the aggregate demand is always equal to aggregate supply in the long run, and the economy remains in stable equilibrium.

The classical postulates of full employment and equilibrium of the economy are based on the assumption that the economy works on the principles of *laissez-faire*. The *laissez-faire* system has the following features:

(i) There is no government control or regulation of private enterprises, if any, it is limited to ensure free competition;
(ii) There are no monopolies and restrictive trade practices—if there are any, they are eliminated by law;

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3. Ackley, G., *Macroeconomics Theory*, (Macmillian, London, 1961), p.109.
4. Pigou, A. C., *Equilibrium and Full Employment*, (Macmillan, London, 1941), p.78.

(iii) There is complete freedom of choice for both the consumers and the producers; and
(iv) Market forces of demand and supply are fully free to take their own course depending on the demand and supply conditions.

3. Money does not Matter The classical economists treated money only as a medium of exchange. In their opinion, the role of money is only to facilitate the transactions. It does not play any significant role in determining the output and employment. The levels of output and employment are determined by the availability of *real resources,* that is, labour and capital.

Summary *The classical economists held the view that, an economy based on laissez-faire principles, is always in the state of equilibrium at full employment. The free market mechanism ensures optimal allocation of resources so that marginal productivity of factors in all industries is the same. The work force is fully employed at the market wage rate. Actual output equals potential output. There is neither underproduction nor overproduction. The entire market system works automatically and it maintains the economy in equilibrium. Whenever there is a deviation from equilibrium, the 'invisible hands' of demand and supply come into operation and restore the equilibrium.*

5.2 SAY'S LAW: THE FOUNDATION OF CLASSICAL MACROECONOMICS

Say's law states that "**supply creates its own demand"** or "supply calls forth its own demand." The logic behind this law is that supply of goods itself generates sufficient income to generate a demand equal to the supply of goods. This is how supply creates its own demand. The significance of this simple law is that it is regarded as the core of 'classical' macroeconomic thought.

The law that 'supply creates its own demand' is generally attributed to a French economist, Jeane Baptiste Say (1767-1832), though some scholars trace the origin of this law to the writings of James Mill.[5] However, it was J. B. Say who refined this law. The law is therefore known as Say's law. Say's law is regarded as the 'beginning of sound thinking in macroeconomics.'[6] This law can be explained in the context of both a barter system and a monetised economy.

In a *barter economy*, people tend to specialise in the production of goods or services which they can produce relatively more efficiently, though they consume many other goods and services. They acquire other goods and services they consume in exchange for their own produce. When they offer their produce in barter for other goods, they create demand for other goods. For example, a farmer offers his surplus produce (say, wheat) to the weaver in exchange for cloth. Thus, the farmer creates demand for cloth. The weaver who is in need of wheat produces surplus cloth which creates demand for wheat. Thus, production of wheat creates demand for wheat.

In this kind of an economy, there cannot be overproduction or underproduction. The reason is, in a barter economy, people produce goods for own consumption. They produce what they

5. See Joseph J. Spengler, "The Physiocrats and Say's Law of Demand," *Jl. of Pol. Eco*., 53, 1945, pp. 25–46.
6. Mark Blaug, *Economic Theory in Retrospect*, 3rd. ed., (Vikas Publishing House, Delhi, 1982), p.153.

consume and they produce as much as they consume. The surplus production, if any, is bartered away for other goods. So there is no underproduction. Also, people do not produce in excess of their consumption needs including what they exchange for other goods. Therefore, there cannot be overproduction. If there is any under- or over-production at some point of time, it is due to wrong calculation of the consumption need.

Say's law applies equally well to the *monetized economy*. Unlike barter system, money is used as medium of exchange in an monetized economy, that is, goods are bought and sold with the use of money. In an monetized economy, the logic of 'supply creates its own demand' works somewhat differently. Production in a market economy is meant for sale in the market. Production of goods requires employment of factors of production—land, labour, capital, and entrepreneurship. The employment of factors of production generates money income in the form of wages, interest, rent and profits. By spending their money income on the goods they produce, they create demand. It follows that if there is production, there is income, and if there is income, there is demand for goods including demand for goods whose production creates income. Thus, supply creates its own demand in a market economy.

5.2.1 Two Major Conclusions of Say's Law

(i) No General Overproduction or Underproduction We have noted above Say's view on why there is no overproduction and underproduction. Say's law was, however, refined and popularised in England by a group of classical economists, especially by David Ricardo. This is known as the classical formulation of Say's law. The *classical reformulation of Say's law* states that, in a capitalist economy, total supply always equals total demand and that there cannot be 'general underproduction' or 'general overproduction.' In the opinion of classical economists, underproduction and overproduction, if any, are only transitory. Underproduction and overproduction, if ever, are caused by external factors, i.e., foreign factors affecting the economy, and are always minor and temporary. That is, there might be short-term imbalances in the demand for and supply of some goods and services caused by the exogeneous factor. The short-term demand-supply imbalance is corrected and equilibrium restored in a capitalist economy by the market forces. When there is underproduction, demand exceeds supply. Excess demand leads to rise in prices which reduces demand, on the one hand, and encourages supply, on the other. Similarly, when there is overproduction, prices tend to decrease. Decrease in price results in decrease in supply, on the one hand, and increase in demand, on the other. This process of demand-and-supply adjustment restores the equilibrium. Thus, in the long run, a market economy will always be in equilibrium. A simple proof of the 'classical' long-run equilibrium can be described as follows.

$$\begin{aligned}
\text{Value of Total Production} &= \text{Cost of Production} \\
\text{Cost of Production} &= \text{Wages} + \text{Rent} + \text{Profit } (+ \text{ Interest}) \\
\text{Wages} + \text{Rent} + \text{Profits} &= \text{Factor Incomes} \\
\text{Factor Incomes} &= \text{Total Expenditure} \\
\text{Total Expenditure} &= \text{Value of Total Production} \\
\text{Total Demand} &= \text{Total Supply}
\end{aligned}$$

(ii) No Unemployment Under Classical System As mentioned earlier, classical economists postulated that, in a capitalist economy, full employment is a normal affair. It means that there cannot be general unemployment in a capitalist economy. In their opinion, full employment ensures that actual output equals the potential output. Full employment coincides with equilibrium level of output. In classical view, total production is always sufficient to maintain the economy at the level of full employment in a free market economy. Unemployment, if any, is a temporary phenomenon. Whenever there is unemployment, wages decrease. Decrease in wage rates makes employment of labour more profitable. This results in increase in demand for labour and unemployment disappears.

However, classical economists did not rule out the existence of *voluntary* and *frictional unemployment* in the state of full employment. In their opinion, ***voluntary unemployment*** arises when:

(a) potential workers are unwilling to work at the prevailing wage rate or at a slightly lower wage rate,
(b) workers go on strike (unpaid) for higher wages,
(c) rich persons are unwilling to work, that is, the *idle rich*,
(d) some persons prefer leisure or idleness to better life, that is, the case of very *poor*, mendicants, *sadhus* and *sanyasins*.

Frictional unemployment arises when workers remain temporarily out of job due to labour market imperfections, immobility of labour, seasonal nature of occupation as in agricultural activities, technological changes, natural calamities, wars, and so on.

The existence of voluntary and frictional unemployment was consistent with the classical postulate of full employment.

5.3 CLASSICAL THEORY OF EMPLOYMENT: A FORMAL MODEL OF SAY'S LAW

This section presents a formal model of Say's law as constructed by the Keynesians. It is noteworthy that classical economists had *not* developed any theory or model of employment. They believed that 'available resources' including 'employable population,' 'natural wealth' and 'accumulated capital equipments' determine employment. In the words of Keynes, however, "... the pure theory of what determines the *actual employment* of the available resources have seldom been examined in great detail. [But] To say that it has not been examined at all would, of course, be absurd". In fact, "... it has been deemed so simple and obvious that it has received, at the most, a bare mention"[7] However, Keynes had himself used the essence of classical thoughts on employment and constructed classical theory of employment. The classical model of employment that we describe below was summarily described by Keynes in his *General Theory* (Ch. 3) and was reconstructed by some of the early Keynesian critics of the classical economics.[8] The classical model of employment as reconstructed by Keynesians consists of two components:

(i) Aggregate production function, and

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7. *General Theory*, pp. 4–5.

8. Sherman, H. J. and Evans, G. R., *Macroeconomics : Keynesian, Monetarist, and Marxist Views,* (Harper & Row, NY, 1984), p.44.

(ii) Labour supply and labour demand functions.

These two functions are used to show the determination of output and employment. The classical model presented below displays the determination of the real output and employment required to produce equilibrium level of national output, and the general price level under the condition of a given money supply.

5.3.1 The Aggregate Production Function

The aggregate production function is central to the classical model as it determines simultaneously the aggregate output and employment. According to the classical economists, the national output of a country at any point in time depends on the capital and labour employed. The aggregate production function used in the reconstructed classical model can be expressed as:

$$Y = f(K, L) \tag{5.1}$$

where Y = aggregate real output, K = capital (fixed), and L = amount of labour (homogeneous) required to produce Y.

The classical production function (5.1) assumes (i) the stock of capital (K) is fixed, (ii) technology of production used by the firms is given, and (iii) population is constant. Obviously, classical production function has been constructed in a short-run framework. The national output in the short-run is therefore the function of the employment of labour drawn from the constant population. The model assumes also that the use of successive units of labour is subject to the law of diminishing returns. In other words, marginal productivity of labour, defined as $MP_L = \Delta Y/\Delta L$, decreases with an increase in employment. According to the classical view, the level of output at which $MP_L = 0$ marks the level of maximum possible level of employment and national output.

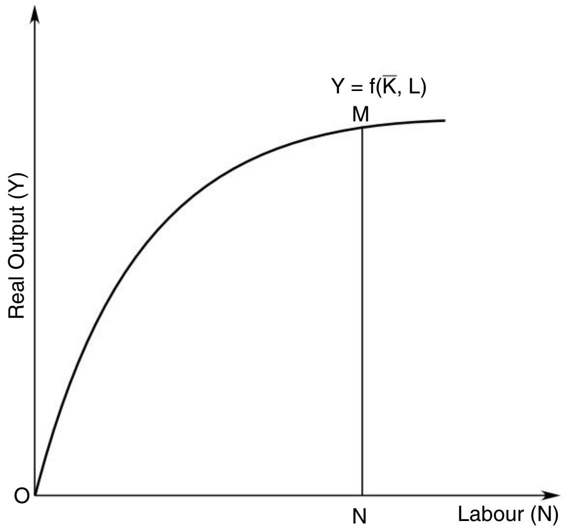


Fig. 5.1 The Classical Production Function

Figure 5.1 presents the short-run aggregate production function [$Y = F(\bar{K}, L)$] under the assumptions that capital (K) is constant and employment of labour yields diminishing returns. As Fig. 5.1 shows, $\Delta Y/\Delta L$ (given by the slope of the production function) goes on decreasing as labour employment increases. As the total production curve (marked $Y = F(\bar{K}, L)$) shows, marginal productivity of labour ($\Delta Y/\Delta L$) goes on decreasing as labour employment increases and $\Delta Y/\Delta L$ tends to zero. Let us suppose that at point M, $\Delta Y/\Delta L \simeq 0$. The point M, therefore, marks the limit of employment at ON and total output at MN.

5.3.2 The Labour Market: Labour Supply and Demand

According to the classical theory of employment, the level of full employment is determined by the equilibrium of the labour market. The level of full employment is determined where labour supply equals labour demand. In fact, equilibrium levels of both employment and wage rate are determined by the equilibrium of the labour market. Equilibrium of the labour market is illustrated by labour supply and labour demand curves. Therefore, before we explain the determination of employment in the neo-classical model, let us explain the derivation of the labour supply and demand curves.

Labour Supply Curve The supply of labour is a function of real wages[9]. Real wage (W_r) is defined as W/P (where W is nominal wage rate and P is the price level). The relationship between labour supply and real wage is given by the law of labour supply. The law of labour supply states that supply of labour increases with increase in the real wage rate. As is widely known, this relationship holds only till the point of work-leisure trade-off. Beyond the trade-off point, the relationship between work and leisure turns inverse, and the labour supply curve bends backward[10]. In general, however, the labour supply function and labour supply curve are based on the assumption of positive relationship between real wages and labour supply and is written as

$$L_s = f(W_r),\ \Delta L_s/\Delta W_r > 0 \qquad \textbf{(5.2)}$$

The labour supply curve based on the function (5.2) is presented in Fig. 5.2.

Labour Demand Curve Let us now derive the labour demand curve. According to the neo-classical theory of labour demand, demand for labour depends on its *marginal revenue productivity* of labour (MRP_L) and real wage (W_r). Labour demand function can thus be expressed as:

$$L_D = f(W_r,\ MRP_L) \qquad \textbf{(5.3)}$$

Thus, given the real wage rate (W_r), the demand for labour is the function of its MRP_L. By definition $MRP_L = MPP_L \times P$ (where P is the price of the commodity labour produces and MPP_L is the marginal physical productivity of labour). In a perfectly competitive market, product price (P) is constant. In order to derive the labour demand curve, we need to derive the MPP_L curve.

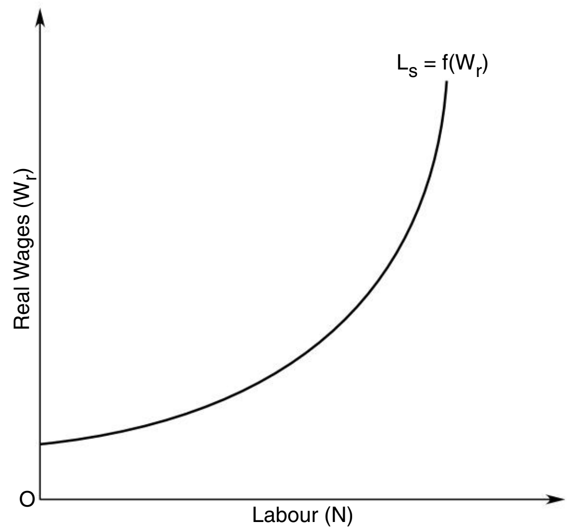


Fig. 5.2 The Labour Supply Curve

9. Real wage rate (W_r) is nominal wage (W_n) adjusted for inflation. A simple method of converting W_n into W_r is to divide W_n by the *ratio* of current price index (PI_c) to base year price index (PI_b). That is,

$$W_r = W_n / (PI_c / PI_b).$$

10. Students not familiar with labour supply curve are advised to see the author's *Microeconomics: Theory and Applications* (Pearson Education, Delhi, 2003), Ch. 20.

The MPP_L curve can be derived directly from the total production function given in Fig. 5.1 by measuring the slope ($\Delta Y/\Delta L$) of the production curve at different levels of labour employment. There is another a simpler and direct method of deriving the MPP_L curve. The MPP_L curve can be derived by assuming a short-run production function of empirical nature conforming to the production curve presented graphically in Fig. 5.1. Let us assume a short-run quadratic production function[11] as given below.

$$Q = bL - cL^2 \tag{5.4}$$

(where b and c are constants).

Given the short-run production function (5.4), MPP_L can be obtained by the first derivative of Eq. (5.4). That is, $MPP_L = \partial Q/\partial L$ can be written as

$$MPP_L = \frac{\partial Q}{\partial L} = \frac{\partial (bL - cL^2)}{\partial L} \tag{5.5}$$

This method is used where labour is infinitesimally divisible. In practice, however, labour is changed by one unit. Under this condition, there is a more simple and practical method of measuring MPP_L given as

$$MPP_L = Q_n - Q_{n-1} \tag{5.6}$$

(where Q_n = output from 'n' labour and Q_{n-1} = output from 'n–1' labour)

Once production function (Eq. 5.4) is estimated on the basis of factory data, the numerical value of constants 'a' and 'b' would be known and MPP_L (Eq. (5.6)) can also be easily worked out.

For example, let us suppose that production function (5.4) is estimated as

$$Q = 55L - 5L^2 \tag{5.7}$$

Given the production function (5.7), total output from different number of workers can be easily worked out by assigning a numerical value to L. For example, suppose $L = 2$. Then $Q = 55(2) - 5(2) = 40$, and so on. Thus, one can generate a series of labour and output. Table 5.1 presents the total output from 1 to 7 labours, as shown in Column (2) of Table 5.1. Once total output (Q) produced by different number of labour is calculated, the MPP_L can easily be worked out, as $MPP_L = Q_n - Q_{n-1}$, as shown in column (3) of the table.

Given the output data, the production function (Eq. 5.7) and MPP_L can be presented graphically by plotting the data given in Table 5.1. The production function (5.7) is presented graphically by total production (TP) curve and MPP_L by the MPP_L-curve in Fig. 5.3. Note that marginal productivity of labour (MPP_L) goes on diminishing as employment of labour increases. Thus, the curve MPP_L represents the law of diminishing return.

11. 'Why quadratic production function'? is explained below. The general production function, or what is also called 'long-run production function' is expressed as $Q = f(L, K)$, where L = labour and K = capital.

In the short run, however, capital (K) is assumed to remain constant. Therefore, production is assumed to depend on the employment of labour only. In that case, short-run production function is expressed as

$$Q = f(L), \ (K \text{ assumed to be a constant factor}).$$

The estimated form of short-run production function depends on the labour-output relationship. Given the law of diminishing returns to variable input (L), production function takes the form of a quadratic equation as given in equation (5.4) in the text.

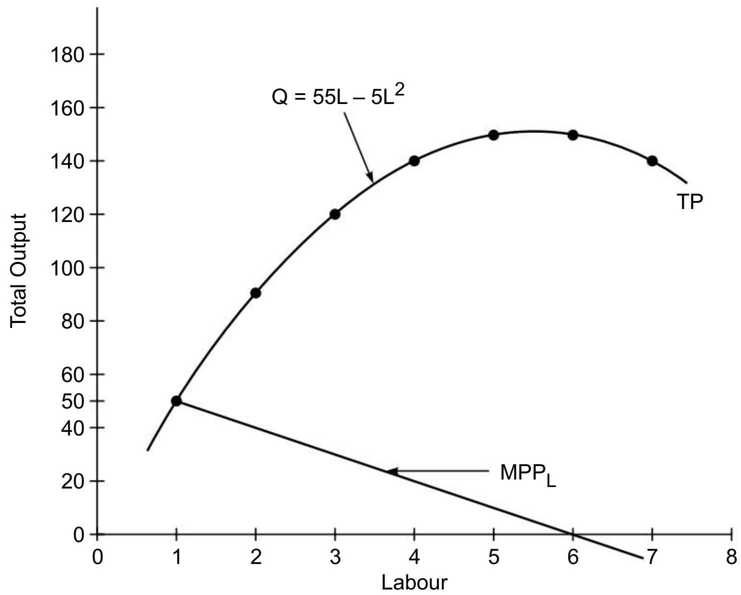


Fig. 5.3 Derivation of Total Production (*TP*) and MPP_L Curves

Table 5.1 Output and Marginal Productivity of Labour

Labour (*L*)	$Q = 55L - 5L^2$ (2)	$MPP_L = Q_n - Q_{n-1}$ (3)	$MRP_L = MPP_L \times P$ (P = 2) (4)
1	50	50	100
2	90	40	80
3	120	30	60
4	140	20	40
5	150	10	20
6	150	0	00
7	140	–10	–20

Let us compare the MPP_L measured by the two methods. As noted above (see Eq. 5.5), the MPP_L function, can be derived directly from production function (Eq. 5.7), as shown below.

$$MPP_L = \frac{\partial(55L - 5L^2)}{\partial L} \tag{5.8}$$

$$= 55 - 10L$$

However, since this method is based on calculus technique, the numerical values of MPP_L will be different from those given in Col. 4 of Table 5.1. For example, if L = 2, Eq. (5.8) produces MPP_L = 35 whereas, according to the other rule ($MPP_L = Q_n - Q_{n-1}$), MPP_L = 40. But the numbers will represent the MPP_L at different levels of labour employment.

Derivation of Labour Demand Curve We have discussed above the basics of the demand side of the labour market. Here we explain the derivation of the labour demand curve. Labour is demanded by the producers, the firms. Firms are profit maximizing units. The necessary condition for profit maximisation is given as:

$$MR = MC$$

Where labour cost (wages) is the only relevant cost, MR is expressed in terms of *marginal revenue productivity of labour* (MRP_L) and MC in converted into *marginal cost of labour,* i.e., *marginal wage* (MW). Thus, profit maximisation condition is expressed as:

$$MRP_L = MW$$

where $MRP_L = MPP_L \times P$ (where P = price of the product).

Given the production function (5.7), the calculation of MRP_L is shown in Col. 4 of Table 5.1. Note that under perfect market conditions, price of the product (P) and cost of labour, i.e., average wage rate (AW) are constant. Under this condition, $AW = MW$. Given these parameters, let us now look at the derivation of labour demand curve.

According to the law of labour demand, labour demanded by the profit maximizing firms per unit of time is determined by the equality of $MRP_L = MW$. That is, workers demanded per day equals the number at which $MRP_L = MW$. The derivation of *labour demand curve* based on this principle is illustrated graphically in Fig. 5.4.

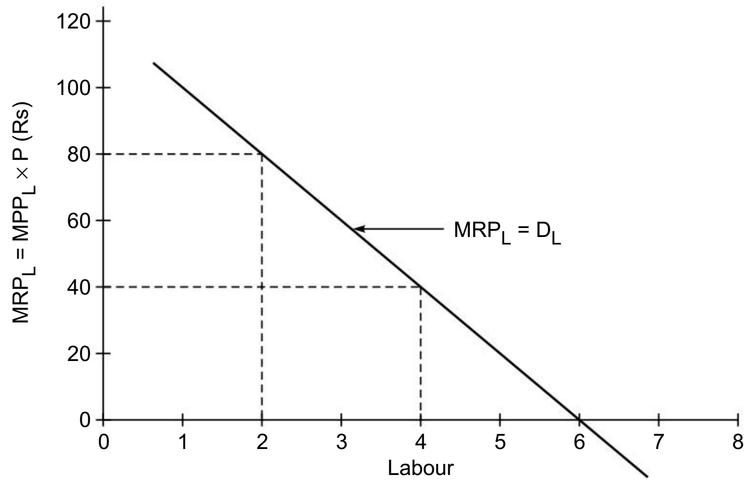


Fig. 5.4 Derivation of Labour Demand Curve

The MRP_L curve represents the *labour demand curve.* As this curve show, labour demanded increases with decrease in the wage rates. For example, if real wage rate per day is Rs 80, the demand for labour is 2 workers as at this employment level $MRP_L = MW$. Similarly, if wage rate decreases to Rs 40 per day, demand for labour increases to 4 workers. The labour demand curve will now be used, along with labour supply curve, to explain the determination of the labour employment and output.

5.3.3 Determination of Employment and Real Output

The aggregate production, labour supply and demand curves can now be used to illustrate the determination of full employment and the aggregate real output in the classical model. The determination of labour market equilibrium is shown in panel (a) of Fig. 5.5. Labour demand and labour supply curves are represented by D_L and S_L curves, respectively. The labour demand and supply curves intersect at point *E*. The point of intersection of demand and supply curves determines simultaneously the equilibrium wage rate and full employment of labour. At point *E*, the equilibrium wage rate is determined at OW_r. At this wage rate, the demand for and supply of labour are equal at *OL* employment of labour. Given the short-run conditions, this is the level of full employment according to the classical theory of full employment.

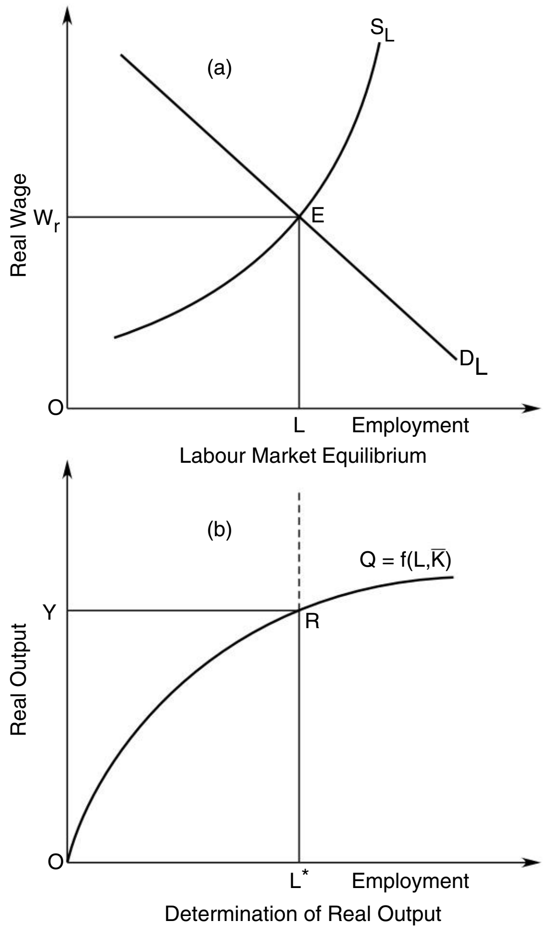


Fig. 5.5 Determination of Equilibrium Output

The determination of output can now be shown by juxtaposing the production function (as shown in Fig 5.1) with labour-market equilibrium. The short-run production function (Fig. 5.1.) is reproduced in panel (b) of Fig. 5.5 at the bottom of panel (a) on the same scale of labour. As noted above, according to the classical theory, the national output in the short-run is the function of labour employment, capital remaining constant. As shown in panel (a), full employment of labour is determined at *OL* at real wage *EL*. The ordinate *EL* extended downward to the production function in panel (b) determines the equilibrium level of national output at *OY*. In panel (b), the extended ordinate *ERL* intersects the production function at point *R*. A line drawn from point *R* to the vertical axis determines the equilibrium level of national output at *OY*. Thus, employment and output are simultaneously determined in the classical model.

An ***important feature*** of the classical model is that factors operating on the supply side of the market determine the level of employment and output. As shown above, labour market equilibrium is determined by the demand for and supply of labour. The labour demand curve is, however, derived from the production function based on a given technology determined exogenously. The labour demand curve is therefore, in a sense, a datum, i.e., a given fact or law. According to classical theory, it is the labour supply, which is a function of real wages, that plays a more important role in the determination of the labour market equilibrium and employment. And, employment determines the level of output. Thus, *in the classical model, employment and output are determined solely by the factors operating on the supply side of the labour market.*

5.3.4 The Collapse of the Classical Economics

The classical economics prevailed until the Great Depression and it had prevailed because it was never put to test by big changes in economic conditions over time. However, the Great Depression proved that the very basic postulates of the classical economics were fundamentally wrong. Look at the two basic postulates of the classical economics.

One of the fundamental postulates of the classical economics is that if there is perfect competition in both product and labour markets, then (i) the economy is always in equilibrium, and if some external forces create disequilibrium, market forces of demand and supply bring it soon back to the equilibrium, and (ii) there is always full employment, and unemployment, if any, is either frictional or voluntary, i.e., those who are unwilling to work at the prevailing wage rate would remain unemployed.

The second basic postulate of the classical economics is the Say's law that, 'supply creates its own demand'. It implies that the aggregate demand is always equal to aggregate supply and there is no demand deficiency, except for a short period of disturbance.

It is ironical that classical thoughts and theories failed to hold when classical postulates were really in existence in the world economy. If market conditions were ever close to the classical perception of perfect competition, it was between the First World War and the Great Depression. Yet, the Great Depression took place. The industrial economies suffered a long-run disequilibrium and a prolonged state of involuntary unemployment. The intensity and duration of economic calamity brought about by the depression was unprecedented. In the US, output had fallen by 30% and unemployment had risen to over 25%. In the UK, the rate of unemployment was lower (10%) but it had persisted over the entire period of 1930s. Most other industrialised nations also had experienced an unprecedented fall in their *GNP* and rise in unemployment. This experience invalidated the classical Say's law. There was supply of labour willing to work at prevailing wage rate but there was no matching demand for labour. There was supply of capital but there was no sufficient demand for capital. Until the beginning of recovery, there was supply of goods and services, but demand lagged far behind. This was a clear case of failure of the Say's law. The classical theory had no answer to these predicaments of the 1930s. This marked the collapse of the classical economics.

This takes us to the end of our brief dicsussion on the classical macroeconomics with focus on the classical theory of output (income) determination and employment and Keynes' attack on the classical macroeconomics.

SUGGESTED READINGS

Ackley G., *Macroeconomics Theory* (Macmillan, NY, 1961), Ch. 5.

Blaug, M., *Economic Theory in Retrospect*, 3rd Edn. (Vikas Publishing House, New Delhi, 1976), Ch. 5.

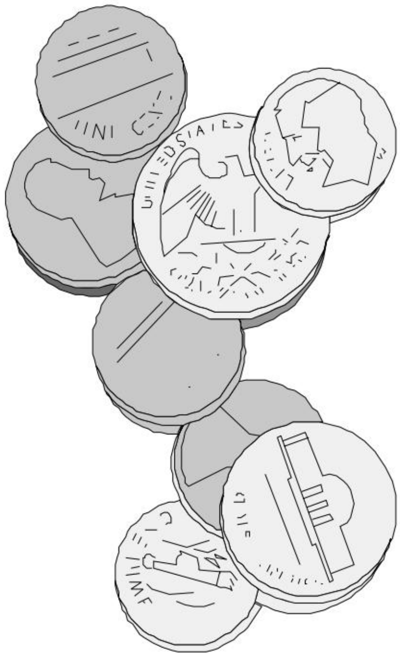
Hagen, E.E., "The Classical Theory of the Level of the Output and Employment", in *Readings in Macroeconomics*, ed. by M.G. Mueller, 1969.

QUESTIONS FOR REVIEW

1. What is meant by the classical economists and classical economics? Did the classical economists develop any macroeconomic theory?
2. What is Say's law? Explain the law in the context of a barter economy and a monetised economy. Do you agree with Say's law? Give reasons.
3. Marginal physical productivity schedule of labour can be derived from the aggregate production function. Do you agree with this statement? If yes, illustrate the derivation of MPP_L curve.
4. Explain briefly the postulates made by the classical economists. Do you agree with the postulates of the classical economics? Give reasons for your answer.
5. Explain and illustrate graphically the classical theory of employment and output determination.
6. Suppose a production function is given as $Q = 45L - 5L^2$. Find the MPP_L function and derive MPP_L curve. Derive labour demand curve assuming price (P) = 2.
7. Explain the classical model of employment and output determination. Is voluntary unemployment consistent with classical meaning of full employment? Show graphically the equilibrium of the labour market and determination of national output.
8. What was the reason for the collapse of the classical economic theories of employment and output?

Chapter 6

Keynesian Theory of Income Determination: A Simple Economy Model



INTRODUCTION

Keynes had developed his theory of income determination in his endeavour to formulate a new theory of employment in contrast to the classical theory of employment. While classical economists had emphasized the role of supply, Keynes emphasized, in contrast, the role of demand in the determination of output and employment. Briefly speaking, the Keynesian theory of income determination states that the equilibrium level of national income is determined at the level where aggregate demand for goods and services equals their aggregate supply.

In this and the two succeeding chapters, we will explain the Keynesian theory of income determination. The Keynesian theory of income determination is generally developed, illustrated graphically and algebraically, in three different models: (i) a **simple economy model** or two-sector model; (ii) **closed economy model** or three-sector model, and (iii) **open economy model** or four-sector model.

The two-sector model includes only households and firms sectors; three-sector model consists of households, firms and the government sectors; and the four-sector model is constructed by adding foreign sector to the three-sector model. In this chapter, we present the Keynesian theory of income determination in a two-sector model.

It is **important** to note here that throughout the Keynesian theory of income determination, *prices are assumed to remain constant* even if aggregate demand and aggregate supply change. This assumption applies to all the three models of income determination in the subsequent chapters.

Before we discuss the Keynesian theory of income determination, let us look at the basic concepts, definitions and functions used in his theory of income determination. The concepts and functions that are crucial to the discussion on the Keynesian theory of income determination are: (i) the aggregate supply function, (ii) the aggregate demand function, (iii) the aggregate consumption function, (iv) the aggregate saving functions, and (v) the constant investment.

6.1 THE CONCEPTS AND FUNCTIONS

6.1.1 The Aggregate Supply[1] Function

Aggregate supply refers to the total supply of goods and services in an economy. The derivation of Keynesian aggregate supply function is illustrated in panel (b) of Fig. 6.1. Keynes used the classical production function to derive his aggregate supply function. It may be recalled that the classical production function is given as:

$$Y = f(K, L)$$

Given the production function and technology, the level of real income (Y) depends on the supply and use of the productive resources, *viz.*, capital (K) and labour (L). In the short run, the stock of capital, K, is fixed. Therefore, short-run output depends on the level of employment (L). Thus, the short-run production function may be written as:

$$Y = f(L) \tag{6.1}$$

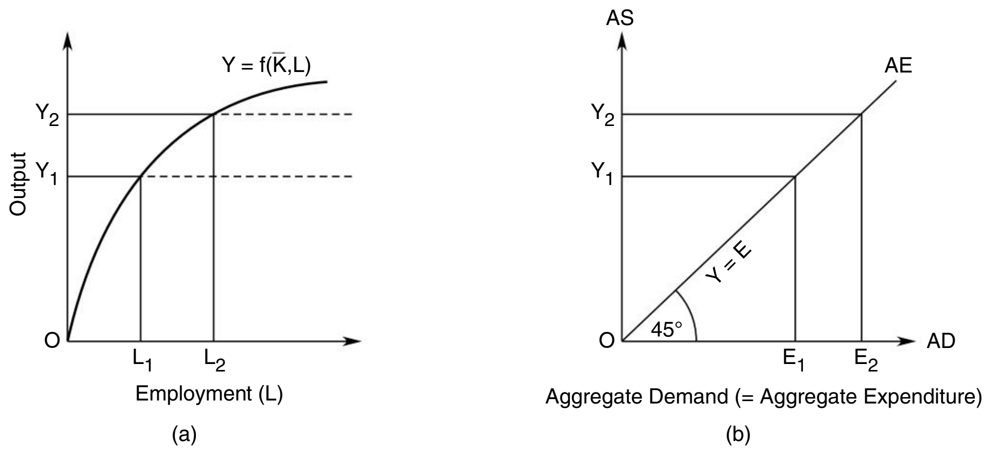


Fig. 6.1 Derivation of the Aggregate Supply Curve

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1. The concepts of aggregate supply and aggregate demand were first used by T. R. Malthus to contradict the classical proposition that there cannot be overproduction or underproduction in the long run. Malthus had shown, though not rigorously, that aggregate demand might fall short of the aggregate supply leading to overproduction. Keynes developed this idea further and used it to develop his theory of income and employment determination.

The production function (6.1) is presented graphically in panel (a) of Fig. 6.1 by the curve marked $Y = f(\bar{K}, L)$. As the curve shows, real output (Y) increases with increase in labour employment, though $MPP_L = \Delta Y/\Delta L$ goes on decreasing. This relationship between the labour employment and the real output forms the basis of the Keynesian aggregate supply curve. Let us see how.

The logic behind the increase in real output and employment is given as follows. The value of real output (Y), measured on Y-axis, equals the aggregate *supply price*, that is, the price which producers expect to realize when total output is sold at a given price. As shown in panel (a) of Fig. 6.1, if producers expect a demand equal to OY_1, they will employ OL_1 labour to produce output OY_1. If they expect a demand OY_2, they will employ labour OL_2, and supply goods and services worth OY_2, and so on. It means that the *aggregate supply* (AS) is always equal to the *aggregate demand* (AD) for output, i.e., $AD = AS$ at all the levels of output. This relationship between the AD and AS forms the basis of Keynesian aggregate supply function. In panel (b) of Fig. 6.1, Y-axis measures the aggregate supply (AS) and X-axis measures the aggregate demand (AD) in terms of aggregate expenditure (E). The relationship between aggregate demand and aggregate supply is shown by a 45° line, AE. The 45° aggregate supply line implies that aggregate demand equals aggregate supply at all the levels of output[2]. The aggregate supply line AE represents the Keynesian aggregate supply function.

6.1.2 The Aggregate Demand Function: Two-sector Model

In a simple two-sector economy in which there is no government and no foreign trade, aggregate demand (AD) consists of only two components: (i) aggregate demand for consumer goods (C), and (ii) aggregate demand for investment goods (I). Of the two, consumption expenditure accounts for the highest proportion[3] of the GDP. Thus, in a simple economy,

$$AD \equiv C + I \tag{6.2}$$

In Eq. (6.2), the variable I is assumed to be determined *exogenously* and to remain constant in the short run. The short-run aggregate demand function can thus be written as

$$AD \equiv C + \bar{I} \tag{6.3}$$

(where $\bar{I}$ = constant investment).

Equation (6.3) implies that, in the short-run, AD depends largely on the aggregate consumption expenditure. It means that the short-run *AD function* is the function of *consumption function* plus a constant ($\bar{I}$). This implies that if *consumption function* is known, the two-sector aggregate demand function can be easily derived, given the investment (I). Therefore, before any further discussion on the aggregate demand function, we need to explain the derivation of consumption function.

6.1.3 The Consumption Function

The *consumption function* is one of the most important functions used in macroeconomics and the most important function used in the Keynesian theory of income determination. A consumption function is a functional statement of relationship between the consumption expenditure and its

2. This relationship is based on the assumption that prices remain constant even if cost of production increases.
3. In India, for instance, consumption expenditure accounts for over 65% of its GDP.

deteminants. Although consumption expenditure of households depends on a number of factors—income, wealth, interest rate, expected future income, life style of the society, availability of consumer credit, age and sex, etc.—'income is the primary determinant of consumption and saving'[4]. Given this dictum, the most general form of consumption function is expressed as:

$$C = f(Y),\ \Delta C/\Delta Y > 0 \tag{6.4}$$

where C = consumption expenditure, and Y = disposable income.

The consumption expenditure is a positive function of income, i.e., consumption increases with increase in income. According to Keynes, this relationship between income and consumption is based on a "fundamental psychological law" that "men are disposed, as a rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income"[5], i.e., $\Delta C/\Delta Y$ goes on decreasing in case of individual households.

A question arises here: Does consumption increase proportionately, less than proportionately or more than proportionately? Keynes and Keynesians have different views on this issue. Their views on this issue are explained by using the concept of ***marginal propensity to consume***.

Marginal Propensity to Consume (MPC) The marginal propensity to consume (*MPC*) refers to the relationship between marginal income and marginal consumption. The marginal propensity to consume is also expressed symbolically as $\Delta C/\Delta Y$. In the opinion of Keynes, $\Delta C/\Delta Y$ decreases with the increase in income. In plain words, as income increases, people tend to consume a *decreasing* proportion of the marginal income. This kind of income-consumption relationship represents the Keynesian consumption function. The Keynesian theory of consumption produces a *non-linear consumption function* as shown in Fig. 6.2.

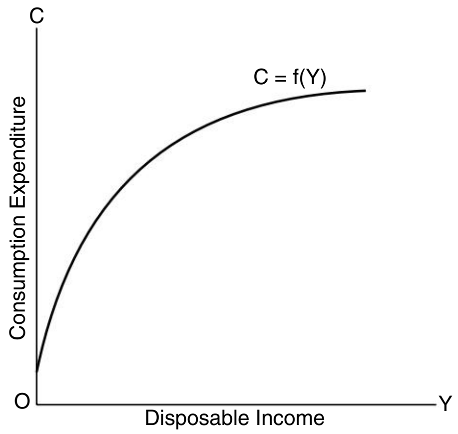

Fig. 6.2 Non-Linear Consumption Function

It is important to note here that the Keynesian consumption function is relevant for individual household's consumption behaviour—not for the economy as a whole or at the aggregate level. Keynesian economists have, however, estimated empirically the consumption function for the economy as a whole which take the form of a *linear consumption function*. The Keynesians have used a linear consumption function in reconstructing Keyne's theory of income determination. Let us therefore look at the linear consumption function.

The Linear Aggregate Consumption Function Although Keynes postulated a non-linear consumption function, it is now a convention in the modern interpretation and analysis of Keynesian macroeconomics to use a linear aggregate consumption function of the following form.

$$C = a + bY \tag{6.5}$$

4. Samuelson, P.A. and Nordhaus, W.D., *Economics*, 11th Edn., 1995, p.424.
5. For details, see *The General Theory of Employment, Interest and Money*, Ch. 5.

In consumption function, as given in Eq. (6.5), C = aggregate consumption expenditure; Y = total disposable income. Intercept a is a positive constant. It denotes the level of consumption at zero level of income. The consumption at zero level of income is called *autonomous consumption,* supposed to be financed out of past savings. In Eq. (6.5), b is a positive constant. Mathematically, it represents the *slope* of a linear consumption function. It denotes a constant $MPC = \Delta C/\Delta Y$. The MPC is less than unity but greater than zero, that is, $0 < b < 1$.

Given the function (6.5), it can be shown that $b = \Delta C/\Delta Y$.

If $$C = a + bY$$

then $$C + \Delta C = a + b(Y + \Delta Y)$$

$$\Delta C = -C + a + bY + b\Delta Y$$

Since $C = a + bY$, the terms $(-C)$ and $(a + bY)$ cancel out. Then,

$$\Delta C = b\Delta Y, \text{ and}$$

$$\Delta C/\Delta Y = b.$$

6.1.4 Graphical Presentation

Let us suppose that an empirically estimated linear aggregate consumption function is given as:

$$C = 200 + 0.75Y \qquad \textbf{(6.6)}$$

The consumption function (6.6) is presented graphically in Fig. 6.3. As Fig. 6.3 shows, consumption (C) equals Rs 200 even when $Y = 0$. This consumption is assumed to be financed out of past savings. It shows also that the subsequent increases in income (*ΔYs)* induce additional consumption (*ΔCs*) at a fixed proportion of 75%. That is, aggregate consumption increases with the increase in aggregate income, at a constant rate of 75% of the marginal income. For example, when aggregate income increases from Rs 200 to Rs 300, aggregate consumption increases from Rs 250 to Rs 325. Here,

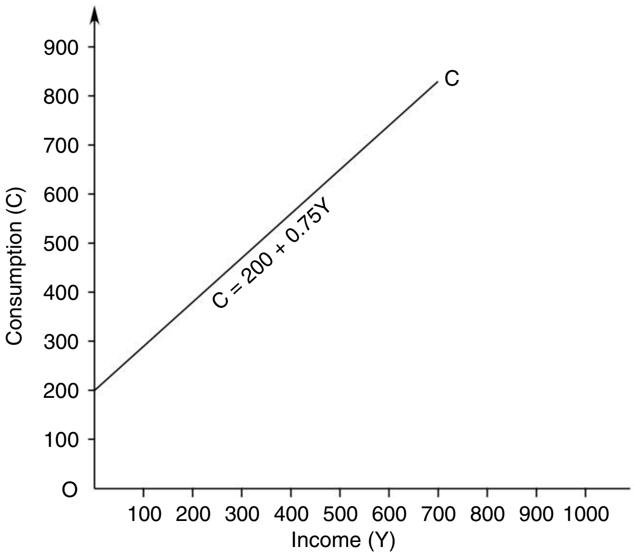

Fig. 6.3 The Linear Aggregate Consumption Function

$$\Delta Y = 300 - 200 = 100$$
$$\Delta C = 325 - 250 = 75$$

Therefore, $\Delta C/\Delta Y = 75/100 = 0.75$ (or 75%).

And, when income (Y) increases from Rs 300 to Rs 400, C increases from Rs 325 to Rs 400. In this case,

$$\Delta Y = 400 - 300 = 100$$
$$\Delta C = 400 - 325 = 75$$

and $\Delta C/\Delta Y = 75/100 = 0.75$ (or 75%).

This shows that, in our example, the marginal propensity to consume (*MPC*) is constant at 75% at the aggregate level.

6.1.5 Average Propensity to Consume (APC)

The average propensity to consume (*APC*) is defined as

$$APC = \frac{C}{Y} \quad \textbf{(6.7)}$$

Given the consumption function, $C = a + bY$,

$$APC = \frac{a + bY}{Y} \quad \textbf{(6.8)}$$

If consumption function is assumed to be of the form $C = bY$, then,

$$APC = \frac{bY}{Y} = b$$

It implies that if $C = bY$, then $APC = MPC$.

6.1.6 Saving Function

The saving function is the counterpart of the consumption function. It states the relationship between income and saving. Therefore, saving is also the function of disposable income. That is,

$$S = f(Y) \quad \textbf{(6.9)}$$

We know that $Y = C + S$. Thus, consumption and saving functions are counterparts of one another. Therefore, if one of the functions is known, the other can be easily derived. Given the consumption function as $C = a + bY$, saving function can be easily derived as follows. Since, $Y = C + S$, savings (S) can be defined as

$$S = Y - C \quad \textbf{(6.10)}$$

By substituting consumption function, $C = a + bY$, for C in Eq. (6.10), we get,

$$S = Y - (a + bY) \quad \textbf{(6.11)}$$
$$= -a + (1 - b)Y$$

The term $1 - b$ in function (6.11) gives the *marginal propensity to save (MPS)*, where $b = MPC = \Delta C/\Delta Y$.

The saving function can be derived algebraically as follows. By substituting consumption function, $C = 200 + 0.75Y$ for C in Eq. (6.10), we get the saving function as

$$\begin{aligned} S &= Y - (200 + 0.75Y) \\ &= Y - 200 - 0.75Y \\ &= -200 + (1 - 0.75)Y \\ &= -200 + 0.25Y \end{aligned} \tag{6.12}$$

The saving function (6.12) is presented graphically in Fig. 6.4. As the figure shows, savings are negative till income rises to Rs 800. At income of Rs 800, savings equal to zero. Positive savings take place only after income rises above Rs 800. Savings increase at the rate of 25% of the marginal income.

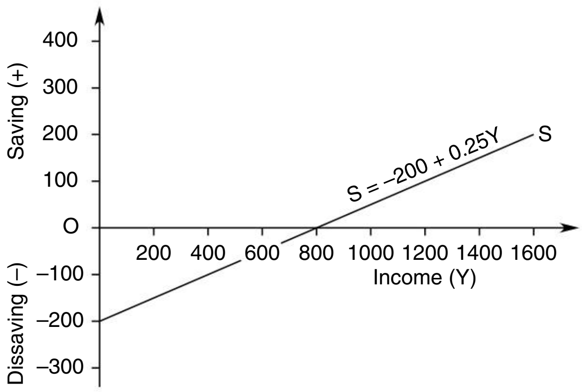

Fig. 6.4 The Saving Function

6.1.7 Aggregate Demand Function

Now that we have explained the consumption and saving functions, we can present aggregate demand function, assuming that investment (I) remains constant. Recall aggregate demand (AD) and consumption (C) functions given as

and
$$\begin{cases} AD = C + \bar{I} & : \text{(Eq. 6.3)} \\ C = a + bY & : \text{(Eq. 6.5)} \end{cases}$$

By substituting $a + bY$ for C, we get

$$AD = a + bY + \bar{I} \tag{6.13}$$

Recall our estimated hypothetical consumption function $C = 200 + 0.75Y$ (See Eq. 6.6) and assume that $\bar{I} = 100$. By substitution, the estimated aggregate demand function (6.13) can be written as

$$AD = 200 + 0.75Y + 100 \tag{6.14}$$

The derivation of the aggregate demand function is shown in Fig. 6.5. In Fig. 6.5, constant investment is shown by a straight horizontal line, $\bar{I} = 100$. Consumption (C) being a rising function of income is shown by an upward sloping line, $C = 200 + 0.75Y$. The aggregate demand function is obtained by vertical summation of the consumption function and the constant investment, that is, $AD = C + \bar{I}$, at different levels of income (Y).

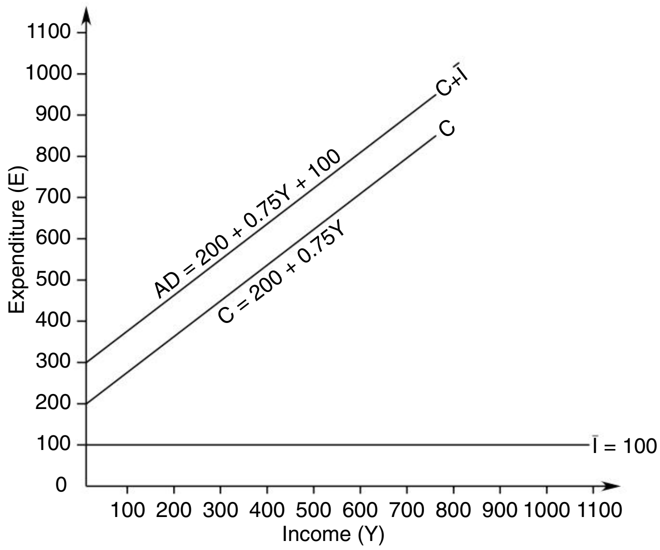

Fig. 6.5 The Aggregate Demand Function

6.2 INCOME DETERMINATION IN SIMPLE ECONOMY MODEL

In the preceding section, we have explained the basic concepts and introduced the important functions used in the Keynesian theory of income determination. The stage is now set for the formal presentation of the theory of income determination in a simple economy model. As already mentioned, simple economy model includes two sectors including the household sector and the business sector. An economy of this kind does not exist in reality. But, this hypothetical economy provides a simple and a very convenient starting point in understanding the Keynesian theory of income determination. The determination of income and output in realistic models will be discussed in the subsequent chapters. To begin with, let us specify the model with its assumptions.

Assumptions The simple economy model makes the following assumptions.

1. There are only two sectors in an economy, *viz.*, (i) the households, and (ii) the business firms—there is no government and no foreign trade.
2. In simple economy model, aggregate demand consists of (i) aggregate consumer demand (C) and aggregate investment demand (I). Thus, aggregate demand (AD) equals $C + I$. There is no leakage or injection.
3. Since there is no government and, therefore, there is no tax and no government expenditure. Even if some form of government exists, it does not tax and it does not spend.
4. The two-sector economy is a closed economy—there is no foreign trade nor is there any external inflow or outflow.
5. In the business sector, there is no corporate savings or retained earnings. The total profit is distributed as dividend.
6. All prices, including factor prices, remain constant.
7. The supply of capital and technology are given.

Having specified the two-sector model, we now turn to analyse the determination of the equilibrium level of national income.

6.2.1 Income and Output Determination

According to the Keynesian theory of income determination, the equilibrium level of national income is determined at a level where aggregate demand ($C + I$) equals the aggregate supply of income $Y = C + S$. That is, the national income equilibrium is determined where:

$$\text{Aggregate demand} = \text{Aggregate supply}$$
$$AD = AS$$
$$C + I = C + S$$

Keynes argued that there is no reason for the aggregate demand to be always equal to the aggregate supply. According to Keynes, aggregate demand depends on households' plan to consume and to save and invest. Aggregate supply depends on the producers' plan to produce goods and services. For the aggregate demand and the aggregate supply to be always equal, the households' plan must always coincide with producers' plan. However, Keynes argued that there is no reason to believe:

(i) that consumers' consumption plan always coincides with producers' production plan; and
(ii) that producers' plan to invest matches always with households' plan to save.

Therefore, there is no reason for $C + I$ and $C + S$ to be always equal and national income to be in equilibrium at all the levels of income. According to Keynes, there is a unique level of output and income at which the aggregate demand equals the aggregate supply. This unique point exists where consumers' plan matches with producers' plan and savers' plan matches with firms' plan to invest. It is here that the equilibrium level of income and output is determined. A formal model of income and output determination is given below.

Formal Model of Income Determination In this section, we present a formal analysis of income determination in a two-sector model. Recall the Keynesian theory of income determination that the equilibrium level of national output is determined where aggregate demand ($C + I$) equals the aggregate supply ($C + S$). As mentioned above, the condition for national income equilibrium can thus be expressed as:

$$AD = AS$$
$$C + I = C + S \tag{6.15}$$

Since C is common to both the sides of Eq. (6.15), C on both sides gets cancelled out. Thus, the equilibrium condition for the national income can also be expressed as:

$$I = S \tag{6.16}$$

Given the Eqs. (6.15) and (6.16), there can be two approaches to explain the Keynesian theory of national income determination, viz.,

(i) *AD-AS* approach, and
(ii) *S-I* approach.

Let us first explain the theory of income determination by *AD-AS* approach.

(i) *AD-AS Approach* According to the *AD-AS* approach, national income equilibrium is determined where

$$C + I = C + S$$

Equation (6.15) tells that at equilibrium level of national income,

$$Y = C + I \tag{6.17}$$

We have assumed above that $C = a + b\,Y$ and I is constant at $\bar{I}$. By substituting $a + bY$ for C and $\bar{I}$ for I in Eq. (6.17), the equilibrium level of national income can be expressed as:

$$Y = a + bY + \bar{I} \tag{6.18}$$

Eq. (6.18) may now be solved to find the equilibrium level of national income (Y) and consumption (C). Let us first solve Eq. (6.18) for Y. As given in Eq. (6.18),

$$Y = a + bY + \bar{I}$$

$$Y - bY = a + \bar{I}$$

$$Y(1 - b) = a + \bar{I}$$

$$Y = \frac{a + \bar{I}}{1 - b}$$

$$Y = \frac{1}{1 - b}(a + \bar{I}) \tag{6.19}$$

Determination of consumption Having obtained the equilibrium level of Y, that is, the total personal income in our two-sector model, we can work out the equilibrium level of consumption as follows. Given the consumption function as

$$C = a + bY$$

By substituting Eq. (6.19) for Y in the consumption function, we get

$$C = a + b\left[\frac{1}{1 - b}\right](a + \bar{I})$$

$$C = a + \frac{b}{1 - b}(a + \bar{I}) \tag{6.20}$$

Numerical Example The equilibrium level of Y and C can be determined numerically by assuming a hypothetical consumption function and a given level of $\bar{I}$. Let us suppose the consumption function is given as:

$$C = 100 + 0.75Y \tag{6.21}$$

and $$\bar{I} = 200$$

Given the consumption function (6.21) and $\bar{I} = 200$, there are two methods of finding the value of C at equilibrium level of Y. One method is to substitute the numerical value for a, b and I in Eq. (6.20). The second method is to first calculate equilibrium Y and find the value of C through Eq. (6.21).

Using the **first method**,

$$C = 100 + \frac{0.75}{1-0.75}(100 + 200)$$
$$= 100 + 3\ (300)$$
$$= 1000.$$

By using the **second method**, the value of Y can be obtained by substituting the numerical values for C and $\bar{I}$, respectively, in Eq. (6.18). We get equilibrium level of Y as follows.

$$Y = 100 + 0.75Y + 200 \qquad \textbf{(6.22)}$$
$$Y\ (1 - 0.75) = 100 + 200$$
$$Y = \frac{1}{1-0.75}\ (300)$$
$$Y = 1200$$

Thus, given the consumption function as $C = 100 + 0.75Y$ and $\bar{I} = 200$, the equilibrium level of national income is determined at 1200.

Once the equilibrium level of national income is determined, the equilibrium level of consumption (C) can be obtained by substituting 1200 for Y in the consumption function (6.21). Thus,

$$C = 100 + 0.75\ (1200) \qquad \textbf{(6.23)}$$
$$= 1000$$

Incidentally, since we have computed the equilibrium values of Y and C, we can easily obtain the equilibrium level of saving (S) as follows.

$$S = Y - C \qquad \textbf{(6.24)}$$

By substituting the actual values of Y and C in Eq. (6.24), we get

$$S = 1200 - 1000$$
$$= 200$$

The final picture of equilibrium in the two-sector model may now be presented as given below.

Aggregate Demand = Aggregate Supply = National Income

$$C + \bar{I} = C + S = Y$$
$$1000 + 200 = 1000 + 200 = 1200$$

Graphical Presentation of Income Determination The determination of national income in a two-sector model based on the numerical example given above is presented graphically in Fig. 6.6. The *AS*-schedule represents the aggregate supply curve. It gives a hypothetical *growth path* of national income on the assumption that the society spends its entire income on consumer and capital goods, that is, the aggregate expenditure is always equal to the aggregate supply. In reality, however, the households consume a part of their income and save a part of it. Their savings may not always find a way to investment. For, households' plan to save may not always match with firms' plan to invest. Therefore, savings may not always be equal to investment. This means that the aggregate demand may not always equal the aggregate supply.

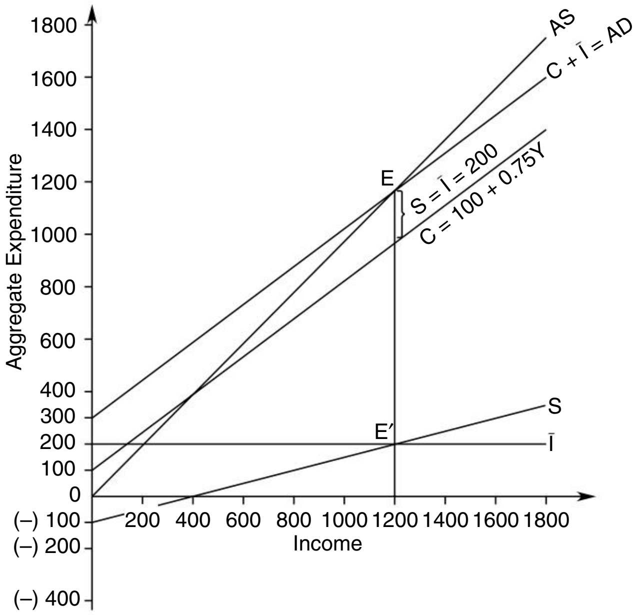

Fig. 6.6 Equilibrium of the National Income and Output: The Two-Sector Model

The C + I-schedule drawn on the basis of Eq. (6.22) represents the aggregate demand (AD). The AD schedule intersects the AS schedule at point E. The intersection of the AD and AS schedules is also called "the Keynesian cross"—a term coined by Samuelson in his *Economics*. The point of intersection between the AD and AS schedules is the point of equilibrium of the national income. The equilibrium point E determines the equilibrium level of national income at 1200 which is the same as obtained in the numerical example [see Eq. (6.22)]. The equilibrium level of income will remain stable so long as there is no change in the aggregate demand, given the aggregate supply.

The saving-investment approach to income determination The equilibrium level of income can also be determined by using only S and I schedules. This is called the saving-investment approach. The saving-investment approach can be derived directly from the national income equilibrium condition based on AD-AS approach. We know that, at equilibrium, $AD = AS$, i.e., where

$$C + \bar{I} = C + S$$

Since C is common to both the sides of this equation, it gets cancelled out. Then, the equilibrium condition can be written as:

$$\bar{I} = S \tag{6.25}$$

Investment (I) is assumed to remain constant at $\bar{I}$. But saving is the function of income, i.e., $S = f(Y)$. So we need to derive the saving function. We know that

$$S = Y - C \tag{6.26}$$

and

$$C = a + bY.$$

By substituting $a + bY$ for C in Eq. (6.26), we get

$$S = Y - (a + bY)$$

or
$$S = Y - a - bY$$
$$S = -a + Y - bY$$
$$S = -a + (1 - b)Y$$

Given the saving function, the equilibrium condition by saving-investment approach can be written as:

$$\bar{I} = -a + (1 - b)Y$$

In our example, $\bar{I} = 100$ and, given the values of a and b in Eq. (6.21), saving function can be written as $S = -100 + (1 - 0.75)Y$. By substituting these values in Eq. (6.25), we get the equilibrium level of Y as:

$$200 = -100 + (1 - 0.75)Y$$
$$300 = (1 - 0.75)Y$$

and
$$Y = \frac{300}{1-0.75} = 1200$$

Note that the saving-investment approach determines the same equilibrium level of the national income (1200) as determined by the aggregate demand and aggregate supply approach. The determination of national income equilibrium through saving-investment approach is presented graphically in Fig. 6.7.

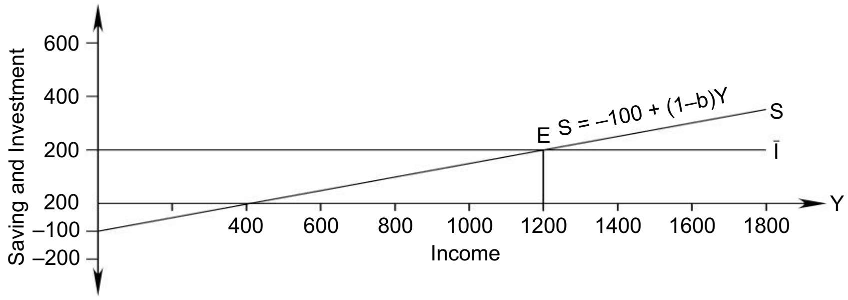

Fig. 6.7 Income Determination: Saving and Investment Approach

As Fig. 6.7 shows, investment ($\bar{I}$) is given at 200 and is shown by a horizontal straight line. Saving function $S = -100 + (1 - b)Y$ is shown as a rising function of income. It can be seen in Fig. 6.7 that $\bar{I}$ and S schedules intersect at point E determining the equilibrium level of income at 1200, where $S = I$ = Rs 200.

6.3 THE CHANGE IN AGGREGATE DEMAND AND THE MULTIPLIER

6.3.1 Change in Aggregate Demand: An Overview

In the preceding sections, we have explained the Keynesian theory of income and output determination in a simple two-sector model. It may be inferred from the income determination analysis that a change in aggregate spending will shift the equilibrium from one point to another and a shift in the equilibrium will reflect change in the level of national income. An increase in aggregate spending makes the aggregate demand schedule shift upward. As a result, the equilibrium point would shift upward along the *AS* schedule causing an increase in the national income. Likewise, a fall in the aggregate spending causes a fall in the national income. This relationship between the aggregate spending and the national income is simple and straightforward. However, our analysis so far tells us only the direction of change in the national income resulting from the change in the aggregate demand. It does not quantify the relationship between the two variables, i.e., it does not tell us the magnitude of change in the national income due to a given change in the aggregate spending.

The two specific questions that need to be answered are: (i) Is there any specific relationship between the change in aggregate demand and the change in the national income? and (ii) If yes, then what determines this relationship and the magnitude of change in the national income? The answer to these questions is provided by the theory of **multiplier**. The theory of multiplier occupies a very important place in the analysis of national income behaviour in response to the changes in its determinants. It is also an important tool to analyse the effects of changes in the monetary and budgetary policies of the government.

Before we begin our discussion on the multiplier theory, let us note that a shift in the aggregate demand in a modern economy may be caused by the change in business investment, government spending, taxes, export and import. Accordingly, we have *investment multiplier, government expenditure multiplier, tax multiplier, balanced budget multiplier, fiscal multiplier, export multiplier* and *import multiplier*. In this section, we are concerned with change in aggregate demand due to change in business investment and *investment multiplier*. Other kinds of multipliers will be discussed in the following chapters.

6.3.2 Change in Investment and Multiplier

In our two-sector model, a change in aggregate demand may be caused by a change in consumption expenditure, or a change in business investment, or a change in both. Consumption expenditure is however a more stable function of income. Therefore, consumption spending changes only with change in income. But when an economy is in equilibrium, income level is fixed and, therefore, consumption level is also fixed.

As regards business investment, it is determined exogenously by such factors as expansion in business prospects, innovation and invention of new products, opening up of new markets, fall in the interest rate, etc. We will therefore assume a change in the aggregate demand function due to a change in business investment. Besides, a change in investment may be in the form of either a decrease or an increase in the investment. However, for our purpose here, we assume an increase in investment and an upward shift in the investment schedule causing an upward shift in the aggregate demand function.

Figure 6.8 illustrates an upward shift in the investment schedule from I to $I + \Delta I$, causing an upward shift in the aggregate demand function from $C + I$ to $C + I + \Delta I$. The increase in investment may be the result of an autonomous investment. In Fig. 6.8, point E_1 marks the equilibrium of the national income prior to the increase in investment.

When investment increases from I to $I + \Delta I$, as shown by upward shift in the I-schedule, it causes an upward shift in the aggregate demand schedule from $C + I$ to $C + I + \Delta I$. Due to upward shift in the aggregate demand schedule, the equilibrium point shifts from point E_1 to E_2 and, as a result, national income increases from OY_1 to OY_2.

It is **important** to note here that the increase in national income implies that point E_1 represented a less than full employment situation. It is only under this condition that equilibrium point E_1 can shift to point E_2.

The increase in the national income (ΔY) can be obtained as:

$$\Delta Y = Y_2 - Y_1 = Y_1 Y_2$$

This increase in income (ΔY) is the result of ΔI. It can be seen in Fig. 6.8 that $\Delta Y > \Delta I$. This point can be proved as follows. Note that $\Delta Y = E_1 M$ and since points E_1 and E_2 are both on the 45° line, $E_1 M = E_2 M$. That is, $\Delta Y = E_2 M$. Note also that $\Delta I = E_2 K$ and that $E_2 M > JK$. It proves

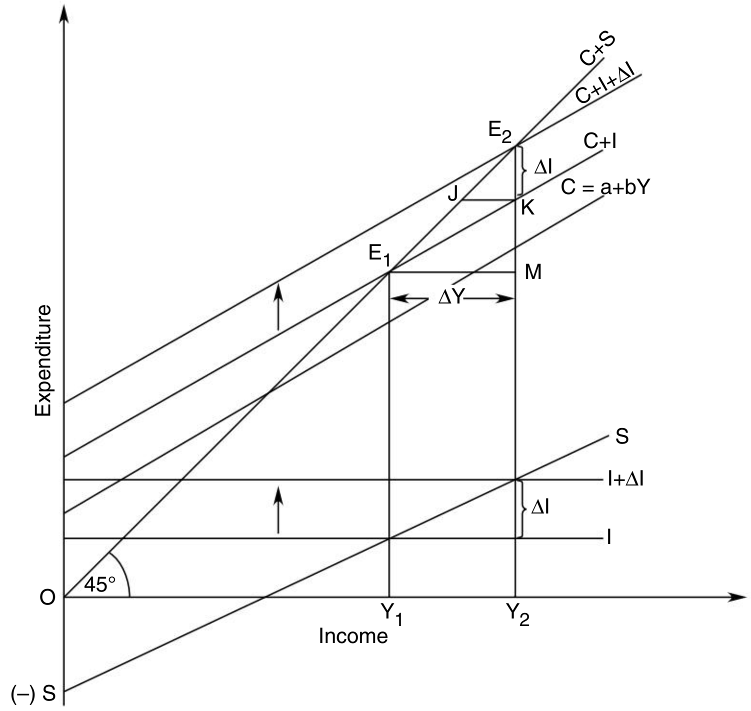

Fig. 6.8 Increase in Investment Demand and National Income Determination

that $\Delta Y > \Delta I$. It means that when ΔI takes place, the resulting ΔY is some multiple of ΔI. The multiple (m) can be obtained as:

$$m = \frac{\Delta Y}{\Delta I} \tag{6.27}$$

In Eq. (6.27), 'm' is the ***investment multiplier***. Since $\Delta Y > \Delta I$, multiplier (m) is greater than 1. It implies that when investment increases in an economy, national income increases by more than the increase in investment. How greater is ΔY than ΔI depends on the *MPC*.

How Multiplier Process Works Suppose an economy is in equilibrium and *autonomous* business investment increases by Rs 100 million. As a result, an additional income of Rs 100 million has been generated in the form of wages, interest and profits. This makes the first round of income generation by the additional investment. Those who receive the additional income spend a part of it on consumer goods and services depending on their *MPC*. Assuming their *MPC* to be 0.8, they would spend Rs 100 million × 0.8 = Rs 80 million on consumer goods and services. This expenditure generates income worth Rs 80 million in the second round for those who supply goods and services. Those who earn Rs 80 million spend Rs 80 × 0.8 = Rs 64 million on consumption. This results in an additional income Rs 64 million to the society in the third round. Note that additional income generated in each successive round goes on decreasing. This process of income generation continues round after round until additional income generated tends to zero. At the end of this process, total additional income equals Rs 500 million. The process of income generation by an additional investment of Rs 100 million is shown in Table 6.1.

Table 6.1 Working of Multiplier Process

Rs in million

Rounds of income generation	*Consumer spending*	*Income generation*
First round	---	100.00
Second round	80.00	80.00
Third round	64.00	64.00
Fourth round	51.20	51.20
Fifth round	40.96	40.96
....	...	....
....	...	....
Last round	...	0.00
Total income		500.00

6.4 A SIMPLE MODEL OF INVESTMENT MULTIPLIER

The investment multiplier model presented below answers the questions: Is there a definite relationship between ΔY and ΔI? If yes, what determines this relationship? The model given below provides an algebraic method of working out the investment multiplier.

Let us recall that the equilibrium level of income is given by

$$Y = C + I \qquad \textbf{(6.28)}$$

Now, let investment increase by ΔI. When ΔI takes place it results in ΔY and ΔY induces ΔC. Thus, the post-ΔI *equilibrium level* of income can be expressed as follows.

$$Y + \Delta Y = C + \Delta C + I + \Delta I \qquad \textbf{(6.29)}$$

Subtracting Eq. (6.28) from Eq. (6.29), we get

$$\Delta Y = \Delta C + \Delta I \qquad \textbf{(6.30)}$$

Given the consumption function as $C = a + bY$,

$$C + \Delta C = a + bY + b\Delta Y.$$

Therefore,
$$\Delta C = b\Delta Y \tag{6.31}$$

By substituting Eq. (6.31) for ΔC in Eq. (6.30) we get

$$\Delta Y = b\Delta Y + \Delta I \tag{6.32}$$

$$\Delta Y\,(1 - b) = \Delta I$$

$$\Delta Y = \frac{1}{1-b}\,\Delta I$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-b} = m \tag{6.33}$$

Thus, the term $\frac{1}{1-b}$ gives the value of the investment multiplier (m).

Recall that, in Eq. (6.33), $b = MPC$ and $1 - MPC = MPS$. Therefore, multiplier (m) can also be expressed as:

$$m = \frac{\Delta Y}{\Delta I} = \frac{1}{1-b} = \frac{1}{1-MPC} = \frac{1}{MPS} \tag{6.34}$$

The last term in Eq. (6.34) indicates that m = reciprocal of MPS.

6.4.1 An Alternative Method of Working Out the Multiplier

The multiplier can be alternatively worked out by using the expanded form of the aggregate demand equations at the points of national income equilibria before and after ΔI takes place. As shown in Fig. 6.8, pre-ΔI national income equilibrium takes place at point E_1, where

$$Y_1 = C + I$$

Since $C = a + bY_1$, the pre-ΔI equilibrium level of income (Y_1) may be rewritten as:

$$Y_1 = a + bY_1 + I \tag{6.35}$$

$$= \frac{1}{1-b}\,(a + I)$$

Similarly, at post-ΔI equilibrium point E_2 in Fig. 6.8,

$$Y_2 = C + I + \Delta I \tag{6.36}$$

$$= a + bY_2 + I + \Delta I$$

$$= \frac{1}{1-b}\,(a + I + \Delta I)$$

By subtracting Eq. (6.35) from Eq. (6.36), we get

$$\Delta Y = \frac{1}{1-b}\,(a + I + \Delta I) - \frac{1}{1-b}\,(a + I)$$

$$\Delta Y = \frac{1}{1-b}\,\Delta I \tag{6.37}$$

Equation (6.37) yields the relationship between ΔY and ΔI, that is, ΔY equals $1/(1-b)$ times ΔI. Therefore, $1/(1-b)$ is the investment multiplier (m). Thus,

$$\text{Investment multiplier } (m) = \frac{1}{1-b} \tag{6.38}$$

A Numerical Example of the Multiplier Model The multiplier model presented above may be illustrated with a numerical example. Let us recall our two-sector model of income determination (see Eq. 6.21). In the model,

$$C = 100 + 0.75Y \tag{6.39}$$

and

$$I = 200$$

Given this model, the pre-ΔI equilibrium level of income (Y_1) may be expressed as:

$$\begin{aligned} Y_1 &= C + I \\ &= 100 + 0.75\ Y_1 + 200 \qquad (6.40) \\ &= \frac{1}{1-0.75}(100 + 200) \\ &= \frac{1}{0.25}(300) \end{aligned}$$

Now let us suppose that exogenous investment increases by 100. Thus, the total investment may be expressed as:

$$I + \Delta I = 200 + 100$$

The post-ΔI equilibrium level of income can now be expressed as:

$$\begin{aligned} Y_2 &= 100 + 0.75\ Y_2 + 200 + 100 \qquad (6.41) \\ &= \frac{1}{0-0.75}(100 + 200 + 100) \\ &= \frac{1}{0.25}(400) \end{aligned}$$

By subtracting Eq. (6.40) from Eq. (6.41), we get

$$\begin{aligned} \Delta Y &= Y_2 - Y_1 \\ &= \frac{1}{0.25}(400) - \frac{1}{0.25}(300) \\ &= \frac{1}{0.25}(100) = 400 \end{aligned}$$

Since $\Delta Y = 400$ and $\Delta I = 100$,

$$m = \frac{\Delta Y}{\Delta I} = \frac{400}{100} = 4$$

It may now be concluded that if $MPC = 0.75$, the investment multiplier (m) equals 4. It implies that if $m = 4$, then any additional investment will generate an additional income equal to four times of ΔI, all other things remaining the same.

What Determines the Value of Multiplier? The numerical value of the multiplier is determined by numerical value of *MPC*. This is evident from the multiplier formula given in Eq. (6.34), reproduced below.

$$m = \frac{1}{1 - MPC}$$

It is obvious from this formula that the numerical value of the multiplier is determined by the value of *MPC,* all other things being given. This relationship is illustrated in the following table.

MPC	$m = 1 / (1 - MPC)$	*Multiplier* (*m*)
0.00	$m = 1 / (1 - 0.00)$	1.00
0.10	$m = 1/ (1 - 0.10)$	1.11
0.50	$m = 1 / (1 - 0.50)$	2.00
0.75	$m = 1 / (1 - 0.75)$	4.00
0.80	$m = 1 / (1 - 0.80)$	5.00
0.90	$m = 1 / (1 - 0.90)$	10.00
1.00	$m = 1 / (1 - 1.00)$	∞

6.5 STATIC AND DYNAMIC MULTIPLIER

Depending on the purpose of analysis, sometimes a distinction is made between the *static* multiplier and the *dynamic* multiplier. The static multiplier is also called 'comparative static multiplier,' 'simultaneous multiplier,' 'logical multiplier,' 'timeless multiplier,' 'lagless multiplier' and 'instant multiplier'.

The concept of **static multiplier** implies that change in investment causes change in income instantaneously. It means that there is no ***time lag*** between the change in investment and the change in income. It implies that the moment a rupee is spent on investment projects, society's income increases by a multiple of Re 1. The concept of multiplier explained in the preceding section is that of static multiplier. Let us explain the concept of the dynamic multiplier also known as 'period' and 'sequence' multiplier.

The concept of **dynamic multiplier** recognises the fact that the overall change in income as a result of the change in investment is not instantaneous. There is a gradual process by which income changes as a result of change in investment or other determinants of income. The process of change in income involves a ***time lag***. The multiplier process works through the process of income generation and consumption expenditure. The dynamic multiplier takes into account the dynamic process of the change in income and the change in consumption at different stages due to change in investment. The dynamic multiplier is essentially a stage-by-stage computation of the change in income resulting from the change in investment till the full effect of the multiplier is realized.

The process of **dynamic multiplier** is described below. Suppose $MPC = 0.80$ and autonomous investment increases by Rs 100 (i.e., $\Delta I = 100$), all other things remaining the same. When an autonomous investment expenditure of Rs 100 is made on the purchase of capital equipment and labour, the income of the equipment and labour sellers increases by Rs 100, in the first instance. Let us call it ΔY_1. Those who receive this income, spend Rs 80 (= 100×0.80). As a result, income of those who supply consumer goods increases by Rs 80. Let it be called ΔY_2. They spend a part of it—Rs 80 × 0.80 = Rs 64. This creates ΔY_3. This process continues until additional income and expenditure are reduced to zero. The whole process of the computation of the total increase in income (ΔY) as a result of ΔI = Rs 100 can be summarised as follows.

$$\Delta Y = \Delta Y_1 + \Delta Y_2 + \Delta Y_3 + \ldots + \Delta Y_{n-1}$$

In numerical terms,

$$\begin{aligned}\Delta Y &= 100 + 100\ (0.8) + 100\ (0.8)^2 + 100\ (0.8)^3 + \ldots + 100\ (0.8)^{n-1}\\ &= 100 + 80 + 64 + 51.20 + \ldots + \to 0\\ &= 499.999 = 500\end{aligned}$$

After having calculated the total income effect (ΔY), the multiplier can be calculated as:

$$\frac{\Delta Y}{\Delta I} = \frac{500}{100} = 5$$

Recall that $\Delta Y_1 = \Delta I$. So the process of dynamic multiplier can be generalised as follows.

$$\begin{aligned}\Delta Y &= \Delta I + \Delta I(b) + \Delta I(b)^2 + \Delta I(b)^3 + \ldots + \Delta I(b)^{n-1} \qquad \textbf{(6.42)}\\ &= \Delta I\ (1 + b + b^2 + b^3 + \ldots + b^{n-1})\\ &= \Delta I\ \frac{1}{1-b}\end{aligned}$$

Eq. (6.42) gives the working of the dynamic multiplier.[6]

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6. The proof of dynamic multiplier is given below. As Eq. (6.42) shows, the series of income generated by ΔI is given as:

$$\Delta Y = \Delta I\ (1 + b + b^2 + b^3 + \ldots + b^{n-1}) \qquad \text{(i)}$$

Now let the terms in the parentheses of Eq. (i) be summed up as:

$$S = 1 + b + b^2 + b^3 + \ldots + b^{n-1} \qquad \text{(ii)}$$

Going by the rule of adding geometric progression, when we multiplying both sides of Eq. (ii), by a factor *'b'* we get

$$bS = b + b^2 + b^3 + b^4 \ldots + b^n \qquad \text{(iii)}$$

By subtraction Eq. (iii) from Eq. (ii), we get

$$\begin{aligned}S - bS &= 1 - b^n\\ S\ (1 - b) &= 1 - b^n\\ S &= \frac{1-b^n}{1-b} \qquad \text{(iv)}\end{aligned}$$

Since $b^n \to 0$ when $n \to \infty$, the term b^n in Eq. (iv) can be omitted. Then, Eq. (iv) can be written as:

$$S = \frac{1}{1-b} \qquad \text{(v)}$$

By substituting Eq. (v) into Eq, (i), for the terms in the parentheses, we get

$$\Delta Y = \Delta I\ \frac{1}{1-b}$$

The multiplier (m) can then be written as:

$$m = \frac{\Delta Y}{\Delta I} = \frac{1}{1-b}$$

Note that, in the ultimate analysis, both static and dynamic multipliers turn out to be the same.

6.6 THE USES AND LIMITATIONS OF MULTIPLIER

6.6.1 The Uses of Multiplier

The concept of multiplier occupies an important place in macroeconomic planning and projections and in the assessment of possible effects of the changes made in the fiscal policy of the government and also of its foreign trade policy. These uses will be discussed in the subsequent chapters. In the two-sector model, its role is limited to:

(a) the assessment of the overall possible increase in the national income due to 'one-shot' increase in investment or due to a 'single injection' of investment, and
(b) to plan economic growth of the country.

The use of the multiplier concept in determining the investment requirement for a certain planned growth in the national income over time can be illustrated with an example. Suppose a country has an income of Rs 100 billion and its *MPC* is 0.8 (or 80%). The value of multiplier for the country will be 5. Suppose also that the country plans to double its national income over a period of time through a 'one-shot' investment. That is, it wants to increase its national income by ΔY = Rs 100 million. The investment requirement of the two-sector country can be easily worked out as follows.

$$\begin{aligned} \text{Planned growth } (\Delta Y) &= \text{Rs } 100 \text{ billion} \\ \text{Multiplier } (m) &= 5 \\ \text{Investment Requirement } (\Delta I) &= \Delta Y/m \\ &= 100/5 \\ &= \text{Rs } 20 \text{ billion} \end{aligned}$$

In means that increasing national income by Rs 100 million requires an additional investment of Rs 20 million, all other things given.

6.6.2 Limitations of the Multiplier

The foregoing illustration of the usefulness of the multiplier in investment planning gives an impression that an exact assessment of investment requirement for a targeted growth of a country can be made if its *MPC* is known. However, the theory of multiplier does not work in practice as it does in theory. The reasons are given below.

(A) Leakages from the Income Stream

The multiplier theory assumes that those who earn income as a result of certain autonomous investment would continue to spend a certain (constant) proportion of additional income, depending on the aggregate *MPC*. In practice, however, this assumption does not hold in reality because people tend to spend their additional income on many other non-consumption and non-investment items. Such expenses are known as ***leakages*** from the income stream in the working process of the multiplier. The leakages reduce the value of multiplier. Some important kinds of leakages and their effect on the multiplier are given below.

(i) ***Payment of the past debts*** When income earners use a part of their additional income to repay their past debts, and those who recover their loans, use it to repay their own debts instead of consuming it. When this process continues, the marginal propensity to consume decreases. This reduces the generation of additional income over the working process of the multiplier. As a result, the value of multiplier is reduced depending on the leakage from ΔY on this account.

(ii) ***Purchase of existing wealth*** Another kind of leakage in the multiplier process arises when people spend the whole or a part of their newly-earned income on purchasing existing wealth and property, for instance, land, building, second-hand consumer durables, and purchase of shares and bonds from the share and bond holders, and so on. If money spent on such items keeps circulating on sale and purchase of old assets and never returns to the consumption stream, then the value of multiplier is reduced.

(iii) ***Import of goods and services***[7] The part of newly earned income spent on imported goods and services, is one of the most important leakages from the income stream created by the additional investment. It is quite likely that income used to repay old debts and money spent on purchase of old assets and consumer durables returns to the consumption stream sooner or later, but the income spent on imported goods and services flows out of the country and has little chance to return to the income stream of the country. The imports which make incomes flow out of the country reduce the value of multiplier.

(B) Non-availability of Consumer Goods and Services

Another limitation of multiplier arises due the lack of adequate and instant supply of consumer goods and services. The multiplier theory assumes an instant and matching supply of consumer goods and services. But, in general, the supply of goods does not follow instantly the rise in demand. There is always a time lag. During the lag period, newly earned income creates additional demand for goods and services which builds, in turn, demand pressure. As a result, prices of consumer goods go up, leading to inflation. Inflation eats away a part of consumption expenditure. This reduces the real consumer expenditure which constrains the multiplier effect.

(C) Full Employment Situation

The multiplier principle does not work in case of full employment. When resources of the country (capital and labour) are fully or near-fully employed, further production will not be possible. Therefore, additional investment will only lead to inflation, not to the generation of additional real income.

6.7 APPLICABILITY OF MULTIPLIER THEORY TO LDCs

According to the multiplier theory, the higher the *MPC,* the higher the rate of multiplier. It is equally true that the lower the income, the higher the *MPC*. The World Bank's Development Reports show that the less developed countries (*LDCs*) have a lower per capita income and lower rates of saving and investment compared to the developed countries (*DCs*). The lower rate of saving indicate that *LDCs* have a relatively higher *MPC*. This implies that multiplier must be higher in *LDCs* than in developed countries (*DCs*). And, therefore, a given amount of autonomous investment should result in a much higher employment and output in *LDCs* than in *DCs*. It follows that the rate of economic growth resulting from additional investment must be much higher in the *LDCs* than in *DCs*. In reality, however, this is not true: the multiplier and the rate of growth are both lower in *LDCs*

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7. This aspect is not relevant in two-sector model. However, for the sake of completeness of the limitations of the multiplier theory we take note of this aspect also.

compared to those in *DCs*. This creates a paradoxical situation which is called 'Keynes's *MPC* and the multiplier paradox.' It is, therefore, generally agreed that *the logic of Keynesian multiplier does not apply to the LDCs*.

The reason for non-applicability of the multiplier theory to the *LDCs* is that the assumptions and conditions under which Keynes had formulated his theories do not apply for the *LDCs*. Keynes had developed his theories in the background of the Great Depression during the early 1930s. The Great Depression had affected mostly the developed countries, that is, the countries which had grown beyond the stage of, what Rostow called, 'take-off.' Besides, Keynesian theory of multiplier assumes: (i) a high level of industrial development, (ii) involuntary unemployment, (iii) existence of excess capacity, and (iv) elastic supply curves. It is a widely known fact that most of these assumptions do not hold in the *LDCs*.

V.K.R.V. Rao[8] had examined the issue of applicability of the Keynesian multiplier in the case of India, then a typical *LDC*, in the early 1950s. He found that the assumptions under which multiplier theory was developed do not hold for the underdeveloped countries. Instead, as he pointed out, an underdeveloped country is characterised by:

(i) a predominant agricultural sector,
(ii) a vast disguised unemployment,
(iii) low level of capital equipment,
(iv) low level of technology and technical know how,
(v) a small proportion of wage employment to the total,
(vi) a vast non-monetised sector, and
(vii) a vast sector producing for self-consumption.

"Under these circumstances, the multiplier principle does not work in the simple fashion visualised by Keynes primarily for the industrialised economies."[9]

Besides, he adds that the very nature of the agricultural economy makes agricultural supply relatively inelastic. Even in the industrial sector, supply of good and services is constrained by limited production capacity, limited supply of inputs and long gestation lag of new production plans. There is therefore a considerable time leg between the increasing demand and forth coming supply. "This tends to widen the difference between the multiplier linking up increments of money investment with increments of money income and that linking up increments of investment with increments of total output with the result that money incomes and prices rise much faster than real income and output". For this reason too the multipier theory does not apply to *LDCs* in *real* terms though it does work in *monetary* terms.

This however should not mean that the multiplier theory applies to the developed countries exactly as construed in theory. The application of the multiplier theory has its limitations for developed countries also, as pointed out above. For instance, given the saving rate of about 20 percent in the US during the 1990s, the value of multiplier should theoretically be 5. But, in reality it has been found to be 1.4[10]. Furthermore, the multiplier theory has been found to work in

8. Rao, V.K.R.V., "Investment, Income and Multiplier in an Underdeveloped Economy", *Indian Economic Review,* Vol. 1, No.1, 1952.

9. Rao, V.K.R.V., *ibid.*

10. Karl E. Case and Ray C. Fair, *Principles of Economics*, (Pearson Education Asia, 6th Edn. 2002), p.450.

developed countries more vigorously in the early stages of recovery from depression because of excess capacity than during the period of boom.

6.8 THE PARADOX OF THRIFT AND THE MULTIPLIER

Before we close our discussion on the theory of multiplier, let us look at the "paradox of thrift" pointed by Keynes (*The General Theory*, p. 358). It is widely believed that "saving is a virtue" and "a penny saved is a penny earned". In simple words, those who save and invest become prosperous. This rule may be taken to be applicable for the country as a whole. However, Keynes contradicted this widely held belief. In his opinion, these beliefs may be true in case of individual households, but not for the society as a whole. Keynes argued that when all or most households become thrifty, i.e., they decide to consume less and save more, the level of income and savings of the nation tends to decline. This is what he calls the 'paradox of thrift'. The paradox of thrift is illustrated in Fig. 6.9 using the saving-investment approach to income determination.

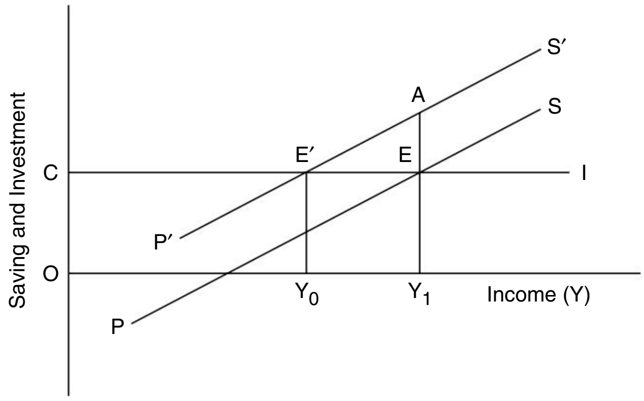

Fig. 6.9 The Paradox of Thrift

In Fig. 6.9, the schedule marked *CI* shows the constant investment (in line with our earlier assumption) and the schedule marked *PS* shows the normal planned saving schedule. The investment and saving schedules intersect at point *E*, determining the equilibrium level of income at OY_1. At this equilibrium level of income, $S = I = EY_1$. Now let the society decide to become thrifty, i.e., to cut down consumption and increase savings, say, by *AE*. As a result, saving schedule shifts upward to $P'S'$ intersecting investment schedule at point E'. Consequently, the point of equilibrium shifts from point *E* to E' and the equilibrium level of income fall from OY_1 to OY_0. As the figure shows, the planned savings too falls from AY_1 to $E'Y_0$. Note that $E'Y_0 < AY_1$. The decline in the equilibrium level of saving shows the paradox of thrift under the assumed conditions. What is worse is that the people get poorer.

The process through which paradox of thrift works to reduce savings is the process of reverse multiplier because increased saving is virtually a ***withdrawal*** from the circular flow of income. This implies that savings are not invested either because there is full employment or people do not want to invest due to high rate of risk. This leads to inverse multiplier. If people decide to increase their savings by cutting down their consumption expenditure, demand for consumer goods and services will fall. The fall in demand results in build up of inventories (unsold stock of goods and services) of the business firm. Therefore, they cut down their production. This leads to decline in incomes. Since saving is the function of income, fall in income causes decline in savings. This process works until the economy reaches a new equilibrium point where saving equals investment.

It must however be borne in mind that if autonomous investment increases with the autonomous increase in planned savings, the paradox of thrift will not work. The reason is that additional savings will find way to the circular flow of income and investment. This will generate income depending on the multiplier. Increase in income will generate more savings and investment.

SUGGESTED READINGS

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QUESTIONS FOR REVIEW

1. Do you agree with the statement that Keynes derived his aggregate supply function by using classical production function. If yes, explain the derivation of the Keynesian aggregate supply function using appropriate diagrams.
2. Explain the concept of aggregate demand. How is the Keynesian aggregate demand function different from the classical demand function based on the Say's law?
3. (a) What is the meaning of the consumption function? Assume a hypothetical consumption function with $MPC = 0.75$ and present is graphically.
   (b) What is the difference between Keynes' own consumption function and one derived by the Keynesians?
4. Which of the following statements is correct?
   (a) Keynes assumed a constant MPC,
   (b) $\Delta C/\Delta Y$ varies with increase in income in Keynes's original consumption function,
   (c) The condition that $0 < MPC < 1$ holds always.
5. Suppose a consumption function is given as $C = a + bY$. Derive a saving function from this consumption function.
6. Assuming a consumption function, prove the following.
   (a) $S = (1 - b) Y - a$; and
   (b) $\Delta C/\Delta Y + \Delta S/\Delta Y = 1$
7. Suppose a consumption function is given as $C = 100 + 0.8Y$ and stock of capital is fixed at Rs 200. Based on this information, draw an aggregate demand function.

8.* Suppose consumption function and investment in a two-sector economy are given as:

$$C = 50 + 0.8Y, \text{ and}$$
$$I = 50.$$

Find the equilibrium level of income, consumption and savings.

9.* Suppose structural equations of an economy are given as follows.

$$Y = C + I$$
$$C = 100 + 0.75Y, \text{ and}$$
$$I = 100$$

Find the equilibrium values for Y and C.

10. What is meant by the equilibrium level of national income? Why is the equilibrium level of income and output supposed to be stable where $AD = AS$?

11. What is a multiplier? Explain how an additional investment multiplies itself to contribute to the national income. Draw a diagram to show that $\Delta Y > \Delta I$ when $MPC > 0$.

12. Suppose in a two-sector economy

    (a) $C = a + bY;$
    (b) $\Delta C = b\Delta Y$, and
    (c) investment is given at I.

    Produce the basic model of the multiplier assuming a ΔI.

13. Suppose

    (a) $C = 100 + 0.75Y,$
    (b) $I = 100$, and
    (c) $\Delta I = 50$.

    Work out (a) the saving function, (b) the multiplier, and (c) ΔY through the dynamic multiplier.

14. *The multiplier for a two-sector economy is computed to be 4. Derive the following.

    (a) the saving function, and
    (b) the consumption function.

15. *A two-sector economy has a total income of Rs 150 billion and its overall MPC is worked out to be 66.67%. How much does this country need to invest once for all to increase its total income by 100%?

16. Distinguish between the static multiplier and the dynamic multiplier. Suppose $C = a + bY$ and investment (I) is given. Assuming $MPC = 0.8$ and $\Delta I = 50$, work out the multiplier by the static and the dynamic methods.

17. The less developed countries have in general a high marginal propensity to consume than the developed countries. This implies that a given investment will add more income to the total in the less developed countries than in the developed countries. But this is generally not the case. Why?

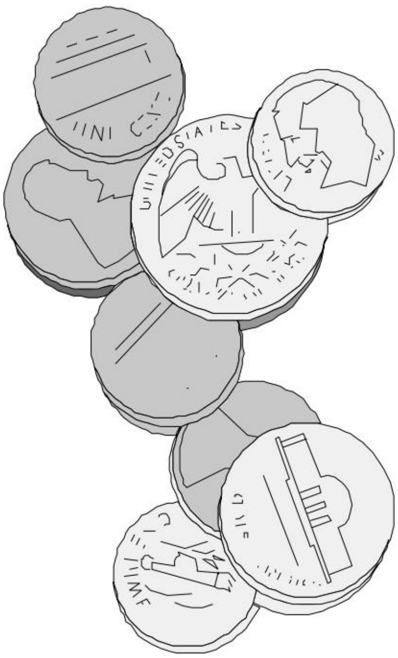
18. What are the conditions that prevent the application of the multiplier theory to the less developed countries?. Give your answer in the light of the conditions prevailing in the Indian economy.

19. What is meant by 'paradox of thrift'? Explain and illustrate that if all the households become thrifty, i.e., they reduce consumption and increase saving, then the level of national income decreases.

(*Note*: For solution of the asterisked questions see *Appendix*).

Chapter 7

Income Determination in a Closed Economy Model: A Model with Government Sector



INTRODUCTION

In Chapter 6, we have explained income and output determination in a simple economy model. In this chapter, we explain income and output determination in a closed economy model—a more realistic model. The closed economy model includes three sectors, viz., household, business and the government sectors. The **closed economy** model is also known as the **three-sector** model. The income and output determination in a four-sector model, i.e., the model with foreign sector will be explained in the next chapter.

7.1 INCOME DETERMINATION WITH THE GOVERNMENT SECTOR

A three-sector or a closed economy model is constructed by adding government sector to the two-sector or simple economy model. The government influences the level of economic activities in a variety of ways through its economic activities, fiscal policy (government expenditure and taxation policies), monetary and credit policy, growth policy, industrial policy, labour policy, price policy, wage policy, employment policy, control and regulation of monopolies, export and import policies, environment policy, etc. However, the closed economy model of the Keynesian income determination theory confines to the effects government expenditure (including transfer payments) and taxation. Thus, inclusion of the government sector into the simple economy model introduces three new variables to the model, viz., taxes (T), government expenditure (G), and transfer payments (G_T). The inclusion of the government complicates the analysis by bringing in the complex system of taxation, expenditure and transfer payments. However, we assume a simple system of government taxation, expenditure and transfer payments. In our simplified system, the government makes only the following fiscal operations.

(i) It imposes only direct taxes on the households;
(ii) It spends money on buying factor services from the household sector and goods and services from the private business sector; and
(iii) It makes transfer payments in the form of pensions and subsidies.

Capturing the effects of all the three variable—taxes, expenditure and transfer payments—on the equilibrium of the national income in a simple model is a difficult proposition at this stage of our analysis. Therefore, for convenience sake, the effects of these variables on the equilibrium level of income will be discussed in a *sequence* of four models— Model I, Model II, Model III and Model IV—each being the extension of the previous model. While Model I analyses the effect of *lump-sum* tax and government expenditure on the equilibrium level of income, Model II analyses the effect of transfer payments. Model III extends the analysis to the effect of proportional tax system. Model IV combines the three models and presents a comprehensive analysis.

7.1.1 Income Determination with Government Spending and Tax: Model I

Model I is an extension of the two-sector model presented in Chapter 6. It includes two additional variables—the government spending on purchases (G), and income tax (T). Model I is based on the following assumptions.

(i) There is no transfer payment;
(ii) There is only one form of tax, i.e., a lump sum income tax, determined exogenously; and
(iii) The government spending is too exogenously determined.

Let us also assume, for the sake of simplicity, that the government follows a balanced budget policy, i.e., the government keeps its expenditure (G) equal to its tax revenue (T). Given these conditions, Model I has been elaborated under (i) *AD-AS* approach, and *S-I* approach.

(i) *AD-AS* Approach

Under *AD-AS* approach, the variables of the aggregate demand (*AD*) and aggregate supply (*AS*) of the three-sector model can be specified as

$$AD = C + I + G \tag{7.1}$$

and

$$AS = C + S + T \tag{7.2}$$

The Keynesian condition for the equilibrium of the national income may now be written as

$$C + I + G = Y = C + S + T \tag{7.3}$$

Thus, at equilibrium,

$$Y = C + I + G \tag{7.4}$$

In three-sector model, variable C in Eq. (7.4) needs to be redefined. With tax imposition, consumption function (C) is redefined as

$$C = a + bY_d$$

where $Y_d = Y - T$, (disposable income)

where T = Tax (lump sum)

By substituting $Y - T$ for Y_d, consumption function in a three-sector model can be written as

$$C = a + b(Y - T) \tag{7.5}$$

By substituting Eq. (7.5) for C in Eq. (7.4), the equilibrium level of national income can be written as

$$Y = a + b(Y - T) + I + G \tag{7.6}$$

By rearranging the variables in Eq. (7.6), we get the equilibrium level of income (Y) as

$$Y = a + bY - bT + I + G$$

$$Y(1 - b) = a - bT + I + G$$

$$Y = \frac{1}{1-b}(a - bT + I + G) \tag{7.7}$$

Equation (7.7) gives a formal model for the equilibrium level of national income. If consumption function and the values of constants (I, G and T) are known, the equilibrium level of the national income can be easily worked out. A numerical example is given below.

Numerical Example For a numerical example, let us recall our earlier consumption function and constant investment given as

$$\text{(a)}\ C = 100 + 0.75Y_d \tag{7.8}$$

and

$$\text{(b)}\ I = 200 \tag{7.9}$$

Let us also assume that the government has a balanced budget with

$$G = T = 100 \tag{7.10}$$

By substituting the values in Eq. (7.7), we get the equilibrium level of the national income (Y) as follows.

$$Y = \frac{1}{1-0.75}[100 - (0.75 \times 100) + 200 + 100] \tag{7.11}$$

$$= \frac{1}{0.25}(100 - 75 + 200 + 100)$$

$$= 4(325)$$

$$Y = 1300$$

Graphical Analysis The determination of equilibrium level of the national income in a three-sector model is presented graphically in Fig. 7.1. The aggregate demand without the government sector, is designated as $C_1 + I$. As Fig. 7.1 shows, the aggregate demand schedule ($C_1 + I$) intersects the aggregate supply schedule (AS) at point E_1 where national income is in equilibrium at Rs 1200. This part of analysis is the same as given in the two-sector model.

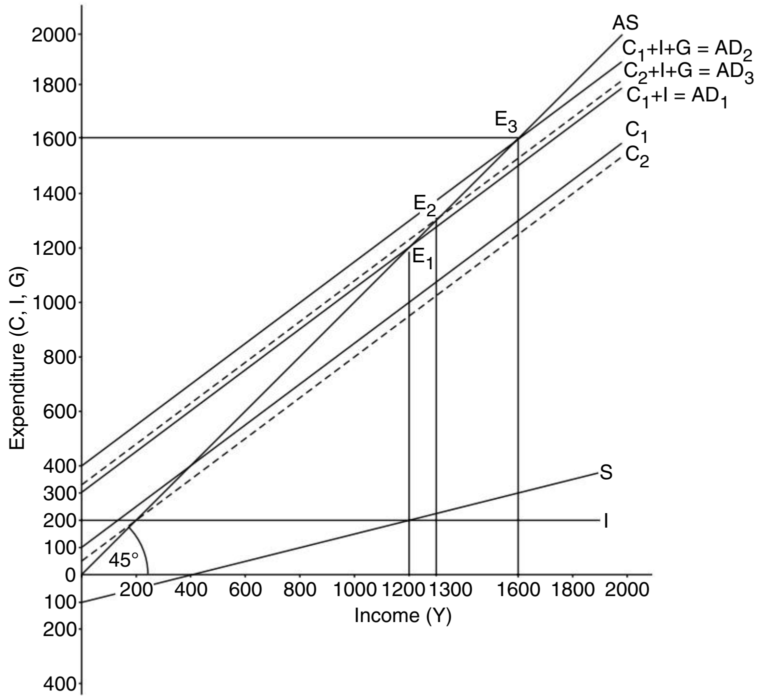


Fig. 7.1 Income Determination in Three-Sector Model

Let us now introduce the government sector to the model. For graphical presentation of the model, let us begin with a simple case. Let us assume that the government makes an expenditure of Rs 100, that is, $G = 100$, which it finances through currency creation, not by taxation, i.e., $T = 0$. With the addition of G under this condition, the aggregate demand function changes from $C_1 + I = AD_1$ to $C_1 + I + G = AD_2$ and the AD schedule shifts upward as shown in Fig. 7.1. As a result, the equilibrium point shifts from point E_1 to E_3 which determines the national income equilibrium at Rs. 1600.

The equilibrium level of the national income with the effects of government expenditure can also be worked out mathematically. Given the assumptions (7.8) through (7.10), the equilibrium level of the national income in three-sector model is given as:

$$Y = 100 + 0.75Y + 200 + 100 \ (= G) \qquad \textbf{(7.12)}$$

$$Y - 0.75Y = 100 + 200 + 100$$

$$Y(1 - 0.75) = 400$$

$$Y = 1600$$

Equation (7.12) shows the *effect of the government spending* (G) on the level of the national income when there is **no tax**.

Let us now introduce a lump sum tax and see its effect on the national income. Suppose total lump sum tax (T) equals Rs 100, i.e.,

$$T = 100 \quad \textbf{(7.13)}$$

After the introduction of tax, the consumption function (7.8) takes the following form.

$$C = 100 + 0.75Y_d \quad \textbf{(7.14)}$$

where, $Y_d = Y - T$

By substituting $Y - T$ for Y_d, the consumption function can be rewritten as:

$$C = 100 + 0.75(Y - T)$$

Since $T = 100$, the final form of consumption function is given as

$$C = 100 + 0.75(Y - 100) \quad \textbf{(7.15)}$$

Recall that a tax is a withdrawal from the income stream. The tax has therefore an adverse effect on the consumption function as it reduces disposal income (Y_d). The adverse effect of tax on consumer demand is shown by a downward shift of the pre-tax demand schedule, C_1, to the position of C_2 shown by a dotted line in Fig. 7.1. This causes a downward shift in the pre-tax aggregate demand schedule, AD_2, to the position of AD_3 as shown by the dotted line. The downward shift in the aggregate demand schedule shifts the equilibrium point from E_3 to E_2 where the equilibrium level of the national income is determined at Rs 1300. Thus, a tax causes a fall in the national income.

The post-tax equilibrium level of national income can also be worked out numerically as shown below.

Recall the post-tax consumption function given in Eq. (7.15) as

$$C = 100 + 0.75(Y - 100)$$

By substituting this consumption function into the equilibrium Eq. (7.12), the equilibrium level of national income can be obtained as follows.

$$Y = 100 + 0.75(Y - 100) + 200 + 100 \quad \textbf{(7.16)}$$

$$Y = 100 + 0.75Y - 0.75 \times 100 + 200 + 100$$

$$Y = \frac{1}{1 - 0.75}(325)$$

$$Y = 1300$$

Note that this equilibrium level of the national income (with $G = T$) is the same as given in Eq. (7.11). Using Eq. (7.16), one can analyse the effect of a tax cut on the equilibrium level of the national income.

(ii) Saving-Investment Approach with *G* with *T*

The same result can be arrived at by using the saving-investment approach income determination with government expenditure (G) and tax (T). By saving-investment approach, the national income equilibrium in a three-sector model can be specified as

$$S + T = I + G \quad \textbf{(7.17)}$$

By substituting values for I, G and T from Eqs. (7.9) and (7.10), equilibrium condition given in Eq. (7.17) can be written as

$$S + 100 = 200 + 100 \tag{7.18}$$

What we need now is to derive the saving schedule (S) based on Eq. (7.18). The saving schedule for three-sector model can be derived as follows. In a three-sector model,

$$S = (Y - T) - C$$

By substituting consumption function for C in this equation, we get

$$S = (Y - T) - [a + b\,(Y - T)] \tag{7.19}$$

By substituting, numerical values for constants a, b and T, saving function can be written as

$$\begin{aligned} S &= Y - 100 - [100 + 0.75\,(Y - 100)] \\ &= Y - 100 - 100 - 0.75\,Y + 75 \\ &= 0.25Y - 125 \end{aligned} \tag{7.20}$$

By substituting saving function given in Eq. (7.20) for S in Eq. (7.18), we get national equilibrium equation as

$$0.25Y - 125 + 100 = 200 + 100 \tag{7.21}$$

$$0.25Y = 325$$

$$Y = 1300$$

Alternatively, following the procedure given in Chapter 6 saving function can be written as follows.

$$\begin{aligned} S &= -100 + (1–0.75)(Y–100) \\ &= 0.25Y - 125 \end{aligned} \tag{7.22}$$

By substituting Eq. (7.22) for S in Eq. (7.17), the equilibrium condition can be rewritten as follows.

$$0.25Y - 125 + 100 = 200 + 100 \tag{7.23}$$

$$0.25\ Y = 325$$

$$Y = 1300$$

Note that saving-investment approach also yields the same equilibrium level of income. Income determination in three-sector model by saving-investment approach is illustrated in Fig. 7.2. As the figure shows, in the simple economy case, S and I schedules intersect at point E_1 determining the equilibrium level of income at Rs 1200. With inclusion of tax (T), saving schedule shifts to $S + T$. And, with addition of G, investment schedule (I) shifts upward to $I + G$. Schedules $I + G$ and $S + T$ intersect at point E_2 determining the equilibrium level of income at Rs 1300. Note that with inclusion of $T = G = 100$, national income increases exactly by the amount of G, i.e., by the amount of injection. Why? This question will be answered later in this Chapter.

7.1.2 Income Determination with Transfer Payments: Model II

Model II is an extension of *Model* I with addition of transfer payments to the Model. A transfer payment is a *non quid pro quo* payment made by the government to different sections of the society for social welfare purposes, for example, old-age pensions, retirement benefits, unemployment compensations, social security payments, poverty relief grants, social welfare payments, and so on.

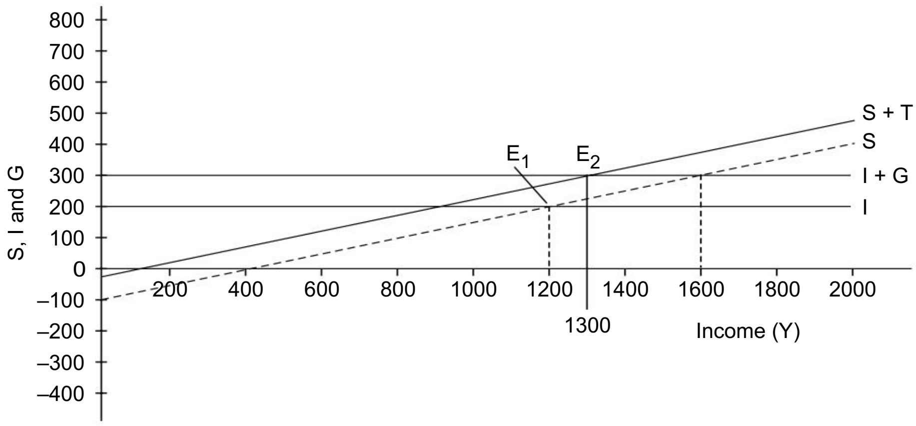


Fig. 7.2 Income Determination by Saving-Investment Approach

A transfer payment is opposite of tax and it can be treated as negative tax. Transfer payments enhance spending capacity of the households and hence have a positive effect on the equilibrium level of the national income.

Transfer payments may be autonomous or may be financed through a lump sum tax. The two different ways of financing transfer payments affect national income equilibrium in two different ways. The analysis of the transfer payments financed through additional lump sum tax is similar to that of government spending and taxation. It is so because transfer payments become a part of the government expenditure and additional tax becomes a part of the total lump sum tax. We will analyse here only the effect of *autonomous transfer payments* on the national income.

The model for the analysis of the transfer payments remains essentially the same as one used for analysing the effects of the government spending and lump sum tax with the same equilibrium condition, that is, $Y = C + I + G$. However, the introduction of transfer payments in the model, all other things remaining the same, alters the consumption function from

$$C = a + b(Y - T)$$

to one given below.

$$C = a + b(Y - T + G_T) \tag{7.24}$$

(where G_T is autonomous transfer payment).

Recall now the equilibrium Eq. (7.7). It is reproduced here.

$$Y = \frac{1}{1-b}(a - bT + I + G) \tag{7.25}$$

By incorporating transfer payment (G_T) in Eq. (7.25), the equilibrium equation involving transfer payments can be expressed as

$$Y = \frac{1}{1-b}[a - b(T - G_T) + I + G]$$

$$= \frac{1}{1-b}[a - bT + bG_T + I + G] \tag{7.26}$$

In Eq. (7.26), the term bG_T is the increase in consumption caused by G_T. When the value of G_T is known, the equilibrium level of the national income can be known.

Numerical Example To illustrate the effect of transfer payments, let us assume that the economy is in equilibrium at point E_2 in Fig. 7.1. The equilibrium level of income at point E_2 is given by Eq. (7.16), reproduced below.

$$\begin{aligned} Y &= 100 + 0.75(Y - 100\ ) + 200 + 100 \\ &= 1300 \end{aligned} \tag{7.27}$$

Let us assume that $G_T = 50$ and that an increase in consumption caused by G_T equals 0.75 (50).

The effect of the transfer payment on the equilibrium level of the national income can be obtained by inserting $G_T = 50$ in Eq. (7.27) which can now be rewritten as

$$\begin{aligned} Y &= 100 + 0.75(Y - 100 + 50\ ) + 200 + 100 \\ Y(1- 0.75) &= 100 - 75 + 37.50 + 200 + 100 = 362.50 \\ Y &= (1/0.25)\ (362.50) \\ &= 1450 \end{aligned} \tag{7.28}$$

Thus, given the equilibrium at point E_2, a transfer payment of Rs 50 adds an income of Rs 150 = 1450 – 1300 to the national income. Given the $\Delta Y = 150$, the multiplier of the transfer payments (with tax) equals $\Delta Y/G_T = 150/50 = 3$ and the government expenditure multiplier (without tax) equals 4. Thus, the transfer payment multiplier is 1 less than the government expenditure multiplier. The difference between the government expenditure multiplier ($\Delta Y/\Delta G$) and transfer payment multiplier ($\Delta Y/\Delta G_T$) can be shown as follows. Suppose $\Delta G = \Delta G_T$ and recall that

$$\Delta Y/\Delta G = 1/(1 - b)$$

and

$$\Delta Y/\Delta G_T = b/(1 - b)$$

By subtracting, we get

$$\Delta Y/\Delta G - \Delta Y/\Delta G_T = 1/(1 - b) - b/(1 - b) = 1$$

The reason for this difference is the fact that any ΔG adds directly to the aggregate demand, whereas only a part of increase in G_T, that is, ΔbG_T , adds to the demand for consumption. The reason is two-fold: (i) a transfer payment does not add to the aggregate demand till it is spent on consumer goods, and (ii) only a part of G_T, not the entire of it, is spent on consumption—a part of it taxed: it is so because of definition of disposable income. On the contrary, the government expenditure on purchase of goods and services directly adds to the aggregate demand. It is also important to note that transfer payment multiplier is equal to the tax-cut multiplier.

7.1.3 Income Determination with Tax as a Function of Income: Model III

In analysing the effect of tax on the equilibrium of the national income, we have so far assumed a lump sum tax—a constant factor determined exogenously. A lamp-sum tax is unrealistic—assumed only for theoretical purpose. In this section, we move one step forward to a realistic system of taxation. In *Model* III, we assume a tax function rather than a lump sum tax. For the purpose, we assume an autonomous constant tax ($\bar{T}$) and a proportional income tax rate, expressed as tY. A proportional income tax is, by implication, a function of income.

The tax function used for model III can be expressed as

$$T = \bar{T} + tY \tag{7.29}$$

where, T = total tax, $\bar{T}$ = autonomous tax, and t = income tax rate.

Given the tax function (7.29), consumption function can now be written as

$$C = a + b\,(Y - \bar{T} - tY) \tag{7.30}$$

or

$$C = a - b\bar{T} + b(1 - t)Y$$

By substituting the consumption function (7.30) into the equilibrium equation given as $Y = C + I + G$, the equilibrium level of national income can be expressed as

$$Y = a + b(Y - \bar{T} - t\,Y) + I + G$$

$$= a + bY - b\bar{T} - btY + I + G$$

$$Y - bY + btY = a - b\bar{T} + I + G$$

$$Y\,(1 - b + bt) = a - b\bar{T} + I + G$$

$$Y = \frac{1}{1 - b + bt}\,(a - b\bar{T} + I + G)$$

or

$$Y = \frac{1}{1 - b(1 - t)}\,(a - b\bar{T} + I + G) \tag{7.31}$$

The term

$$\frac{1}{1 - b(1 - t)}$$

in Eq. (7.31) is the **tax multiplier** in case of $T = f(Y)$.

Numerical Example Suppose structural equations are given as follows:

$$C = 100 + 0.80\,(Y - T)$$

$$I = 200$$

$$T = 25 + 0.1Y$$

$$G = 100$$

Given these parameters, equilibrium Eq. (7.31) can be written as follows.

$$Y = 100 + 0.80(Y - 25 - 0.10Y) + 200 + 100$$

$$= \frac{1}{1 - 0.80 + 0.08}\,(380)$$

$$= 1356.60$$

7.1.4 Income Determination with Tax Function, Government Expenditure and Transfer Payments: Model IV

In model III, we have shown income determination with two fiscal operations of the government, including government spending on purchases (G), and a tax function (T). Model III is an extension of model I. Now we extend model III to include transfer payments (G_T) and analyse its effect on the equilibrium level income. This makes our Model IV. Recall that the effect of transfer payment on the equilibrium level of income has already been analysed in model II. In model IV, we include it again just to present a complete three-sector model of income determination.

We assume that all the parameters of Model IV are the same as in Model III and that transfer payments (G_T) = 50. With the inclusion of transfer payments (G_T), consumption function given in Eq. (7.31) can be written as follows.

$$C = a + b(Y - \bar{T} - tY + G_T) \qquad \textbf{(7.32)}$$

By substituting Eq. (7.32) in equilibrium Eq. (7.31) can be expressed as

$$\begin{aligned} Y &= a + b(Y - \bar{T} - tY + G_T) + I + G \\ &= a + bY - b\bar{T} - btY + bG_T + I + G \\ &= \frac{1}{1 - b(1-t)} (a - b\bar{T} + bG_T + I + G) \qquad \textbf{(7.33)} \end{aligned}$$

By substituting parametric values in Eq. (7.33), we get the equilibrium level of national income as follows.

$$\begin{aligned} Y &= \frac{1}{1 - 0.8(1 - 0.1)} [100 - 0.8(25) + 0.8(50) + 200 + 100] \\ &= \frac{1}{0.28} [100 - 20 + 40 + 200 + 100] \\ &= \frac{1}{0.28} [420] \\ &= 1500 \end{aligned}$$

7.2 THE FISCAL MULTIPLIERS

In this section, we discuss briefly the multipliers associated with government's fiscal operations, called *fiscal multipliers*. Given our limited purpose here, we consider only the main fiscal operations of the government, viz.,

(i) government expenditure (including transfer payments), and
(ii) taxation of incomes.

Government's fiscal operations affect the equilibrium level of national income depending on the **multiplier effects** of fiscal operations. Government expenditure (with no taxation) increases the equilibrium level of national income. The overall effect of the government expenditure on the national income depends on the value of *government expenditure multiplier*. On the other hand, taxation (with no government expenditure) causes a reduction in the national income. The overall effect of taxation depends on the *tax multiplier*. In practice, however, both the fiscal operations (government spending and taxation) go side by side. If the government adopts a balanced budget policy, it spends only as much it taxes. In that case, the overall effect of government's fiscal operations on the national income depends on the combined effect of expenditure and tax multipliers. In this section, we describe the method of working out the *expenditure multiplier, tax multiplier* and the *balanced budget multiplier*. Let us discuss first the government expenditure multiplier.

7.2.1 The Government Expenditure Multiplier: The *G*-Multiplier

To explain and derive the government expenditure multiplier, let us assume (i) that the government spends its money on the goods and services only, i.e., there is no transfer expenditure, (ii) that I, G and T are constant, and (iii) consumption function is given.

To work out the government expenditure multiplier, i.e., G-multiplier, and its effect on the national income, let us recall the three-sector equilibrium Eq. (7.7) reproduced below.

$$Y = \frac{1}{1-b}\ (a - bT + I + G) \tag{7.34}$$

Let us now suppose that the government expenditure increases by ΔG, all other factors given. This (ΔG) causes an increase in the aggregate demand and, therefore, a rise in the equilibrium level of income by, say, ΔY. The equilibrium level of the national income with ΔG can be expressed by modifying Eq. (7.34).

$$Y + \Delta Y = \frac{1}{1-b}\ (a - bT + I + G + \Delta G) \tag{7.35}$$

By subtracting Eq. (7.34) from Eq. (7.35), we get ΔY resulting from ΔG.

$$\Delta Y = \frac{1}{1-b}\ (\Delta G) \tag{7.36}$$

The government expenditure multiplier (G_m) can then be obtained as

$$G_m = \frac{\Delta Y}{\Delta G} = \frac{1}{1-b} \tag{7.37}$$

7.2.2 The Tax Multiplier: The *T*-Multiplier

A tax is withdrawal from the circular flow of the income. Therefore, a tax has a negative effect on the equilibrium level of national income. Tax multiplier refers to the negative multiple effect of a change in tax on the national income. To analyse the effect of change in tax and to work out tax multiplier, we will confine to only two kinds of taxation systems:

(a) lump sum income tax, and
(b) proportional income tax.

A change in lump sum income tax or a change in proportional income tax affects the equilibrium level of national income differently. Therefore, tax multiplier in the two methods of taxation is different. The effect of a lump sum tax and that of the proportional income tax have already been discussed (see Models III and IV). For the sake of completeness, we show here the computation of the tax multipliers of a rise in the *lump sum tax*.

Increase in Lump Sum Tax and Tax Multiplier In order to find the impact of a change in the lump sum tax, let us introduce ΔT into the equilibrium equation. Let us recall again the national income equilibrium Eq. (7.7) with a given lump-sum tax (T). The equation reads as

$$Y = \frac{1}{1-b}\ [a - bT + I + G] \tag{7.38}$$

Let us now introduce a change in tax by ΔT. A change in tax, ΔT, changes the national income by ΔY. When ΔT and ΔY are incorporated into the national income equilibrium Eq. (7.38), it takes the following form.

$$Y + \Delta Y = \frac{1}{1-b}\,[a - b(T + \Delta T) + I + G] \tag{7.39}$$

$$= \frac{1}{1-b}\,[\,a - bT - b\Delta T + I + G]$$

The effect of ΔT on the equilibrium level of national income, i.e., ΔY, can now be obtained by subtracting Eq. (7.38) from Eq. (7.39). Thus, we get,

$$\Delta Y = \frac{1}{1-b}\,[-\,b\Delta T]$$

$$\Delta Y = \frac{-b\Delta T}{1-b} \tag{7.40}$$

Now, tax multiplier (T_m) can be obtained by dividing both sides of Eq. (7.40) by ΔT.

$$T_m = \frac{\Delta Y}{\Delta T} = \frac{-b}{1-b} \tag{7.41}$$

Note that ΔT, that is, a rise in tax, has a **negative effect** on the equilibrium level of the national income. Increasing tax by ΔT, decreases equilibrium level of national income by a multiple of ΔT. And, as a corollary of it, a tax cut ($-\Delta T$) results in a rise in the equilibrium level of national income.

7.2.3 The Balanced Budget Multiplier

Now we turn to examine the effect of *balanced budget policy* of the government on the national income. When a government adopts a balanced budget policy it spends only as much as it collects through taxation. That is, in the balanced budget policy, $T = G$ and $\Delta G = \Delta T$. The effect of the balanced budget policy on the national income is measured through the ***balanced budget theorem*** or *balanced budget multiplier*. The balanced budget theorem states that the *balanced budget multiplier is always equal to one*. Therefore, the balanced budget theorem is also called *unit multiplier theorem*. The proof of the balanced budget theorem with a lump sum is given below.

The effect of a lump sum tax has already been discussed above (see Eq. 7.34). We reproduce Eq. (7.34) here with a minor modification, i.e., replacing T with $\bar{T}$. That is,

$$Y = \frac{1}{1-b}\,(a - b\bar{T} + I + G) \tag{7.42}$$

In order to find the balanced budget multiplier let us incorporate ΔG and ΔT (while $\Delta G = \Delta T$) into Eq. (7.42). When we do so, Eq. (7.42) takes the following form.

$$Y + \Delta Y = \frac{1}{1-b}\,[a - b\,(\bar{T} + \Delta T) + I + G + \Delta G] \tag{7.43}$$

By subtracting Eq. (7.42) from Eq. (7.43), we get

$$\Delta Y = \frac{1}{1-b}\,(-\,b\Delta T + \Delta G) \tag{7.44}$$

Since $\Delta T = \Delta G$ in the balanced budget, by substituting ΔG for ΔT in Eq. (7.44), we get

$$\Delta Y = \frac{1}{1-b}\,(-\,b\Delta G + \Delta G) \tag{7.45}$$

By rearranging the terms, in Eq. (7.45) we get:

$$\Delta Y\,(1-b) = -\,b\Delta G + \Delta G \tag{7.46}$$

$$\Delta Y\,(1-b) = \Delta G\,(1-b)$$

$$\Delta Y = \Delta G$$

The balance budget multiplier (BB_m) can be obtained by dividing both sides of Eq. (7.46) by ΔG. Thus,

$$BB_m = \frac{\Delta Y}{\Delta G} = \frac{\Delta G}{\Delta G} = 1 \tag{7.47}$$

Alternatively, the balanced budget multiplier can also be obtained by adding up G_m and T_m. We know from Eqs. (7.37) and (7.41) that $G_m = 1/(1-b)$ and $T_m = -\,b/(1-b)$, respectively. Thus,

$$BB_m = G_m + T_m \tag{7.48}$$

$$= \frac{1}{1-b} + \frac{-b}{1-b}$$

$$= \frac{1-b}{1-b} = 1$$

It is thus proved that when $\Delta G = \Delta T$, the balanced budget multiplier (BB_m) is always equal to unity. It implies that with $\Delta G = \Delta T$, national income increases exactly by the amount of increase in the government expenditure (ΔG). This can be proved as follows.

Under the condition of balanced budget,

$$\Delta Y = G_m(\Delta G) + T_m(\Delta T)$$

$$= \frac{1}{1-b}\Delta G + \frac{-b}{1-b}\Delta T$$

Since in a balanced budget, $\Delta G = \Delta T$, by substitution,

$$\Delta Y = \frac{1}{1-b}\Delta G + \frac{-b}{1-b}\Delta G$$

$$= \left(\frac{1}{1-b} - \frac{b}{1-b}\right)\Delta G$$

$$= \frac{1-b}{1-b}\,\Delta G$$

$$= 1(\Delta G)$$

$$\Delta Y = \Delta G$$

This discussion brings us to the end of our three-sector model. The four-sector model will be discussed in the next chapter.

SUGGESTED READINGS

Dernburg, Thomas, F., *Macroeconomics : Concepts, Theories and Policies,* (McGraw-Hill Book Co., New York, 7th Edn., 1985), Ch. 4.

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Froyen, Richard, T., *Macroeconomics : Theories and Policies,* (Pearson Education, Delhi, 7th Edn., 2002), Ch. 5.

Shapiro, E., *Macroeconomic Analysis* (Harcourt Brace Jovanocich, Inc., New York 4th Edn., 1994), Ch. 4.

QUESTIONS FOR REVIEW

1. What additional variables are added when two-sector model is converted into a three-sector model? How do these variables affect national income?
2. *Suppose behavioural and structural equations for an economy are given as follows.

$$C = 50 + 0.80\, Y_d$$
$$Y_d = Y - T$$
$$I = 50$$
$$G = 50$$
$$T = 50$$

   (i) Name the endogenous and exogenous variables.
   (ii) Derive reduced form of endogenous variables.
   (iii) Find equilibrium values for each endogenous variable.
3. What is a transfer payment? Assuming behavioural equations in Question 1 and a transfer payment of Rs 50, find (a) equilibrium equation, and (b) transfer payment multiplier.
4. *Suppose structural model of an economy is given as follows.

$$C = 100 + 0.80\, Y_d$$
$$Y_d = Y - T$$
$$I = 100$$
$$G = 100$$
$$T = 100$$

   Find the following.
   (a) Expenditure multiplier and ΔY if ΔG = 50,
   (b) Tax multiplier,
   (c) Find national income equilibrium if $T = \bar{T} + t\, Y_d$.
5. Suppose behavioural and structural equations are given as in Question 4. What ΔG will you suggest for increasing national income by 500.
6. In a two-sector model economy, equilibrium Y = Rs 400 with C = Rs 50 + 0.75Y and I = Rs 50. Add government sector to the economy and find change in equilibrium income assuming:
   (a) Government taxes Rs 20 and does not spend it,
   (b) Government spends Rs 20 without taxing peoples income;
   (c) Government taxes Rs 20 and spends total tax revenue;
   (d) Government taxes Rs. 20 and spends Rs. 25; and
   (e) Government taxes Rs 25 and spends Rs 20
7. An economy is in equilibrium at Rs 1000 billion with an *MPS* of 20%. Suppose it plans to raise the level of its income to Rs. 1100 billion. What amount of the government expenditure or, alternatively, transfer payment would you recommend.

8. Define government expenditure and tax multiplier. Suppose a consumption function is given as $C = a + bY_d$ and I, G and T are given. Derive G and T multiplier.
9. *Which of the following statements are correct?
   (a) An expenditure is an injection into the economy and a tax is a withdrawal.
   (b) An equal amount of expenditure and autonomous tax will leave the equilibrium level of the national income unaffected.
   (c) An equal amount of transfer payment and tax reduction will have the same impact on the national income.
   (d) Tax multiplier is one greater than the expenditure multiplier.
   (e) Expenditure multiplier is one greater than the tax multiplier.
   (f) The level of national income is not affected whether a tax is autonomous or income related because both are withdrawals from the income stream.
   (g) $[1/(1 - b)]\ \Delta G = [-b/(1 - b)]\ \Delta T$
   (h) $[1/(1 - b)]\ \Delta G > [-b/(1 - b)]\ \Delta T$
   (i) $[1/(1 - b)]\ \Delta G < [-b/(1 - b)]\ \Delta T$
   (j) $\dfrac{1}{1-b} + \dfrac{-b}{1-b} = 1$
10. What is balanced-budget multiplier? Assuming a theoretical model of an economy, prove that the balanced budget multiplier is always equal to unity.
11. Suppose a model is given as follows.

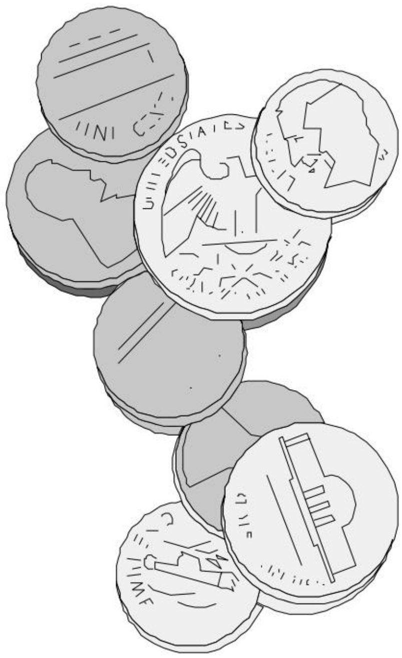
$$C = 100 + 0.80\, Y_d \text{ (where } Y_d = Y - T)$$
$$I = 150$$
$$G = 50$$
$$T = 20 + 0.25Y$$

Find (a) Equilibrium level of income, consumption and savings; and
(b) Change in equilibrium income if G increases to 100 and I decreases to 100.

(*Note*: For solution to the asterisked questions, see *Appendix*).

Chapter 8

Income Determination in Open Economy Model: A Model with the Foreign Sector



INTRODUCTION

We have so far analysed national income determination in a closed economy model. In this Chapter, we move on to discuss income determination in an 'open economy' model. An open economy is conceptually one which has economic transactions with the rest of the world. Open economy model, is, in fact, a realistic model. It is difficult to name an economy of the modern world which has no economic transactions with any other country. It is another thing that only a few countries account for the major proportion of the world trade and in its growth. The world trade has increased at a tremendous pace during the post-Second World War period. Between 1950 and 2005, the world trade (exports + imports) increased from \$60 billion to \$21046 billion, although only 8 countries accounted for nearly half of it—the US (12.5 percent), West Germany (8.3 percent), China (6.8 percent), Japan (5.3 percent), France (4.6 percent), UK (4.2 percent), Netherlands (3.6 percent) and Italy (3.5 percent)[1]. In 2005, there were 30 countries whose foreign trade (exports + imports) accounted for over one-quarter of their *GDP*, including 3 countries, whose foreign trade ran over 100 percent of their *GDP*, *viz*. Singapore (197 percent), Hong Kong (164 percent), and Malaysia (109 percent). In 2005, India had a share of only 0.9 percent in the world exports and

[1] Based on data published in World Development Report-2007, Table 5.

1.2 percent of the world imports. In 2005-06, India's foreign trade (exports + imports) accounted for only 16.2 percent of her *GDP*.[2] Currently, India's exports account for about 13% and imports about 19% of her *GDP*.

Foreign trade and transactions of a country affect its macro variables, and thereby the equilibrium level of its national income, especially when foreign transactions account for a significant proportion of its *GNP*. For example, US being the largest trade partner of India, the US recession is affecting the Indian economy. Rupee appreciation against dollar has affected leather and textile industries of India. More than 20 lakh workers have lost their jobs. Subprime crisis of US has seriously affected the financial sector of the country. IT industry of India is reported to be adversely affected by the US recession.

In this chapter, we will analyse the effects of foreign transactions on the equilibrium level of the national income, using a four-sector model. It should be noted at the outset that foreign transactions involve two kinds of flows: (i) commodity flows, and (ii) financial flows. Financial flows are of two kinds: (i) financial flows resulting from the commodity flows, and (ii) autonomous flows including foreign borrowings and investment, like FDI and FII, and financial assistance. For the sake of simplicity, we will consider only foreign trade—merchandise exports and imports—and the resulting financial flows.

8.1 EXPORTS, IMPORTS AND THE AGGREGATE DEMAND

Before we analyse the combined effect of exports and imports on the national income, let us first analyse separately the effect of export and import on the national income. Let us begin by looking at the export and import functions, their determinants and how they affect the aggregate demand and the national income.

8.1.1 Export Function and Export Multiplier

Like *C, I* and *G*, exports of goods and services constitute a part of the aggregate demand in an economy and its effect on the economy is also the same. There is however a difference. The demand for consumer goods (*C*), investment goods (*I*) and the government purchases (*G*) originate within the economy, and is called *domestic demand*. But, the demand for exports originates outside the economy. It is therefore called the *external demand*. Let us look at the determinants of exports and the export function.

Export Function Exports of a country are a function of a number of external and internal factors. Some of the ***important external determinants of exports*** of a country are: (i) domestic prices of exports in relation to those in importing countries, (ii) income of the importing countries, (iii) importers' income-elasticity for imports, (iv) their tariffs and trade policy, and (v) their exchange rate policy and foreign exchange restrictions. Some of the ***important internal determinants of exports*** of a country include: (i) export policy of the exporting country, (ii) export duties and subsidies, (iii) availability of exportable surplus, (iv) trade and tariffs agreements with other countries, and (v) international competitiveness of domestics goods.

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2. *Economic Survey* 2007–2008, MOF, GOI, Table 6.3, p.112.

In practice, however, exports of a country are determined mostly by the external or exogenous factors. It is neither practically feasible nor useful from policy point of view to incorporate all the determinants of exports in a simple open economy model used for income determination. For the purpose of theoretical determination of the national income in four-sector model, therefore, exports are treated to be autonomous, determined exogenously, and export (X) is assumed to be given as $\bar{X}$.

Exports and Aggregate Demand As noted above, in an open economy, exports constitute a part of the aggregate demand. Exports result in inflows of incomes from abroad. A part of this income is consumed and a part saved. The increase in consumption due to increase in exports affects the economy in the same manner as the increase in consumption due to increase in income.

Since exports constitute a part of the aggregate demand, AD for an open economy is given as

$$AD = C + I + G + X \tag{8.1}$$

Assuming there are no imports, the equilibrium level of the national income with exports can be written as:

$$Y = C + I + G + X \tag{8.2}$$

where,

$$C = a + b(Y - T) \tag{8.3}$$

The equilibrium level of income in an economy with no imports can be obtained by substituting Eq. (8.3) into Eq. (8.2). Thus,

$$Y = a + b(Y - T) + I + G + X$$

or

$$Y = \frac{1}{1-b}(a - bT + I + G + X) \tag{8.4}$$

Export Multiplier Given the Eq. (8.4), the export multiplier (X-multiplier) can be easily worked out. Assuming an increase in exports, ΔX, national income equilibrium equation (8.4) can be rewritten as:

$$Y + \Delta Y = \frac{1}{1-b}(a - bT + I + G + X + \Delta X) \tag{8.5}$$

Subtracting Eq. (8.4) from Eq. (8.5), we get

$$\Delta Y = \frac{1}{1-b}(\Delta X) \tag{8.6}$$

$$\frac{\Delta Y}{\Delta X} = \frac{1}{1-b} = X\text{-multiplier}$$

Equation (8.6) implies that an increase in exports results in income at the rate of export multiplier. Note that X-multiplier equals the investment multiplier, that is, $1/(1-b)$ where $b = MPC$.

8.1.2 Import Function[3]

Let us now look at the determinants of imports and their effect on the aggregate demand and on the national income. We begin by specifying the import function.

[3] Under the assumption that $X = \bar{X}$, import multiplier, given the import function, is the same as foreign trade multiplier, as shown in the subsequent section.

Imports are purchases of goods and services from abroad. Payments for imports are a *leakage* from the income stream because payments made for imports make the domestic incomes flow out of the economy. The level of imports determines the level of outflow of domestic income.

Like exports, imports are determined by a number of both internal and external factors. In case of imports, however, internal factors play a predominant role. The major determinants of the imports of a country are: (i) prices of the foreign goods in relation to the domestic prices, (ii) income level of the domestic economy, (iii) income-elasticity of imports, (iv) tariff rates and import policy of the government, (v) exchange rate policy and foreign exchange restrictions, and (vi) taste and preference for foreign goods.

In income determination model, however, most of these variables are assumed to remain constant in the short run. There are two major variables which appear in the short-run import function, viz., (i) the level of income, and (ii) autonomous imports, independent of the level of the income, for example, import of food grains and capital goods. Given these conditions, import function can be expressed as:

$$M = \overline{M} + mY \tag{8.7}$$

where, $\overline{M}$ is constant, autonomous import and m is marginal propensity to import.

Imports and Aggregate Demand The aggregate demand, as given in Eq. (8.1), is reduced by the amount of payments for imports. This negative effect of imports on the aggregate demand is accounted for by including imports (M) as a *negative value* in the aggregate demand equation. Following the national income accounting convention, only exports net of imports (i.e., $X - M$) appear in the aggregate demand equation. Thus, the aggregate demand equation for an open economy is expressed as:

$$Y = C + I + G + (X - M) \tag{8.8}$$

Equation (8.8) means that if $M > X$, the aggregate demand decreases, and if $X > M$, the aggregate demand increases.

8.2 NATIONAL INCOME EQUILIBRIUM IN A FOUR-SECTOR MODEL

Having explained the export and import functions, we turn now to explain the determination of national income in a four-sector model incorporating both X and M. At equilibrium, the level of national income equals the aggregate demand as given in Eq. (8.8). The entire four-sector model of income determination can be written as follows.

$$Y = C + I + G + (X - M) \tag{8.9}$$

where

$$C = a + b(Y - T) \tag{8.10}$$

$$M = \overline{M} + mY \tag{8.11}$$

and I and G are constants.

The equilibrium level of the national income can now be obtained by substituting Eq. (8.10) and Eq. (8.11) in Eq. (8.9). Thus, at equilibrium,

$$Y = a + b(Y - T) + I + G + (X - \overline{M} - mY) \tag{8.12}$$

By simplifying Eq. (8.12), we get the final form of the equilibrium equation as given below.

$$Y = \frac{1}{1 - b + m}(a - bT + I + G + X - \overline{M}) \tag{8.13}$$

In Eq. (8.13), the term $1/(1 - b + m)$ is ***foreign trade multiplier*** when consumption and imports are both a linear function of income. Incidentally, $1/(1 - b + m)$ gives also the import multiplier. A proof of foreign trade multiplier is provided in the following section. Let us first present the four-sector model graphically.

Graphical Presentation The simple four-sector model of income determination is illustrated graphically in Fig. 8.1 under certain simplifying assumptions: (i) there is no transfer expenditure (G_T), and (ii) X is autonomous. As Fig. 8.1 shows, the economy would be in equilibrium at point E_2 without foreign trade. With the inclusion of foreign trade in the model (assuming $M > X$) the AD_3 schedule shifts downward to $AD_2 = C + I + G + X - M$ and equilibrium point shifts to E_1. It means that inclusion of foreign trade (with $M > X$) causes a reduction in the equilibrium level of national income. In case $X > M$, the $C + I + G + (X - M)$ schedule will shift upward above the $AD_3 = C + I + G$ schedule and equilibrium point will shift beyond point E_2.

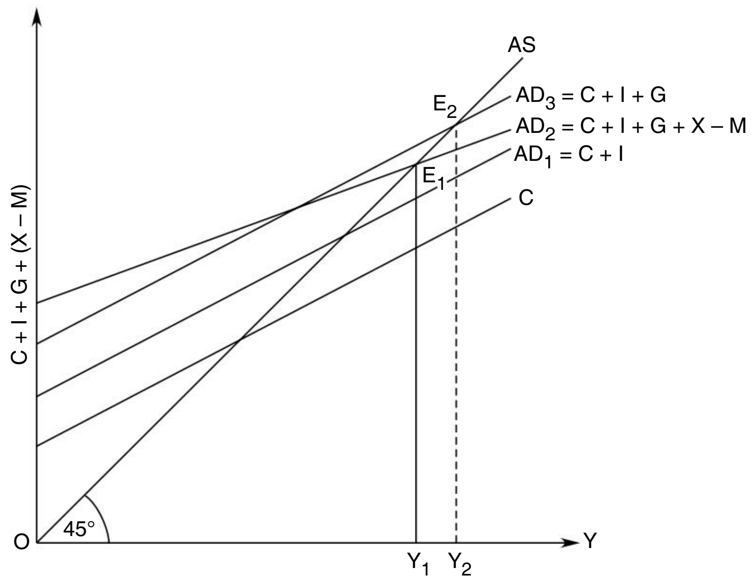


Fig. 8.1 Income Determination in a Four-Sector Model

Foreign Trade Multiplier Given the equilibrium Eq. (8.13), let exports increase by ΔX, *all* other variables remaining constant. The equilibrium of the national income can then be written as:

$$Y + \Delta Y = \frac{1}{1 - b + m}(a - bT + I + G + X - M + \Delta X) \tag{8.14}$$

Equation (8.14) can also be written as:

$$Y + \Delta Y = \frac{1}{1-b+m}(a - b\overline{T} + I + G + X - M) + \frac{1}{1-b+m}\Delta X \quad \textbf{(8.15)}$$

Subtracting Eq. (8.13) for Y from Eq. (8.15), we get

$$\Delta Y = \frac{1}{1-b+m}\Delta X \quad \textbf{(8.16)}$$

By rearranging Eq. (8.16), we get ***foreign trade multiplier*** as

$$\frac{\Delta Y}{\Delta X} = \frac{1}{1-b+m} \quad \textbf{(8.17)}$$

Equation (8.17) can be alternatively written as:

$$\frac{\Delta Y}{\Delta X} = \frac{1}{1-(b-m)} \quad \textbf{(8.18)}$$

Equation (8.18) yields an *important* conclusion, that is, if $b = m$, foreign trade multiplier is equal to unity, and if $b > m$, foreign trade multiplier is greater than unity and *vice versa*.

8.3 A COMPLETE FOUR-SECTOR MODEL OF INCOME DETERMINATION

The four-sector model given in Eq. (8.12) assumes, for simplicity sake, that tax is a constant factor, i.e., $T = \overline{T}$, and transfer payment, $G_T = 0$. In this section, we drop these assumptions and present a complete four-sector model. Let us assume that

$$T = \overline{T} + tY \quad \textbf{(8.19)}$$

and,

$$G_T = \overline{G}_T > 0. \quad \textbf{(8.20)}$$

With these assumptions, the equilibrium level of the national income can be expressed as:

$$Y = C + I + G + \overline{G}_T + (X - M) \quad \textbf{(8.21)}$$

where,

$$C = a + b(Y - T + G_T) \quad \textbf{(8.22)}$$

$$T = \overline{T} + tY \quad \textbf{(8.23)}$$

$$G_T = \overline{G}_T \quad \text{(Transfer payment)} \quad \textbf{(8.24)}$$

$$M = \overline{M} + mY \quad \textbf{(8.25)}$$

By substituting Eqs. (8.22) through Eq. (8.25) in Eq. (8.21), we get a reduced form of equilibrium equation as given below.

$$Y = \frac{1}{1-b+bt+m}(a - b\overline{T} + b\overline{G}_T + I + G + X - \overline{M}) \quad \textbf{(8.26)}$$

$$= \frac{1}{1-b(1-t)+m}(a - b\overline{T} + b\overline{G}_T + I + G + X - \overline{M})$$

8.3.1 The Foreign Trade Multiplier (F_m) with Tax Function

Given the equilibrium Eq. (8.26), the foreign trade multiplier can now be worked out as follows. Suppose country's exports increase by ΔX. With increase in the exports, the equilibrium equation can be written as:

$$Y + \Delta Y = \frac{1}{1-b(1-t)+m}(a - b\bar{T} + b\bar{G}_T + I + G + X - \bar{M} + \Delta X) \quad \textbf{(8.27)}$$

By subtracting Eq. (8.26) from Eq. (8.27), we get

$$\Delta Y = \frac{1}{1-b(1-t)+m}\Delta X$$

The ***foreign trade multiplier*** in a complete four-sector model can be expressed as

$$F_m = \frac{\Delta Y}{\Delta X} = \frac{1}{1-b(1-t)+m} \quad \textbf{(8.28)}$$

Equation (8.28) gives the *foreign trade multiplier* in a complete four-sector model. It may be noted from this equation that like taxation, imports have a negative effect on the multiplier.

Numerical Example In order to illustrate income determination numerically in a four-sector model, let us recall the equilibrium Eq. (8.21) reproduced here (for ready reference).

$$Y = C + I + G + \bar{G}_T + (X - M) \quad \textbf{(8.29)}$$

Recall also the expanded version of the variables in Eq. (8.29), given in Eq. (8.22) through Eq. (8.25), and make the following assumptions.

$$C = 100 + b(Y - \bar{T} - tY + \bar{G}_T)$$

$$I = 200 \qquad G = 100$$

$$\bar{T} = 100 \qquad \bar{G}_T = 50$$

$$X = 20 \qquad M = 10 + 0.1Y$$

$$b = 0.8 \qquad t = 0.25$$

By substituting these values in Eq. (8.29), we get the equilibrium equation as follows.

$$Y = 100 + 0.8(Y - 100 - 0.25Y + 50) + 200 + 100 + (20 - 10 - 0.1Y)$$

$$= 100 + 0.8Y - 80 - 0.2Y + 40 + 200 + 100 + 10 - 0.1Y$$

$$Y - 0.8Y + 0.2Y + 0.1Y = 100 - 80 + 40 + 200 + 100 + 10$$

$$Y(1 - 0.8 + 0.2 + 0.1) = 370$$

$$Y = \frac{1}{0\cdot 5}(370) = 740$$

Alternatively The parametric values can be substituted straightaway in the reduced form of the equilibrium equation, that is, Eq. (8.27) to obtain the equilibrium level of the national income. Since

$$Y = \frac{1}{1-b(1-t)+m}(a - b\bar{T} + b\bar{G}_T + I + G + X - \bar{M}),$$

$$Y = \frac{1}{1 - 0.8(1 - 0.25) + 0.1} (100 - 0.8 \times 100 + 0.8 \times 50 + 200 + 100 + 10)Y$$

$$= \frac{1}{0 \cdot 5} (100 - 80 + 40 + 200 + 100 + 10) = \frac{1}{0 \cdot 5} (370)$$

$$Y = 2\ (370) = 740$$

Conclusion The foregoing analysis of the national income determination in the four-sector model takes us to the end our discussion on the Keynesian theory of national income determination. The important conclusion that emerges from the four-sector model, especially the foreign-trade multiplier formula as given in Eq. (8.28), is that given a country's marginal propensity to consume and tax rate, country's propensity to import plays the most important role in determining the overall *multiplier*: the higher the marginal propensity to import, the lower the multiplier.

SUGGESTED READINGS

Froyen, Richard, T., *Macroeconomics: Theories and Policies,* (Macmillan Publishing Co., New York, 3rd Edn., 1990), Appendix to Ch. 5.

Shapiro, E., *Macroeconomic Analysis,* (Harcourt Brace Jovanocich, Inc., New York, 4th Edn., 1994), Ch. 7.

QUESTIONS FOR REVIEW

1. What additional variables are included in the model when foreign trade is introduced in the national income determination model? How do they affect national income equilibrium?
2. *What is export multiplier? Find export multiplier from the following model.

$$AD = C + I + G + X$$

where $C = a + b(Y - T)$

$$I = \bar{I} \qquad G = \bar{G}$$

$$T = \bar{T} \qquad X = \bar{X}$$

$$M = 0$$

Compare export multiplier with investment multiplier.

3. *How is import function different from export function? Assuming the following model, find the foreign trade multiplier.

$$Y = C + I + G + (X - M),$$

where, $C = a + b(Y - T)$

$$I = \bar{I} \qquad G = \bar{G}$$

$$T = \bar{T} \qquad X = \bar{X}$$

$$M = \bar{M} + mY$$

4. *Suppose in Question 3, $T = \bar{T} + tY$ and $G_T = \bar{G}_T > 0$, where, $\bar{T}$ is constant tax, and G_T is constant government transfer payment. Find the foreign trade multiplier. (Guide: see Section 8.4)
5. *Suppose that the behavioural equations and identities for an economy are given as follows.

$$C = 100 + b(Y - 50 - tY)$$

$$I = 50 \qquad G = 50$$

$$X = 10 \qquad M = 5 + 0.1Y$$

$$b = 0.8\ (mpc) \qquad t = 0.25$$

(a) Specify the endogenous and exogenous variables,

(b) Find reduced form of equilibrium equations, and

(c) Find equilibrium value of imports.

6. *Suppose that an economy is in equilibrium at

$$Y = C + I + G + G_T + (X - M)$$

where,

$$C = 50 + b(Y - 50 - tY + G_T)$$
$$I = 100$$
$$G = 50$$
$$G_T = 25 \quad \text{(transfer payments)}$$
$$X = 10$$
$$M = 5 + 0.1Y$$
$$b = 0.8$$
$$t = 0.25$$

(a) Find the national income at equilibrium.

(b) Find foreign trade multiplier.

(c) How much additional government expenditure will be required to increase the equilibrium level of national income by Rs 50?

(d) At equilibrium, does the economy have trade deficit or trade surplus and by how much?

7. *Suppose $C = 50 + 0.6(Y - T)$

$$I = 35 \qquad X = 30$$
$$G = 25 \qquad M = 8 + 0.1Y$$
$$T = 20$$

Find (i) The equilibrium level of income;

(ii) ΔG to increase equilibrium income by 16;

(iii) ΔG if financed totally by ΔT under condition (ii).

(iv) Trade balance at equilibrium level of income with $\Delta G = \Delta T$.

8. *Suppose in an economy:

Consumption function :

$$C = 150 + 0.75Y_d$$

Investment spending :

$$I = 100$$

Government spending :

$$G = 115$$

Tax : $T_x = 20 + 0.20Y$

Transfer Payments :

$$T_r = 40$$

Exports : $X = 35$

Imports : $M = 15 + 0.1Y$

where Y and Y_d are income and personal disposable income, respectively. All figures are in rupees.

Find : (a) The equilibrium level of income,

(b) Consumption at equilibrium income,

(c) Net exports $(X - M)$ at equilibrium income,

(d) By how much the equilibrium income changes if investment increases by Rs 50.

(e) The increase in the government spending required to ensure that the economy reaches the full employment level of income of Rs 1200.

(DU, B.Com (H), 2003)

9. An economy is characterised by the following equations:

$$C = 4 + 0.75Y_d;\ T_r = 8;\ T = 0.2Y;$$
$$G = 120; \quad \text{and} \quad I = 110$$

where C is consumption spending, Y_d is personal disposable income, T_r is transfer payment, T is tax, Y is income, G is government spending and I is investment expenditure. Subsequently the economy becomes an open economy with $X = 55$ and imports $M = 5 + 0.1Y$.

(a) Calculate the difference between the income of the closed economy and the open economy;

(b) What is the budget surplus or deficit in the open economy at the full employment level of income [of] 600;

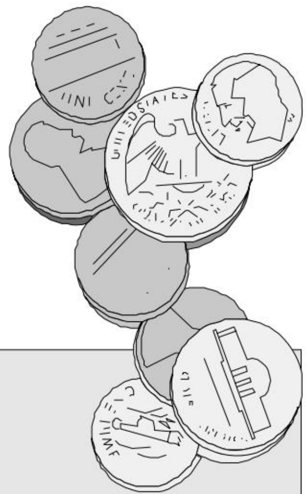
(c) What should be the level of government spending and the rate of tax if the government wanted to achieve fall employment level of income and have a balance budget, i.e., $G + T_r = T$.

(DU, B.Com (H), 2004)

(*Note:* For solution to the asterisked questions, see *Appendix*).

Part 3

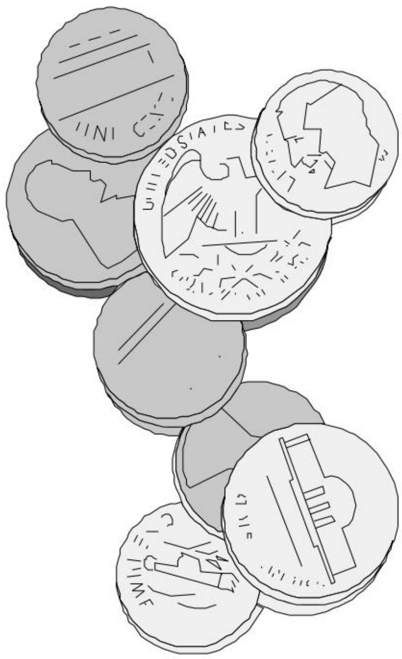
Theories of Consumption and Investment



In Part 2 of the book, we have discussed the Keynesian theory of national income determination. In the Keynesian theory of national income determination, the two most important determinants of national income—consumption and investment expenditure—are assumed to be given factors. Consumption expenditure is assumed to be a given function of disposable income, i.e., $C = a + bY_d$ and investment is assumed to be a constant factor in the short run. These assumptions are, however, far from reality. The economists have questioned the reliability of the Keynesian consumption theory and have developed several other theories of consumption. As regards investment, it does not remain constant – it continues to change with change in its determinants. Many important contributions have been made to the theory of investment. Therefore, before we discuss the theory of the determination of the equilibrium of money market, we will discuss in this Part of the book, the post-Keynesian theories of consumption and the theories of investment, so as to get a more complete view of the product market.

Chapter 9

Theories of Aggregate Consumption



INTRODUCTION

In this Chapter, we discuss the theories of consumption. However, before we proceed to discuss theories of consumption, let us have a glance at the significance of consumption expenditure and the development of consumption theory.

As regards the significance of the aggregate consumption expenditure, it makes the largest component of *GNP* accounting for 65-75 percent of it in different developed and developing economies. In India, for example, aggregate consumption expenditure accounted for 66% of *GDP* in 2007-08. Consumption expenditure is the second most important macro variable used in macroeconomic analysis—the first being the national income itself. It is also the most important factor in determining the level of economic activities in an economy. It is therefore the most important variable in income determination models. Therefore, we need to have a good understanding of the theories of consumption, determination of consumption expenditure and the nature of relationship between consumption and its determinants.

As regards the developments in aggregate consumption theory, John Maynard Keynes was the first to develop a systematic theory of aggregate consumption spending by the households in his *General Theory*.[1] The Keynesian theory of consumption in its elementary form has already been discussed in Chapter 6. Keynes' theory of consumption was however challenged after the Second World War on the ground that household consumption depends not only on current income but also on a number of other factors, viz., real wealth, taxation, interest rate, availability of consumer credits, consumers' expectations and income distribution so far as aggregate consumption is

1. See his *The General Theory of Employment, Interest and Money* (Macmillan and Co. Ltd, London 1961), Chs. 8, 9 and 10.

concerned. This led to a prolonged debate on the issue as to what determines the level of consumption which resulted in some significant contributions to the theory of consumption. The developments in this area can be attributed to the lack of clear empirical evidence to support the various hypotheses that were developed by the economists. However, the economists generally agree that the household consumption expenditure is a function of household income. But they are not unanimous on 'which income'–*absolute or relative income, current or expected future income, short-run or permanent* (*long-run*) *income or income-cycle over life-time*? Different economists have linked consumption expenditure to different concepts of income and to factors other than income. This has led to the emergence of four major contributions to the theory of consumption.

(i) Absolute-Income Hypothesis,
(ii) Relative-Income Hypothesis,
(iii) Permanent-Income Hypothesis, and
(iv) Life-cycle Hypothesis.

In addition, James Tobin has made an important contribution to the theory of consumption in respect of the role of wealth in consumption behaviour. These theories occupy a significant place in the literature on the aggregate consumer spending and in macroeconomic analysis. In this chapter, we will discuss briefly these theories of consumption.

9.1 THE ABSOLUTE INCOME HYPOTHESIS: KEYNESIAN THEORY OF CONSUMPTION

The basic proposition of the *absolute-income theory of consumption,* also known as the *Absolute Income Hypothesis*, has already been described along the Keynesian 'Consumption Function' (see Chapter 6). Our discussion there was, however, limited to the extent it was relevant and necessary for the presentation of the Keynesian *theory of income determination*. Here, we look at the Keynesian theory of consumption in a greater detail including its main properties and weaknesses.

9.1.1 Keynesian Consumption Theory and Its Properties

The Keynesian consumption theory is based on, what he calls, "a fundamental psychological law." In Keynes' own words, "The fundamental psychological law, upon which we are entitled to depend with great confidence both *a priori* from our knowledge of human nature and from the detailed facts of experience, is that men are disposed, as a rule and on average, to increase their consumption as their income increases, but not by as much as the increase in their income."[2] That is, $\Delta C/\Delta Y$ is "positive and less than unity." This law, he says, emerges "*a priori* from our knowledge of human nature and from the detailed facts of experience". According to Keynes, households decide their current consumption expenditure on the basis of their **current income**. Based on this law, the *absolute-income theory of consumption* hypothesizes that current consumption expenditure depends on the current and absolute level of income. Formally, the absolute income theory of consumption can be stated as current consumption is the function of the current income. That is,

$$C = f(Y) \tag{9.1}$$

where, C = current consumption, and Y = current income.

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2. For details, see *The General Theory, op. cit.,* Ch. 8, p.96.

The main ***properties of the Keynesian consumption function*** can be summarized as follows.

(i) The real consumption expenditure (C/P) is a positive function of the real current disposable income (Y_d/P). In other words, $C = f(Y)$ and $\Delta C/\Delta Y > 0$. This relationship between consumption and income makes the absolute income hypothesis. Since the Keynesian theory deals with economic phenomenon in the short-run, his theory of consumption is also treated as *short-run theory*.

(ii) The marginal propensity to consume (MPC)—the proportion of the marginal income consumed—ranges between 0 and 1, that is, $0 < MPC < 1$ (0 and 1 included).

(iii) The MPC is less than the average propensity to consume (APC), that is, $\Delta C/\Delta Y < C/Y$.

(iv) The MPC declines as income increases, that is, the proportion of marginal income consumed goes on decreasing.

An additional factor that Keynes adduced to increase in consumption is the increase in wealth[3] of the households. However, the first two properties are essential for the Keynesian theory of consumption, but not the latter two. In fact, property (iii) has been abandoned by the Keynesians on the ground that it does not stand the empirical test. The Keynesians hold that $APC = MPC$, i.e., $\Delta C/\Delta Y = C/Y$.

The *absolute-income theory of consumption* is illustrated along with its properties in Fig. 9.1. The 45° line ($C = Y$) shows a hypothetical relationship between income and consumption. It shows

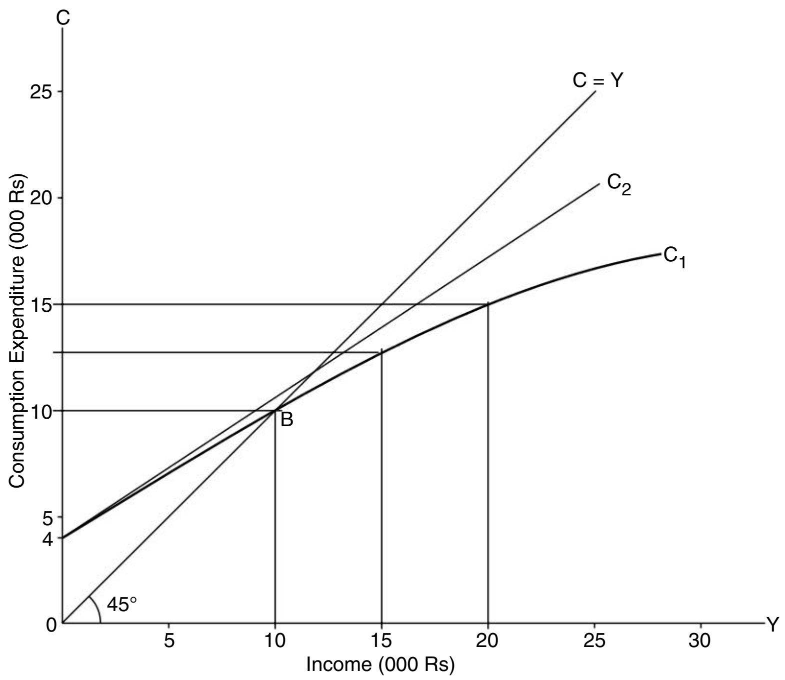

Fig. 9.1 Income and Consumption: The Absolute Income Hypothesis

3. There are some other 'non-income factors' which influence consumption. These factors will be discussed in Section 9.6.

that current consumption expenditure always equals the current income. It implies that if $Y = 0$ then $C = 0$. This is not a realistic proposition. For, people do consume even when their income equals zero—they beg, borrow or steal to consume.

Another feature of consumer behaviour is that when income increases, people do not spend their entire incremental income on consumption. They save a part of it for their financial security against the loss of job, unemployment, illness, death of the bread winner, or for investment to enhance their future income. The overall consumer behaviour has been shown by the curve C_1. The curve C_1 delineates Keynes's absolute-income theory of consumption. As the curve C_1 shows consumption expenditure exceeds the current income up to a certain level of income (say, Y = Rs 10,000). At point B, income and consumption break even. Beyond point B, consumption expenditure increases with the increase in income but at a slower rate. Note that the slope of the curve C_1 goes on diminishing with increase in income. This shows decrease in *MPC* with increase in income.

In simple words, according to the absolute income theory of consumption, marginal propensity to consume (*MPC*) decreases, i.e., households spend a decreasing proportion of marginal income on consumption. That is why households on lower income scale save a lower percentage of their income and those on higher scale of income save a larger proportion of their income. In economic terminology, low-income households have higher marginal propensity to consume than high income households. This theoretical proposition when applied to the society as a whole, gives a downward bend to the positively sloping income-consumption curve, as shown by the curve C_1.

This form of the Keynesian theory of consumption was accepted by most economists in the first few years of the publication of his *General Theory*. The empirical studies in the subsequent years, however, revealed that *MPC* was of stable nature. For instance, Keynesian economists used US data for the period from 1929-41 and estimated the consumption function[4] as:

$$C = 26.5 + 0.75Y_d$$

This consumption function supported the Keynesian theory of consumption. Further support for Keynesian consumption was produced by comparative studies of family budgets. The household budget studies concluded that as households incomes increased, *MPC* was greater than zero, i.e., $b > 0$ and that $b < 1$. Briefly speaking, the studies carried out later by the economists of Keyensian orientation found a straight-line relationship between consumption and income. A straight-line-consumption-function of the following form gives the *absolute-income hypothesis*.

$$C = a + bY \qquad \textbf{(9.2)}$$

where 'a' is an intercept showing consumption at the zero level of income, and

'b' stands for $MPC = \Delta C/\Delta Y$.

Consumption function (9.2) is represented by the consumption schedule labelled C_2 in Fig. 9.1. Note that the schedule C_2 has a constant slope which is given by b in Eq. (9.2). It may also be noted, at the end, that the use of consumption function with a constant slope does not alter the basic proposition of the *absolute-income hypothesis*. What it does is that it shifts the break-even point B up or down the $C = Y$ *schedule*.

4. As quoted in Gardner Ackley, *Macroeconomic Theory* (Macmillan, NY, 1961), p.226.

9.1.2 Drawbacks of the Absolute Income Hypothesis

One of the serious drawbacks of the Keynes' absolute income hypothesis is that it is based more on 'introspection' than on observed facts[5]. It is also argued that Keynesian theory is 'Conjectural'—not supported by empirical data on consumption and disposable income.

Second, the early empirical studies have supported only the first and the third properties of the Keynesian consumption function. That is, empirical tests have supported the view that $C = f(Y_d)$ and $\Delta C/\Delta Y < C/Y$. The second and the fourth properties have not only failed to stand the empirical test but have also been a major source of controversy.

Third, and more importantly, the post-War studies based on the US data cast serious doubts on the validity of the simple Keynesian consumption function. Kuznets' study[6], which earned him Nobel Prize, of the disposable income and savings in the US during the period from 1869 to 1929 disclosed that *MPC* remained constant during the whole reference period and that *MPC* = *APC*. Kuznets estimated a consumption function of the form $C = bY$, b being approximately equal to 0.9. This contradicted the third property of the Keynesian consumption function, i.e., *MPC* < *APC*. Furthermore, the Keynesian consumption function applied to the pre-War data predicted a consumption level which was much higher than that of the aggregate income. This created doubts about the empirical validity of the Keynesian consumption theory.

9.1.3 India's Case

While some studies on income-consumption relationship carried out by the economists support Keynesian hypothesis, some refute it. Let us have a cursory look at how aggregate household consumption has behaved in India during the past almost five decades. The *GDP* and household savings data used by the Government of India show that *APC* = *C*/*GDP* has almost continuously declined. This implies that *MPC* has almost continuously declined in the country over the past five decades. Table 9.1 presents the ratio of household savings to *GDP* for quinquennial period.

From saving-*GDP* ratio, we can work out the household consumption-*GDP* ratio as shown in Col. (3) of the Table 9.1. It can be seen from the table that as *GDP* increases over time, household saving-*GDP* ratio goes on increasing. This means that household consumption-*GDP* ratio, i.e., *C*/*GDP* = *average propensity to consume, goes on decreasing*. It has decreased from 93.5 percent in 1960-61 to 75.7 percent in 2007-08. Decreasing average propensity to consume implies that marginal propensity consume has declined too and at a higher rate. This conclusion, based on a crude analysis, supports the Keynes' 'introspective' consumption theory but not the consumption function, i.e., $C = a + bY,$ suggested by the Keynesian economists with constant *MPC*.

However, in spite of controversy and lack of indisputable empirical evidence, the Keynesian consumption function with constant marginal propensity to consume is generally applied to present the Keynesian theory of income determination and its further extension to develop the general equilibrium model, i.e., the *IS-LM* model, constructed by J.R. Hicks.

5. Ackley, G., *Macroeconomics: Theory and Policy,* (Macmillan and Collier Macmillan, New York and London), p.534.

6. Quoted in Glahe, F. R., *Macroeconomics: Theory and Policy,* (Harcourt Brace, Jovanovich, Inc., New York, 1973), p.69.

Table 9.1 Household Saving-*GDP* and Consumption-*GDP* Ratio 1960-61 to 2005-06

Year (1)	*GDP (Rs in crore) (At current Prices)* (2)	*Saving-GDP Ratio (%) (APS)* (3)	*Consumption-GDP Ratio (%) = APC* (4) = 100 – (3)
1960-61	16546	6.5	93.5
1965-66	26099	8.6	91.4
1970-71	42903	9.5	90.5
1975-76	77129	10.9	89.1
1980-81	132520	12.9	87.1
1985-86	254427	13.1	86.9
1990-91	515032	18.4	81.6
1995-96	1083289	16.9	83.1
1999-2000	1786526	21.1	78.9
2005-06	3282385	24.1	75.9
2006-07	3779385	24.1	75.9
2007-08 Q	4320892	24.3	75.7

Source: *Economic Survey* – 2008-09, MOF, GOI, Table 1.3B, p. A6 and 1.6, p. A-10.

9.2 THE RELATIVE INCOME HYPOTHESIS: DUESENBERRY'S THEORY

As noted above, Keynes' consumption theory could not be supported by empirical data. After the World War II, however, several economists attempted to develop a consumption theory based on empirical data. Duesenberry[7] was the first to make an attempt in this direction in the late 1940s. By using income-consumption data of 1940s, he propounded the *relative-income theory of consumption*, also known as *Relative Income Hypothesis.* The relative income hypothesis links the consumption level of a household with the income and expenditure level of the households of the comparable income groups. Also, it stresses the imitative and competitive consumption behaviour of the households with regards to consumption. This hypothesis states that households having a relatively lower income and living in the community of higher incomes tend to spend a higher proportion of their income than the households with higher incomes. Duesenberry calls it 'demonstration effect.' This kind of consumer behaviour is also known as 'keeping up with the Joneses.'

The relative-income theory of consumption states that the proportion of income consumed by a household depends on the level of its income in relation to the households with which it identifies itself, not on its absolute income. In other words, the level and pattern of the consumption of a household is determined by the consumption level and pattern of the households with which it lives or of those with whom it wishes to keep up. The relative income hypothesis can be presented in the form of the following four propositions. In order to present clearly the four propositions of the relative income hypothesis, we single out a household X from a group of households with more or less the same level of income and analyse its consumption behaviour in response to change in its income in relation to the income of other households.

7. Duesenberry, James S., *Income, Saving and the Theory of Consumer Behaviour* (Harvard University Press, Cambridge, Mass., 1949).

(i) If income of all the households belonging to the group increases by about the same rate, then the consumption level of all the households of the group, including household X, goes up at the same rate and *vice versa*. That is, $\Delta C/\Delta Y$ remains the same for all the households if their income changes by the same amount.

(ii) If household X remains at the same scale of relative income and its absolute income rises, then its absolute consumption and savings rise, but its $\Delta C/\Delta Y$ remains the same as it was before the rise in its income.

(iii) If household X remains on the same scale of the relative income (with income constant) and the income of other households of the group increases, then $\Delta C/\Delta Y$ of the household X with constant income increases.

(iv) If household X moves up from a lower income-group to a higher income-group then its $\Delta C/\Delta Y$ decreases.

The last proposition supports the fourth property of Keynes' absolute income hypothesis. Other propositions of the *relative* income hypothesis make a significant deviation from the absolute income hypothesis.

Furthermore, both *absolute* and *relative income hypotheses* suggest that a proportional increase in relative incomes causes a proportionate increase in consumption. In other words, when absolute disposable income of households increases, their relative income remaining the same, then their consumption increases so much that household's average propensity (*APC*) to consume remains constant and is equal to the *MPC*. However, the *relative income hypothesis* deviates from the *absolute income hypothesis* on the question as to what happens when household income decreases. While *absolute income hypothesis* holds that consumption decreases in proportion to decrease in income, the *relative income hypothesis* holds that consumption does not decrease in proportion to decrease in income because of, what Duesenberry calls, the *Ratchet Effect*.

The Ratchet Effect in Consumption Behaviour The ratchet effect arises due to households' resistance against the fall in consumption following a decrease in income. Duesenberry argues that *when absolute income increases, absolute consumption increases, but when absolute income decreases, the households do not cut their consumption in proportion to the fall in their incomes*. The second part of this rule holds because households get used to a certain standard of living in the long run and hence when their income falls, their consumption falls *less than proportionately.* When consumption does not fall in proportion to the fall in income, then *APC* rises and *MPC* falls. This is called ***ratchet effect*** in consumption behaviour. For example, let the income of a household increase from Rs 1000 per unit of time to Rs 1100 and its consumption increase from Rs 800 to Rs 880. In this case, $MPC = \Delta C / \Delta Y = 80/100 = 0.80$ and $APC = C/Y = 880/1100 = 0.80$. Here, $MPC = APC = 0.80$. But, when income decreases, say, from Rs 1000 to Rs 900, consumption decreases *less than proportionately* to, say, from Rs 800 to Rs 750. In that case, $MPC = -\Delta C /-\Delta Y = -50/-100 = 0.5$ and $APC = C/Y = 750/900 = 0.84$. Note that *MPC* has decreased from 0.80 to 0.50 and *APC* has increased from 0.80 to 0.84.

The relative income hypothesis is illustrated in Fig. 9.2. Let the long-run consumption function be given by the line $C_L = bY$. Given the consumption function, suppose that, at a point of time in the long run, households have an income equal to OY_2 out of which they consume CY_2. At these levels of income and consumption, $APC = CY_2/OY_2$. Now let the household's income decrease in the short run to OY_1. Recall that according to the ***absolute income hypothesis***, the consumption would fall to MY_1 and $APC = MY_1/OY_1$. In that case, APC will remain the same, i.e., $MY_1/OY_1 = CY_2/OY_2$. It implies that the fall in the household consumption due to fall in income would be proportional.

According to the ***relative income hypothesis***, however, the decrease in the household consumption would be less than proportional because households resist the decrease in their standards of living when there is a short-run decrease in their income. Therefore, their consumption decreases but less than proportionately. This point is illustrated by the line C_SC in Fig. 9.2. When income decreases from OY_2 to OY_1, the household consumption decreases, say, to NY_1, not to MY_1. Note that, according to the relative income hypothesis, the fall in household consumption due to fall in income by $Y_1 Y_2$ is lower. Given the $C_L = bY$ schedule, a fall in income by Y_1Y_2 should have caused a, decline in consumption by BM whereas it decreases by only BN. Note that $BN < BM$. It means that ratchet effect causes a lower fall in consumption than expected.

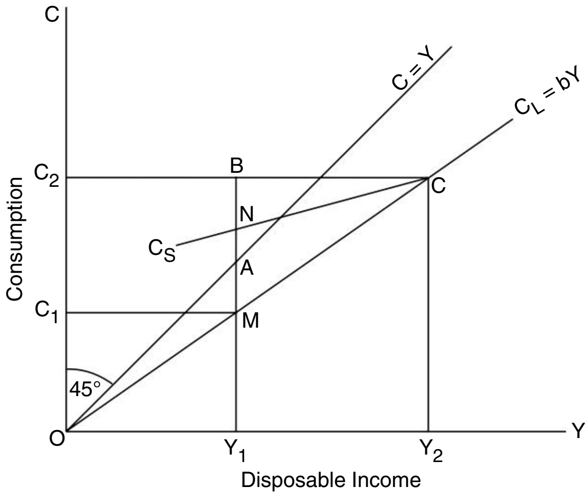

Fig. 9.2 The Relative Income Hypothesis

The ***ratchet effect*** keeps the consumption at point N. When we join point C with point N and extend it further, the resulting line C_SC gives the short-run consumption function. Note also that AN is the amount of **dissaving**. It implies that when household income falls, the households resort to dissaving in order to prevent a large fall in their living standards. They do so to maintain their living standards on par with their peer groups.

Furthermore, Duesenberry's consumption hypothesis inplies that short-run APC is greater than long-run APC. It can be seen in Fig. 9.2 that short-run average propensity to consume (APC_S) is greater than the long-run average propensity to consume (APC_L). At point N on the short-run consumption function (C_SC),

$$APC_S = NY_1/OY_1$$

and at point M on the long-run consumption function (OC),

$$APC_L = MY_1/OY_1.$$

As the figure shows, $NY_1 > MY_1$. Therefore, $NY_1/OY_1 > MY_1/OY_1$. This proves that short-run APC is greater than the long-run APC. This is an important point of distinction between the *absolute* and *relative* income hypotheses.

Shortcomings of the Relative Income Hypothesis The economists have pointed out the following shortcomings in the relative income hypothesis, though not significant enough to pose a serious challenge to the validity of the theory.

One, the relative income hypothesis states that an *upward change in income and consumption is always proportional irrespective of whether change in income is small or large.* The empirical evidence however suggests that exceptionally large and unexpected increases in incomes are often associated, at least initially, with less than proportionate increase in consumption.[8]

Two, the relative income hypothesis states that *consumption standards are irreversible*. It is however argued that this proposition may hold in the short run, but not in the long run. If income continues to decrease, people cannot go on dissaving in the long run to maintain their earlier living standards. That is, the consumption standard is reversible in the long run. This criticism is, however, not very relevant because the relative income hypothesis does admit the reversibility of consumption expenditure with decrease in income but less than proportionately. That is, reversibility argument of the critics matters only with regards to proportionality.

Three, the relative income hypothesis states that income and consumption change always in the same direction. It implies that recession must always be accompanied by a fall in the aggregate consumption expenditure. There have, however, been contrary instances, e.g., during the 1948-49 recession in the US, consumption expenditure was rising while disposable income was decreasing. Obviously, income and consumption had changed in the opposite direction. Such exceptions, however, do not reduce theoretical importance of the relative income hypothesis.

It may thus be concluded that, despite its criticism based on some minor empirical aberrations, Duesenberry's relative income hypothesis is regarded as a significant improvement over the absolute income hypothesis as it resolves certain paradoxes of the absolute income hypothesis.

9.3 THE PERMANENT INCOME HYPOTHESIS: FRIEDMAN'S THEORY OF CONSUMPTION

The *absolute income hypothesis* relates household consumption to the *current absolute income* and the *relative income hypothesis* relates it to the *current relative income*. Both these hypotheses relate consumption to *current income*—absolute or relative. Milton Friedman[9] rejected the 'current income hypotheses' and developed another theory of consumption, popularly known as ***permanent income hypothesis***. According to the permanent income hypothesis, it is the *permanent income*, not the current income, which determines the level of current consumption expenditure.

Friedman's theory postulates that consumption is the function of permanent income, i.e.,

$$C = f(Y_p),$$

and that C is proportional to Y_p, i.e.,

$$C = kY_p$$

Permanent income, defined broadly, is the mean of all the incomes anticipated by the households in the long run. The method of estimating permanent income, as described below, is an approximation of incomes anticipated from all human[10] and non-human[11] wealth (or capital). In simple

8. Evans, M. K., *Macroeconomic Activity,* (Harper and Row, 1969), p.19, and Glahe, Fred R., *Macroeconomics: Theory and Policy,* (Harcourt Brace and Jovanovich, Inc., NY, 1973), p.75.

9. Milton Friedman, *A Theory of Consumption Function,* (Princeton University Press, 1957).

10. Income from 'human wealth' refers to the income from 'human capital' including training, education, skill and intelligence. Broadly speaking, income from human capital is the income earned by selling the household labour.

11. Income from non-human wealth (or capital) refers to the income from such assets as money, stocks, bonds, real estate and consumer durables.

words, it means labour income *plus* capital incomes. If all material, financial and human sources of income are treated as *wealth,* then the permanent income of the current year can be defined as

$$Y_p = rW \tag{9.3}$$

where Y_p is the permanent disposable income with reference to the current year, W represents overall wealth and r is the rate of return.

9.3.1 Treatment of Transitory Incomes and Expenditures in Estimating Permanent Income

In addition to the permanent income, the households make some transitory incomes. For instance, special bonus given to factory workers, lottery wins, and others. Like transitory incomes, there is transitory loss of incomes due to unpaid sickness leaves, temporary loss of job or unemployment, non-payment of wages due to labour strikes and lock-outs, a short time fall in the return on the income earning assets due to fire and theft, and so on. The transitory incomes are addition to and transitory income losses are subtractions from the permanent income. In the long-run analysis, however, transitory income gains and losses are assumed to cancel out. Besides, the permanent income hypothesis assumes no correlation between permanent and transitory incomes.

Like transitory income gains and losses, there are certain transitory purchases. The households make once-in-a-while purchase of the goods which they do not need for immediate consumption. Such purchases are made due to attractive prices or anticipated scarcity of a commodity. Similarly, some routine purchases are deferred by the households due to lack of funds, sudden rise in the price or a lower price expected in future. The purchases postponed are treated as negative transitory purchases. The permanent income hypothesis assumes no relationship between income and transitory purchases made or postponed.

9.3.2 Basic Propositions of Permanent Income Hypothesis

The basic propositions and assumptions of the permanent income hypothesis can be stated algebraically as follows.

(a) $C_p = kY_p$	: Permanent consumption (C_p) equals k proportion of permanent income (Y_p)	**(9.4)**
(b) $Y_m = Y_p + Y_{tr}$	: Measured income (Y_m) equals permanent income (Y_p) *plus* transitory income (Y_{tr})	**(9.5)**
(c) $C_m = C_p + C_{tr}$	: Measured consumption (C_m) equals permanent consumption (C_p) *plus* transitory consumption (C_{tr})	**(9.6)**
(d) $R_1\ (Y_{tr}, Y_p) = 0$	: Correlation coefficient (R_1) between Y_{tr} and Y_p equals zero	**(9.7)**
$R_2\ (C_{tr}, C_p) = 0$	: Correlation coefficient (R_3) between C_{tr} and C_p equals zero	**(9.8)**
$R_3\ (Y_{tr}, C_{tr}) = 0$	: Correlation coefficient (R_3) between Y_{tr} and C_{tr} equals zero	**(9.9)**

These equations are self-explanatory. Yet, Eq. (9.4) needs some elaboration. It states that permanent or planned consumption is a certain proportion (k) of the permanent income. The proportionality factor k need not be a constant because it depends on demographic and ethnic factors, the interest rate, and the ratio of non-human wealth to permanent income.

9.3.3 Estimating Permanent Income

Equation (9.3) gives the impression that W and r are precisely known and permanent income (Y_p) can be obtained simply by multiplying r by W. That is not the case. Therefore, the problem remains to define and estimate permanent income. According to Dornbusch and Fischer,[12] Friedman has not provided a 'standard definition' of permanent income. He has, however, adopted a pragmatic approach to estimating the permanent income. In his investigation, he found that *permanent income was equal to geometrically weighted average of present and past measured income*. For testing his hypothesis, Friedman estimated permanent income on the basis of measured income data for 17 years. The formula that he used to measure the permanent income is given below.

$$Y_{pt} = \beta Y_t + \beta(1-\beta)\,Y_{t-1} + \beta(1-\beta)^2\,Y_{t-2} + \ldots + \beta(1-\beta)^n\,Y_{t-n} \qquad \textbf{(9.10)}$$

where, Y_{pt} = permanent income in period t, β = rate of declining weightage for the annual measured income in the past. In Friedman's own estimate of permanent income, $\beta = 0.33$.

Given the Eq. (9.10), the permanent income of a household in any year (say, period t) can be easily obtained by summing up a declining percentage of incomes in the past years, say, t, $t-1$, $t-2$ and so on. For example, assuming $\beta = 0.33$, the permanent income of a household for 2009 can be obtained as follows.

$$\begin{aligned} Y_{2009} &= (0.33)Y_{2009} + 0.33(1-0.33)Y_{2008} + 0.33(1-0.33)^2 Y_{2007} \\ &\quad + 0.33(1-0.33)^3\,Y_{2006} \text{ and so on} \qquad \textbf{(9.11)} \\ &= (0.33)Y_{2009} + 0.22Y_{2008} + 0.148Y_{2007} + 0.10Y_{2006} \text{ and so on.} \end{aligned}$$

It means that permanent income for 2009 equals 33 percent of 2009-income *plus* 22 percent of 2008-income *plus* 14.8 percent of 2007-income *plus* 10 percent of 2006-income, and so on.

Now the question arises: How many past years are to be taken into account in measuring the permanent income of a year? Friedman is not committed on the number of years to be considered. One can however find that with 15 years, the value of β is reduced to nearly zero. Friedman has himself considered 16 years in his study.

More importantly, Eq. (9.10) can be manipulated and reduced to a simpler version. Following Eq. (9.10), the permanent income for year t-1 can be written as

$$Y_{pt-1} = \beta Y_{t-1} + \beta(1-\beta)Y_{t-2} + \beta(1-\beta)^2\,Y_{t-3} + \ldots + \beta(1-\beta)^{n-1}\,Y_{t-n} \qquad \textbf{(9.12)}$$

Multiplying Eq. (9.12) by $(1-\beta)$, we get

$$\begin{aligned} (1-\beta)Y_{pt-1} &= (1-\beta)\,[\beta Y_{t-1} + \beta(1-\beta)Y_{t-2} + \beta(1-\beta)^2\,Y_{t-3} + \\ &\quad \ldots + \beta(1-\beta)^{n-1}\,Y_{t-n}] \qquad \textbf{(9.13)} \\ &= \beta(1-\beta)\,Y_{t-1} + \beta(1-\beta)^2 Y_{t-2} + \beta(1-\beta)^3 Y_{t-3} + \ldots + \beta(1-\beta)^n\,Y_{t-n} \end{aligned}$$

By subtracting Eq. (9.13) from Eq. (9.10), we get

$$Y_{pt} - (1-\beta)Y_{pt-1} = \beta Y_t \qquad \textbf{(9.14)}$$

12. Dornbusch, R. and Fischer, S., *Macroeconomics,* 1994, p. 308 fn. The authors summarize Friedman's formula for estimating permanent income as follows.

$$Y_p = Y_{-1} + g\,(Y_0 - Y_{-1})$$

where, Y_p = permanent income, Y_0 = income of the current year; Y_{-1} = income of the previous year, and g = rate of increase in income over the previous year $(0 < g < 1)$.

By rearranging Eq. (9.14), we get

$$Y_{pt} = Y_t + (1-\beta)Y_{pt-1} \tag{9.15}$$

Equation (9.15) gives a simplified and final version of the equation for measuring the permanent income which can be used to measure the permanent income of a household in any year. For example, suppose that we want to measure the permanent income of a household for 2009, assuming β = 0.33, Y_{2009} = Rs 50,000 and Y_{2008} = Rs 40,000. Then the permanent income for 2009 can be obtained as follows.

$$\begin{aligned} Y_{p2009} &= 0.33(\text{Rs } 50{,}000) + (1 - 0.33)\text{Rs } 40{,}000 \\ &= \text{Rs } 43{,}300 \end{aligned}$$

Thus, the permanent income is a weighted average of the actual income of the year (t) chosen for measuring the permanent income and the actual income of the preceding year (t–1). Whether the measured average income is closer to the income of year t or to that of the preceding year (t–1) depends on the weightage. For example, with weightage 0.33, the measured average is closer to the income of the preceding year (t–1). And, if β = 0.6, then the measured average income will be Rs. 46,000 which is closer to the income of the year t.

Main Features Friedman's method of measuring permanent income has two *special features*.

First, it can be judged from Eq. (9.15) that if income in year t is the same as income in year t–1, that is, if income of the household has been constant over the current and the preceding years, then permanent income is also the same. For example, $Y_t = Y_{t-1}$ = Rs 50,000, then

$$Y_{pt} = 0.33\ (50{,}000) + (1 - 0.33)\ 50{,}000 = 50{,}000.$$

Second, Eq. (9.15) implies also that if income increases continuously over time, that is, if $Y_t > Y_{t-1}$, then permanent income (Y_{pt}) is less than Y_t. For example, Y_t = Rs 50,000 and Y_{t-1} = Rs 40,000, then

$$Y_{pt} = 0.33\ (50{,}000) + (1 - 0.33)\ 40{,}000 = 43{,}300.$$

9.3.4 Permanent Income and Consumption

Having described Friedman's method of measuring permanent income, we return to his theory of consumption. His hypothesis that consumption in any year is a function of the measured permanent income has already been shown by the consumption function (9.4), i.e., $C_p = kY_p$. With permanent income measured as in Eq. (9.15), the long term or permanent consumption function can now be expressed in terms of Eqs. (9.4) and (9.15) as:

$$C_p = k[\beta Y_t + (1 - \beta)Y_{pt-1}] \tag{9.16}$$

The long-term consumption function is shown by the line C_L in Fig. 9.3. To begin the analysis, suppose a short-run consumption function is given as $C_s = a + bY_m$ (where, Y_m = measured income) and is shown by the line C_s, included in the diagram for a comparative view of short and long-run consumption functions. Friedman's long-run consumption function has a zero intercept whereas short-run consumption function has an intercept, $a = OC_0$.

As shown in Fig. 9.3, the two functions intersect at point A because both measured and permanent incomes are the same at OM. In order to compare the two consumption functions, let the measured income rise to ON in a subsequent year and as a result of it, permanent income rises to OQ. Note that in both the cases, consumption rises from OC_1 to OC_2. However, if the measured income stays at ON year after year, then the consumption will shift to point B.

9.3.5 Critical Assessment

Empirical evidence supports the permanent income hypothesis more than any other hypothesis. However, its critics have pointed out the following snags in this theory.

First, one of the main conclusions of Friedman's theory is that $APC = MPC$ throughout. For a cross section data, it means that 'rich' and 'poor' consume the same proportion of their income. This conclusion has been questioned by most critics on the empirical ground. Friend and Kravis[13] have, for example, argued that low-income households are forced to consume a larger proportion of their income compared to the high-income households. This fact implies that MPC declines when permanent income increases.

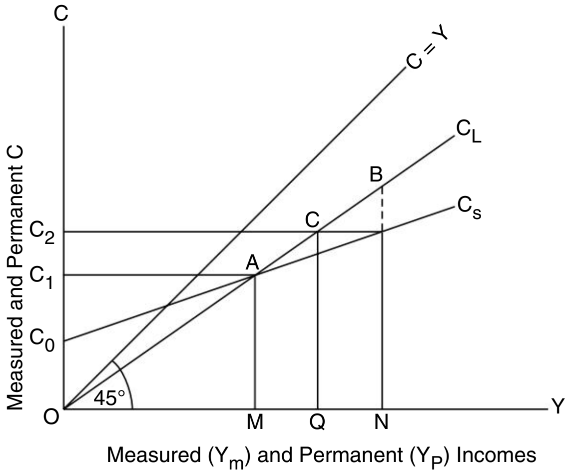

Fig. 9.3 The Permanent Income Hypothesis

Second, according to permanent income hypothesis, transitory positive and negative incomes and transitory consumption are not correlated. This means that short-run income variations do not affect consumption. This means that $MPC = 0$ and $MPS = 1$. This conclusion conflicts with the conclusion that MPC and therefore APC remain constant throughout. Houthakkar[14] has questioned Friedman's conclusion that MPC of transitory income equals zero. He argues that it is possible that when the wallet of a person is stolen, he/she cuts down his/her shopping. But it is difficult to believe that when a person has a lucky day at races, he/she runs to the saving bank: the person does consume a part of the transitory income made at the race course. Kreinin[15] finds in an empirical study that MPC of windfall gains is positive. Recent empirical studies also support this contention.

In reply to this argument, Friedman and others have argued that transitory large positive gains or windfalls are generally spent on consumer durables. Expenditure on consumer durables are in the nature of investment which yields services over a number of years and only a small fraction of the total flow of services of the consumer durables is consumed. If only annual consumption is considered, the change in MPC would rather be insignificant. Therefore, the assumption of zero MPC of transitory income seems to be more plausible.

Third, critics argue that "The long string of terms (estimating) permanent income" in Friedman's hypothesis, "is extremely unwieldy in a more detailed econometric analysis."[16]

These points of criticism question the validity of Friedman's hypothesis only at the micro level which are not strong enough to invalidate his theory at the macro level. As Michael Evans[17] has

13. Friend, Irwin and Kravis, B. Irving, "Consumption Pattern and Permanent Income," *Am. Eco. Rev.,* Vol. 47, May 1957.

14. Houthakkar, H. S., "The Permanent Income Hypothesis," *Am. Eco. Rev.,* June 1958, p. 398.

15. Kreinin, M. E., "Windfall Income and Consumption–Additional Evidence," *Am. Eco. Rev.,* 51, June 1961.

16. Michael Evans, *Macroeconomic Activity, op. cit.*, p. 23.

17. Michael Evans, *Macroeconomic Activity, op. cit.*, p. 34.

observed, "... it can be fairly said that the weight of evidence supports this theory. Even if the parts of the hypothesis are ultimately shown to be incorrect, Friedman's reformulation has reshaped and redirected much of the research on the consumption function."[18]

9.3.6 Policy Implications of the Permanent Income Hypothesis

Consumption theories have significant policy implications because the government is often required to alter household consumption with a view to achieving some economic goals. For instance, a government is often required to curb the household consumption during the period of high inflation, by a hike in tax rate, specially when rise in price is caused by increasing consumer demand. Similarly, during the period of economic recession, a government is required, as a matter of policy, to revive the economy by encouraging demand by such budgetary measures as tax-cut and subsidy. For instance, Indian government is currently using these measures to control the recessionary trend in the economy.

As regards the comparative usefulness of various consumption theories, the permanent income hypothesis is considered to be a better policy guide than the absolute and relative income hypotheses. The argument runs as follows. The absolute income hypothesis states that current consumption depends on the current absolute income while according to the relative income hypothesis current consumption depends on the current relative income. Therefore, the policy implication of these hypotheses is that a tax rebate and a subsidy would affect the consumption in the current year and the magnitude of the effect will depend on the *MPC* and the multiplier. According to the permanent income hypotheses, however, household consumption depends on the permanent income. So the effect of a tax rebate or subsidy on the household consumption depends on how the households view the policy measure. If they view a tax rebate or a subsidy as transitory gains, their consumption remains unaffected. If they expect the tax rebate or subsidy as a permanent gain, then, given the method of measuring permanent income, such policy measures would be effective immediately. The policy measures affect consumption, if they do at all, only marginally and their effect is distributed over a number of years. These conclusions have been verified with respect to the US economy by Modigliani and Steindel.[19]

9.4 THE LIFE-CYCLE THEORY OF CONSUMPTION: THE LIFE-CYCLE HYPOTHESIS

The life-cycle theory of consumption, popularly known as 'life-cycle hypothesis,' was developed by Ando and Modigliani[20] in the early 1960s. Like Friedman's permanent income hypothesis, the life-cycle hypothesis too rejects the Keynesian consumption theory that the current consumption depends on the current income. ***The life-cycle hypothesis postulates that individual consumption***

18. Michael Evans, *Macroeconomic Activity, op. cit.,* p. 34.

19. Franco Modigliani and Charles Steindel, "Is Tax Rebate an Effective Tool for Stabilization Policy?", *Brookings Paper on Economic Activity,* No. 1, 1977.

20. Albert Ando and Franco Modigliani, "The Life-cycle Hypothesis of Saving: Aggregate Implications and Tests," *Am. Eco. Rev.,* March 1963. The basic idea of this theory was developed earlier by Franco Modigliani and R. E. Brumberg in their paper "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data" in Kenneth K. Kurihara (ed.) *Post-Keynesian Economics,* (Rutgers University Press, 1954), and even earlier by Franco Modigliani in his "Saving Behaviour: A Symposium," *Bulletin of the Oxford Institute of Statistics,* Vol. 19, May 1957.

in any time period depends on (i) resources available to the individual, (ii) the rate of return on his capital, and (iii) the age of the individual. The resources available to an individual consist of his existing net wealth and the present value of all his current and future labour incomes. According to the life-cycle hypothesis, a rational consumer plans consumption on the basis of all his resources and allocates his income to consumption over time so that he maximizes his total utility over his life time.

9.4.1 Basic Propositions

The basic propositions of the life-cycle theory of consumption can be summarised as follows.

(i) The total consumption of a 'typical individual' depends on his current physical and financial wealth and his life-time labour income.
(ii) Consumption expenditure is financed out of the lifetime income and accumulated wealth.
(iii) The consumption level of a typical individual is, more or less, constant over his lifetime.
(iv) There is little connection between current income and current consumption.

Propositions (i) and (ii), can be transformed into a lifetime consumption function as follows.

$$C = aW_R + cY_L \qquad \textbf{(9.17)}$$

where, W_R = real wealth, Y_L = labour income, a = *mpc* wealth income, and c = *mpc* labour income.

To explain the life-cycle hypothesis, let us suppose that an individual expects to live for N years with his retirement age at R. He starts working at the age of B, i.e., his working life equals $R–B$ years. For simplicity sake, we assume also: (i) that the individual has no uncertainty about his longevity, employment and health condition; (ii) that he earns no interest on his accumulated savings; (iii) that he does not consume his total labour income; and (iv) that prices remain constant.

With these assumptions, his lifetime income is estimated as follows.

$$\text{Lifetime income} = Y_L(R - B)$$

where, Y_L = annual labour income, and $R – B$ = number of working years. Assuming $R – B = E_L$ to be the earning life, we may redefine lifetime labour income as lifetime income = $Y_L \times E_L$

According to the life-cycle hypothesis, an individual plans his lifetime *consumption* in such a way that his *lifetime consumption equals his lifetime income*. Here the term 'lifetime' means working life = $N – B$. Given the individual's expected life of N years and his planned constant (annual) consumption (C), the *consumption hypothesis* can be written as

$$C \times N = Y_L \times E_L \qquad \textbf{(9.18)}$$

Given the Eq. (9.18), the lifetime consumption (C) can be worked out as

$$C = \frac{Y_L \times E_L}{N} \qquad \textbf{(9.19)}$$

Equation (9.19) reveals that only a fraction of labour income is consumed annually and the rest is saved and accumulated. We will return to the savings aspects shortly. Let us first explain the life-cycle hypothesis through a numerical example.

Numerical Example Suppose (i) life expectancy (N) = 80 years, (ii) retirement age (R) = 60 years, (iii) age at start of working life (B) is 20 years, (iv) working life ($R – B$) = E_L = 60 – 20 = 40 years, and (v) annual income (Y_L) = Rs 225,000. On these assumptions,

$$\text{Lifetime income} = Y_L \times E_L = \text{Rs } 225{,}000 \times 40 = \text{Rs } 9{,}000{,}000$$

The lifetime income is shown by the area $Y_L MRB = Y_L B \times BR$ in panel (a) of Fig. 9.4. Following Eq. (9.19), individual's planned working-life consumption can be worked out as follows.

$$C = \frac{E_L \times Y_L}{N} = \frac{40 \times 225{,}000}{60}$$

$$= (2/3) \times \text{Rs } 225{,}000$$

$$= \text{Rs } 150{,}000$$

This means that two-thirds of the income is annually consumed. The remaining part of the income is saved and consumed after the retirement. Since we know the annual income of the individual and have worked out the annual consumption, we can find his savings (S) easily.

$$S = \text{Lifetime income} - \text{Working life consumption}$$

$$= (Y_L \times E_L) - (C \times E_L)$$

$$= (\text{Rs } 225{,}000 \times 40) - (\text{Rs } 150{,}000 \times 40) = \text{Rs } 3{,}000{,}000$$

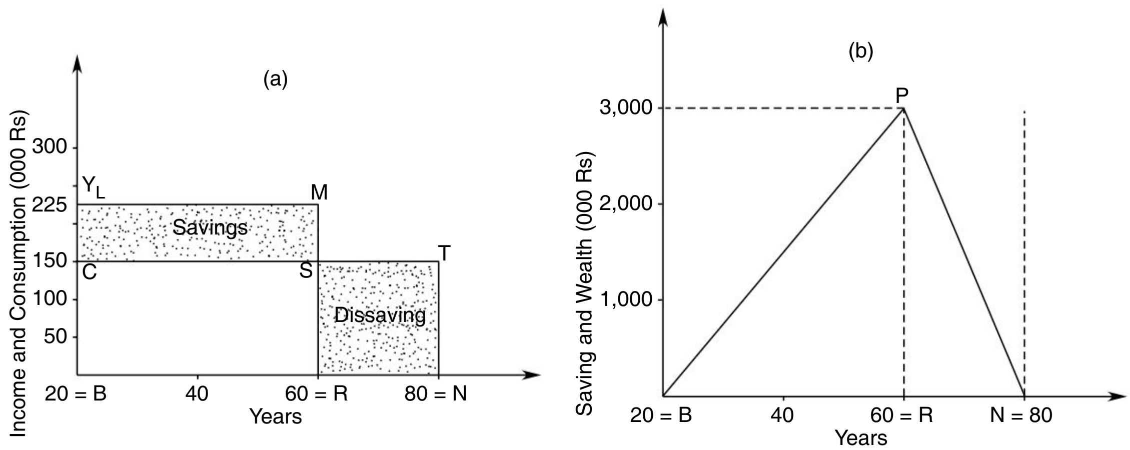

Fig. 9.4 The Life-cycle Hypothesis

Figure 9.4(a) shows individual's lifetime saving, Rs 3,000,000, by the area $Y_L MSC = Y_L M \times MS$. Note that $CS = BR = E_L$ = working life. Figure 9.4 shows also the dissaving which equals the area $RSTN$. Dissaving equals consumption during the retired life. Dissaving equals total saving = Rs 3,000,000. This means that consumption after retirement is financed out of the past savings or accumulated wealth. The growth of savings during the working lifetime is shown in panel (b) of Fig. 9.4. Line BP shows the growth of savings till the retirement age of 60 years. Line PN shows decline in the accumulated savings or decrease in individual's wealth. This increase and decrease in savings gives the life-cycle hypothesis. The saving behaviour tells how an individual, given his lifetime income, plans his lifetime consumption and savings so that he has a smooth life with his constant living standard.

Criticism Like other consumption theories, the life-cycle hypothesis too has its own weaknesses.

First, the life-cycle hypothesis has been strongly criticized for its strong assumptions. This theory assumes that an individual has a definite vision of future size of his income, the entire profile of his life-time income, availability of present and future credits, future emergencies, opportunities and social pressures, present and future rates of interest and returns on investment, and that he has a finely planned life. These assumptions are questionable.

Second, the life-cycle hypothesis assumes that the expectation of the spending units about their own life expectancy has a high degree of 'certainty' whereas the world's experience is full of uncertainties in economic life. Therefore, this kind of assumption is highly untenable.

Third, this theory assumes that each individual has all the information he needs; can make all the fine and complex calculations; makes rational decisions; and plans his present and future consumption so finely that it can be repeated year after year. This is an unrealistic assumption.

Fourth, Branson and Litvack have criticized Ando-Modigliani hypothesis for obscuring the relationship between current income and current consumption. In their own words, "The analysis of the relationship of current consumption to the present value of the entire future income stream suggests that a change in current income not accompanied by a change in expected future income would cause a relatively small change in current consumption. To a certain extent, Ando-Modigliani analysis obscures this point by *assuming* that expected average income depends on current income, raising the leverage of *current income* on current consumption."[21]

Finally and more importantly, the empirical studies that have been carried out to verify the life-cycle hypothesis do not produce supporting evidence. Instead, most studies on the subject in the subsequent period produce evidence contrary to the life-cycle theory of consumption.[22]

9.5 CONSUMPTION UNDER UNCERTAINTY: ROBERT HALL'S RANDOM-WALK THEORY

The theories of consumption, discussed above, assume that the consumers have *certainty* about their income. More importantly, Ando-Modigliani's *life-cycle income hypothesis* and Friedman's *permanent income hypothesis* also assume *certainty* about the income – be it life-cycle or permanent income. In reality, however, life-cycle income and permanent income are not predictable with high degree of *certainty.* It means that there is ***uncertainty*** *about the future income.* This raises doubt about the validity of these consumption theories. An economist, Robert E. Hall, has, however, attempted to develop a new theory of consumption[23] by incorporating the element of ***uncertainty*** of income to *life-cycle* and *permanent-income* hypothesis. His theory is known as the modern version of Life-Cycle (*LC*) and Permanent Income (*PI*) hypothesis (abbreviated to *LC-PI* hypothesis) and also known as ***random walk theory*** of consumption.

To begin with, let us recall that *LC* and *PI* hypotheses postulate that households make expectations about their future income with certainty and behave rationally. Under the condition of

21. Branson, W. H., and Litvack, J. M., *Macroeconomics,* (Harper and Row, New York, 1976), p.199.

22. For details see Dornbusch, R. and Startz, S., *Macroeconomics*, *op. cit*., p.306, Box 11.1.

23. See Robert E. Hall, "Stochastic Implications of the Life-cycle – Permanent Income Hypothesis: Theory and Evidence", *Journal of Political Economy,* Vol. 86, December 1978.

certainty, consumers rationality means that they maximise their lifetime utility, i.e., utility gained over lifetime. The ***lifetime utility*** is defined as

$$\text{Lifetime Utility} = u(C_t) + u(C_{t+1}) + \ldots + u(C_{T-1}) + u(C_T) \quad \textbf{(9.20)}$$

where u = utility gained, and C_t = consumption in a period of time (t), and so on.

Consumers choose to consume in each period, i.e., in period t, $t + 1$, $t + 2$, etc., so that their lifetime utility is maximised with the *condition that lifetime utility equals their lifetime resources,* the income. The utility maximisation condition is equalising *marginal utility* gained in each period of time. The utility maximisation condition can be specified as

$$MU(C_{t-1}) = MU(C_t) = MU(C_{t+1})$$

Let us now introduce *uncertainty* about lifetime income. If there is uncertainty about the income, there is uncertainty about maximisation of lifetime utility. In that case, the consumer would be uncertain in equalising $MU(C_t$ with $MU(C_{t+1})$ to maximise his/her lifetime utility.

Hall applied *rational expectations theory* to explain consumer behaviour under the condition of uncertainty. *Rational expectations* are made by 'using all available relevant information and using it intelligently'. In case expectations about future income are rational, then the rule, according to rational expectations theory, is to equalise marginal utility in period t with expected marginal utility in period $t + 1$. Thus, the modified rule for utility maximisation is given as:

$$E[MU(C_{t+1})] = MU(C_t).$$

Upto this level of analysis, the theory is very close to Friedman's *permanent income hypothesis.* But marginal utility functions cannot be specified reliably. But, accordings to Hall, one thing is fairly reliable that total utility (U) depends on total consumption (C). So the rule for utility maximisation can be rewritten as:

$$E[(C_{t+1})] = (C_t)$$

However, expected value of consumption, i.e., the value of $E[(C_{t+1})]$, is not observable either. It is here that Hall applied that the theory of *rational expectations* to the theory of consumption. According to Hall, the observed consumption behaviour can be written as:

$$C_{t+1} = C_t + \tilde{e}$$

where $\tilde{e}$ is *expected consumption* due to sudden or 'surprise' rise in income.

This theory constructed by Hall is known Hall's ***random-walk model****.* The reasoning of the random-walk model runs as follows. There is uncertainty about future income – it may increase or decrease over time. Accordingly consumers adjust their consumption level. For example, the central government officers in India had never expected over 50 percent increase in their salary recommended by the Sixth Pay Commission. This came as a 'surprise' rise in their salary income. Similarly, managerial staff of some companies had not expected a reduction in their pay package in year 2008. But some companies had announced reduction in pay package. Going by permanent income hypothesis, people facing fluctuation in their income try to 'smooth' their consumption level over time. When people get unexpected rise in their income, they increase their consumption. Likewise, people facing decline in their income, reduce their consumption level. This kind of change in consumption is unpredictable. *Thus, the change in consumption in case of uncertainty is a 'random' change in consumption*. This is the basic conclusion of random-walk model.

9.6 CONCLUDING REMARKS ON CONSUMPTION THEORIES

We have noted in the preceding sections that all consumption theories—from Keynes' absolute income theory to Hall's random walk theory—have their own merits and demerits. So the question that arises now is: What is the final status of the consumption theories? An answer to this question lies in the empirical validity of the consumption theories. But the empirical evidence on income and consumption relationship is too ambiguous.

James Tobin[24] made a comparative study of the absolute income and the relative income hypotheses based on four different sets of empirical data to find their empirical validity. His results do not tell categorically which of these hypotheses has a greater empirical validity. However, his findings based on short-run budget data, support absolute income hypothesis, but not the long-run relationship between consumption and income. His own study has however been questioned too.

According to Gardner Ackley[25], although permanent-income and life-cycle consumption theories have earned a great honour in recent years for providing theoretical basis of empirical research on consumption behaviour, 'this seems a victory by default.' The honour is accorded to these theories because 'there is absence of serious competition' and not because they have improved 'our understanding of aggregate consumption.' Their 'fundamental assumptions can be seriously challenged,' particularly their 'stability.'

Michael K. Evans comments on the permanent income hypothesis, "Without making final judgment on whether the strict terms of the permanent income hypothesis will hold, it can be fairly said that the weight of evidence supports this theory."[26]

Finally, it is generally agreed that the *short-run consumption function* takes the form of Keynesian consumption function given as $C = a + bY$ (where Y is current income) and the long-run consumption function as $C = kY_P$ (where Y_P is current income). Though there is no conclusive evidence for either of these consumption functions, 'regardless of which explanation [of consumption] is correct, Keynes' original consumption function starts to look more attractive. That is, current income has a larger role in determining consumer spending than what the random-walk hypothesis suggests.'[27]

9.7 NON-INCOME FACTORS AFFECTING CONSUMPTION

It may be inferred from the foregoing discussion that change in income does not fully explain the change in consumption expenditure even though income is the dominant determinant of the consumption level. It implies that there are some non-income factors also which influence the proportion of income consumed. As Ackley has remarked, "Either there is an erratic, unexplainable element in spending, particularly important in the short run, or there are other systematic factors influencing consumption that need to be brought into the analysis."[28]

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24. James Tobin, **"**Relative Income, Absolute Income, and Saving", in *Money, Trade and Economic Growth,* (Macmillan, NY, 1951), pp. 135–156. For a good summary, see Glahe, *Macroeconomic Theory and Policy,* Ch. 5.
25. Gardner Ackley, *Microeconomic Theory and Policy,* (Macmillan and London Collier Macmillan, NY, 1978).
26. Michael K. Evans, *Macroeconomic Activity*, *op. cit.,* p.34.
27. N. Gregory Mankiw, *Macroeconomics* (NY, Worth Publishers, 5th Edn., 2003), p.456
28. Gardner Ackley, *Macroeconomic Theory*, (Macmillan, NY, 1969), p.267.

Keynes had himself recognised the influence of non-income factors on consumption. He has classified them under two categories: (i) the "objective factors" and (ii) the "subjective factors."[29] Of Keynes's objective and subjective factors, that have figured most under 'the other factors influencing consumption' include: (i) change in interest rates, (ii) change in price level, (iii) expectations about future prices, (iv) wealth or net assets of the household, and (v) distribution of the national income in regard to national consumption level. Some economists have made empirical studies to find the influence of such factors on the household consumption. The empirical findings have, however, not produced conclusive evidence of non-income factors in the aggregate consumption. However, we discuss here, for completeness sake, the effect of first four non-income factors on consumption.

9.7.1 Interest Rate and Consumption

The Classical View The classical economists were the first to point out the relation between interest rate and consumption. They held that the rate of interest is an important factor influencing the consumption and saving. This view is based on the observation that people prefer present goods to future goods. People save for future only when they have a high prospects for future consumption. It is the rate of interest earned on savings which determines the prospects of future income and consumption: the higher the rate of interest, the higher the future income and consumption prospects, prices remaining stable at equilibrium. Therefore, at high rates of interest, the households tend to save more and consume less. This forms the basis of the classical theory of interest.

In order to examine the classical view *theoretically,* let us assume a typical individual who has (i) a regular, constant income, (ii) no past savings or accumulated wealth, (iii) attempts to maximise utility over his life time, and (iv) faces constant prices. Let us also assume that the individual saves a part of his present income for future consumption, and he hoards his savings—does not invest it. The present-future consumption possibilities of the individual is shown by 45° line *NM* in Fig. 9.5. This line shows the possible combinations of present-and-future consumption and serves as *intertemporal budget line* (*IBL*).

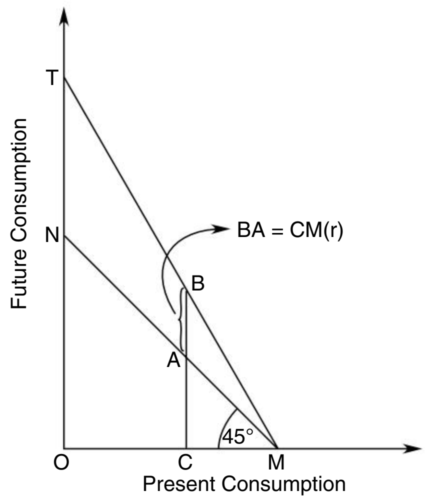

Fig. 9.5 Intertemporal Budget Constraints

A typical individual, however, does not hold his savings in the form of idle cash balance. He invests his savings so as to enhance his future income. As a result, the intertemporal budget line (*IBL*) rotates to the position of *TM* (see Fig. 9.5). As shown in Fig. 9.5, the individual having an income of *OM* consumes *OC* and saves *CM* = *AC* of his income. If he hoards it, his future additional consumption will be *AC* = *CM*. But when he invests his savings, he earns an income of *BA,* given the rate of interest (*r*). The shift in the intertemporal budget line shows that saving and investment increase the prospects for future consumption from *AC* to *BC*.

[29] For details, see Chapters 8 and 9 of his *The General Theory.*

Individual's Intertemporal Equilibrium The question that arises now is: How does a consumer distribute his income between consumption and savings so that his total utility over his life time is maximised? This question can be answered by superimposing his intertemporal consumption indifference map over the intertemporal budget line. The intertemporal consumption indifference curve (*IIC*) is drawn on the basis of an individual's subjective valuation of the present and future consumption. The *IIC* is shown in Fig. 9.6. The curve *IIC* shows various combinations of the present and future consumption which yield the same amount of utility over time. The slope of the indifference curve shows the marginal rate of substitution between the present consumption and the future consumption.[30]

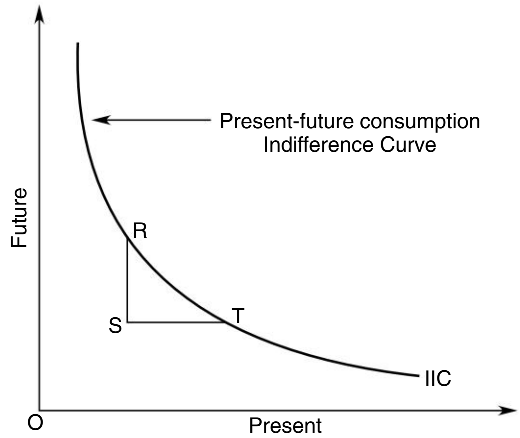

Fig. 9.6 The Present-Future Consumption Indifference Curve

Figure 9.7 presents the individual's equilibrium at point *B* where intertemporal indifference curve IIC_2 is tangent to the intertemporal budget line. Point *B* shows the optimum distribution of income between consumption and saving for an individual seeking to maximise his life time utility. As Fig. 9.7 shows, the individual with an income of *OM* consumes *OC* and save *CM* and maximises his total utility over time.

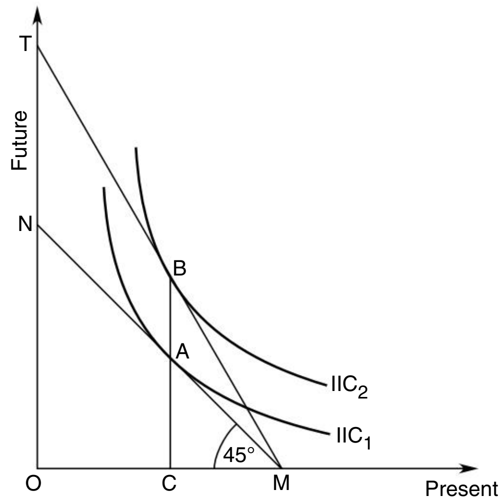

Fig. 9.7 The Optimum Intertemporal Consumption

Macro Level Effect of Interest Theoretical analysis of the consumption behaviour of a typical individual in response to change in the interest rate can be extended to see the effect of changes in the interest rate on the aggregate level of consumption. For macro level analysis, households may be divided into three categories: (i) households preferring higher future consumption to present consumption; (ii) households preferring present consumption to higher future consumption; and (iii) households indifferent between present and future consumption. The effect of interest on consumption and savings at the macro level is the sum of the behaviour of the three categories of households.

Theoretically, the responses of different categories of households to the rise in the interest rate remains ambiguous. According to Shapiro, "No simple, systematic relationship can be established

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30. For example, as shown in Fig. 9.6, the individual would sacrifice *ST* of his present consumption for *SR* of future consumption and he will remain equally well off over time. Since the slope of *IIC* changes all along the curve, an upward movement on the curve shows increasing cost of present consumption in terms of future consumption and *vice versa*.

between aggregate personal savings and the rate of interest on the theoretical grounds."[31] According to Baird, however, consumption and interest rate are inversely related and a rise in the interest rate encourages savings and discourages investment.[32] Their views are a matter of empirical verification.

As regards, the *empirical evidence* of the relationship between consumption and interest rate, it is ambiguous too. Most studies on consumption-interest relationship have concluded that consumption is, in general, insensitive to the changes in the interest rate.[33] Some researchers, however, find that there is a positive relationship between consumption and interest rate.[34] Some others find that the expenditure on consumer durables is negatively related to the rate of interest.[35] The empirical evidence on the influence of interest rate on the consumption expenditure is not conclusive.

9.7.2 Price Level and Consumption

Price related factors that are expected to influence the aggregate consumption expenditure are: (a) change in price levels, and (b) expectations about future prices. Here we discuss the effect of change in price level on consumption.

A significant *rise* in the *general* price level is generally accompanied by a more or less similar increase in money income.[36] The rate of increase in money income may be equal to, greater than, or smaller than the rate of increase in prices. When increase in prices and disposable money income are proportional, consumption in real terms remains almost unchanged and the consumption-income ratio remains largely unchanged. When disposable income increases at a rate higher than the rate of increase in price, one may expect consumption to increase. But then this is income effect, not the price effect. When money income increases at a slower pace than the prices, then the real consumption tends to decrease. These observations are based on the assumption that people do not suffer from "money illusion."

It is, however, often argued that people do suffer from money illusion and it influences their consumption. ***Money illusion*** refers to consumers' false feeling of richness with increase in money income even if their real income is falling due to increase in prices. With this false feeling of richness, they tend to spend more on consumption.[37]

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31. E. Shapiro, *Microeconomic Analysis,* 4th Edn, (Galgotia, New Delhi, 1994), p.352.

32. Baird, Charls, W., *Macroeconomics—An Integration of Monetary and Income Theories*, (University of California, Los Angeles, 1973), p. 95–101.

33. A good summary of the works on this issue can be found in "The Determinants of Consumer Expenditures: A Review of Present Knowledge," by Daniel B. Suits in *Impacts of Monetary Policy* by the Commission on Money and Credit (Englewood Cliffs, N.J., Prentice-Hall Inc., 1963).

34. See, for example, Warren E. Weber, "Interest Rates, Inflation and Consumption Expenditure," *Am. Eco. Rev.*, Vol. 65, December 1975.

35. See, for example, Michael J. Hamburger, Frederic S. Mishkin "Interset Rates and the Demand for Consumer Durable Goods," in *Am. Eco. Rev.*, Vol. 57, December 1967.

36. For instance, price level in India had risen at annual rate of 8–10% over 25 years before 1990-91 and per capita GNP (at current prices) has risen at 10–12 during this period—*Basic Statistics Relating to the Indian Economy*, CMIE, August 1993, Tables 13.1 and 22.2.

37. On the contrary, some consumers look only at the denominator and suffer from another kind of illusion, called *price illusion*. Such consumers feel they are getting worse of with an increase in price level and tend to consume less because of price effect even if their money income is increasing proportionately or even more.

The question whether people suffer from money illusion has been examined both theoretically and empirically. From a theoretical standpoint, consumers are assumed to be rational being and money illusion implies irrationality and hence there is no money illusion. Empirically too there is little evidence of money illusion. However, two recent studies[38] based on the US data show the existence of money illusion in consumer behaviour. In 1969, Branson and Klevorick[39] showed in their study that money illusion does exist in the US consumer behaviour in short run. They found that 'price level plays a significant role in determining the level of per capita real consumption in the United States' and that 'real consumption increases when the consumer price index rises with real income and wealth constant.' In a similar study, Raymond M. Johnson[40] found the existence of money illusion in the behaviour of the US consumers.

9.7.3 Price Expectations and Consumption

Apart from the actual change in price, consumers' price expectations also matter in determining the present level of consumption. In general, when consumers expect prices to rise in future, they tend to spend more, especially on consumers durables. On the contrary, when consumers expect prices to fall in future, they tend to postpone their consumption with a view to benefit from the expected lower prices. Such occurrences are generally of temporary nature. In general, prices tend to increase and people adjust their consumption to price levels in accordance with increase in their real income.

Sometimes, however, expectations about future prices play havoc on prices and on the economy. Expectations of price rise in future prompts people to buy more. This results in unusual rise in demand for goods. Some times it leads to hyper inflation. For instance, when the Korean war began in 1952, the World War-II experience of shortages and high prices prompted the consumers to stock consumer goods for the war period. The result was, prices shot up, which might not be the case otherwise. But again, such events do not show a consistent relationship between price expectations and consumption.

However, expectations about future prices do play a significant role in consumer's decision. From theoretical point of view, anticipated rise in price should increase the present consumption. Empirically, however, the precise nature of their influence on the consumer behaviour is still unknown. Some researchers have found a negative effect of anticipated higher price on the consumption.[41]

9.7.4 Wealth and Consumption

Another factor that is considered to influence the consumption behaviour is the accumulated wealth in the form of land and building, bank balances, shares and debentures, bonds and cash holdings (including accumulated black money). A household with a large accumulated wealth is expected to spend a larger part of its present income on consumption than those with the same income but no

38. See also Michael M. Edgmand, *Macroeconomics: Theory and Policy,* (Prentice-Hall, NJ, 1979), p.12.

39. William H. Branson and Alvin K. Klevorick, "Money Illusion and Aggregate Consumption Function," *Am. Eco. Rev.*, 59, December, 1969.

40. Raymond M. Johnson, "The Empirical Question of Money Illusion in the United States: Its Implications for a Patinkin-Type Model", (unpublished doctoral dissertation, Oklahoma State University, 1973).

41. For instance, F. Thomas Juster and Paul Wachtel. "Inflation and the Consumer" in Brokings Papers on Economic Activity, No. 1, 1972.

accumulated wealth. There are at least two possible reasons for this. *First*, people in general try to maximise their utility over time and, those with accumulated wealth have assured future income for a higher level of future consumption. Therefore, they do not feel the need to save for future consumption. *Second*, the marginal utility of the accumulated wealth goes on diminishing which increases preference for the present consumption. For such households *APC increases.*

As regards the effect of wealth on *aggregate* consumption, it depends on: (i) distribution of wealth between accumulating and non-accumulating households, and (ii) distribution of private wealth among the households. The higher the proportion of wealthy households with increasing *APC,* the higher the probability of rise in the aggregate level of consumption with increase in wealth, and *vice versa.* And, the greater the inequality in the distribution of private wealth, the smaller the influence of wealth on the aggregate level of consumption.

Concluding Remarks In the preceding section, we have discussed briefly economists' views on the influence of four non-income factors on the level of the aggregate consumption. These 'other factors' include rate of interest, price level, price expectations, wealth, and also distribution of income. None of these factors is found to have a systematic relationship with consumption either on theoretical or on empirical ground. Nor do they appear to have *a priori* a considerable influence on the consumption level. The findings of the empirical works are not conclusive. In the final analysis, therefore, the absolute disposable income is considered to be the most important determinant of the aggregate consumption, in spite of the effects of some other factors.

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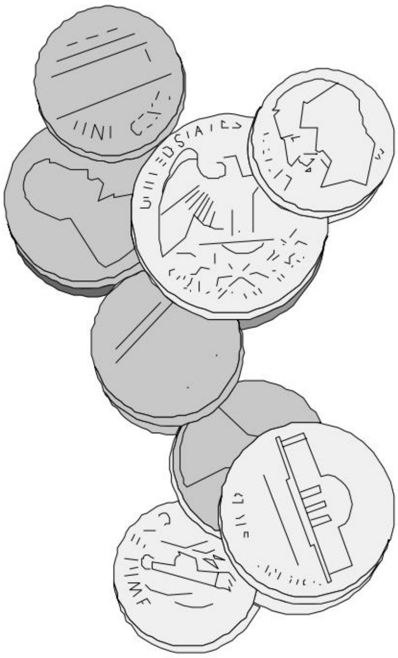
QUESTIONS FOR REVIEW

1. Describe briefly the absolute income hypothesis. What are its main properties and weaknesses.
2. What is the main theme of the relative income hypothesis? What is meant by the 'ratchet effect'? What are the weaknesses of the relative income hypothesis?
3. Describe the permanent income hypothesis. How is the permanent income measured? Examine it critically.
4. What is permanent income hypothesis of consumption behaviour? How is the permanent income hypothesis different from the absolute income hypothesis?
5. Write a note on the merits and demerits of the Keynesian and post-Keynesian income-consumption hypotheses.
6. What significant contribution emerges from the post-Keynesian consumption theories? How would macroeconomic analysis be affected in the absence of the alternative theories of consumption?
7. The level of consumption is determined only by the level of income, be it absolute, relative or permanent. Do you agree with this statement? If not what other factors influence household consumption?
8. The interest rate affects saving and investment. Does it affect consumption also? What are the classical views in this regard?
9. Is there any relationship between the present and future consumption? How does a consumer allocate his income between the present and the future consumption with a view to maximising his life-time utility?
10. What is 'money illusion'? How does it affect the consumption of those suffering and not suffering from money illusion?
11. The households with large accumulated wealth and a given income tend to spend more than those with the same income but no wealth. Do you agree with this statement? Give reason for your answer.

Chapter 10

Theory of Investment and Capital Accumulation



INTRODUCTION

In our discussion on the theory of income determination in Part 2, investment was throughout treated as a 'constant' variable, In reality, however, investment spending is a very 'volatile' component of *GDP*[1]. However, as can be seen in Table 10.1, investment has not been very volatile in India. Investment, percentage of *GDP*, has been fairly stable in India. However, a review of data on annual percentage of gross capital formation to *GDP* shows 2-3 percentage point variation in investment *GDP* ratio.

In general, however, investment being the second most important component of *GDP,* fluctuation in investment is the single most important factor causing business cycles—boom and depression—fluctuation in production, employment, price levels and foreign trade. Investment is, in fact, a pivotal factor in any economic system. Rising investment leads to growth in *GDP* and a continuous decline in investment leads to depression in the economy.

In this Chapter, we will discuss the theory of investment. Let it be noted at the outset that the theory of investment is a vast subject in itself. Also, "the theory and measurement of investment behaviour is one of the most controversial areas of professional economic study[2]. A number of

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1. For volatility of investment in the US, see Rudiger Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics* (Tata McGraw-Hill, New Delhi, 9th Ed., 2004), p.361; N. Gregory Mankiw, *Macroeconomics* (Worth Publishers, New York, 2003, 5th Ed., 2003), pp. 461-62.

2. Meyer, J, R, and Glauber, R, *Investment Decisions, Economic Forecasting, and Public Policy*, (Harvard Business School, 1964), p.1.

Table 10.1 Gross Domestic Saving and Investment* as Percentage of *GDP*

(At current prices)

Year	*Savings as % of GDP*	*Investment as % of GDP*
1960-61	11.2	14.4
1965-66	13.7	16.1
1970-71	14.2	15.6
1975-76	16.9	18.8
1980-81	18.5	18.5
1985-86	19.0	23.5
1990-91	22.8	24.2
1995-96	24.4	26.6
2000-01	23.7	24.2
2005-06	34.2	34.8
2006-07	35.7	36.4
2007-08 Q	37.3	38.7

* Based of data on 'Gross Domestic Capital Formation'.
Source: *Economic Survey* 2008-09, MOF, GOI, Table 1.6, p. A-10-11.

economists have attempted to explain the investment behaviour and, in the process a variety of theories[3] have been formulated, adding more to the controversy. Despite the extensive literature on the subject, 'our understanding of the factors that determine the amount of investment remains far from satisfactory—either on a theoretical or on an empirical basis'[4]. A comprehensive treatment of various theories of investment falls outside the purview of this book and a summary treatment of complex theories may be misleading. We will, therefore, confine our discussion to the central theme of the investment theory.

The aspects of investment theory that are discussed here include the following.

(i) Methods of Investment Decisions:
   (a) Net Present Value Method, and
   (b) Marginal Efficiency of Capital Method
(ii) Marginal Efficiency of Capital and Marginal Efficiency of Investment
(iii) Theory of Capital Accumulation
(iv) Income and Investment: The Acceleration Theory of Investment
(v) The User Cost of Capital and Investment
(vi) Tobin's q Theory of Investment.

3. Including Keynesian, neoclassical, accelerator, profit, and financial theories of investment. For a detailed and advanced treatment of investment theories, see D.W. Jargenson, and C.D. Siebert, "A Comparison of Alternative Theories of Corporate Investment Behaviour", *Am. Eco. Rev.*, September 1968.

4. Gardner Ackley, *Macroeconomics: Theory and Policy*, (Macmillan, NY, 1978,), p.244.

It may also be added here that the major components of investment, as defined in national income accounting are (i) business investment in plant, building, machinery, etc., (ii) residential buildings, and (iii) investment in business inventories. Following the general practice, however, we will concentrate on the theory of investment in plant and machinery by the business firms. Besides, the determination of investment in these kinds of assets vary from asset to asset. We will, however, assume profit maximisation as the basic motive of investment.

Let us begin our discussion with some basic aspects used in investment analysis.

10.1 SOME BASIC CONCEPTS

Some basic concepts used in the analysis of investment spending and in investment decisions are discussed below.

10.1.1 Investment

***What is meant by investment*?** In general sense of the term, investment means using or spending money on acquiring physical or financial assets and skills that yield a return over time. Acquiring physical assets takes the form of land, building, machinery and equipments. Financial assets include time deposits, shares, bonds, mutual funds. Acquiring skill is spending money on higher education or professional qualification or expertise in any field of knowledge. Even lending money on interest is a form of investment. Given the scope and purpose of this book, we will confine to what is called 'business investment', i.e. acquiring or buying physical or financial assets for the purpose of making profit. In macroeconomics, investment means the sum of spending made by the business firms per unit of time to build physical 'stock of capital'.

Capital and Investment The terms 'capital' and 'investment' are two different concepts. Capital is a *stock* concept. It refers to the capital accumulated over a period of time. The term 'capital' means stock of productive assets[5] including: (i) business fixed investment in machinery and equipment, (ii) residential land and building, and (iii) inventories.[6] Investment is, on the other hand, a *flow* concept and it is measured per unit of time, generally one year. Conceptually, investment refers to the *addition* to the physical stock of capital, i.e., if capital = K, then investment = $\Delta K = I$.

Gross and Net Investment The *gross investment* is the total purchase of capital goods per time unit, usually one year. It consists of total annual expenditure on (a) plant, building, machinery and equipment, (b) residential land and building, and (c) inventories. The gross investment of category (a) is called *gross fixed investment.*

Net investment, on the other hand, is the gross investment net of *depreciation.* In other words, net investment equals gross investment *less* depreciation. *Depreciation* is not merely the part of the capital worn out or used up in the process of production. It includes also the obsolence of capital, that is the capital becoming economically obsolete due to change in technology, source of energy, increase in input prices or a product going out of demand. By definition, therefore, depreciation includes also the obsolete capital goods.

5. The expanded version of capital also includes the national capital such as, roads, railways, airways, aircrafts, dams, barrage, bridges, canals, schools, colleges, universities, hospitals, public buildings, etc.

6. We will confine here only to the business fixed investment.

Autonomous and Induced Investment New investments can be classified as: (i) *autonomous investment,* and (ii) *induced investment*. The distinction between the two kinds of investments can be made with reference to neo-classical *investment function*. The general form of investment function is given as

$$I = f(Y, i), \qquad f(Y) > 0 \text{ and } f(i) < 0$$

where, Y = income, and i = interest rate.

The investment caused by the increase in income (Y) and decrease in the interest rate (i) is called ***induced investment***. Since Y is assumed to remain constant in the short-run, investment function is given as

$$I = f(i)$$

Autonomous investment, on the other hand, is the investment caused by the factors other than the level of income and interest rate. In fact, income and interest rate are not the only determinants of investment. There are other factors also, called ***exogenous factors***. The exogenous factors include such changes in the economy as: (a) innovations in production technique, (b) invention of new production process, (c) invention or discovery of new raw materials, (d) invention of new products, (e) discovery of new markets, (f) growth of population and its spending power, (g) expansion plan of the business firms, (h) increase in public expenditure, (i) future expectations and (j) emergence of new entrepreneurs. Investment caused by these factors called ***autonomous investment***.

10.2 METHODS OF INVESTMENT DECISION

The theory of investment is essentially the theory of demand for capital. Capital is demanded because it is productive and yields a return over time. But, the return on capital is subject to a cost, i.e., interest paid on money spent on capital acquisition. Firms are profit maximisers. Therefore, firms demand capital stock that maximises their profit, given the cost. The theory of investment deals with how firms decide on the profit maximising level of capital stock. Theoretically as well as practically, there are different methods of making investment decisions. However, we will discuss here the two most important methods of investment decision making.

1. The Net Present Value Method, and
2. The Method based on Marginal Efficiency of Capital.

10.2.1 The Net Present Value (*NPV*) Method

The *net present value* method is one of the popular methods of taking decision on investment projects. The net present value (NPV) is defined as the difference between the *present value* (PV) of a future income stream and the *cost of investment* (C). That is,

$$NPV = PV - C \qquad \textbf{(10.1)}$$

To understand the full implication of the NPV method, we need to understand the concept and calculation of the present value (PV).

The Present Value of Future Income The present value of a future income is the value of the future income *discounted* at the current market rate of interest. The future income is discounted at the market rate of interest under the assumption that prices remain constant—there is neither inflation nor deflation. The need for discounting future income arises because money has a *time value*. The **'time value of money'** implies that an amount of money is preferable today to the same amount at some future date. For example, Rs 100 is always preferable today to Rs 100 after one year, or at some other future date. The reason for this preference is the loss of interest on the deferred receipt of the amount. For example, if a person receives Rs 100 today and deposits it in the bank at 10% interest for one year, his Rs 100 grows to Rs 110 (= Rs 100 + Rs 100 × 0.10). That is why Rs 100 today is preferable to Rs 100 after one year. It means that *PV* of Rs 110 receivable one year hence is Rs 100, at 10% rate of interest. The *PV* of an income receivable after one year is obtained by a discounting formula given below.

$$PV = \frac{R}{1+i} = R\,\frac{1}{1+i} \qquad \textbf{(10.2)}$$

where, R = amount expected after one year, and i = rate of interest.

The market rate of interest is regarded as the *opportunity cost* or the *time value of money.* Given the discounting method in Eq. (10.2), the *PV* of Rs 110 available after one year can be worked out as follows.

$$PV \text{ of Rs } 110 = \frac{110}{1+0.1} = \text{Rs } 100 \qquad \textbf{(10.3)}$$

Equation (10.3) implies that to get Rs. 110 after a year, Rs 100 must be invested today. Going by this logic, the present *value of an amount expected at some future date is the sum of money that must be invested today at a compound interest rate to get the same amount at some future date.*

The Present value of a receivable in the nth year The present value of an amount receivable (R_n) in the *nth* year can be obtained by the following formula.

$$PV \text{ of } R_n = \frac{R_n}{(1+i)^n} = R_n\,\frac{1}{(1+i)^n} \qquad \textbf{(10.4)}$$

Note that the term $1/(1+i)^n$ is the *rate of discount* for *nth* year.

The Present value of an income stream The formula for computing the total present value (*TPV*) of an income stream over n years is given below.

$$TVP = \frac{R_1}{(1+i)} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + \cdots + \frac{R_n}{(1+i)^n} \qquad \textbf{(10.5)}$$

$$= \sum_{j=1}^{n} \frac{R_n}{(1+i)^n} = \sum_{j=1}^{n} R_n \frac{1}{(1+i)^n}$$

The Net present value (NPV) and the decision rule Having explained the concept and computation of the present value, we return now to the concept of the *NPV* and the investment decision rule. Given the formula for *NPV* in Eq. (10.1) and that for *PV* in Eq. (10.4), *NPV* of returns from an investment worth *C* expected to yield a stream of income over 'n' years can be obtained as follows.

$$NPV = \sum_{j=1}^{n} \frac{R_n}{(1+i)^n} - C \qquad \textbf{(10.6)}$$

Given the measure of *NPV*, investment decision becomes an easy task. If *NPV* is substantially greater than *C,* then the project under consideration is worth the investment. The investor can borrow money at the market rate of interest and make the investment. The optimum level of investment is reached where $NPV = 0$. In case $NPV < 0$, then the project is rejected.

10.2.2 The Marginal Efficiency of Capital (*MEC*) Method

Keynes has suggested an alternative method of investment decision based on, what he called, *Marginal Efficiency of Capital* (*MEC*). This is also known as **Internal Rate of Return (*IRR*)**. According to Keynes, the marginal efficiency of capital is "that rate of discount which makes the present value of the series of annuities given by returns expected from the capital asset during its life just equal to its supply price."[7] In simple words, *MEC is the rate of discount which makes the discounted present value of expected income stream equal to the cost of capital.* For example, suppose cost of an investment project is *C* and it is expected to yield a return *R* for one year, then *MEC* can be found as follows.

$$MEC = \frac{R}{1+r} = C \qquad \textbf{(10.7)}$$

In Eq. (10.7), *r* is the rate of discount that makes the discounted value of *R* equal to *C*. Therefore, the value of *r* is the marginal efficiency of capital (*MEC*) or the internal rate of return (*IRR*). The value of *r* can be obtained by rearranging the terms in Eq. (10.7).

$$r = (R/C) - 1 \qquad \textbf{(10.8)}$$

For example, suppose an investment project costs Rs 100 million and is expected to yield Rs = 125 million at the end of one year. By substituting these values in Eq. (10.8), we get

$$MEC = r = (125/100) - 1 = 0.25 \text{ or } 25\%$$

When we use the value of *R* and *r* in Eq. (10.7), it reduces the discounted value of the *expected return* (Rs 125 million) exactly equal to the cost of capital (Rs 100 million) as shown below.

$$\frac{125}{1+0.25} = 100$$

Thus, *r* gives the measure of *MEC*. In our example, $MEC = 25\%$.

Consider now a two-year investment project costing Rs 100 million expected to yield no return in the first year and Rs 144 million in the second year. The *MEC* of this project can be obtained as follows.

$$100 \text{ million} = 0 + \frac{144 \text{ million}}{(1+r)^2}$$

$$(1 + r) = \sqrt{1.44}$$

$$r = 0.20 \text{ or } 20.0\%$$

If a capital project costing *C* is expected to generate an income stream over a number of years as R_1, R_2, R_3, ... R_n, then *MEC* of the project can be computed by using the following formula.

$$C = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \frac{R_3}{(1+r)^3} + \ldots + \frac{R_n}{(1+r)^n} \qquad \textbf{(10.9)}$$

7. J.M. Keynes, *The General Theory,* 1961 (print), p.135.

Given the formula, the value of r can be computed, if C and R_1, R_2, R_3, ... R_n are known. For example, suppose that an investment project costs C = Rs 1000 million and is expected to yield an annual stream of income as R_1 = Rs 500 million, R_2 = Rs 400 million, R_3 = Rs 300 million, R_4 = Rs 200 million, and R_5 = Rs 100 million. By applying the formula given in Eq. (10.9), we get $r = 20.27\% = MEC$.

Decision rule Once *MEC* or *IRR* is estimated, investment decision can be taken by comparing *MEC* with the market rate of interest (i). The general investment decision rules are:

(i) If $MEC > i$, then the investment project is acceptable.
(ii) If $MEC = i$, then the project is acceptable only on non-profit considerations.
(iii) If $MEC < i$, then the project is rejected.

10.2.3 Derivation of the MEC Schedule: The Investment Demand Curve

We have described above the investment decision rule under the condition that there is a single investment project. Now we explain how decision for total investment is taken when a firm has a number of alternative investment projects to select from. Suppose a profit-maximising firm having a large amount of investable funds is considering four investment projects—Project I: setting up of a new production unit; Project II: expansion of the existing production plant; Project III: modernisation of the production plant; and Project IV: construction of a new building. In this case, the firm will have to work out the *MEC* of the different projects and list them in order of their *MEC*. Suppose that the cost and *MEC* of each of these projects are given as in Table 10.2.

Table 10.2 Cost and *MEC* of Investment Projects

Projects	*Cost of Project (Rs million)*	*MEC (%)*
Project I	100	25
Project II	100	18
Project III	100	13
Project IV	100	10

This information can be presented in the form of a diagram as shown in Fig. 10.1. In this figure, the vertical axis measures the *MEC* and the horizontal axis shows investment cost cumulatively.

The *MEC* of each project is shown in the form of a bar-diagram in its decreasing order. When the top of the bars is joined by solid lines, as shown in Fig. 10.1, it gives a stairs-like *MEC* schedule. The stairs-like *MEC* schedule is the result of a small number of projects presented in Fig. 10.1. If a firm is considering a large number of investment projects of varying *MEC* and cost of capital and if they are all plotted together, the stairs like formation of the *MEC* schedule will get evened out and it will produce a smooth curve as shown by the *MEC* schedule. The *MEC* curve can be drawn also by joining the top corner points of project bars as shown in Fig. 10.1. The *MEC* schedule gives the ***investment demand curve*** of an individual firm.

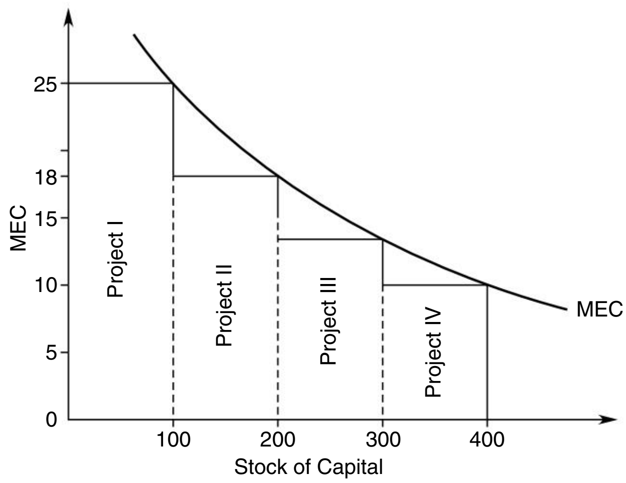

Fig. 10.1 Derivation of Individual Firm's *MEC* Schedule

Figure 10.2 presents a general form of *MEC* curve. It shows the relationship between the market rate of interest and the investment demand under the optimum investment rule that $i = MEC$. Given the *MEC* schedule, when the market rate interest is Oi_3, the profit maximising investment demand is limited to OK_1. And, when market rate of interest decreases from Oi_3 to Oi_2, the demand for capital increases to OK_2 and when the interest rate falls to Oi_1, investment demand increases to OK_3. Thus, given the *MEC* schedule and the market rate of interest, firm's demand for capital can be easily known. It may thus be concluded that the *MEC* schedule represents the investment demand schedule for an individual firm.

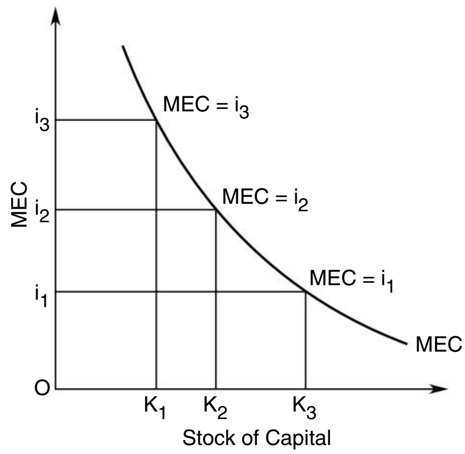

Fig. 10.2 Interest Rate, *MEC* and Investment Demand

10.2.4 The Desired Stock of Capital

Once *MEC* curve, i.e., the investment demand curve, is derived, the desired stock of capital or the optimum investment, can be determined easily, given the interest rate. For example, suppose *MEC* curve is given as shown in Fig. 10.2. Given the interest rate as i_2, desired stock of capital is determined at K_2. Note that at this stock of capital, $MEC = i_2$. That is, profit maxmisation condition is fulfilled at capital stock K_2.

10.3 THE MARGINAL EFFICIENCY OF INVESTMENT (*MEI*) AND AGGREGATE DEMAND FOR CAPITAL

It may be concluded from the *MEC* schedule given in Fig. 10.2, that the sum of the individual firms' demand for investment will give the aggregate investment demand schedule for the economy as a whole, and that when the market rate interest decreases, investment in the economy as a whole increases along the *MEC* schedule. ***This conclusion can be misleading***. The conclusion that decrease in the interest rate will increase investment along the *MEC* schedule holds in case of an individual firm but not for the economy as a whole. The reason is that when interest rate falls, demand for capital goods increases. Given the production capacity of capital goods industry, demand exceeds supply and price of capital goods increases. Consequently, *MEC* decreases and *MEC* curve shifts leftward. It means that total investment is less than expected from the fall in the interest rate. To explain the point further, an individual firm's capital stock can be increased overnight to its desired level as its demand for capital goods can be met from the inventories of the firms in the capital goods industry. But inventories would fall too short of demand when all the firms plan to increase their stock of capital to its desired level in one time period. For example, if interest rate decreases from 14 percent to 10 percent, in Fig. 10.3, the desired stock of capital increases from Rs. 30 million to Rs. 50 million. That is, the desired level of capital stock increases by 66.67 percent. This increase in capital demand can be met under only one condition that capital goods industry has more than 70 percent of its production capacity unutilised and it can increase its supply of capital goods (plant, machinery, equipment, etc.) in the short run. This is generally not the case in reality. Under normal conditions, there cannot be such a huge *excess capacity* in the capital goods industry. In fact, the production capacity of the capital goods industry in the short run depends on and is limited to the replacement demand for capital, market interest rate remaining constant.[8]

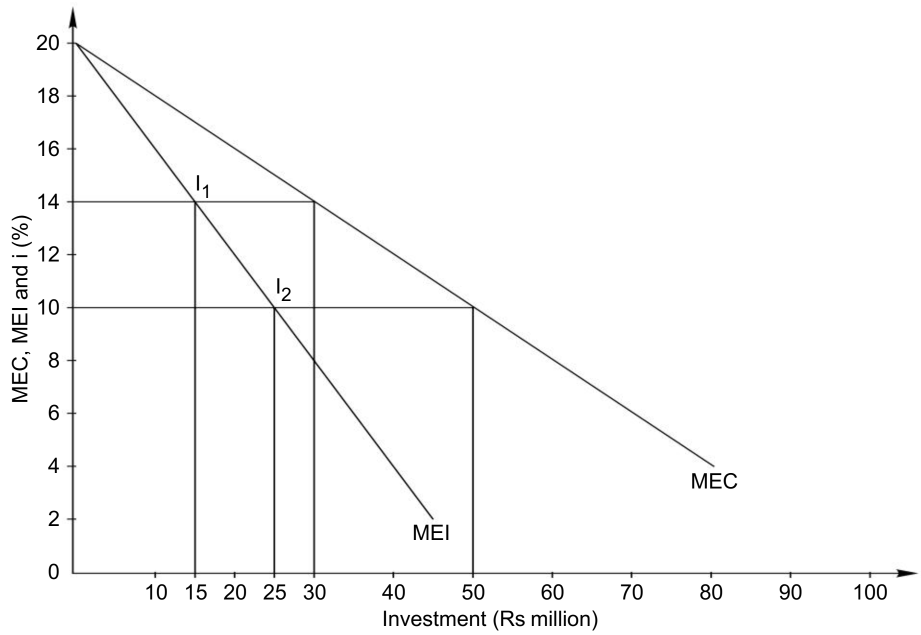

Fig. 10.3 The Derivation of the *MEI* Schedule

8. For example, suppose that the total stock of capital in an economy is given at a point of time at Rs. 1000 million and the rate of depreciation is 10 percent. So the current replacement demand for capital will be equal to Rs. 100 million. Therefore, the capital goods industry will have a production capacity that can produce and supply capital goods, machinery, etc. worth Rs 100 million.

Therefore, with increase in demand for capital goods beyond the production capacity causes a rise in the price of capital goods. This increases cost of investment. As a result, *MEC* decreases. Consequently, total investment increases but by less than Rs 20 million. The relationship between the interest rate and total investment is shown by the curve *MEI* in Fig. 10.3. The derivation of the *MEI* curve is explained below.

To begin with, let us suppose that *MEC* is given by a straight line as shown in Fig. 10.3. The *MEC* schedule terminates at 20 percent market rate of interest. Suppose at 20 percent rate of interest, there exists some stock of capital, say, worth Rs. 1000 million, in the economy. Given the stock of capital, the annual production of capital goods by the capital goods industries is limited to the replacement demand for capital. If rate of depreciation is 10 percent, then the annual supply of capital goods will be limited Rs 100 million. Therefore, the annual production capacity of the capital goods industry would be limited to the output worth Rs 100 million and there is no net investment. That is, given the interest rate at 20 percent, net investment will be zero at both individual firm and country levels. Therefore, both *MEC* and *MEI* curves terminate at 20% rate of interest.

Now, let the market rate of interest fall to 14 percent. Given the *MEC* schedule, the individual firms together would demand additional capital goods worth Rs 30 million in order to increase their capital stock to its optimal level. Recall that the production capacity of the capital goods industry is limited to the replacement demand, and there is no excess capacity. Therefore, an attempt to increase the supply of capital by the capital goods industry increases the cost of production due to diminishing returns. As a result, the supply price of the capital goods increases. With the increase in the cost of capital goods, the *MEC,* that is, the internal rate of return, *decreases* for all the firms and for all their projects. Therefore, the actual investment demand decreases from Rs 30 million to Rs 15 million as shown by point I_1.

Similarly, when the market rate of interest decreases further to 10%, the additional investment demand by all the firms put together would be worth Rs 50 million. But the additional supply of capital goods can be made only at the increasing cost which reduces the *MEC*. As a result, the additional investment demand is reduced to Rs 25 million, as shown by the point I_2. When we join points I_1 and I_2 through a line and extend it up and down, it gives the *MEI* schedule. The *MEI* represents the demand for investment for the economy as a whole. Note that the *MEI* schedule intersects the vertical axis at 20 percent interest, indicating that at this interest rate, *MEI* is the same as the *MEC* and the demand for additional investment is zero.

Figure 10.3 brings out also the *distinction* between the *MEC* and *MEI* schedules. While *MEC* schedule represents the investment demand of *individual firms* in relation to the market rate of interest, *MEI* schedule represents the investment demand by all the firms. This makes the demand for capital in the *economy as a whole*. The *MEI* schedule is represented by the *investment function* as $I = f(i)$.

10.4 THE THEORY OF CAPITAL ACCUMULATION

As shown in Fig. 10.3, a fall in the interest rate from 14 percent to 10 percent increases the desired level of investment by Rs 50 – 30 = Rs 20 million though actual investment at the economy level increases by only Rs 10 (= 25 – 15) million in the first stage. A question arises here: Do the firms ever attain the desired level of investment and, if yes, what is the process of capital accumulation?

In this section, we explain the process of capital accumulation to its desired level under two conditions:

(i) a decrease in the interest rate, given the *MEC* schedule, and
(ii) increase in efficiency of capital causing an upward shift in the *MEC* schedule, interest rate remaining constant.

10.4.1 Decrease in Interest Rate and Capital Accumulation

The process of capital accumulation by the firms in response to a fall in the market rate of interest is illustrated in Fig. 10.4. Suppose that the *MEC* schedule is given as shown in panel (a) of the figure and that the rate of interest is given at 12 percent. At this interest rate, the actual and the desired stock of capital is worth Rs 500 million. Here, all the firms have optimised their stock of capital, their demand for capital is limited to the replacement demand and net investment is zero at the existing rate of interest. Under these conditions, the production capacity of the capital goods industry would be limited to the replacement demand plus their inventories. Under this situation, the capital goods industry is in equilibrium at point *N* in panel (b) of the figure.

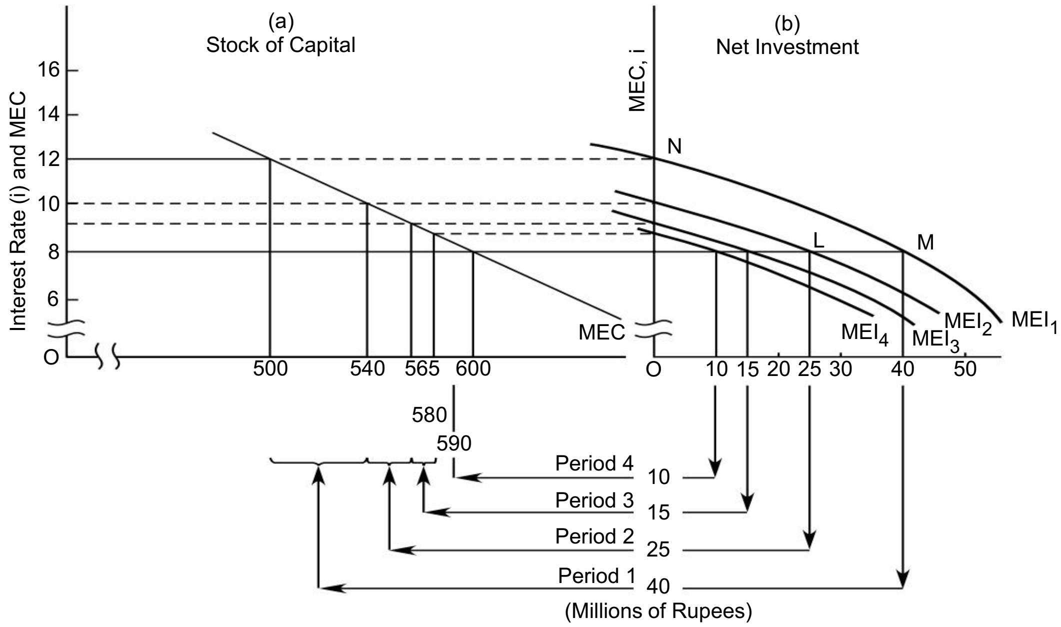

Fig. 10.4 Decrease in the Interest Rate and Capital Accumulation

Now, let the market rate of interest fall from 12 percent to 8 percent. Consequently, firms' desired stock of capital increases from Rs 500 million to Rs 600 million. Now the question arises: How long will it take for the firms to accumulate an additional capital stock worth Rs 100 million? The answer to this question lies in the rate of supply of capital goods per unit of time. If capital goods industry were to have an unlimited production capacity, the firms would be in a position to increase their capital stock to Rs 600 million in one time period. But, this cannot happen because capital goods industry does not have unlimited production capacity. Therefore, the accumulation of the desired capital stock takes a longer time and is accumulated at declining pace.

The process of capital accumulation is explained below. Suppose that the initial *MEI* schedule is given by MEI_1 in panel (b) of Fig. 10.4. Two things are important to note here. *One*, only one *MEI* schedule is associated with a given capital stock. Thus, MEI_1 is associated with the capital stock of Rs 500 million in panel (a) of Fig. 10.4. *Two,* in difference with *MEI* schedule drawn in Fig. 10.3, MEI_1 drawn here is concave. The concavity of the *MEI* schedule implies the rising cost of capital supply. It is derived from the upward bending capital supply curve.

Given the *MEC* schedule and *MEI* schedule as MEI_1, let us suppose that interest rate falls from 12 percent to 8 percent. As a result, the demand for capital increases from Rs 500 million to Rs 600 million, i.e., by Rs 100 million. But given the *MEI*, schedule, the decrease in the rate of interest to 8 percent causes production of capital goods to increase only by Rs 40 million. Thus, in the first period, the firms add a capital worth only Rs 40 million to their stock of capital which now rises to Rs 540 million [see panel (a) of the figure]. When the stock of capital increases to Rs 540 million, *MEC* falls from 12 percent to 10 percent [see panel (a)] due to *diminishing returns.* Since *MEC* (10 percent) is still higher than the market interest rate (8 percent), the unsupplied demand for capital goods worth Rs 60 million is still there. This warrants new investments in the capital goods industry.

***What happens in the second period*?** Since, at 8 percent interest rate, demand for capital goods exceeds the supply, the prices of capital goods go up. Consequently, the *MEI* schedule shifts downward. How much down is the shift? If total stock of capital were to be maintained at Rs 540 million, the net investment in the second period will be zero. Therefore, the new *MEI* schedule will begin at zero net investment with *MEC* at 10 percent, remaining parallel to the MEI_1 schedule, as shown by the schedule MEI_2. The schedule MEI_2 intersects the 8 percent interest line at point *L* determining the capital supply worth Rs 25 million. It means a net investment of Rs 25 million in the second period and rise in the stock of capital to Rs 565 million. With the increase in the stock of capital to Rs 565 million, *MEC* falls to 9 percent which is still higher than 8 percent rate of interest. This warrants further investment in the third period.

In the *third period*, the whole process of the second period is repeated. The *MEI* schedule shifts downward from MEI_2 to MEI_3. The point of intersection between *MEI* schedule and 8 percent line of interest determines a net investment of Rs 15 million in the third period and the total stock of capital rises to Rs 580 million. Since there is still an excess demand for capital goods worth Rs 20 million, the process of capital accumulation will repeat itself period after period until $MEC = i$ and actual stock of capital equals its desired level—Rs 600 million at 8 percent interest.

10.4.2 Upward Shift in *MEC* Schedule and Capital Accumulation

In this section, we explain the effect of an upward shift in the *MEC* schedule on investment and the process of capital accumulation, with a given interest rate. A graphical analysis of the effect of an upward shift in the *MEC* schedule on investment demand and on the capital stock is presented in Fig. 10.5. Suppose that the initial *MEC* schedule is given as MEC_1 in panel (a) of the figure and the market rate of interest is given at 8 percent. Given the schedule MEC_1 and 8 percent interest rate, the optimum stock of capital is determined at Rs 500 million. The optimality of capital stock means that net investment is zero. Now let the *MEC* schedule shift upward from MEC_1 to MEC_2. The upward shift in the *MEC* schedule might have been caused by such factors as increase in labour supply, decrease in wage rate, increased availability of natural resources, invention of new inputs, innovation in technology, and increase in capital productivity. Whatever might be the reason,

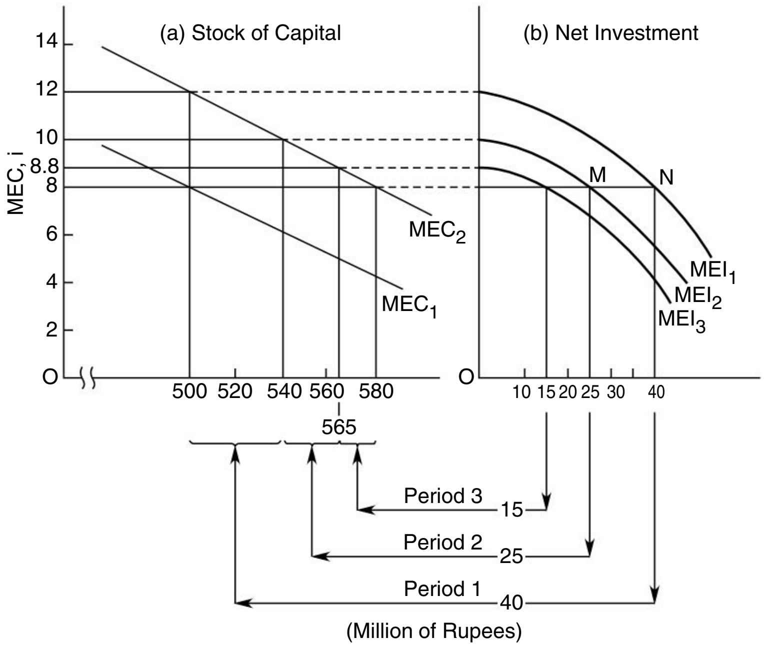

Fig. 10.5 Shift in *MEC* Schedule and Capital Accumulation

the upward shift in the *MEC* schedule, given the interest rate at 8 percent, increases the desired level of capital stock from Rs 500 million to Rs 580 million. This level of desired capital stock is determined by the intersection of *MEC* schedule and 8 percent interest line where $MEC_2 = i = 8$ percent. Thus, the upward shift in the *MEC* schedule creates an additional demand for capital goods worth Rs 80 million. For the reasons given above, this additional demand for capital can be supplied and capital accumulated to its desired level over a period of time. The process of capital accumulation is explained below.

The increase in the demand for additional capital warrants an increase in the production of additional capital goods. Now the question arises: How much capital goods can be produced in the first period? As shown in panel (a) of the figure, given the interest rate at 8 percent and the stock of capital at Rs 500 million, the upward shift in the *MEC* schedule increases *MEC* to 12 percent, i.e., 4 percent higher than the previous *MEC*. The *MEI* schedule associated with this stock of capital and MEC_1 is shown by the schedule MEI_1 in panel (b) of the figure. The schedule MEI_1 intersects the 8 percent line at point *N* determining the additional capital production at Rs 40 million. It means that the net investment in the first period will increase by Rs 40 million. This increases the stock of capital to Rs 540 million. As a result, *MEC* falls to 10 percent. If capital stock were to be maintained at Rs 540 million, net investment would be equal to zero. At zero net investment, there will be another *MEI* schedule, that is, schedule MEI_2. The *MEC* at 10 percent is still higher than the interest rate (8 percent). It can be seen in panel (b) that MEI_2 intersects the 8 percent interest line at point *M*. This implies an additional net investment of Rs 25 million in the second period increasing the stock of capital to Rs 565 million. Since *MEC* is still higher that the interest rate, further investment is still warranted. By the logic explained above, the *MEI* schedule will shift downward increasing the net investment by Rs 15 million. The net investment of Rs 15 million in the third period raises the stock of capital to its desired level at Rs 580 million. At this stock of capital, $MEC = i = MEI$. Therefore, the net investment falls once again to zero level.

10.5 INCOME AND INVESTMENT: THE ACCELERATOR THEORY[9] OF INVESTMENT

As noted in the beginning of the chapter, the Keynesian model of income determination assumes investment to be an autonomous variable and it is taken to be the main determinant of the level of national income. The post-Keyensian developments in investment theory, however, recognise the fact that the relationship between income and investment is a two-way relationship. That is, investment and income are interdependent and the level of investment depends also on the level of national income. There are two main strands in the post-Keynesian developments in this aspect of the investment theory. One strand traces the relationship between income and investment and develops the theory of ***super multiplier***. The economists have developed over a period of a century another version of income related theory of investment, called ***Accelerator Theory of Investment***[10] or ***Acceleration Principle.*** In this section, we discuss the accelerator theory of investment.

It is important to note at the outset that the *acceleration principle is concerned with the size of the desired or optimum stock of capital rather than the investment.* The accelerator theory of investment describes the technological relationship between the change in capital stock and the change in the level of output. The technological relationship between capital and output is defined as capital-output ratio, that is, $\Delta K/\Delta Y$.

The accelerator theory of investment is based on the following assumptions.

(i) All firms have a production function of Cobb-Douglas type.
(ii) Factors of production are homogeneous and perfectly divisible.
(iii) Factor market is competitive and factor prices are given.
(iv) Firms produce with the least-cost combination of inputs.
(v) There is no excess production capacity.
(vi) Firms' calculation about the future demand is fairly accurate.
(vii) There is no financial constraint and funds are easily available.

Given the assumptions, the acceleration theory of investment can be presented briefly as follows. Suppose that the demand for firms' output in period t is given at Y_t and firms use capital stock K_t to produce Y_t. Denoting capital-output ratio (K/Y) by k, the relationship between capital stock (K_t) and the output (Y_t) can be expressed as:

$$K_t = kY_t \quad (\text{where } k > 1) \tag{10.10}$$

9. The origin of the acceleration principle is traced in the writings of A. Aftalion (1909), Hawtrey (1913), and C. F. Bickerdike, in his paper "A Non-Monetary Cause of Fluctuation in Employment," *Eco. Jl.,* September 1914. — quoted in Michael Evans, *Macroeconomic Activity*, *op.cit.,* p. 80. Some authors mention also Aftalion's paper "The Theory of Economic Cycle Based on the Capitalistic Technique of Production," *Rev. of Eco. & Stat.,* October 1927. However, the best known study of the acceleration principle is said to have been made by J. M. Clark in his "Business Acceleration and the Law of Demand," *Jl. of Pol. Eco.,* March 1917, reprinted in *Readings in Business Cycle Theory*, American Economic Association.

10. For a detailed critical evaluation, see R. S. Eckaus, "The Acceleration Principle Reconsidered," *QJE,* May 1953. Reproduced in M.J.C. Surrey (ed), *Macroeconomic Themes,* (Oxford University Press), pp. 136–45.

Now let the demand for output increase in period $t + 1$ to Y_{t+1}. The increase in the demand for output may be expressed as

$$\Delta Y_{t+1} = Y_{t+1} - Y_t \tag{10.11}$$

Given the assumptions (iv) and (v), the firms will be required to increase their desired stock of capital in period $t + 1$ to produce an additional output of ΔY_{t+1}. Given the capital-output ratio (k) and the additional demand for output (ΔY_{t+1}), the desired capital stock (K_{t+1}) in period $t + 1$ is given as

$$K_{t+1} = kY_{t+1}$$

Now the change in capital stock (ΔK) in response to the change in output (ΔY) can be obtained as given below.

$$K_{t+1} - K_1 = k(Y_{t+1} - Y_t)$$

$$\Delta K_{t+1} = k(\Delta \mathrm{Y}_{t+1}) \tag{10.12}$$

We know that $\Delta K = I$ (net-investment). Therefore, $\Delta K_{t+1} = I_{t+1}$. Thus, Eq. (10.12) can be written as

$$I_{t+1} = k(\Delta Y_{t+1})$$

Equation (10.12) states the accelerator theory of investment. It reveals that the investment is a function of the change in the level of income (or output). The conclusions that follow from Eq. (10.12) can be stated as follows.

(a) If $Y_{t+1} - Y_t > 0$, then $I_{t+1} > 0$
(b) If $Y_{t+1} - Y_t = 0$, then $I_{t+1} = 0$
(c) If $Y_{t+1} - Y_t < 0$, then $I_{t+1} < 0$

Let us now look at the treatment of gross investment in the acceleration principle. Since gross investment (I_g) equals net investment (I_n) *plus* replacement capital (R), i.e., $I_g = I_n + R$, and $I_n = kY_{t+1}$, the gross investment in period $t + 1$ can be written as

$$I_g = k\Delta Y_{t+1} + R_{t+1} \tag{10.13}$$

or

$$I_g = k(Y_{t+1} - Y_t) + R_{t+1}$$

The factor k in Eq. (10.13) is *aecelerator coefficient*. The value of k depends not only on the capital-output ratio but also on the period over which capital goods are acquired and output is measured. For example, if a machinery worth Rs 100 million can produce goods worth Rs 40 million over a period of one year, then output can be measured bi-annually at Rs 20 million or quarterly at Rs 10 million. If full one year is considered for measuring the accelerator (k), then

$$k = 100/40 = 2.5$$

If a period of six months is considered, then

$$k = 100/20 = 5$$

If accelerator is measured on the basis of the quarterly output, then

$$k = 100/10 = 10$$

This method of measuring the value of k is often misleading. A question therefore arises as to what is the appropriate period for measuring the accelerator? The answer is 'the investment period', that is, the period during which the firms are able to acquire the required capital.

Numerical Example Let us now explain the working of the acceleration principle through a numerical example under the following assumptions: (i) capital-output ratio (k) equals 4; (ii) rate of depreciation equals 10%, and (iii) demand for output increases continuously over 5 time units and then begins to decline. The process of acceleration and deceleration based on these assumptions is presented in Table 10.3.

Table 10.3 The Acceleration Process

(Billion Rs)

Period	*Output*	*Required Capital*	*Capital Consumption*	*Required Net Investment*		
				Replacement		*Gross*
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
t	100	400	40	40	0	40
$t + 1$	110	440	44	44	40	84
$t + 2$	125	500	50	50	60	110
$t + 3$	145	580	58	58	80	138
$t + 4$	170	680	68	68	100	168
$t + 5$	200	800	80	80	120	200
$t + 6$	200	800	80	80	0	80
$t + 7$	190	760	76	76	–40	36
$t + 8$	175	700	70	70	–60	10
$t + 9$	150	650	50	50	–50	0
$t + 10$	120	650	50	50	0	50

As shown in the table, the total output in period t was Rs 100 billion. It increases to Rs 110 billion in period $t + 1$ and continues to increase till it reaches Rs 200 billion in period $t + 5$. In response to increase in demand for output, the required stock of capital increases with a multiple of 4, the capital-output ratio. For example, when demand for output increases from Rs 110 billion in period $t + 1$ to Rs 125 billion in period $t + 2$, the required stock of capital increases from Rs $110 \times 4 =$ Rs 440 billion to $125 \times 4 =$ Rs 500 billion. With the increase in output, capital consumption ($= k \times 10/1000$) increases too. Consequently, demand for replacement capital increases—it equals the capital consumption. Since total stock of capital is increasing, net investment is increasing too. The net investment in a period equals the capital stock of the period *less* capital stock of the previous period. For example, net investment in period $t + 2$ equals Rs 500 billion *less* Rs 440 billion = Rs 60 billion. Col. (6) of the table shows the acceleration and deceleration in the net investment. Note that the process of deceleration begins when the increase in demand for output ends in period $t + 6$. Net investment falls to zero and then turns negative.

Critical evaluation of the accelerator theory The simple acceleration principle, in its abstract form, works under certain rigid assumptions. In reality, however, these assumptions do not hold.

The empirical validity of the acceleration theory has also been questioned. This has led to a severe criticism of the acceleration principle and also of the modifications in this principle. We will first discuss briefly the major weaknesses of the acceleration principle and then describe an important modification made in this principle called the *flexible version* of accelerator theory.

The acceleration principle has certain serious ***limitations***. Most of its limitations are due to its rigid assumptions and were recognised by its early proponents. Later on, Clark pointed out an unsymmetrical operation of the accelerator on the downward phase of the trade cycle. He also hinted at the following barriers to the working of the acceleration principle.

(i) financial limitations on meeting additional capital requirements,
(ii) prohibitory changes in the relative factor prices,
(iii) uncertainty regarding the continuance of increase in demand,
(iv) possible time-lag in acquiring the capital equipment due to absence of excess capacity in capital goods industry.

Eckaus[11] has focused on many other factors that limit the operation of the acceleration principle. These factors include: "(i) business firms do not always follow profit maximising behaviour or even act in such a way as to maintain their share of the market due to lack of motivation or knowledge of opportunities; (ii) the existence of discontinuities or indivisibilities in the production function prevents smooth and continuous adjustments; (iii) a separate and distinct influence is exerted by expenditure based on factors other than output such as group psychological buoyancy or depression; (iv) changing methods of production modify the reactions of the firms to changes in demand for output; (v) changes in profits may exert an influence on businessmen's investment decisions in a way which is, to some extent, distinct and different from the influence of the changes in output." Eckaus adds, "The process of generalising the acceleration principle from the level of a partial explanation of the investment behaviour of the firm to a macroeconomic relations involves further possible pitfalls." The limitations in generalising the acceleration principle arise also due to changing relations between the various sectors of the economy. Inter-sectorial relations change because sectoral changes are not simultaneous and unidirectional.

Michael Evans has criticised the acceleration principle on two empirical grounds. *One*, empirical testing of the relationship of the form $I_g = k\Delta Y_{t+1} + R_{t+1}$ explains invariably little of the variations in the investment. *Second*, as Kuznets found, the value of accelerator (k) obtained by estimating investment function is much smaller than the value of k obtained by measuring the average of K/Y ratios.

Besides, there is contradiction between some of the assumptions of the acceleration principle. On the one hand, it assumes that there is no excess production capacity, and on the other, it assumes that the gap between the actual and optimum capital stock is eliminated in a single period. This can hardly be possible if excess capacity in the capital goods industry is eliminated by assumption. By the same logic, acceleration principle is not valid for the period of recession because there is an excess capacity during the recession period.

Finally, the acceleration principle assumes that the firms' calculations about future demand are always accurate or nearly accurate. In real life, this does not happen. One can find in economic literature a plethora of predictions and forecasts proved wrong by time. Besides, it is rare that all

[11] Eckaus, R.S., "The Acceleration Principle Reconsidered", *QJE*., May 1953.

firms have identical expectations about the future demand. Even if they have similar expectations, investment will be made only when an increase in demand is of permanent nature. The short-term or temporary increases in demand create uncertainty rather than condition for new investments.

For all these reasons, the validity of the acceleration principle has been questionable. Many economists, viz., Tinbergen, Klein, Kalecki, Kaldor, Chenery and Goodwin have suggested alternative formulations of the acceleration principle. A discussion on all these alternative formulations falls outside the purview of this book. We will discuss here a popular version of the acceleration principle, called the *Flexible Version of the Accelerator Theory*.

10.5.1 A Flexible Version of the Accelerator Theory

The flexible version of the acceleration principle removes some of the rigid assumptions of the original accelerator theory. That is why it is called the flexible version of the acceleration theory. One such assumption is the acquisition of desired additional capital in one period. The modified version assumes instead that the gap between the actual and desired capital stock is filled over a number of periods. There are at least two possible reasons for this: *first,* the production of additional capital equipment takes a longer time than implied in the simple version of the acceleration principle, and *second*, acquisition of desired capital stock is usually based on long-run considerations. This is obviously a more realistic approach than that of simple acceleration principle.

The flexible version of the acceleration principle allows a time lag in filling the gap between the desired capital stock (K^*_t) in period t and the actual capital stock (K_{t-1}) in period $t-1$. In period t, therefore, only a fraction (λ) of K^*_t is procured. This relationship is expressed as

$$K_t - K_{t-1} = \lambda(K^*_t - K_{t-1}),\ (0 < \lambda < 1) \tag{10.14}$$

where, K_t is the actual capital stock in period t; K_{t-1} is the actual capital stock in period $t-1$; K^*_t is the desired capital stock in period t; and λ is a constant (proportion).

Since $K_t - K_{t-1}$ equals net investment (I_n) and $I_n = (I_t - R_t)$—where R_t is replacement capital in period t—Eq. (10.14) can be written as

$$I_t - R_t = I_n = \lambda(K^*_t - K_{t-1}) \tag{10.15}$$

Equation (10.15) reads that net investment in period *t equals a fraction* of the difference between the desired capital stock in period t and actual capital stock in period $t-1$.

Since, given the technology, K^*_t equals capital-output ratio (k) times Y_t, the output in period t, Eq. (10.15) can be written as

$$I_n = \lambda(kY_t - K_{t-1}) \tag{10.16}$$

and gross investment (I_g) can be expressed as

$$I_g = \lambda(kY_t - K_{t-1}) + R_t \tag{10.17}$$

To conclude, the flexible version of the acceleration principle incorporates a partial adjustment mechanism between the desired and the actual capital stock rather than instantaneous adjustments. However, the basic principle remains the same. With this brief description of flexible version of the accelerator theory, we come to the end of our discussion on the investment theory.

In what follows, we discuss the other two major modern developments in the theory of investment, viz.,

(i) Rental cost theory of investment, and
(ii) Tobin's q theory of investment.

10.6 THE RENTAL COST OF CAPITAL AND INVESTMENT

For making investment, i.e., adding to their stock of capital, firms have two alternatives: (i) borrow money from banks, (ii) reinvestment their own retained profits, and (iii) lease capital equipments on rent. When they borrow money, their cost of capital is market interest rate; when they investment their own retained earnings, their cost of capital is their 'opportunity cost', i.e., the earnings which they could make from the second best alternative use of their money; and when they hire or lease the capital, their cost of capital is called 'user cost of capital' or 'rental cost of capital'. The investment theories based on the market rate of interest (with prices remaining constant) have already been discussed in section 10.2.

In this section, we discuss investment theories based on the other concepts of cost of capital, viz., the 'opportunity cost' of capital, 'the user cost of capital' and 'the rental cost of capital'. These theories may be referred to as modern approach to investment decisions. It may be added here that, in a competitive market, all these cost concepts converge to the same concept of 'cost of capital'. Therefore, we use here the term 'the rental cost of capital' to elaborate the modern approach to the theory of investment.

Besides following the modern approach, the investment theory will be discussed under ***two additional conditions***: (i) ***Inflation***, and (ii) capital subject to ***depreciation***.

Under these conditions, ***rental cost of capital*** **(*rc*)** has three elements of cost[12]:

(i) interest rate (i), i.e., the cost firms pay for borrowed funds,
(ii) real interest rate (r), the rate adjusted for inflation, and
(iii) rate of depreciation (d).

Given these cost elements, the *rental cost of capital* (rc) can be calculated[13] as follows.

$$\text{Rental cost of capital } (rc) = i - \pi + d$$
$$= r + d$$

where i = market rate of interest, r = real interest rate ($i - \pi$), π = rate of inflation, and d = rate of depreciation.

Given the rental cost of capital, investment decisions at the firm and economy level can be easily taken. At the firm level, optimum level of capital (K_F^*) is determined where ***marginal productivity of capital*** **(*MPK*)** equals the rental cost of capital (rc), i.e., where $MPK = rc$. At the economy level, optimum level of capital (K_E^*) is determined by the formula given as $K_E^* = g(rc, Y)$, where $Y = GDP$.

10.7 TOBIN'S q THEORY OF INVESTMENT: STOCK MARKET AND INVESTMENT

Raising capital by selling shares to the public has now become a prominent method of raising capital, especially for big business corporations. In modern times, in fact, most business

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12. All these cost are in terms percentage.

13. For details, see Rudigar Dornbusch, Stanley Fischer and Richard Startz, *Macroeconomics* (Tata McGraw-Hill, New Delhi, 9th Ed., 2004), p.368.

corporations raise a larger proportion of their investment funds through share market rather than borrowings from the banks. In India, for example, about three quarters of industrial finance is raised by issuing shares and only about one quarter of capital is acquired through bank loans.

According to James Tobin, a Nobel Laureate in economics, the firm's investment decision is based on market value of company shares. The market value of company's shares is determined in the stock market. The fact of life is that share market is volatile. But, share price index keeps rising, i.e., share prices keep going up. According to Tobin's theory, the price of a share in a company is the measure of the shareholder's claim in the company. The value of share gives, in fact, the ownership share of the shareholder in the assets of the company. Therefore, the higher the share price, the higher the investment in the company. As a result, the total investment in the company increases with increase in its profits and profit prospects. Also, the share price of a company depends on the profits and profit opportunities of the firm. It may thus be inferred that the company's rising share price is incentive for more and more investment.

Tobin's q theory of investment[14] links business investment to the price of its shares determined in the stock market. His theory concludes that investment decisions are taken on the basis of the ***ratio*** *of market value of installed capital to the replacement cost of installed capital.* This *ratio* is called ***Tobin's q***. Tobin's q is measured as follows.

$$q = \frac{\text{Market Value of Installed Capital}}{\text{Replacement Cost of Installed Capital}}$$

The 'market value' of a firm's 'installed capital' is determined by the stock market, and its 'replacement cost' is the price which has to be paid if capital stock is to be replaced today. Tobin's q can also be interpreted as the *ratio* of the market value of the firm's existing capital to its replacement cost.

Once Tobin's q is estimated, ***investment decisions*** are taken by the firms as follows.

(i) If $q > 1$, firms decide to increase investment in the stock of capital, and
(ii) If $q < 1$, firms will not replace their depreciated capital.

SUGGESTED READINGS

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[14] For details, see Fumio Hayashi, "Tobin's Marginal q and Average q: A Neoclassical Approach", *Econometrica*, 50, January 1962.

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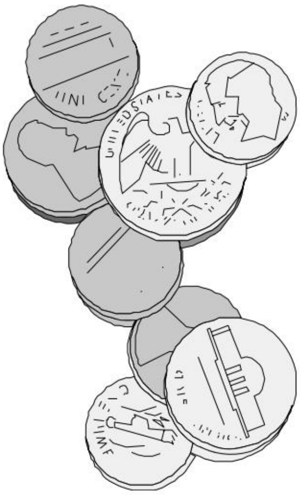
QUESTIONS FOR REVIEW

1. Distinguish between the following:
   (a) Capital and investment
   (b) Autonomous and induced investment
   (c) Net and gross investment.
2. Explain the concept of the present value of a future income? Explain why it is necessary in investment decision to discount the future income stream.
3. Suppose an investment yields an income of Rs. 500 in the first year, Rs. 1000 in the second year and Rs. 500 in the third year. If rate of interest is 10 percent, what is the present value of this income stream?
4. Define and explain the concept of marginal efficiency of capital. What is its significance in investment decisions?
5. *Suppose an investment project costs Rs. 5,000 and yields an annual income of Rs. 2,500 for a period of three years. Find the marginal efficiency of capital.
6. What is internal rate of return? Suppose an investment project costs Rs. 5,000 and yields an annual income of Rs. 2,500 for a period of three years. Find the marginal efficiency of capital.
7. *Suppose a company is considering an investment of Rs. 50 million. The market rate of interest is 10 percent and anticipated marginal efficiency of investment is 12 percent. How will the company react to each of the following changes in the conditions?
   (a) Market rate of interest increases to 12 percent.
   (b) *MEC* increases to 14 percent.
   (c) Cost of capital increases from Rs. 50 million to Rs. 60 million.
   (d) *MEC* decreases to 9 percent due to increase in operational cost.
8. Distinguish between *MEC* and *MEI*. Illustrate graphically the relationship between *MEC* and *MEI*.
9. Assuming an *MEC* schedule, a rate of interest and a capital stock, explain diagrammatically the process of capital accumulation.
   (*Hint :* For help, see Section 12.6).
10. Explain the accelerator theory of investment. How is this theory different from the Keynesian theory of Investment?
11. What is meant by rental cost of capital? How are the rental cost of capital and the desired stock of capital determined?
12. What is the basis of Tobin's q theory of investment. How is q theory different from other theories of investment decisions?

Part 4

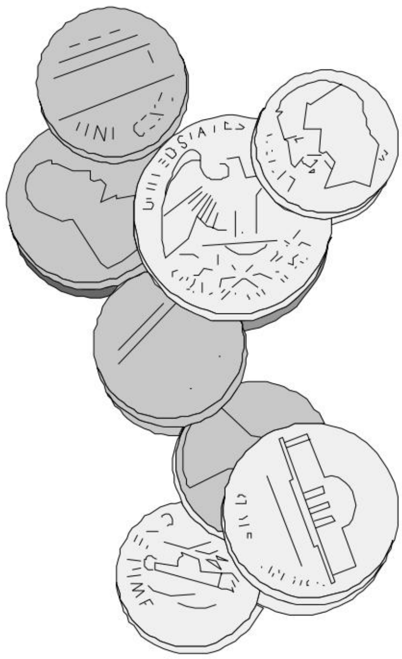
Money Market Analysis: Theory of Money and Interest



As noted earlier, macroeconomic theories can be grouped broadly under four categories, viz., product market analysis, money market analysis, integrated analysis of the product and money markets, and macroeconomic problems and policies. In Parts 2 and 3 of this book, we have discussed the product market related theories. This Part of the book deals with the theories related to the money market, including theories of demand for and supply of money and money-sector equilibrium. While Chapter 11 explains the kinds and functions of money in a monetised economy, Chapter 12 explains the sources, measures and the modern theory of money supply. Chapters 13 and 14 discuss classical and the Keynesian theories of demand for money and the determination of the interest rate, respectively, given the supply of money. Chapter 15 presents a brief discussion on the post-Keynesian developments in the theory of demand for money.

Chapter 11

Money: Definition, Kinds and Functions



INTRODUCTION

In general sense of the term, 'money' means the currency notes and coins. In economics, however, 'money' is a concept rather than a commodity. Look at an old definition of 'money'—"Money is what money does". The economists have defined money differently. Money flows represent the other side of the product flows. Money plays a very important role in the economy. In fact, "money makes [economy] go". We begin our discussion on the monetary sector in this chapter by looking at the definition, functions and kinds of money in circulation.

11.1 DEFINITION OF MONEY

As mentioned above, in general usage, the term 'money' means currency notes and coins held as cash in hand or chequeable deposits with banks. In economics, however, the term 'money' is used in a much wider sense and is defined differently by different economists. There is no universally agreeable definition of money. As Walters has remarked, "Throughout the history to the present day there is no agreement on the most fundamental of questions—what *is* money?"[1] The definition of money has been rather a controversial issue. ***Conceptually, money can be defined as any commodity that is generally accepted as a medium of exchange and a measure of value.*** Historically, many commodities have performed these functions of money, and forms of money have been changing from cattle to credit cards. Therefore, an empirical question arises as to what should be and what should not be included in the actual count of money. This remains an unsettled issue.

[1] Walters, A. A., "Introduction: Money and the Economy" in his *Money and Banking* (ed.), (Penguin, 1973), p.7.

A major factor that complicates the task of defining money is the increasing number of money substitutes in the form of asset that can be converted into spendable money with different degrees of convertibility. Although currency remains the most liquid form of asset followed by bank deposits, many other forms of money have emerged over time.

Another factor that has added to the controversy is the divergence between the conceptual and empirical definitions of money. As a result, the concept of money has changed from a measurable to immeasurable quantity. Let us now look at the different approaches to the definition of money.

H. G. Johnson[2] has classified, the approaches to the definition of money under the following four categories:

1. The Conventional approach,
2. The Chicago approach,
3. The Central Bank approach, and
4. The Gurley-Shaw approach.

These approaches to definition of money are discussed below.

The Conventional Definition The conventional approach to the definition of money is the oldest and the most widely accepted approach. The conventional definition of money emphasises the basic functions of money, that is, the medium of exchange and measure of value. Going by these functions, money is defined as, 'Money is what money does' (Stanley Withers). Conceptually, any commodity that functions as a *medium of exchange* and *measure of value* is money. If one looks back into the history of money, one finds many kinds of commodities—cattle (cow, ox, horse, pig, goat), grains, stones, cowrie shells, cigarette, metals (copper, brass, silver and gold), dried fish, coffee, leather, etc.—have served as a medium of exchange and a measure of value[3] at different stages of human civilisation and in different parts of the world. These are called 'commodity money'.

The *commodity money* had, however, some problems by today's standards. It lacked **(i)** uniformity, **(ii)** homogeneity, **(iii)** standard size and weight **(iv)** durability and storability, **(v)** portability, **(vi)** stability in value, and **(vii)** its divisibility. Owing to these problems, other forms of money were evolved over a long period of time, viz., **(a)** metallic coins, **(b)** paper currency and **(c)** demand deposits (operated through cheques). These forms of money perform the basic functions of money and their sum constitutes, according to the conventional approach, the total supply of money.

The first two forms of money (metallic coins and paper currency) possess two distinctive features against the third form of money (demand deposits). The metallic coins and paper currency

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2. Johnson, Harry G., "Monetary Theory and Policy," *Am. Eco. Rev.,* Vol. 52, No. 3, June 1962, reprinted in his *Essays in Monetary Economics,* (George Allen and Unwin Ltd., London, 1969). All quotations in the text are from the reprint in the *Essays in Monetary Economics.*

3. For example, till the mid-20th century, most commodities were valued by East-African tribes in terms of goat. The prices of some commodities were fixed as follows.

   1 hunting knife = 10 goats; 50 bananas = 1 goat;

   5 bushels of corn = 2 goats; 1 young wife = 6 goats

   See also Geoffrey Crowther, *An Outline of Money,* 1958, p.2.

are created and issued by the government and are *legal tenders* in the sense that they enjoy a legal status. As legal tenders, coins and paper currency are not only accepted as a medium of exchange by all the citizens of a country but are also legally enforceable in the settlement of payment obligation.[4] These forms of money have perfect liquidity. Demand deposits, on the other hand, are the product of the banking system, though making and accepting payments by cheques is *optional,*[5] i.e., one has the option to make or not to make and to accept or not to accept payments through cheques.

The Chicago Approach The Chicago approach was pioneered by Milton Friedman of the Chicago University and his associates,[6] called jointly as Chicago school. The Chicago school has extended the conventional definition of money to include also the *time deposits with the commercial banks.* Thus, the Chicago school has broadened the definition of money to include three components: (i) currency, (ii) chequeable demand deposits, and (iii) *time deposits*. Although time deposits are not readily available as medium of exchange, the Chicago school gives two reasons for including it in the concept of money supply. *First,* in their opinion, *GNP* and money supply are highly correlated and money supply including time deposits has a high correlation with *GNP* than the money supply without it. Therefore, time deposit must be included in the definition of money. *Second,* the Chicago school finds that *time deposits and demand deposits are, in practice, close substitutes* because banks make time deposits available to their customers after a lapse of time, say 90 days, or so. So time deposits remain unavailable for transaction only for a short period. However, it is contended that neither of the arguments make a strong case for including time deposits in the concept of money.

However, there is another and a more strong argument in support of Chicago approach. The argument is that time deposits are not kept as idle cash—a major part of it is loaned out to the borrowers, which is used as a medium of exchange. The portion of time deposit which is not lent out depends on the *cash reserve ratio* imposed by the central bank. Since a major portion of time deposit returns to the circular flow of money, it must be included in the definition of money.

The Gurley-Shaw Approach The Gurley-Shaw approach[7] is attributed to John G. Gurley and Edward S. Shaw. Recall that the Chicago school recognises the medium-of-exchange function of time deposits as it can be a substitute for demand deposits and includes time deposits in the supply of money. Gurley and Shaw go one step further and recognise the asset function of also the 'financial claims against the non-banking financial intermediaries.' They emphasise 'close substitution relationship between currency, demand deposits, commercial bank time-deposits, saving-bank deposits, saving and loan association shares, and so on, all of which are viewed by the public as alternative liquid stores of value.' According to the Gurley-Shaw approach, money supply should be defined as a weighted sum of currency, demand deposits and all the deposits and claims against

4. For example, if a person, say *X*, causes a damage to the limb, life or property of another person, say *Y*, then the compensation fixed by the court of law is enforceable on both *X* and *Y*. Neither can offer any other mode of payment not permissible by the law of the country. Especially, *Y* cannot insist on 'an eye for an eye and a tooth for a tooth' kind of settlement.

5. In India, however, the government has made it obligatory for all official payments to be made by cheque.

6. Including David Mieselman, Philip Cagan, Anna J. Schwartz and David Fand.

7. John G. Gurley and Edward S. Shaw, *Money in a Theory of Finance,* (Motilal Banarsidas, Delhi, 1968). Ch. 5.

the financial intermediaries that can be treated as the substitutes for currency and weightage of demand deposits should be determined on the basis of the degree of their substitutability.

However, though the Gurley-Shaw approach looks theoretically sound, empirically it is immensely difficult to determine the degree of substitutability of deposits and claims against the financial intermediaries and, therefore, to assign appropriate weights to measure the money supply. "Except for illustrative purposes, no attempt has been made to make the weighted sum definition operational, that is, the concept has not been used for testing monetary theory or for carrying out monetary policy."[8]

The Central Bank Approach The central banks take still a broader view of money supply. The reason is that the central banks are entrusted with the task of controlling and regulating the credit flows in accordance with the need of the economy. To accomplish this task, they need to formulate and implement a suitable monetary policy to achieve predetermined objectives. Therefore, central banks view all available means of payment and credit flows as money. For their purpose, money supply constitutes currency plus all 'realisable assets,' that is, the assets that can be converted into money at will, i.e., the assets which have perfect or near perfect liquidity.

The central bank approach is accredited to the Radcliffe Committee of the US. This Committee recognises and emphasises 'the similarity between currency and other realisable assets or means of purchasing to the point of rejecting money in favour of some broader concept, measurable or immeasurable.'[9] According to this approach, *money is, in a way, the total credit flow to the borrowers*. Depending on the objective of the monetary policy and policy targets, however, central banks make and use different measures of money supply, referred to as M_1, M_2, M_3, and M_4. The various measures of money supply used by the RBI will be described in a subsequent section.

11.2 THE KINDS OF MONEY

Gone are the days of commodity money. Today, all the countries—developed, developing, less developed and backward—use modern monetary system with *metallic coins* and *paper currency* in circulation. Another important kind of money is *bank deposit*. The latest addition to the monetary system is *credit card*. Credit cards work as means of payments without the use of the cheque system. In this section, however, we will discuss only the major kinds of modern money in circulation.

1. Metallic Coins Metallic coins made of iron, copper, silver and gold—and now made also of alloys and aluminium—are the second most important form of money in circulation today—first being the paper money. The invention and introduction of metallic coins must have been necessitated by the *defects* of commodity money—*heterogeneity or non-homogeneity of money units, non-durability, perishability, non-portability, unstable value, and indivisibility*. The exact year or period of introduction of metallic coins is not known. "The first coins are believed to have been made in ancient Lydia on the Aegian Sea during the seventh century BC."[10] It is believed that metallic coins

8. Dwayne Wrightsman, *An Introduction to Monetary Theory and Policy,* (Free Press, NY, 1971), p.20.

9. Johnson, H. G., *op. cit.,* p.35.

10. Thomas D. Simpson, *Money, Banking, and Economic Analysis,* (Prentice-Hall, 1987), p.16.

were in circulation in India about 2500 years ago. The metallic coins are believed to have been first minted and introduced by the private bankers and goldsmiths, the *sahukars,* who used to certify the weight of the coin and the purity of the metal (gold and silver) and put their seal. With the passage of time, the monetary system was taken over by the government or the government authorities with a view to making coins uniform and giving them a legal status. This gave the currency a general acceptability and also a legal status. Except silver and gold coins, however, other metallic coins were and are only *token money*—a token money has no *intrinsic value.* In India, the metallic coins in circulation include rupee[11] coins of 1, 2 and 5 rupee denominations and paisa[12] coins of 1, 5, 10, 20, 25, 50 paise denominations.[13]

2. *Paper Money* The paper money consists of the currency notes printed, authenticated and issued by the government and the central bank of the country. Paper money makes the largest part of the total money supply in any country today. In some countries, there is a dual system of issuing currency notes. For example, in India, one-rupee currency notes and coins are issued by the Government of India and currency notes of higher denominations—rupees 2, 5, 10, 20, 50, 100, 500 and 1000—are issued by the Reserve Bank of India (RBI). The currency issued by the RBI is in the form of *promissory notes but enjoys the status of a legal tender*. Each currency note issued by the RBI bears a promise by the RBI Governor—"I PROMISE TO PAY THE BEARER A SUM OF. . . RUPEES". Here, the 'sum' means one-rupee currency notes or coins issued by the Government of India and the RBI currency notes of other denominations.

Like metallic coins, the exact time of introduction of the paper currency is not precisely known. The factors that might have contributed to the advent of paper money are: (i) supply of gold and silver lagging far behind the demand for money due to rapid increase in the supply of goods and services, (ii) lack of portability of large sums of metallic money, and (iii) loss of weight and value due to depreciation and debasement of coins by the people.

3. *Bank Deposits* The third form of common money is bank deposit. Bank deposits include three kinds of deposits: current account deposits, saving bank deposits and time deposits. The current account deposits are available on demand. That is why current account deposits are widely referred to as *demand deposits* which can be transferred and used as medium of exchange by the instrument of cheque. Demand deposits are also known as 'bank money' and 'credit money.' According to the conventional approach to the definition of money, *only demand deposit is treated as money, because it is nearly as liquid as cash in hand*. However, the Chicago approach (as described above) treats *saving* and *time deposits* as close a substitute for cash and demand deposits.

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11. The term 'rupee' might have originated from the Sanskrit word *rupa* which means white horse. This indicates that horses also served as money in ancient India. The word *rupa* also means silver of inferior quality which came in usage in medieval India.

12. The term *paisa* might have derived from *peso*, the currency in many western countries, e.g., Mexico, Argentina, Colombia, Uruguay and Cuba, which might have travelled to eastern countries, like India and Philippines.

13. The aluminium coins of 1, 5, 10 and 20 paise are nearly out of circulation because of their higher metal value than their face value. Consequently, people melted the coins sold it as metal for a higher value.

Therefore, according to the Chicago approach, saving and time deposits are also included in money and money definition.

11.3 THE FUNCTIONS OF MONEY

Money was devised initially as a medium of exchange and a measure of value. However, it acquired over time some other functions also. The following couplet brings out the major functions of money.

Money is a matter of functions four:
A medium, a measure, a standard, a store.

As this couplet reveals, money performs four major functions: (i) as a medium of exchange, (ii) as a measured of value, (iii) as a means of deferred payment, and (iv) as a store of value. These functions of money are discussed below in some detail.

(i) *Money as a Medium of Exchange* Money functions as a medium of exchange between any two goods. This is the most important and unique function of money. The importance of this function lies in that it has solved one of the biggest problems of the barter system. In the barter system, for exchange to take place, there must be 'double coincidence of wants.' The double coincidence of wants exists when, between any two persons, one is willing to accept what the other person is willing to give in exchange. Until this condition is fulfilled, exchange cannot take place. For example, a weaver cannot exchange his cloth for shoes unless the shoemaker wants cloth. In a modern market economy, the problem of 'double coincidence of wants' is solved by money. Since money is acceptable to all, the weaver can sell his cloth to any willing person (say, to a farmer) for money and buy the shoes in exchange for that money. This system works efficiently because money can buy anything, it has purchasing power and is acceptable to all.

The uniqueness of the medium-of-exchange function of money comes from certain unique merits of money: (a) general acceptability, (b) easy portability, (c) divisibility, (d) difficult to counterfeit, (e) value guaranteed by the government, and (f) legal enforceability as mode of compensation.

(ii) *Money as a Measure of Value* The second basic function of money is that it works as the measure of value of goods and services. All values are measured in terms of money. As a measure of value, money works as a *common denominator*, as a *unit of account.* Today, unlike barter system, the value of all the goods and services is expressed in terms of money. Money being a common denominator, the values of different goods can be added to find one value of all possessions of a person, of a firm and of a nation. In fact, money makes computation of national income possible. In the absence of money, measuring value would be an extremely difficult proposition in a modern economy.

In modern times, a society produces, buys and sells and consumes goods and services in such a large number, variety and quantity that measuring and expressing values in terms of commodities, as in barter system would be a rather impossible task. If possible, it would mess up the entire exchange economy. Money has made the task easier. Not only each good and service has a price, but also one can find and compare the relative prices in terms of money.

(iii) *Money as a Store of Value* The third basic function of money is that it serves the purpose of storing value for future use. The need to store value must have arisen for such reasons as (i) need for storing surplus produce because production and consumption or exchange of goods and services are not instantaneous in most cases, (ii) need for storing value for future use arises due to uncertainties of life, and (iii) accumulative nature of the people. The advent of money has provided a means to store value for future use. Even the most perishable goods can be converted into money, provided there is a market for them, and value stored in terms of money. If prices do not increase over a long period, value can be stored for long without the loss of value. However, in case of rising prices, money stored loses its value in proportion to the rise in the general price rise.

(iv) *Money as a Standard of Deferred Payments* Borrow today and repay tomorrow or buy today and pay later has been an old practice. This is a deferred payment system. One necessary condition of deferred payment is that the value returned after a time gap must be the same. During the barter days, it might be a difficult problem to judge whether the value returned after a lapse of time was the same. For example, whether a quintal of wheat borrowed today and returned one year later had the same value was a difficult question to which answer lay in customs and practices of those days. However, with the expansion of economic activities, the volume of borrowing and lending of money and sale and purchase on credit expanded enormously. Personal borrowing and lending expanded to professional activity by a class of people including moneylenders, the *sahukars,* to modern banking system and growth of credit market, involving payment of interest and principal at a later date. The deferred payment system expanded to purchase of raw materials, payment of wages, salaries and pensions, payment by wholesalers to producers and by retailers to wholesalers and consumers to retailers. In the absence of money, the economic system would have not grown to today's level and would have been extremely chaotic. The advent of money has solved the problem of deferred payment by its such unique merits as (i) it is generally acceptable (ii) it is legally enforceable, and (iii) it has a relatively more stable value than other commodities.

11.4 THE SIGNIFICANCE OF MONEY IN MODERN ECONOMY

The significance of money in a modern, rather monetised economy, lies in the functions it performs. Money plays many significant roles in a modern economy, be it a capitalist or a socialist economy. For its role in a modern economy, money is considered by some economists as 'one of the most fundamental of all man's inventions.' For example, in the opinion of Crowther, "Every branch of knowledge has its fundamental discovery. In mechanics it is the wheel, in science fire, in politics the vote, similarly, in economics, ... money is the essential invention on which all the rest [of economic inventions] is based."[14] Money was, in fact, not invented[15] by one man, one community or even one nation in a year or a decade. The history of money over three-four thousand years reveals that the modern money has evolved itself in the course of human civilisation. According to Keynes, "... money, like certain other elements in civilisation, is a far more ancient institution than we were taught to believe ... Its origin is lost in the mist when the ice was melting, ..."[16]

14. Crowther, Geoffrey, *An Outline of Money,* 1958, p.3.

15. Nor was wheel, fire or vote. All of them have gone through a process of evolution.

16. Keynes, J.M., *A Treatise on Money*, Vol. 1, 1930, p.13.

Irrespective of whether money—as we know it today—was invented or evolved, its role in a modern society is well comparable with wheel and fire. We will describe here some of the major contributions that money makes to the working of a modern economy.

11.4.1 Contributions of Money to Modern Economy

1. Money Eliminates the Problems of Barter System The two major problems that confronted the people under barter system were (i) finding a person with 'double coincidence of wants,' and (ii) measure of value. Money has eliminated these problems because (i) it is a generally accepted medium of exchange, and (ii) it measures the value of goods and services. Besides, money has the backing of the government. With the help of money people can buy and sell any commodity in the market without facing the problems of double coincidence of wants. As regards the problem of *measuring the value*, the (nominal) value of money is fixed in terms of its face value and, in a modern economy, the value of each and every commodity is given in terms of money. So all those who accept the market price of a commodity can easily buy and sell the commodity without loss of time.

There was another and serious problem in the barter system, i.e., the problem of finding and remembering the prices—pricing of different goods in terms of one another. There was, no doubt, a price system also during the days of barter system. But, one can imagine the problem of remembering the multitudinous prices in the absence of money. If there are only 2 goods, there would be only 2 prices. But, if there are 3 goods, there would be 5 prices. This number would go on increasing with the increase in the number of goods. For example, if there are four goods, there would be 6 prices; if five goods, then ten prices; if ten goods, then forty-five prices.[17] Imagine the problem. In a barter economy producing and consuming 100 goods, there would be 4950 prices. In contrast, in a monetised economy, there are only as many prices as the number of goods.

2. Money Works as a Factor of Production Money plays such an important role in the modern economy that it is regarded as a *fifth factor of production*, in addition to the traditional factors of production, *viz.* land, labour, capital and entrepreneurship. Even if these factors were available in plenty, the withdrawal of money from the system would cause the production system to collapse and production to decrease substantially. As Walters puts it, "if a modern economy were somehow deprived of the monetary mechanism and driven back to a system of barter, the level of output will be much lower and the variety of goods and services much smaller than is enjoyed with a money system. Money therefore serves as a 'factor of production' enabling output to increase and diversify."[18]

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17. The number of prices for a larger number of goods can be worked out by using the following formula.

$$\text{Number of prices (N)} = \frac{n(n-1)}{2}$$

In case of 10 goods,

$$\text{Number of prices} = \frac{10(10-1)}{2} = \frac{90}{2} = 45$$

18. Walters, A. A., *op. cit.,* p.9.

3. *Money Accelerates the Pace of Production and Growth* Money as a medium of exchange accelerates the speed of production. It accelerates the production process in two ways: ***one***, by making the factor payment quick and efficient, and ***two***, by making sale of the output speedy and efficient. Imagine a production system without money. Each individual will be required either to produce all the goods he or she consumes or to go around finding factories each of which can offer him wages in terms of the good that he/she needs: the individual will then work as a part-time labour shifting from factory to factory. This will be a chaotic method of production resulting in colossal waste of time. This kind of production system reduces the output per unit of time.

Besides, given the productive resources and technology, the output per unit of time depends on the disposal of the output, that is, how quickly is the output disposed of. If a producer is required to load his/her produce on a truck or cart and go around vending his/her goods, he/she would produce only as much as he/she is able to sell per unit of time. With the advent of money, these problems—the loss of time and inefficiency in production—have been fully resolved. All factor payments are made and are acceptable in terms of money and all goods and services produced are sold in the market without confronting the problems of the barter system.

4. *Money is the Lifeblood of a Modern Economy* The circulation of money in a modern economy can be compared with the circulation of blood in the human body. Like a human body remains alive and in working order so long as blood is circulating in the veins, an economy remains alive and working efficiently so long as money keeps circulating in the economy. Recall the circular flows of commodity and money in the economy discussed in Chapter 3. As has already been shown, if a part of money is withdrawn from the circular flows, the production will be reduced to the same extent. And, if money were to be somehow withdrawn from the circular flows, the production and employment system would come to a standstill in a modern economy. The old saying that 'money makes mare go', holds literally true in a modern economy. Money keeps each and every element of the economy in working order. As Marshall put it, money is the 'pivot' around which all economic activities cluster.

5. *Money Contributes in Many Other Ways* Money facilitates the working of a modern economy in many other ways. It facilitates consumers' choice in the multitudes of goods and services. In the absence of money, consumers' choice will be limited to only what he or she can offer in exchange. In a monetised economy, even if a person has only one commodity or service to offer for sale, he or she can buy and consume any number and variety of goods and services of his/her choice, given the monetary resources. Finally, with the advent of money, a money market and credit system have evolved. The growth of the financial system has created an efficient system of financial flows to various sectors of the economy. This has helped the efficient allocation of the financial resources in the economy.

This brief discussion on money takes us to the end of a brief discussion on the definition, functions and importance of money in a modern economy. In the next chapter, we will be concerned with supply aspect of money.

SUGGESTED READINGS

Gupta, S. B., *Monetary Economics: Institutions, Theory and Policy,* (S. Chand & Co., New Delhi, 1998), Ch. 1.

Newlyn, W. T., *Theory of Money,* 2nd Edn. (Clarendon, Press, Oxford, 1974), Ch.1.

QUESTIONS FOR REVIEW

1. What is money? What is the nature and basis of controversy on the definition of money?
2. What are the various approaches to the definition of money? What is the basic difference between the conventional and modern approaches to the definition of money?
3. Distinguish between conventional and modern approaches to the definition of money. What is the basic difference between conventional and Chicago definitions of money?
4. Discuss the different kinds of money available in a modern economy. How is bank money different from token money?
5. Money is a matter of functions four: A medium, a measure, a standard, a store. Explain.
6. What is a barter system? How does money solve the problems of the barter system?
7. What are the basic functions of money? Why does paper currency work more efficiently than the commodity money?
8. 'Money is a factor of production.' Do you agree with the statement? Give your reasons.
9. Explain how money accelerates the pace of production and how it contributes to the efficiency of economic system?
10. Write an essay on the significance of money in a modern economy.

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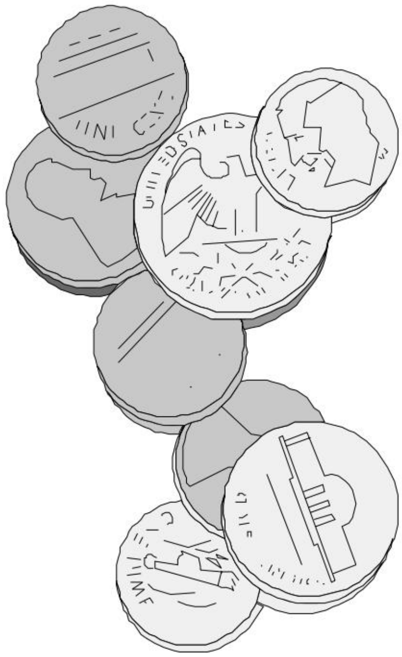
Chapter 12

The Supply of Money



INTRODUCTION

In the previous chapter, we have discussed the definition, kinds and functions of money. We have also noted that money plays a very important role in the economy. But, both excess and shortage of money supply are harmful to the economy. Therefore, money supply has to be controlled and regulated in accordance with the requirement of the economy. It is for this reason that measuring money supply becomes inevitable. Although definitions of money do not provide clear answer to 'what is' or 'what is not' money, in practice, some methods and measures are used to measure the supply of money. In this chapter, we will discuss three major aspects of money supply: (i) the sources of money supply, (ii) the measures of money supply, and (iii) the theory of money supply.

12.1 THE SOURCES OF MONEY SUPPLY

The central bank of a country—the Reserve Bank of India (RBI) in India—is the main source of money supply in the country. The money supplied by the central bank is known as 'high power money'. However, the central bank is not the only source of money supply used as medium of exchange. The second major source of money supply is the banking system of the country. Banks create money supply in the process of borrowing and lending transactions with public. Money created by the commercial banks is called 'credit money.' The high power money and the credit money broadly constitute the most common measure (generally denoted by $M1$) of money supply, or the total money stock of a country. According to Gurley and Shaw, however, non-banking financial intermediaries also contribute to money supply. We will describe here how central bank creates high power money; how banks create credit money and how other kinds of financial intermediaries contribute to the money supply.

12.1.1 The Central Bank and High Power Money Supply

The central banks of all the countries are empowered to issue the currency. The currency issued by the central bank is called 'high power money' because it is generally backed by supporting reserves and its value is guaranteed by the government and it is the source of all other forms of money. The currency issued by the central bank is, in fact, a liability of the central bank and the government. In general, therefore, this liability must be backed by an equal value of assets consisting mainly of gold and foreign exchange reserves, especially in terms of high power foreign currencies. In practice, however, most countries have adopted a 'minimum reserve system.[1]

Under the *minimum reserve system,* the central bank is required to keep a certain minimum reserve of gold and foreign securities and is empowered to issue currency to any extent. India adopted this system in October 1956. The RBI was required to hold a reserve worth of only Rs 515 crore consisting of foreign securities worth Rs 400 crore and gold worth Rs 115 crore. In 1957, however, the minimum reserves were further reduced to only gold reserve of Rs 115 crore and the rest in the form of rupee securities, mainly due to the scarcity of foreign exchange to meet essential import bill. A gold reserve of Rs 115 crore against the currency of Rs 1,50,000 crore in circulation, makes only 0.08 per cent reserve which is of no consequence. This makes the Indian currency system a 'managed paper currency system.'

In India, there are two sources of high power money supply: (i) the Reserve Bank of India (RBI), the central bank of the country, and (ii) the Government of India (GOI). The RBI issues currency notes of rupees 2, 5, 10, 20, 50, 100, 500 and rupees 1000 denominations. The RBI calls it the 'Reserve Money.' The RBI issues currency of one rupee notes and coins including coins of smaller denominations on behalf of the Government of India. The currency issued by the RBI on behalf of the government accounts for only seven-eight per cent of the total high power money.

12.1.2 The Measure of High Power Money Supply in India

The RBI uses the following measure of the high-power money supply (H).

$$H = C + R + OD \tag{12.1}$$

where, C = currency held by the public, R = cash reserves of the commercial banks, and OD = 'other deposits' with the RBI.

Since 'other deposits with RBI' account for an insignificant proportion (around 1%) of the total 'money supply with the public' ($M1$)[2], i.e., high-power money supply, it is ignored while measuring the money supply. For all practical purposes, the high-power money supply is measured as

$$H = C + R \tag{12.2}$$

1. In past, there were two other systems of reserves; (1) no reserve up to a certain limit of currency issued, called fiduciary system adopted by Great Britain in the 19th and 20th centuries; and (2) proportional reserve system, generally 40%, adopted by France and the US in 1928 and by India during 1935-56, replaced in October 1956 by a 'minimum reserve system'—reserves consisting of gold and foreign exchange.

2. For example, 'other deposits with RBI' accounted for only about 1% of $M1$(money supply with the public) and 0.35% of $M3$ (aggregate monetary resources), on March 31, 1993. These ratios have been declining almost continuously. For example, the figures were 0.45% and 0.11%, respectively, in fiscal year 2006-07. These ratios were 0.47% of M_1 and 0.13% of M_3 on 21 December 2007.

The cash reserves (*R*) with the commercial banks forms the basis of money supplied by the banks. The money (credit) supplied by the banks increases money supply in circulation in addition to *H*. It is, therefore, useful to look at the process of money creation by the banks.

12.1.3 Money Creation by the Commercial Banks

Commercial banks are the second most important source of money supply. The money that commercial banks supply is called ***credit money***. The credit money that banks create is an outcome of their monetary transactions, mainly borrowing and lending money. In the process of their financial transactions, banks receive deposits from the public. The money deposited with the banks are called ***primary deposits***. Primary deposits are made by the people on account of three exogenous factors: (i) household savings deposited with banks, (ii) payment received (by cheque or draft) from the central bank for sale of government bonds, (iii) payments received from abroad and deposited with the bank, and (iv) money deposited for convenience in transaction.

On the basis of primary deposits, banks create ***secondary deposits*,** called also as ***derivative deposits***. It is the volume of derivative deposits which constitutes the money supply by the banks. The process of 'deposit creation' or 'credit creation,' begins with banks lending money out of primary deposits. In fact, banks cannot loan out the entire primary deposits as they are required to maintain a certain proportion of primary deposits in the form of *cash reserves*. The banks are required to maintain *two kinds of cash reserves*:

(i) 'statutory cash reserve'(*SCR*), required by the central bank as a mandatory cash reserve, and
(ii) bank's 'excess reserve' (*ER*) in addition to *SCR* to meet the cash demand by the depositors.

After maintaining the required cash reserves, the banks can loan out the balance of the primary deposits. Banks' lending starts the process of credit creation and derivative deposits. The amount of total derivative deposits created by the banks depends on (i) the amount of primary deposits, (ii) the rate of 'required reserves', (iii) demand for bank loans by the society, and (iv) efficiency of the banking system.

The process of derivative deposit and credit creation by the banks has been explained below assuming two kinds of banking system: (a) a single bank model, and (b) a multiple bank model.

12.1.4 Deposit Creation in a Single Bank Model

To describe the money creation process in the single bank model, we make the following simplifying assumptions: (i) there is a single bank, (ii) the bank accepts only demand deposits, (iii) the bank's cash reserve requirement (*CRR*) is 20 percent of which 8 percent is statutory reserve requirement (*SRR*) and 12 percent excess reserve (*ER*) requirement,[3] (iv) the bank holds its assets only in the form of cash reserves and loans and advances.

To begin with, suppose that the monopoly bank closes its balance sheet on the last day of the accounting year with its assets and liabilities in balance. And, on the first day of the next accounting year, an individual A deposits Rs 100 thousand with the bank. All deposits with the bank are its

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[3] By assumption, the bank knows by its experience that only 12% of the demand deposits is demanded in cash by the depositors at any point of time.

liability. Now the balance sheet of the monopoly bank (excluding its other assets and liabilities) reads as given in Table 12.1.

Table 12.1 Balance Sheet of the Monopoly Bank

(Rs in thousand)

Liabilities	*Amount*	*Assets*	*Amount*
A's deposit	100.00	Cash reserves (CRR)	20.00
		Excess reserves	80.00
Total	100.00	Total	100.00

Note that the bank has an excess reserve of Rs 80 thousand which it can lend, otherwise it loses interest on it. Suppose an individual, B, approaches the bank to borrow money and the bank agrees to lend her Rs 80 thousand. There are two ways of lending. *One*, the bank hands over Rs 80 thousand to B, and *two*, the bank opens an account in B's name and credits the amount to her account. Suppose B finds it convenient to keep the money safe in the bank[4] and to make payments by cheques whenever she needs. Now bank's deposits increases by Rs 80 thousand and its CRR by Rs 16 thousand, that is, 20% of Rs 80 thousand. This completes the first round of credit creation. After the first round, bank's balance sheet reads as given in Table 12.2.

Table 12.2 Bank's Balance Sheet after the First Round

(Rs in thousand)

Liabilities	*Amount*	*Assets*	*Amount*
A's deposit	100.00	CRR (20+16)	36.00
B's deposit	80.00	Loan to B	80.00
		Excess cash reserves	64.00
Total	180.00	Total	180.00

Note that the bank has now an excess cash reserve of Rs 64 thousand. The process of borrowing and lending is repeated again. Now the bank can lend Rs 64 thousand. Suppose the bank lends Rs 64 thousand to an individual, C, and credits the money to her account. This process of borrowing and lending is called, in economic terminology, as *the process of credit creation* or *the process of deposit creation*. After the second round of deposit and credit creation, the bank's balance sheet reads as given in Table 12.3.

4. If the bank lends money to B in cash, the credit creation process will not be cut short. Suppose the bank lends cash to B. What does B do with this money? Obviously, she has borrowed money to make payment to her creditor or to buy a commodity or bond. In either case, the person who gets money deposits it in the bank. For example, suppose, B buys C's second-hand car and pays Rs 80 thousand. Now C deposits the money in the bank. Then, in Table 12.2, the entry will be C's deposit, instead of B's deposit. And the process of credit creation goes on.

Table 12.3 Bank's Balance Sheet after the Second Round

(Rs in thousand)

Liabilities	*Amount*	*Assets*	*Amount*
A's deposit	100.00	CRR (20 + 16 + 12.80)	48.80
B's deposit	80.00	Loan to B	80.00
C's deposit	64.00	Loan to C	64.00
		Excess cash reserve	51.20
Total	244.00	Total	244.00

Table 12.3 shows that the bank has an excess cash reserve of Rs 51,200 in its cash vault. This excess cash reserve is again used in the process of borrowing and lending. This process of deposit and credit creation continues until the excess cash reserve is reduced to zero, provided no other primary deposits are made. The bank's balance sheet at the end of the final round (incomplete though) reads as given in Table 12.4.

Table 12.4 Bank's Balance Sheet at the End of the Final Round

(Rs in thousand)

Liabilities	*Amount*	*Assets*	*Amount*
A's deposit (primary)	100.00	CRR (20 + 16 + 12.80 + ...)	100.00
B's deposit (derivative)	80.00	Loan to B	80.00
C's deposit (derivative)	64.00	Loan to C	64.00
....	....	....	....
....	....	....	....
....	....	....	....
*n*th deposit	00.00	Excess cash reserve	00.00
Total	500.00	Total	500.00

Note that a primary deposit of Rs 100 thousand forms the basis of the creation of a total deposit of Rs 500 thousand. It implies that the bank has created additional deposits of Rs 400 thousand on the basis of a primary deposit of Rs 100 thousand. It means also that the bank has multiplied a primary deposit of Rs 100 thousand five times. Thus, the *deposit multiplier* equals five. The formula for calculating deposit multiplier will be explained in a subsequent section. Let us first look at the deposit and credit creation process in the multiple bank model.

12.1.5 Deposit Creation in the Multiple Bank Model

Let us now explain the process of deposit creation in the *multiple bank model*—a realistic model. Suppose there is a number of commercial banks in the banking system—Bank 1, Bank 2, Bank 3, and so on. Suppose also that assumptions (ii) through (iv) of the single bank model are applicable also to the multiple bank model.

To begin with, let us suppose that an individual A makes a demand deposit of Rs 100 thousand in Bank 1. Bank 1 is required to maintain a cash reserve requirement (*CRR*) of 20 percent of its total deposits. That is, against a deposit of Rs 100 thousand Bank 1 is required to maintain a cash reserve of Rs 20 thousand. The bank has now an excess cash reserve of Rs 80 thousand. Let the Bank 1 lend Rs 80 thousand to a borrower, say B. The method of lending is the same, i.e., Bank 1 opens an account in the name of the borrower B and credits her account by Rs 80 thousand. At the end of the process of deposit and lending, the balance sheet of Bank 1 reads as given in Table 12.5.

Table 12.5 Balance Sheet of Bank 1

(Rs)

Liabilities	*Amount*	*Assets*	*Amount*
A's deposit	100.00	Cash reserves CRR)	20.00
		Excess reserves	80.00
Total	100.00	Total	100.00

Now suppose that money that B borrows from Bank 1 is paid to an individual C in settlement of her past debts. What does C do with the money she gets? She may purchase a consumer durable, say, a car, and pay the money to the car-seller or may deposit the money with her bank—Bank 2. To cut short the procedure, suppose *C* deposits the money with Bank 2. Now Bank 2 carries out its banking transaction. It keeps a cash reserve to the extent of 20 percent of its deposits, that is, Rs 16 thousand = 80 thousand × 20/100, and lends Rs 64 thousand to a borrower, say D. At the end of the process, the balance sheet of Bank 2 reads as given in Table 12.6.

Table 12.6 Balance Sheet of Bank 2

(Rs in thousand)

Liabilities	*Amount*	*Assets*	*Amount*
C's deposit	80.00	CRR	16.00
		Loan to D	64.00
Total	80.00	Total	80.00

The amount advanced to D will return ultimately to the banking system, as described in case of B, and the process of deposit and credit creation will continue until the excess reserve with banks is reduced to zero. The final picture that emerges at the end of the process of deposit and credit creation by the banking system is presented in a combined balance sheets of all the banks as shown in Table 12.7.

It can be seen from the combined balance sheet (Table 12.7) that a primary deposit of Rs 100 thousand in Bank 1 leads to the creation of a total deposit of Rs 500 thousand. If we subtract *primary deposit* of Rs 100 thousand from the overall deposit of Rs 500 thousand, we get a total *derivative deposit* of Rs 400 thousand. The combined balance sheet also shows that the banks have created a total credit of Rs 500 thousand and maintain a total cash reserve of Rs 100 thousand which equals the primary deposit. *The total deposit created by the commercial banks constitutes the money supply by the banks.*

Table 12.7 The Combined Balance Sheet of the Banks

(Rs in thousand)

Bank	*Liabilities*	*Assets*		*Total Assets*
	Deposits	*Loans and Advances*	*Reserves*	
Bank 1	100.00	80.00	20.00	100.00
Bank 2	80.00	64.00	16.00	80.00
Bank 3	64.00	51.80	12.80	64.00
....	.....	....	....	....
....	.....	....	....	....
....	.....	....	....	....
Bank n	00.00	00.00	00.00	00.00
Total	500.00	400.00	100.00	500.00

12.1.6 The Deposit Multiplier[5]

As noted above, a primary deposit leads to the creation of ***derivative deposits***, which add up to a multiple of the primary deposit. In our example above, an initial deposit of Rs 100 thousand leads to a total deposit of Rs 500 thousand. Obviously, the total deposit creation is 5-times the primary deposit. It means, *deposit multiplier* is 5. The deposit multiplier (d_m) can be obtained by using the data given in Table 12.7, as follows.

$$d_m = \frac{\text{Total Additional Deposits}}{\text{Total Additional Cash Reserves}} = \frac{\Delta TD}{\Delta TR} = \frac{500{,}000}{100{,}000} = 5 \tag{12.3}$$

where, ΔTD = total additional deposits created by the banks (including the initial deposit), and ΔTR = change in total cash reserves of the banks.

Derivation of Deposit Multiplier The method of deriving deposit multiplier (d_m) is similar to derivation of investment multiplier.[6] The process is elaborated here. Suppose a primary deposit is made and deposit-loan ratio is given by tradition or by the central bank.

By designating primary deposit as ΔD and loan-deposit ratio as k, the entire series of deposits (including primary and derivative deposits) can be rewritten as:

$$\begin{aligned}\Delta TD &= \Delta D + \Delta D(k) + \Delta D(k)^2 + \Delta D(k)^3 + \cdots + \Delta D(k)^{n-1} \\ &= \Delta D(1 + k + k^2 + k^3 \; . \; . \; . \; . + k^{n-1})\end{aligned} \tag{12.4}$$

Using the formula for adding up a (declining) geometric series, Eq. (12.4) can be written as

$$\Delta TD = \left(\frac{1}{1-k}\right) \Delta D \tag{12.5}$$

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5. Here we illustrate the computation of deposit multiplier in a simple hypothetical model. More on deposit multiplier follows in a subsequent section.

6. For details see Chapter 6, the section on Static and Dynamic Multiplier.

It is noteworthy that loan-deposit ratio (k) *plus* reserve-deposit ratio (r), always equals 1. That is, $k + r = 1$. In our example, $k = 0.8$ and $r = 0.2$ and $0.8 + 0.2 = 1$. Therefore, in Eq. (12.5), $1 - k = r$.

By substituting r for $1 - k$ in Eq. (12.5), ΔTD can be written as

$$\Delta TD = \frac{1}{r}\,\Delta D \text{ (where, } r = \text{reserve-deposit ratio)} \tag{12.6}$$

In our example, $\Delta D = 100$ and $r = 0.2$. By substituting these values in Eq. (12.6), we get

$$\Delta TD = \frac{1}{0.2}\,100 = 5\ (100) = 500 \text{ (thousand)} \tag{12.7}$$

Note that Eq. (12.6) gives not only the formula for computing ΔTD, but also the formula for deposit multiplier (d_m). By rearranging the terms in Eq. (12.6), we get

$$d_m = \frac{\Delta TD}{\Delta D} = \frac{1}{r} \tag{12.8}$$

In our example, $r = 0.2$. By substitution, we get $1/r = 1/0.2 = 5$. The deposit multiplier (5) is the same as obtained in Eq. (12.3).

12.1.7 Credit Multiplier

Credit multiplier is another useful concept used in the analysis of money supply. Let us first make a distinction between the *deposit multiplier* and the *credit multiplier.* As Eq. (12.8) shows, deposit multiplier, (d_m) is the ratio of total deposit-creation (ΔTD) to the primary deposit with banks (ΔD), that is, $d_m = \Delta TD/\Delta D$. Similarly, *credit multiplier can be defined as the ratio of additional credit creation* (ΔCC) *to the total cash reserves* (ΔR). That is, credit multiplier (c_m) can be measured as:

$$\text{Credit multiplier } (c_m) = \frac{\Delta CC}{\Delta R} \tag{12.9}$$

In our example (see Table 12.7), total credit creation (ΔCC) by the banks = Rs 400 thousand, and total reserves = Rs 100 thousand. Thus, the credit multiplier can be obtained as

$$c_m = \frac{\Delta CC}{\Delta R} = \frac{400{,}000}{100{,}000} = 4$$

The total credit creation (ΔCC) by the commercial banks can be obtained by subtracting the change in cash reserves (ΔR) from the *total deposit creation* (ΔTD). That is,

$$\begin{aligned}\Delta CC &= \Delta TD - \Delta R \\ &= 500{,}000 - 100{,}000 \\ &= 400{,}000\end{aligned}$$

By substituting $\Delta TD - \Delta R$ for ΔCC in Eq. (12.9), credit multiplier (c_m) can be expressed as

$$c_m = \frac{\Delta TD - \Delta R}{\Delta R} \tag{12.10}$$

The formula for *credit multiplier* (c_m) can be derived following the formula for *deposit multiplier* (d_m) given in Eq. (12.8). Thus, Eq. (12.10) can be written as

$$c_m = \frac{1-r}{r}$$

It is **important** to note here that the forgoing analysis of deposit and credit multiplier process has been carried out in the framework of a *static model* with a highly restrictive assumptions that deposit or credit multiplier process does not affect currency holding and time deposits by the people. This analysis will, therefore, not apply if assumptions are relaxed to make the model realistic. We will return to deposit multiplier after we have discussed the theory of money supply.

12.1.8 Non-banking Financial Intermediaries and Money Supply

We have described above the money creation process by the commercial banks only. As mentioned earlier, Gurley and Shaw recognise the asset function of also the 'financial claims against the non-banking financial intermediaries' (NBFIs) and its role in money supply. They argue that there is a 'close substitution relationship between currency, demand deposits, commercial bank time deposits, saving bank deposits, saving and loan association shares, and so on, all of which are viewed by the public as alternative liquid stores of value.'[7] According to Gurley-Shaw approach, therefore, money supply should be defined as a weighted sum of currency, demand deposits and all the deposits and claims against the NBFIs that can be treated as the substitutes for currency and demand deposits—weights determined on the basis of the degree of their substitutability. As already mentioned, though the Gurley-Shaw approach looks theoretically sound, empirically it is immensely difficult to determine the degree of substitutability of deposits and claims against the financial intermediaries and, therefore, to assign appropriate weights to measure the money supply. "Except for illustrative purposes, no attempt has been made to make the weighted sum definition operational, that is, the concept has not been used for testing monetary theory or for carrying out monetary policy."[8] In practice, however, the central banks use different measures of money supply and one of the measures conforms, at least partly, to the Gurley-Shaw approach to money supply.

12.2 THE MEASURES OF MONEY SUPPLY IN INDIA

12.2.1 Purpose of Measuring Money Supply

The quantity of money available to the people, i.e., money supply, is the second most important macro variable—the first being the *GDP*. As has already been pointed out, given the *GDP* and the prices, a certain quantity of money is required to carry out economic activities smoothly and to maintain a reasonable level. Excess money supply may lead to inflation and shortage of it may cause economic recession. Therefore, the supply of money needs to be maintained at an optimum level. In other words, money supply needs to be controlled and regulated in accordance with the monetary requirement of the country. A pre-requisite of maintaining money supply at its optimum level is to take the stock of money supply on regular basis and this is the practice in all countries. This is the basic purpose of measuring money supply. Let us now see how money supply is measured in India.

7. Dwayne Wrightsman, *An Introduction to Monetary Theory and Policy*, (Free Press, NY, 1971), p.20.

8. Dwayne Wrightsman, *op. cit,* p.21.

In India, money is supplied by the RBI. The RBI makes the estimates of annual money supply in the country and publishes it in its various publications. In the context of the RBI measures of money supply the following definitions must be borne in mind: (i) money supply is a *stock variable* and the *measure of money supply* refers to the *stock of money* at a point of time; (ii) by measure of money supply is meant the measure of *stock of money* available to the public as *a means of payments* and *store of value*; and (iii) the term 'public' means all economic units including households, firms and institutions.[9] It does not include the producers of money, *viz.* the central bank, the government and the commercial banks.

The measures of money supply vary from country to country, from time to time and from purpose to purpose. So is the case in India also. We will describe here the various alternative measures of money supply made and published by the RBI. The RBI measure of money supply has been changing. We will describe here only the current measures of money supply.

12.2.2 RBI Measures of Money Supply

The measures of money supply used by the Reserve Bank of India (RBI) have been changing depending on the recommendations of its *Working Group*. The First Working Group was appointed in 1961, the Second in 1977 and the Third in 1998. Different Working Groups have recommended different measures of money supply. We give here the details of the measures of money supply recommended[10] by the *Third Working Group* and currently being used by the RBI. However, RBI uses a somewhat modified version of measures of money supply. The following measures of money supply[11] are used by the RBI.

1. M_0 (Reserve Money) = Currency in Circulation + Bankers' Deposit with the RBI + Other Deposits with the RBI.
2. M_1 (Narrow Money) = Currency with the Public + Demand Deposits with Banks + Other Deposits with the RBI.
3. $M_2 = M_1$ + Time Liabilities of the Saving Deposits with banks + Certificate of Deposits issued by Banks + Term Deposits (excluding FCNR(B) Deposits) with Banks
4. M_3 (Broad Money) = Currency with the Public + Demand Deposits with Banks + Time Deposits with Banks + Other Deposits with the RBI.

   Or $M_3 = M_1$ + Time Deposits with Banks

Of the four measures of money supply, M_0, M_1 and M_3 are the most important money supply measures from the policy point of view. The estimates of money supply, M_0, M_1 and M_3, for the fiscal year 2005-06 and 2006-07 are given in Table 12.8. Money supply in India has been increasing continuously. During 2006-2007, money supply (M_3) increased by about 13 percent. It can be noted that demand deposits with banks account for about 70% of the broad money supply.

9. For the purpose of measuring money supply, the institutions like local authorities, non-banking financial intermediaries, non-departmental PSEs, foreign governments, and the IMF and the World Bank that hold currency of a member country in the form of reserves and deposits are also included.

10. For a summary of recommendations, see *Economic Survey* – 1998-99, p.37. Based on measures of money supply reported *Economic Survey* – 2007-08, Table 4.1, p. A-54.

11. As reported in *Economic Survey* – 2006-07, pp. 50-53, and 2007-08, Table 4.1, p. A-54.

Table 12.8 Measures of Money Supply in India

(Rs in Crore)

Measures of Money Supply	*Mar 31, 2006*	*%*	*Jan 19, 2007*	*%*
1. M_0(Reserve Money)	573086	100.0	641790	100.0
(i) Currency in Circulation	430676	75.2	488251	76.0
(ii) Bankers' Deposit with RBI	135511	23.6	147830	23.0
(iii) Other Deposits with RBI	6879	1.2	5709	1.0
2. M_1(Narrow Money)	825246	100.0	865538	100.0
(i) Currency with the public	413143	50.0	471845	54.4
(ii) Demand Deposits with banks	405224	49.1	397986	45.9
(iii) Other Deposits with RBI	6879	0.9	5709	0.7
3. M_3(Broad Money)	2729536	100.0	3071706	100.0
(i) Currency with the public	413143	15.1	471845	15.4
(ii) Demand deposits with banks	405224	14.8	397986	13.0
(iii) Time Deposits with banks	1904290	69.8	2196186	71.5
(iv) Other Deposits with RBI	6879	0.3	5709	0.1

Note. Totals of M_1 and M_3 do not match with the sum of their sub-items due, perhaps, to approximation.
1 Crore = 10 million

Source: *Economic Survey* – 2006-07, Table 3.1, p. 52.

12.3 THE THEORY OF MONEY SUPPLY

We have noted above that the total money that serves as medium of exchange and store of value is supplied mainly by two sources—the central bank (the RBI in India) and the commercial banks. Banks do not create their own money. They add to the money supply through their system of borrowing and lending. The money supplied by the two sources—central bank and commercial banks—do not work independently. Nor does the money supplied by each of them circulate as independent and identifiable units. The money supply from both the sources is, in fact, interlinked. The high-power money multiplies itself in the process of monetary transactions between the people and the banks. The analysis of how money supplied by the central bank multiplies itself in the process of monetary transactions results into the *theory of money supply*. In this section, we will briefly discuss the theory of money supply.[12]

The theory of money supply makes a distinction between the two concepts of money supply: the *ordinary money* or *the stock of money* (M) and the *high-power money* (H), also called 'base money'. The ordinary money includes the currency held by the public and the demand deposits,

12. The origin of the theory of money supply lies in the 'identity equations' used by Milton Friedman and Anna Jacobson Schwartz in their *A Monetary History of the United States, 1867 – 1960* (Princeton University Press, Princeton, 1963) to estimate money supply in the US. Different authors have used different process and natations in their narration of the theory of money supply. The theory of money supply discussed here is based largely on the enunciation of this theory by Prof. S. B. Gupta, *Monetary Economics : Institutions, Theory and Policy* (S. Chand & Co. Ltd., New Delhi, 2000, pp. 270-92).

both used as medium of exchange and store of value. The concept of 'ordinary money' is similar to M_1 used by the RBI. For theoretical convenience, the *ordinary money* (M) is defined as

$$M = C + DD \tag{12.11}$$

where, C = currency with the public, and DD = demand deposits with banks.

The *high-power money* (H) is defined as:

$$H = C + R \tag{12.12}$$

where, C = currency with the public, and R = cash reserves with the central bank and with other banks themselves.

The cash reserves (R) with the commercial banks have two components: (i) *statutory reserve requirement*, also called *statutory reserve ratio* (*SRR*) which banks are required to maintain with the central bank, the RBI;[13] and (ii) *excess reserve* which commercial banks need to maintain as 'cash in hand' or 'cash in vault', in excess of *SRR*, to meet the demand for cash by the depositors. The ratio of excess reserve to deposits is based on bank's payment need and past experience.

Having introduced the two concepts of money supply, let us explain the theory of money supply. In brief, the theory of money supply can be stated as the *total supply of money* (M) in a country is determined by a money multiplier, given the supply of the *high power money* (H). In other words,

$$M = mH \tag{12.13}$$

where, constant m is *money multiplier*.

Thus, money multiplier (m) is measured as

$$m = \frac{M}{H}$$

This is the general method of measuring money multiplier—used also by the RBI.

The analysis of the relationship between M and H, given in Eq. (12.13), is the central theme of the theory of money supply. The high-power money (H) is the basic money and it forms the basis of money creation through monetary transactions between the public and the banks. By assumption, H is policy-determined: it is determined exogenously by the central bank of the country. Given the supply of H, the determination of M, i.e. the stock of ordinary money, depends entirely on the value of money multiplier (m). The theory of money supply explains how the value of m, the *money multiplier*, is determined. Let us now discuss how money multiplier is determined.

12.3.1 The Money Multiplier

As shown in Eq. (12.13), money multiplier is the rate at which high power money or 'reserve money' gets multiplied to make the supply of total ordinary or broad money. We describe here the factors that determine the money multiplier and their interrelationships. Following the practices in different countries, different authors use different variables to explain the method of measuring money multiplier.

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13. In India, the RBI is empowered to vary the statutory reserve ratio (*SRR*) between 3% and 15% of the total demand and time deposits of the commercial banks, depending on the credit needs of the economy. The RBI had fixed CRR at 6.50 percent in April 2007, which it increased to 8.00% in May 2008, to control inflation which crossed 7.4% in April 2008.

Two Approaches to the Determination of Money Multiplier (*m*)

In general, there are two widely used methods of measuring the money multiplier (m). While some authors[14] consider only a 'uniform deposit' or demand deposits (DD) in working out the money multiplier, some other authors[15] consider both (i) demand deposit (DD), and (ii) time deposit (TD). Incidentally, RBI uses the second method. The RBI measures money multiplier (m) as

$$m = \frac{M_3}{M_0} = \frac{C + DD + TD + OD}{C + D \text{ with RBI}}$$

where M_3 is 'broad money'; M_0 is 'reserve money'; and C is 'currency in circulation.

Since both M_3 and M_0 are subject to variation, money multiplier (m) also keeps changing. For instance, during 2006-08, money multiplier varied between 4.5 and 5.

In what follows, we explain the determination of money multiplier under both the approaches—with only DD and with both DD and TD.

Money Multiplier with Demand Deposit (DD) Under this approach, the two determinants of money multiplier are (i) *currency-deposit ratio* (cr) and (ii) *reserve-deposit ratio* (rr). Given the Eqs. (12.11) and (12.12), following Mankiw's approach, cr and rr can be obtained as follows. To find these ratios, let us first divide Eq. (12.11) by Eq. (12.12). Thus,

$$\frac{M}{H} = \frac{C + DD}{C + R} \tag{12.14}$$

By dividing both the numerator and the denominator of Eq. (12.14) by DD, we get

$$\frac{M}{H} = \frac{C/DD + 1}{C/DD + R/DD} \tag{12.15}$$

It is obvious from Eq. (12.15) that $C/DD = cr$ (currency-deposit ratio) and $R/DD = rr$ (reserve-deposit ratio). By substitution, we get

$$\frac{M}{H} = \frac{cr + 1}{cr + rr} = m \tag{12.16}$$

Since in Eq. (12.16), $(cr + 1)/(cr + rr) = m$, money supply is determined as

$$M = \frac{cr + 1}{cr + rr} H \tag{12.17}$$

or

$$M = m\ H$$

If in a country, $cr = 0.4$ and $rr = 0.05$, then money multiplier (m) = (0.4 + 1)/(0.4 + 0.05) = 3.11

Money Multiplier with DD and TD To work out the money multiplier with DD and TD, let us recall our basic equations (12.11 and 12.12) given, respectively, as

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14. See for example, N. Gregory Mankiw, *Macroeconomics* (Macmillan Worth Publishers, NY, 5th edn., p.486) and Rudiger Dornbusch, *et. at., Macroeconomics* (Tata McGraw-Hill, New Delhi, 9th edn.), p.414.

15. For example, S.B. Gupta, *op. cit.,* and Jagdish Handa, *Monetary Economics* (Routledge, London, 2000), pp. 240–41.

$$M = C + DD, \text{ and}$$
$$H = C + R.$$

By substitution, Eq. (12.13), can be rewritten as

$$C + DD = m(C + R) \tag{12.18}$$

As we will show below, all the terms in Eq. (12.18) are interrelated and interdependent directly or indirectly. The entire further analysis of relationship between H and M is related to bringing out the relationship between the variables in Eq. (12.18). Therefore, what we need now is to bring out the relationships between C and DD and between R and DD.

Let us first look at the LHS of Eq. (12.18), We have earlier assumed (implicitly) that DD is determined exogenously, all other things remaining the same. In reality, however, both C and DD are a function of the level of income and the interest rate. Therefore, C and DD can be assumed to be highly correlated.[16] Besides, it can be assumed that the public holds C and DD in certain proportion at any point of time. Hence, one can be defined as a proportion of the other. Let

$$C = c \cdot DD \tag{12.19}$$

where, c is 'deposit-currency ratio', that is, the ratio of DD to C.

By substitution, Eq. (12.18) can now be rewritten as

$$c \cdot DD + DD = m(c \cdot DD + R) \tag{12.20}$$
$$(c + 1)\, DD = m(c \cdot DD + R)$$

The *money multiplier* (m) can now be obtained from Eq. (12.20), as

$$m = \frac{(c+1)\, DD}{(c \cdot DD + R)} \tag{12.21}$$

Note that money multiplier is expressed in terms of DD and R whereas it is only DD which multiplies not the reserves (R). What is required now is to define R in terms of DD so that m can be expressed in terms of DD only. Recall also that the commercial banks hold cash reserves (R) as a proportion of their total deposits (D). Therefore, R can be expressed as

$$R = r \cdot D \tag{12.22}$$

where, D = total deposits, and r = reserve-deposit ratio.

The total deposit (D) consists of *demand deposits* (DD) and *time deposit* (TD). That is,

$$D = DD + TD \tag{12.23}$$

Recall that demand deposits (DD) are a part of money supply but time deposits (TD) are not. Therefore, TD has to be expressed in terms of DD for theoretical purpose. Recall also in this regard that the total money demand by the public is held in the form of (i) currency (C), (ii) demand deposit (DD), and (iii) time deposit (TD). Given the total demand for money, the proportion of money held in these three forms is determined by the level of income and the interest rate. The proportions of money held in each of these three forms are 'highly correlated.' Therefore, demand deposit (DD) can be expressed as a proportion of currency holding (C), and time deposit (TD) can be expressed as a proportion of DD. For simplicity sake, let us assume that TD is held as 't' proportion of DD. Then,

16. S. B. Gutpa, *op. cit.* p.273.

$$TD = t \cdot DD \tag{12.24}$$

By substituting Eq. (12.23) and (12.24) for D, Eq. (12.22) can be written as

$$R = r(DD + t \cdot DD) \tag{12.25}$$

By substituting Eq. (12.25) into Eq. (12.21), money multiplier (m) can be expressed as

$$m = \frac{(1+c)\,DD}{c \cdot DD + r\,(DD + t \cdot DD)} \tag{12.26}$$

$$= \frac{(1+c)\,DD}{(c+r+rt)\,DD}$$

Now money multiplier (m) can be expressed as

$$m = \frac{1+c}{c+r(1+t)} \tag{12.27}$$

By substituting Eq. (19.27) into Eq. (12.13), we get final formula of money supply as

$$M = \frac{1+c}{c+r(1+t)}\;H \tag{12.28}$$

Equation (12.28) is the key equation in the theory of money supply. According to this equation, the total money supply, called 'ordinary money'(M) is the function of the 'high-power money'(H). This is the gist of the theory of money supply. In Eq. (12.24), factors c, r and t are assumed to be constant. Therefore, H is the main determinant of the 'ordinary money supply.' Since 'high-power money' (H) is the key factor in the determination of the 'ordinary money supply' (M), the theory of money supply is also called the 'H-theory of Money Supply.' Let us now look at the factors that determine the value of money multiplier (m).

The Determinants of Money Multiplier The determinants of money multiplier (m) can be grouped under two categories.

(a) The proximate or immediate factors, and
(b) The ultimate factors.

These two categories of factors appear, in fact, at two levels of the money multiplier analysis. The two categories of the determinants of money multiplier are explained here briefly.

(a) *The proximate or immediate factors* The proximate or immediate determinants of money multiplier are given in the money-multiplier formula itself. As Eq. (12.27) shows, the proximate factors include (i) currency-deposit ratio (c), (ii) reserve-deposit ratio (r), (iii) time and demand deposit ratio, i.e., *TD/DD* ratio (t). Given the money-multiplier formula in Eq. (12.27), the role of c, r and t in determining the value of the money multiplier can be described, respectively, as follows.

(i) Currency-deposit ratio (c) and money multiplier The higher the currency-deposit ratio (c), the smaller the money multiplier (m), and *vice versa*. It means that if public prefers to hold a high proportion of H in the form of cash (C) and a smaller proportion of it as deposits (D), then the ability of the banks to create secondary deposits and credit will be reduced to the extent it reduces the value of 'm'. Consequently, m will be lower. For example, suppose $c = 0.3$, $r = 0.1$, and $t = 0.2$. The substitution of these values in Eq. (12.27) gives $m = 3.1$. If c rises to 0.5, other factors remaining the same, then m decreases to 2.42. On the contrary, if public decides to hold only a small part of H as cash, m will be higher.

(ii) Reserve-deposit ratio (r) and money multiplier The role of reserve-deposit ratio (r) is more obvious. It appears in the denominator of the money-multiplier formula. Therefore, the higher the reserve-deposit ratio (r), the lower the value of money multiplier (m). In simple words, if banks' reserve requirement (RR) increases, their ability to create deposit and credit decreases and, therefore, the value of m decreases. For example, recall that if $c = 0.3$, $r = 0.1$ and $t = 0.2$, then $m = 3$. And, if the central bank raises RR so that r increases from 0.1 to 0.15, other factors remaining the same, then m falls to 2.7.

(iii) Time-deposit ratio (t) and money multiplier The role of time-deposit ratio (t), that is, *the ratio of time deposit to demand deposit,* in the determination of money multiplier is like that of the reserve-deposit ratio (r). That is, the higher value of t, the smaller the value of m. That is, if public decides to increase the ratio of time deposit (TD) to demand deposit (DD), then the value of m decreases. Recall the example again if in one period $c = 0.3$, $r = 0.1$ and $t = 0.2$, then $m = 3.1$. Suppose now that the public decides to increase the time-deposit ratio (r) from 0.2 to 0.3, then the value of m decreases to 2.38.

(b) ***The ultimate factors*** The proximate determinants of the money multiplier**,** c, r and t, are merely the numerical ratios that appear in the multiplier formula. The value of these factors depends on certain other factors. The factors that determine the value of c, r and t are the *ultimate factors.* They are ultimate in the sense that they arise out of the working of the economic system and the decisions taken by the Central Bank, the public and the commercial banks. Let us look at the factors that are behind their decision-making.

As regards the reserve-deposit ratio (r), it depends on (i) the statutory reserve ratio (SRR), and (ii) the excess reserve ratio (ER). The SRR is determined by the central bank, in view of the monetary needs of the country. This decision is policy-based. Under expansionary monetary policy, r is kept low and under contractionary monetary policy it is kept low. The *excess reserve ratio* (ER) is determined by the banks themselves in view of demand for cash by the depositors.

As regards the determination of c and t, it is the public which decides the proportion of H to hold as currency, as demand deposit and as time deposit. The decision regarding these factors are taken on the basis of (a) the level of income, (b) the interest rate, (c) the development level of the banking system, (d) banking habit of the people, and also (e) the black money held by the public—it is very high in the context of the Indian economy.

12.4 MONETARY EXPANSION AND THE MONEY MULTIPLIER: A SIMPLIFIED MODEL

The money multiplier given in Eq. (12.28) assumes static conditions in which all factors (H, c, r, and t) are given. In this section, we relax the assumption, that H remains constant, and see how ordinary money supply (M) responds to a change in H. To answer this question, again a simplified model will be used.

The ***simplified model*** makes the following assumptions.

(i) The commercial banks provide *only demand deposit facility.*

(ii) Commercial banks hold their assets only in the form of commercial loans and advances.
(iii) The deposit-currency ratio (c), and the cash-reserve ratio (r) remain costant.
(iv) There is no demand or capacity constraint. That is, there is a large demand for commercial bank loans, and banks have ample funds of loans and advances.

Note that in the simplified model, *TD* is omitted by assumption (i). With the omission of *TD*, the factor R is defined[17] in the simplified model as

$$R = r \cdot DD$$

With R redefined, money multiplier given in Eq. (12.21) changes to the following form.

$$m = \frac{(c+1)\,DD}{(c \cdot DD + r \cdot DD)} \tag{12.29}$$

$$= \frac{(c+1)\,DD}{(c+r)\,DD}$$

Thus, the money multiplier (m) in the simplified model is reduced to

$$m = \frac{c+1}{c+r} \tag{12.30}$$

Now let us compare the money multiplier given in Eq. (12.27) with that given in Eq. (12.30). While numerator in the formula for money multiplier remains the same, the denominator in the simplified model changes from $c + r\,(1 + t)$ to $c + r$. This implies that the value of m in Eq. (12.30) is greater than that given in Eq. (12.27). For example, given $c = 0.3$ and $r = 0.1$, Eq. (12.30) yields $m = 3.25$ whereas Eq. (12.27) gives $m = 3.1$ with $t = 0.2$.

Given the money supply function in Eq. (12.13), the change in money supply, ΔM, due to ΔH can be expressed as

$$\Delta M = m(\Delta H)$$

By substituting Eq. (12.30) for m in this equation, monetary expansion can be measured as

$$\Delta M = \frac{c+1}{c+r}\;\Delta H \tag{12.31}$$

Equation (12.31) tells that monetary expansion in a country depends on increase in high-power money (ΔH) and the money multiplier (m).

Numerical Example The computation of money multiplier by Eq. (12.31) is illustrated here with a simple numerical example. Suppose that the RBI buys bonds from the public worth Rs 30 million, all other factors given. It means that ΔH = Rs 30 million. The public, on the other hand, deposits RBI cheques with the banks and withdraws Rs 10 million as currency holding and leaves Rs 20 million in the bank as demand deposit (*DD*). This means that ΔC = Rs 10 million and ΔDD = Rs 20 million. Thus, the deposit-currency ratio, $c = \Delta C/\Delta DD = 10/20 = 0.5$. Suppose also that the banks are required to maintain a total cash reserves of 25% (including 10% as *SRR* and 15% as *ER*) of their deposits. That is, the *reserve-deposit ratio* (r) = 0.25.

17. Recall that with *TD* included, R was defined as $R = r \cdot D$ (where $D = DD + TD$ and $TD = t \cdot DD$). See Eq. (12.21).

By substituting the numerical values for ΔH, c and r, in Eq. (12.31), we get, ΔM as follows.

$$\Delta M = \frac{0.5+1}{0.5+0.25} \times 30 = 60$$

In means that an additional 'higher power' money of Rs 30 million increases total money supply by Rs 60 million.

12.5 MONETARY EXPANSION, CURRENCY DRAIN AND DEPOSIT MULTIPLIER

In the preceding section, we have explained the response of M to ΔH. In this section, we explain the response of demand deposits to ΔH. To do this, we need to extend the deposit multiplier ($1/r$), given in Eq. (12.7) to dynamic conditions. The deposit multiplier ($1/r$) is based on an over-simplified static model. This formula of deposit multiplier holds only when (i) the high-power money supply (H) remains constant and a new primary deposit is made out of savings, and (ii) the entire money lent by the banks takes the forms of demand deposits and no part of it is held as currency. This formula does not apply when primary deposits are caused by monetary expansion by the central bank and a part of ΔH is held as ΔC also, not only as ΔD. Here ΔC is 'currency drain'. The deposit multiplier formula $d_m = 1/r$ does not take into account the relationship between currency holding (ΔC), the currency drain, and the demand deposit (ΔD). Here, we explain the **deposit multiplier** under the condition of an increase in the supply of high-power money and currency holding.

Suppose that the central bank buys back government bonds from the public and issues cheques to the public worth the value of bonds. As a result, money supply with public increases by ΔH. The public deposits these cheques with the banks for realisation. After realisation, the public withdraws a part of it and holds as ΔC (which is currency drain), and leaves the remaining part with the bank as ΔD. Consequently, banks' reserves increase by ΔR. Now the situation that emerges can be expressed algebraically as

$$\Delta H = \Delta C + \Delta R \quad \textbf{(12.32)}$$

Given the relationship between C and D, $\Delta C = c \times \Delta D$, and given the relationship between R and D [in Eq. (12.22)], $\Delta R = r \times \Delta D$. So Eq. (12.32) can be written as

$$\begin{aligned} \Delta H &= c \times \Delta D + r \times \Delta D \quad \textbf{(12.33)} \\ &= (c + r)\ \Delta D \end{aligned}$$

where c is 'deposit-currency ratio' and r is reserve-deposit ratio.

It follows from Eq. (12.33) that

$$\Delta D = \frac{1}{c+r}\ \Delta H \quad \textbf{(12.34)}$$

Eq. (12.34) gives the **deposit multiplier** as

$$\text{Deposit multiplier} = \frac{1}{c+r} \quad \textbf{(12.35)}$$

Eq. (12.35) gives deposit multiplier under the conditions of monetary expansion and the currency drain. Note that this deposit multiplier is different from one used in Eq. (12.6), that is, $1/r$.

SUGGESTED READINGS

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QUESTIONS FOR REVIEW

1. What are the major sources of money supply? How do the banks create and supply money?
2. What are the main constituents of the money supply in a modern economy? How is Gurley-Shaw approach to the constituents of money supply different from the conventional approach?
3. What is meant by demand deposit? How can you justify the inclusion of demand deposits in the money supply?
4. Explain the process of deposit creation. Is deposit creation different from credit creation. If yes, how?
5. What are the RBI measures of money supply? Explain briefly how each measure is different from the other.
6. What is 'high-power' money? How is high-power money different from the ordinary money?
7. Distinguish between 'ordinary money' and 'high-power money.' How is ordinary money related to the high-power money?
8. Describe the money measures used by the RBI. What is the purpose of different measure of money supply? How is M_3 different from M_1?
9. What is money multiplier? How is '*m*' affected if reserve ratio is increased.
10. Explain theory of money supply. How does money multiplier contribute to the supply of money?
11. The high-power money supply is exogenously and policy determined. Comment.
12. Explain the concept of money multiplier. How is money multiplier different from the deposit multiplier?
13. What are the determinants of money multiplier? How is money multiplier affected when the central bank changes the statutory reserve requirement?
14. Distinguish between money multiplier and credit multiplier. Why is credit multiplier lower than the money multiplier?
15. Suppose, in a country, currency deposit ratio is given as 0.5 and reserve-deposit ratio is found to be 0.05. Find the money multiplier.
16. Explain the following
    (i) Deposit multiplier,
    (ii) Credit multiplier,
    (iii) Money multiplier,
    (iv) Currency drain.

Chapter 13

The Classical Theory of Money and Interest

INTRODUCTION

The main purpose of this Chapter is to analyse the conditions and the factors that bring about equilibrium of the money market. Going by the fundamental economic law, money market reaches its equilibrium where demand for money equals the supply of money. The theory of money supply has already been discussed in Chapter 12. In this and the following two chapters, we will be concerned with the theories of demand for money which seek to answer the question 'what determines the demand for money in an economy?' The economists of different schools of thought hold different views on 'what determines the demand for money'. As a result, there are different theories of demand for money. The origin of the theory of demand for money is traced in the *classical quantity theory of money*. In this Chapter, we first discuss the basics of the quantity theory of money and show the derivation of the classical formula of demand for money. The post-classical developments in the theory of demand for money, i.e., Keynesian and post-Keynesian theories of demand for money, are discussed in the two subsequent Chapters.

13.1 THE CLASSICAL QUANTITY THEORY OF MONEY

The classical quantity theory of money was conceived in 1568 by Jean Bodin, a sixteenth-century French philosopher, to explain the price rise in the contemporary France. Over a period of two centuries after Bodin, a number of writers[1], including John Locke, David Hume, Richard Cantillon, David Ricardo and Irving Fisher, commented on and contributed to the quantity theory of money.

However, Fisher's version of the quantity theory of money, which he developed in his book *Purchasing Power of Money* (1911), is the most famous version and represents the classical approach to the analysis of the relationship between the quantity of money and the price level. The neo-classical version of the quantity theory of money is known as 'Pigou's cash-balance equation' or 'Cambridge cash-balance equation.' All the versions of quantity theory of money demonstrate that there is a strong relationship between money and price level. We will first discuss Fisher's version of quantity theory of money. This will be followed by a brief description of the Cambridge versions of the quantity theory money.

13.1.1 Fisher's Quantity Theory of Money and Price Level

Fisher's version of the quantity theory of money, or as it was originally called 'the quantity theory of exchange,' is formally expressed as

$$MV = \Sum pQ \qquad \textbf{(13.1)}$$

Fisher gave a simplified version of this equation as

$$MV = PT \qquad \textbf{(13.2)}$$

The symbols used in Eqs. (13.1) and (13.2) are described below.

1. M represents the quantity of money in circulation.
2. V is the transaction velocity of money, that is, *the number of times a unit of money is used in transaction per unit of time*.
3. $\Sigma pq = p_1 q_1 + p_2 q_2 + ... p_n q_n$ (where, q_1, q_2, …, are the output of individual commodities and p_1, p_2, …, are their prices, respectively).
4. P is weighted average of all individual prices and $P = MV/T$.
5. T is the sum of all the transactions of goods and services per unit of time (including transaction velocity of goods and service).

Fisher expanded Eq. (13.2) to include the money supply created by the banks through the process of credit creation based on their demand deposits. The expanded equation is written as:

$$MV + M'V' = PT \qquad \textbf{(13.3)}$$

where, M' and V' are the total bank deposits subject to transfer by cheques, and average velocity of their circulation, respectively.

13.1.2 Uses of Quantity Theory of Money

The classical quantity theory of money—which apparently looks very simple—has two important implications which constitute two important aspects of classical macroeconomics. Specifically speaking, the quantity theory of money yields two important classical macroeconomic theories, viz., (i) the classical theory of price level, and (ii) the classical theory of demand for money. Let us now look at how quantity theory of money can be used to derive the theories of price level and demand for money.

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[1] For details, see *The Controversy over the Quantity Theory of Money*, edited by Edwin Dean, (D.C. Heath and Company, Boston, 1965).

(i) *Theory of Price Level* The classical quantity theory of money implies that the quantity of money determines, *ceteris paribus*, the general level of prices. This conclusion follows directly from Fisher's equations given in Eq. (13.2). That is,

$$P = MV + M'V'/T \tag{13.4}$$

Equation (13.4) implies that, V and T remaining constant, P changes proportionately to the change in M and M'. When M is doubled, P is doubled too. If T rises (or falls), M, M' and V remaining constant, P decreases (or rises) proportionately. In the words of Fisher, "This mechanism makes clear the fact that the average price increases with the increase of money or bank deposits and with the velocities of their circulation, and decreases with the increase in the volume of trade."[2]

(ii) *The Demand for Money* Although Fisher did not state it specifically, the demand for money is implicit in his quantity theory. In Fisher's quantity theory of money, as Laidler has stated, "The demand for money depends on the value of transactions to be undertaken in the economy and is equal to a constant fraction of those transactions" and given the supply of money, "in equilibrium, the demand for money must be equal to its supply"[3]. The equilibrium demand for money can be derived from simple version of Fisher's quantity theory of money as follows. At equilibrium,

$$M\,\overline{V} = P\,\overline{T} \tag{13.5}$$

where $\overline{V}$ and $\overline{T}$ are constants.

Given the equilibrium Eq. (13.5),

$$M = \frac{1}{\overline{V}}\,P\,\overline{T} \tag{13.6}$$

Since at equilibrium, demand for money (M_d) equals the supply of money (M_s), M in Eq. (13.6), can be taken as M_s, and the term $1/\overline{V}\ (P\,\overline{T})$ as M_d. It can thus be construed that at equilibrium demand for money equals $1/\overline{V}$ fraction of the total value of transactions ($P\,\overline{T}$). Note that the constant factor ($1/\overline{V}$) is inverse ratio of velocity of money. It implies that the quantity of money demanded is determined by the inverse ratio of money velocity given P and $\overline{T}$. Assuming $1/\overline{V} = k$, the money demand equation can be written as

$$M_d = kP\overline{T} \tag{13.7}$$

where $M_d = M/P$, i.e., demand for real cash balance.

Thus, according to Fisher's quantity theory of money, demand for money (M_d) at equilibrium equals a constant fraction (k) of the total value of transactions (PT). Since the economy is always in equilibrium (according to classical postulates), the demand for money is always equal to the supply of money. Considering $P\,\overline{T} = Y$ = aggregate national income, the classical money demand function can be expressed as

$$M_d = kY.$$

This equation implies that, according to the classical theory, the aggregate demand for money is k proportion of the national income.

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2. Fisher, Irving, *Purchasing Power of Money* (1911), p.9.
3. David E.W. Laidler, *The Demand for Money: Theories and Evidence*, Monetary Economics Series, (Allied Publishers Private Limited, New Delhi, 1972), p.45.

13.1.3 Criticism of Fisher's Quantity Theory

The economists, both contemporary and later ones, pointed out a number of weaknesses in Fisher's quantity theory of money, especially his transaction equation, $MV = PT$. Some major points of criticism are following.

(i) Fisher's transaction equation is a truism, a tautology—it has no theoretical value;
(ii) It does not explain how a change in M changes P;
(iii) It is a static theory as it is based on the assumption that M and V, and M' and V' have a fixed relationship which is not realistic;
(iv) M refers to a point of time and V to a period of time: this means internal inconsistency;
(v) Price (P) is regarded to be only a passive factor which is unrealistic because it does affects output; and
(vi) Not only M determines P, but also P determines M—this is Keynes' *contra-quantity theory causation argument*.

Some economists, however, defend the quantity theory of money. They argue that Fisher's equation is no doubt a tautology, a static theory, and it makes certain unrealistic assumptions but so do most economic theories. All other points of criticism are either out of context or they are on the periphery. Hansen has remarked that "there has been a tendency to over criticise the theory and to try to read into it more than writers like Irving Fisher really intended."[4] Besides, it has been generally found that there is a positive correlation between money supply and the price level. This justifies Eq. (13.4).

13.1.4 Income Version of Quantity Theory—A Digression

Fisher's quantity theory of money is criticised for being a mere truism. It is argued that Fisher's equation as given in Eq. (13.2), is merely a tautology as it tells only that money in circulation multiplied by its velocity equals the total expenditure (PT). It has no theoretical content. An equation with theoretical content must show that a change in one of the variables induces a systematic and predictable change in other related variables. The economists have provided a modified version of Fisher's equation which converts it into a theory. The modified version, called *income version of quantity theory*, is written as

$$MV = PY \tag{13.8}$$

In Eq. (13.8), Y is the physical output which includes all exchanges. By definition, Y is the same as the real income in social accounting sense.

The income version of quantity theory (Eq. 13.8) makes two significant improvements. *One*, it converts Fisher's tautological equation into a theory. *Two*, the substitution of Y for T brings real output (Y) in relation with money supply. In classical theory, Y is the function of employment. That is, $Y = f(N)$ where N = total employment.

Thus, income version of quantity theory integrates the classical theory of output and employment with their theory of money. This point can be explained as follows.

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4. Hansen, J.L., *Monetary Theory and Practice*, 1965, 3rd Edn., p.192.

Equation (13.8) implies that a rise in money (Y remaining constant) results in a proportional rise in prices. When money supply increases, it increases the cash balance at the disposal of the people. People do not prefer to hold idle cash balance. They spend it on goods and services. An increase in money expenditure, while Y is held constant, means aggregate demand increases while aggregate supply is fixed. The ultimate result is rise in price. Prices rise because production cannot be increased in the short run.

Similarly, when money supply is reduced, spending capacity of the people is reduced and total spending decreases. A decrease in total spending means a fall in the aggregate demand. A fall in the aggregate demand means increase in unsold stock with the firms. The firms are forced to cut down their prices to get rid of the unsold stock. Thus, the final outcome of a fall in money supply is a proportional fall in the prices. The fall in price is proportional to fall in money supply because, in classical theory, unsold stock eventually equals the fall in money supply.

13.2 THE CAMBRIDGE VERSION OF QUANTITY THEORY OF MONEY

The Cambridge version of quantity theory of money was first developed by a great Cambridge economist, Alfred Marshall. It was later modified by his followers, viz., A.C. Pigou, D. H. Robertson and also J.M. Keynes, all at Cambridge University. That is why Marshall's version is popularly known as Cambridge version of quantity theory of money. The Cambridge version is also referred to as 'Neoclassical Theory of Money' and 'cash balance approach'. The Cambridge quantity theory of money is a significant improvement over the classical quantity theory of money. According to the Cambridge version of quantity theory of money, price level is affected only by that part of money which people hold in the form of cash for transaction purpose, not by the total MV as suggested by the classical theory.

According to the neoclassical economists, individuals hold money or demand money primarily for transaction purposes[5]. Some money is also held for security and for meeting the unexpected obligations. People do not hold their entire income in the form of money. They hold only an optimum amount of money because, as Pigou said, "currency held in the hands yields no income". The optimum amount of money people hold is not precisely defined. However, neoclassical economists hypothesised that income-earners strike a balance between the convenience and security that money provides and the loss of income resulting from money holding. In the ultimate analysis, they postulated that people hold only a certain proportion of their money income for transaction purposes. They stated their hypothesis in the form of an equation.

$$M^d = kPQ \tag{13.9}$$

where M^d = demand for money, P = price, Q = real income, and k = proportion of money income held as currency and bank deposits.

The term 'k' in Eq. (13.9) is called 'Cambridge k' and $PQ = Y$, that is, money value of real income. Equation (13.9) reads *that the demand for money (M^d) equals k proportion of the total money income*. The neoclassical economists held that k is fairly stable and that, *at equilibrium level*, stock of money *(M)* equals demand for money (M^d). That is,

5. Pigou had, in fact, linked demand for money to income and wealth. But wealth as a determinant of demand for money lost its significance in later analyses.

$$M = M^d = kPQ \tag{13.10}$$

At equilibrium, therefore,

$$M = kPQ \tag{13.11}$$

or

$$M(1/k) = PQ \tag{13.12}$$

It is important to note that, in Eq. (13.12), $1/k$ is same as V in Fisher's equation. This means that Cambridge k is reciprocal of Fisher's V. That is, $k = 1/V$ and $V = 1/k$. Thus, k and V are reciprocals of one another.

The *important features of neoclassical monetary theory* may now be summed as follows.

1. Unlike Fisher's quantity theory, neoclassical monetary theory links prices to the *demand for money,* not the supply of money, because idle cash balance does not, in reality, create demand and affect prices.
2. Cambridge equation links demand for money to money income. In other words, it hypothesises that demand for money is a function of money income.
3. By linking prices to demand for money, Cambridge version of monetary theory brings out the mechanism by which change in demand for money affects the general price levels.

13.3 THE CLASSICAL THEORY OF INTEREST

Having described the classical and neo-classical demand for money, we discuss in this section the classical theory of interest as constructed by Keynes. In Keynes's opinion, none of the classical economists had given a precise theory of interest.[6] In fact, Keynes was the first economist to trace and reconstruct the classical theory of interest. Keynes found it difficult to state the classical theory of interest precisely or to discover an explicit account of it in the leading treatise of the classical school. What he referred to as the classical theory of interest is, indeed, a combined view of Marshall, Cassel, Tausig and Walras. Thus, Keynes's interpretation of classical theory of interest includes also, what is often referred to, the loanable fund theory of interest or the neo-classical theory of interest.

It must be noted at the outset that according to the classical and neo-classical view, interest rate is determined not by the total supply of and total demand for money but by only that part of total money which is saved for investment. Given this basic classical postulate, let us now look at the classical theory of interest.

According to the classical theory of interest, as constructed by Keynes, the rate of interest is determined by the funds demanded for investment and supply of savings. In the words of Keynes, "Investment represents the demand for investible resources; saving represents the supply, and the rate of interest is the 'price' of investible resources.... The rate of interest is determined where demand for investible resources and supply of savings are equated." He adds, "Just as the price of a commodity is necessarily fixed at that point where the demand for it is equal to its supply, so the rate of interest necessarily comes to rest under the play of market forces at the point where the amount of investment at the rate of interest is equal to the amount of saving at that rate."[7] In simple words, the rate of interest is determined where demand for investible funds equals the supply of investible funds, that is, the supply of savings.

6. J. M. Keynes, *The General Theory,* p.175.

7. *The General Theory*, p.175.

The classical theory of interest is illustrated in Fig. 13.1. In classical view, investment is an inverse function of the interest rate. That is, demand for investible funds increases when interest rate decreases and *vice versa*. That is, $I = f(i)$, $\Delta I/\Delta i < 0$. The investment schedule is shown by the curve I_1. The supply of savings, according to the classical view, is a positive function of the interest rate. That is, $S = f(i)$, $\Delta S/\Delta i > 0$. The saving supply schedule is shown by the curve S.

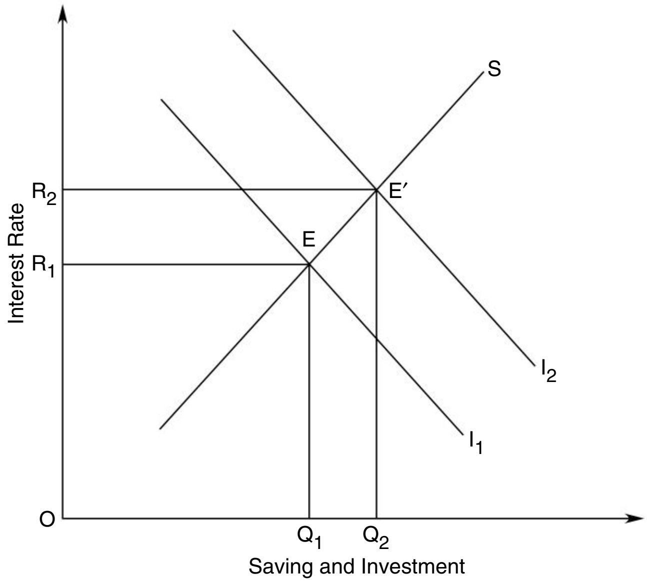

Fig. 13.1 The Classical Theory of Interest Rate

As Fig. 13.1 shows, investment and saving schedules intersect at point E determining the interest rate at OR_1. At this interest rate both demand for investible funds and supply of savings are equal at OQ_1. That is, at the interest rate OR_1, the households are willing to supply only as much funds as investors are willing to invest. That is, demand for investment equals supply of savings. Therefore, the capital market is in equilibrium.

The equilibrium rate of interest changes only when there is a change in either of the two determinants of the interest rate. For example, suppose new inventions are made, like a car manufacturing company invents a car that can be run by water or an energy research institute invents a technique to conserve solar energy in unlimited quantity, and so on. Such inventions encourage new investments, at interest rate (OR_1). As a result, the investment curve shifts upward to I_2 which intersects the supply-of-saving curve at point E'. Consequently, the interest rate rises to OR_2.

13.4 KEYNES'S CRITICISM OF CLASSICAL THEORY OF INTEREST

According to Keynes, *the classical theory of interest is indeterminate as it does not take into account other factors which play an important role in the determination of the interest rate*. To prove his point, he pointed out several flaws in the classical theory of interest.

First, the classical theory implicitly assumes income to be given and saving to be a unique function of interest, that is, $S = f(i)$. Assuming income to be given implies that there is a relationship between saving and income, that is, saving is not a function of interest alone but also of income. While classical economists did recognise this fact, they ignored the relationship between income and saving in their saving function. To this extent their interest theory remains incomplete.

Second, the classical school recognises in its formulation of the interest theory only two primary functions, *viz.*, $S = f(i)$ and $I = f(i)$. It ignores two other factors which are equally important in the determination of the interest rate. These are: (i) relationship between income and saving, and (ii) the relation between investment and income. More precisely, the classical theory of interest ignores the facts that $S = f(Y)$ and $Y = f(I)$. These two relationships are equally, if not more, important in the determination of the interest rate. That is why classical theory of interest is indeterminate.

The indeterminateness of the classical theory is illustrated in Fig. 13.2. Suppose that initial investment and saving schedules are given as I_1 and S_1 which intersect at point *A* determining the interest rate at OR_1. Now let the demand for investment go up due to, say, innovation of a new product, and investment schedule shift to I_2. Now a new equilibrium is set up at point *B*. In the classical scheme of thought, a new interest rate (OR_2) is determined which will remain stable. Similarly, if there is a shift in the saving schedule or in both saving and investment schedules, a new stable equilibrium rate of interest will be determined, say, at point *C*. As Keynes puts it, "The classical theory of rate of interest seems to suppose that, if the demand for capital shifts or if the curve relating the rate of interest to the amount saved of a given income shifts or if both these curves shift, the new rate of interest will be given by the point of intersection of the new position of the two curves. But this is nonesense theory."[8] He adds that error in the classical theory lies in its assumption that the investment demand schedule (I) can shift without causing a shift in the

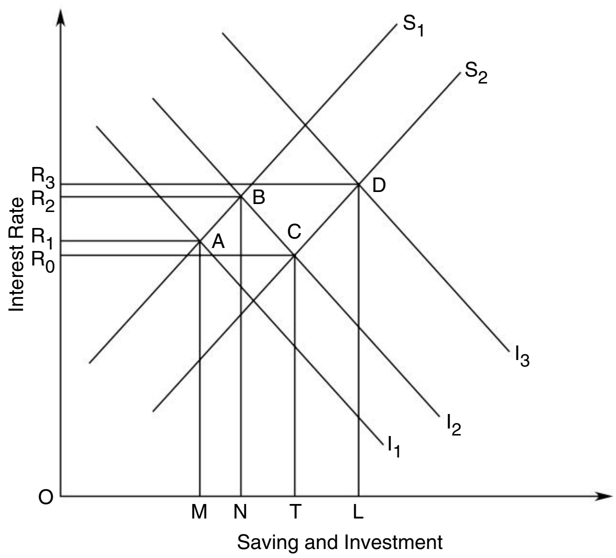

Fig. 13.2 Indeterminateness of the Classical Theory of Interest

8. J. M. Keynes, *The General Theory,* p.179.

saving schedule (S). But this is not true. What happens, in fact, when investment increases, it causes an increase in income. That is, since $Y = f(I)$, ΔI results in ΔY. And, since $S = f(Y)$, ΔY results in ΔS. An increase in savings (ΔS) makes the saving schedule shift to S_2 which intersects I_2 at point C. Note that due to this shift in S schedule, the interest rate falls heavily to OR_0. This fall in the interest rate will cause a rise in the investment, and the whole process repeats itself, without interest rate being determined at any specific point.

Other dimensions to this problem are added by two other close factors, *viz.* (i) marginal efficiency of capital (*MEC*) and (ii) consumption-income relationship: $C = f(Y)$. If we assume that *MEC is* subject to diminishing returns, an increase in investment will cause a fall in *MEC*. If decrease in *MEC* is greater than the fall in the interest rate, investment will decrease even with falling interest rate. The other factor involves the effect of the market expansion on the investment. With several bouts of ΔY, the level of consumption (C) will continue to increase. This will expand the market size. This may lead to an increase in investment, interest rate remaining the same. This causes a shift in the investment schedule. It is clear that a change in one variable causes change in other variables. As a result, saving and investment schedules keep shifting regularly, making the system indeterminate.

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QUESTIONS FOR REVIEW

1. Explain Fisher's version of the quantity theory of money. Examine critically the classical quantity theory of money.
2. It is argued that classical quantity theory of money is a mere truism. Do you agree with this argument? Give reasons.

3. Explain the income version of the quantity theory of money. How is this version different from Fisher's transaction equation?
4. Distinguish between transaction equation and income equation of the quantity theory of money. In what way is income version an improvement over the transaction equation?
5. The quantity theory of money was developed essentially to explain the changes in the general price level. Do you agree with this statement? How can you derive the demand for money from the Fisher's quantity theory of money?
6. Which of the following equations represents Fisher's quantity theory of money?

   (a) $M = PT/V$ (b) $V = PT/M$
   (c) $MV = PT$ (d) $P = MV/T$

7. Write the name of the quantity theory of money which is associated with each of the following equations.

   (a) $M_d = kPR$ (b) $MV = PT$
   (c) $MV = PY$

8. Write the equation for the following quantity theories of money.

   (a) Income version of Fisher's equation
   (b) Classical version of quantity theory
   (c) Neoclassical version of quantity theory
   (d) Fisher's quantity theory
   (e) Cambridge cash-balance equation

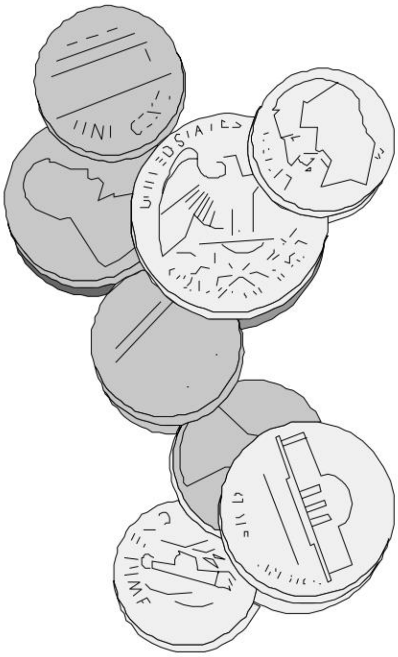
9. Discuss elaborately the difference between the Fisher's and Cambridge versions of quantity theory of money. Show the relationship between 'Cambridge k' and Fisher's V.
10. Which of the following equations is associated with neoclassical quantity theory of money?

    (a) $M/k = PR$ (b) $M^d = kPR$
    (c) $M(1/k) = PR$ (d) $MV = PR$

11. All versions of the quantity theory of money link the general price level to the change in supply of or demand for money. Explain with the help of relevant equations.
12. Explain the classical theory of interest. Is this theory determinate? What is the Keynesian view on the classical theory of interest?

Chapter 14

The Keynesian Theory of Money and Interest



INTRODUCTION

In Chapter 13, we have discussed the classical theory of money and interest. In this chapter, we will discuss the Keynesian theory of money and interest.[1] Keynesian theories of demand for money and interest rate determination mark two significant developments in the theory of money and interest in the post-classical era.

14.1 THE CLASSICAL AND NEOCLASSICAL VIEWS ON HOLDING MONEY: A PRECURSOR

Before we discuss the Keynesian theory of demand for money, let us have a quick view of the classical and the neoclassical views on holding money. This will be helpful in understanding the background in which Keynes had formulated his own theory of demand for money. Here, the terms 'holding money' and 'demand for money' are used as synonyms.

The classical economists treated money only *as a medium of exchange*. In their opinion, therefore, people hold money only for transaction purposes. They held the view that people do not hold any idle cash balance in excess of their transaction demand because it involves loss of interest. The classical economists did not recognise the asset function or the *store-of-value function* of money.

[1] The readers interested in complete picture of the monetary theory are advised to read Chapters 13, 14 and 15 together.

The classical money demand function is written as

$$M_d = kY$$

(where $M_d = M/P$, *i.e.,* demand for real cash balance).

The neoclassical or the Cambridge theory of money did recognise the asset function of money, but did not go beyond. According to this theory, people hold cash balance because it performs medium-of-exchange and store-of-value functions. Although the Cambridge cash-balance approach did recognise the 'asset' function of money, it did not look at the idle cash balance *vis-à-vis* alternative forms of income earning financial assets, especially bonds. Also, the Cambridge version did recognise the fact that expected future prices and interest rate could affect the demand for money, but it does not go further to investigate the relationship between the interest rate and demand for money.

Keynes extended Cambridge theory to include *holding bonds and securities as an alternative to holding idle cash balance as an asset*. In his own theory of demand for money, Keynes emphasised the asset function of money *vis-à-vis* another form of asset—bonds. More importantly, he linked the demand for money to the variations in the interest rate and introduced, thereby, another kind of demand for money, i.e., *speculative demand for money*. In Keynesian sense, the element of speculation arises due to uncertainty about interest rate fluctuations. According to Keynes, when people make choices between the idle cash balance and income-yielding bonds under the condition of uncertainty, they speculate on the interest rates. According to Keynes, the money which people hold to buy bonds in future expecting bond prices to go down is the *speculative demand for money.* This is Keynes' innovative contribution to the theory of demand for money.

14.2 THE KEYNESIAN THEORY OF DEMAND FOR MONEY

Keynes built his theory of demand for money, *i.e.,* his '**liquidity preference'[2] theory**, on the Cambridge cash-balance approach to the demand for money. It is, in fact, an extension of the Cambridge theory of money. According to Keynes, money is demanded for three motives.

(i) Transaction motive,
(ii) Precautionary motive, and
(iii) Speculative motive.

The three motives and their determinants are discussed below.

14.2.1 The Transaction Demand for Money

Keynes's approach to the transaction demand for money is virtually the same as the Cambridge cash-balance approach to holding money. The need for holding money arises because there is a time gap between the receipt of income and expenditure. Income is received periodically—weekly, monthly or annually—whereas it is spent on goods and services almost regularly as and when need arises. For example, individuals getting their salary on monthly basis do not spend the entire income on the first day of the month. They hold some money for telephone and electricity bills and house tax, and so on, to be paid as and when the demand is received.

The transaction demand for money is positively related to the level of income. It is important to note here that Keynes assumed prices (P) to remain constant. Therefore, his demand for money

2. The terms 'liquidity preference,' 'demand for money,' and 'holding money' are used synonymously.

implies demand for real cash balance and income refers to real income. People know by their experience the amount of money they need for transacting their planned expenditure. The higher the level of income, the higher the demand for money. This micro logic of demand for money is extended to the aggregate demand for money for transaction purpose. In fact, the aggregate demand for transaction money is the sum of the individual demands. According to Keynes, the aggregate transaction demand for money is a positive function of the national income. That is,

$$M_t = f(Y) \tag{14.1}$$

where M_t is transaction demand for money and Y is real income.

In the Keynesian system, the proportion of income held for transaction motive is *constant* or *fairly stable* in the short run. It implies that, given the income and its distribution, the short-run relationship between income and transaction demand for money can be specified as

$$M_t = kY \tag{14.2}$$

where k denotes a constant proportion of income demanded for transaction purpose.

The relationship between income and transaction demand for money is graphically depicted in Fig. 14.1. The straight line marked $M_t = kY$ shows the relationship between the income and transaction demand for money. The slope of this line = $\Delta M_t/\Delta Y = k$ *(constant)*. However, the assumption that k remains constant has been questioned by some economists. This aspect will be discussed in the next chapter.

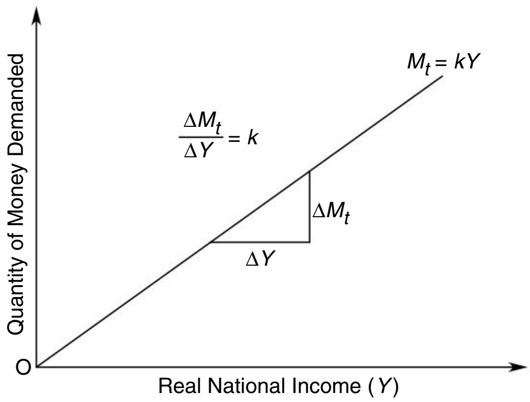


Fig. 14.1 The Transaction Demand for Money (M_t)

In the Keynesian system, money demanded for planned and committed transactions is assumed to be *interest-inelastic* because, whatever the rate of interest, people cannot stop paying grocer's bill, house-rent, electricity and telephone bills, school fees, and medical bills, etc. However, some economists[3] argue that when the rate of interest is very high, even in the short run, the demand for money starts responding to the rising rate of interest. This situation is illustrated in Fig. 14.2. The transaction demand for money is shown to be interest-elastic beyond the rate of interest i_3. The reason is, a high rate of interest means a high cost of holding idle cash balance. Therefore, individuals begin to rationalise their expenses and postpone nonessential purchases and businessmen

[3] See, for example, A. H. Hansen, *Monetary Theory and Fiscal Policy,* (McGraw-Hill, 1949), pp. 66-67.

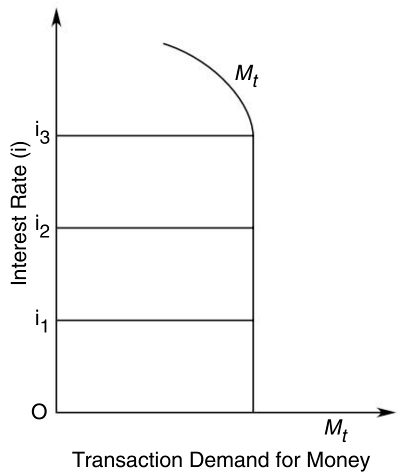


Fig. 14.2 The Interest and Transaction Demand for Money (M_t)

begin to reduce their inventories. However, the analysis of the Keynesian theories that follows is based on the assumption that M_t *is interest-inelastic* throughout.

14.2.2 The Precautionary Demand for Money

Keynes argued that both households and business firms hold some money in excess of their transaction demand to provide for unforeseen contingencies. The need for contingent expenditure arises due to such unforeseen and unpredictable events like fire, theft, sickness, loss of job, accidents, death of the bread winner and market eventualities. Besides, when unforeseen opportunities arise, for instance, market changes like a sudden temporary fall in prices of bonds and consumer durables people take advantage of it to promote their interest. To protect and to promote their interest against such contingencies and unforeseen opportunities, people do hold some idle cash balance. The money held for this motive is called *precautionary demand for money.*

Like transaction demand for money, precautionary demand for money is also closely and positively related to the level of income. The higher the level of income, the higher the demand for money for precautionary motive. This relationship is expressed in functional form as

$$M_p = f(Y) \qquad \textbf{(14.3)}$$

where M_p is the *precautionary demand for money*.

The money demanded for precautionary motive also becomes interest-elastic if the interest rate rises beyond a certain level. It is rather more interest-elastic than the transaction demand.

Since both transaction and precautionary demands for money are a function of the income, Keynes lumped them together which can be expressed as $M_t + M_p = M_T$. Thus, the Keynesian total transaction demand for money can be expressed as

$$M_T = f(Y) = kY \qquad \textbf{(14.4)}$$

Till this point, there is no significant difference between the classical and Keynesian theories.

14.2.3 The Speculative Demand for Money

According to Keynes, people hold a part of their income also in the form of idle cash balance for *speculative purpose*. The desire to hold idle cash balance for speculative purpose arises from the desire to take advantage of the changes in the *money market*, specifically, the asset market. In Keynes' view, it is rational to hold idle cash balance instead of holding a bond if the rate of interest is expected to rise in future. If the interest rate does increase in future, the bond prices go down. Then the person who holds the idle cash can buy the bond at a lower price and make a capital gain. Besides, he earns a higher rate of return on the bonds. The higher rate of return arises because he earns a given income on a bond which has a price lower than its face value. If interest rate does not increase, those who hold idle cash balance lose interest on it. Thus, if a person decides to hold idle cash balance in expectation of rise in the interest rate under the condition of uncertainty, the person is speculating. Speculation involves an element of risk. Keynes called this kind of cash balance holding as *speculative demand for money.*

The speculative demand for money is not without a rationale. Suppose a person has Rs 1000 in excess of his transaction demand for money. He has only two options with respect of his excess cash balance—either to hold it as idle cash or buy a very long-term or perpetual bond yielding a fixed income of Rs 50 per annum. Assuming that he is a gain maximiser, how does he make his choice? One widely used method of evaluating his options is to compare the sterile cash balance with the market value of the bond. The market value of the bond is simply the **present value** of income stream expected from the bond. The formula[4] for obtaining the present value (V), or the capitalised value, of a constant income stream is given below.

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[4] The formula has been arrived at as follows. As discussed in Chapter 10, the market value (V) of a constant future income *stream* can be obtained as follows.

$$V = \frac{R}{(1+i)} + \frac{R}{(1+i)^2} + \frac{R}{(1+i)^3} + \ldots\ldots + \frac{R}{(1+i)^n} \quad \textbf{(i)}$$

By multiplying both sides of Eq.(i) by $(1 + i)$, we get

$$V(1+i) = R + \frac{R}{(1+i)} + \frac{R}{(1+i)^2} + \ldots\ldots + \frac{R}{(1+i)^{n-1}} \quad \textbf{(ii)}$$

or,
$$V + V(i) = R + \frac{R}{(1+i)} + \frac{R}{(1+i)^2} + \ldots\ldots + \frac{R}{(1+i)^{n-1}}$$

By subtracting Eq. (i) from Eq. (ii), we get

$$V + V(i) - V = R - \frac{R}{(1+i)^n} \quad \textbf{(iii)}$$

or,
$$V(i) = R - \frac{R}{(1+i)^n}$$

Dividing both sides of Eq. (iii) by i, we get

$$V = \frac{R}{i} - \frac{R}{(1+i)^n} \times \frac{1}{i} \quad \textbf{(iv)}$$

Since income from the bond is perpetual, $(1 + i)^n$ tends to infinity and the term $R/(1 + i)^n \times 1/i$ in Eq. (iv) tends to zero. The Eq. (iv) is reduced to

$$V = \frac{R}{i}$$

$$V = \frac{R}{i} \tag{14.5}$$

where, R is the annual return and i is the market rate of interest.

Assuming a market rate of interest to be given at 5% p.a., the present value (V) of a perpetual income of Rs 50 can be obtained by the formula given in Eq. (14.5) as

$$V = \frac{\text{Rs}\,50}{5/100} = \frac{\text{Rs}\,50}{0{\cdot}05} = Rs.\ 1000 \tag{14.6}$$

The amount thus calculated (i.e., Rs 1000) is the *capitalised value* of the fixed income stream of Rs 50 per annum over a long period. This is also the market value of the bond because those who want to earn an annual income of Rs. 50 will be willing to buy the bond at a price of Rs 1000. Under these conditions, one may or may not buy the bond because Rs 1000 in the form of cash is as good as buying a bond for Rs 1000.

Let us now see what happens if a bond holder speculates market rate of interest to fall in future to 2.5 percent p.a. At this rate of interest, the market value of the bond will increase to Rs. 2000 computed as below.

$$V = \frac{50}{0.025} = \text{Rs } 2000$$

He will buy the bond and sell it at a future date (when his expectations materialise) at Rs 2000 and make a capital gain of Rs 1000. Thus, when a fall in the market rate of interest is expected, the preference for bond increases and, therefore, speculative demand for money increases.

On the contrary, if the market rate of interest is expected to increase to 10%, the market value of the bond decreases to Rs. 500 as shown below.

$$V = \frac{50}{0.10} = \text{Rs. } 500$$

Thus, with the increase in the market rate of interest, the market value of the bond decreases and involves a capital loss of Rs 500. Therefore, the preference for bond will decrease and the speculative demand for money will decrease too. This implies that as the rate of interest increases, the speculative demand for money decreases.

The ***conclusion*** that emerges from these calculations can be stated as follows. *The market value of bonds and the market rate of interest are inversely related. A rise in the market rate of interest leads to an increase in the market value of the bond, and vice versa.* This means that the speculative demand for money (M_{sp}) and interest are inversely related. This relationship can be expressed as

$$M_{sp} = f(i),\ (\Delta M_{sp}/\Delta i < 0) \tag{14.7}$$

The nature of relationship between the speculative demand for money and the market interest rate is graphically depicted in Fig. 14.3. The M_{sp}-curve is the demand curve for speculative demand for money. It shows an inverse relationship between the rate of interest and the speculative demand for money.

The Liquidity Trap Keynes has hinted at a *remote possibility* of a situation when the market rate of interest falls to a 'critical' minimum level, say to i_1 in Fig. 14.3, and the liquidity preference curve becomes flat. It implies that the speculative demand for money becomes infinitely large or elastic when the rate of interest goes below a 'critical' minimum level—a level below which people prefer to hold idle cash balance and banks pull down their shutters. Keynes called this kind of a situation as 'liquidity trap.'

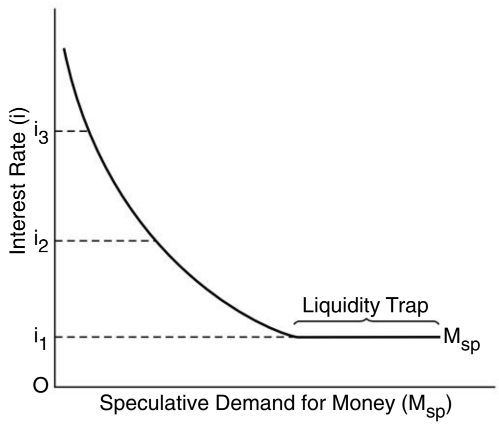

Fig. 14.3 The Speculative Demand for Money

The phenomenon of liquidity trap can be explained as follows. There are two kinds of speculators, called 'factors', in the stock markets—bulls and bears. These factors—bulls and bears—operate also in the money market. Bulls are those who expect interest rate to go down and bond prices to go up in future. Therefore, they convert their idle cash balances into bonds. Bears, on the other hand, expect interest rates to go up and bond prices to go down. Therefore, they off load their bonds and accumulate idle cash balance. These bullish and bearish factors explain the liquidity preference curve. The behaviour that explains the *liquidity trap* is the preference for unlimited idle cash balance when the rate of interest falls much below the 'normal' level. At this stage, even the bulls turn bears. They too start believing that the interest rate would not go any further down as it has reached its 'critical' minimum level.[5] Instead, they begin to expect that the interest rate would rise and, therefore, bond prices will go down causing a capital loss. Therefore, they too start selling their bonds and accumulating cash balance. It is a situation when everybody prefers idle cash balance to bond holding. Under this condition, even if monetary authority increases money supply to lower the rate of interest the entire extra money supply gets trapped in liquidity as extra idle cash balance. This is what Keynes called 'liquidity trap'.

14.2.4 The Keynesian Demand-for-Money Function

Having described the various components of aggregate demand for money and their determinants, we present here the final form of the Keynesian theory of demand for money. According to Keynes, the aggregate demand for money consists of two components:

(i) The transaction (including precautionary) demand (M_T), and
(ii) Speculative demand (M_{sp}).

Thus, the aggregate demand for money (M_d) can be expressed as

$$M_d = M_T + M_{sp} \qquad \textbf{(14.8)}$$

Since $M_T = kY$ and $M_{sp} = f(i)$, given the income and interest rate, the Keynesian aggregate money demand function can be expressed as

$$M_d = kY + f(i) \qquad \textbf{(14.9)}$$

5. The rate of interest is said to be at its critical minimum when even if monetary authorities were to expand the money supply, the rate of interest would not fall as the entire additional money supply would be held by the people as idle cash balance in anticipation of the rise in the interest rate.

The relationship between the aggregate demand for money and the interest rate is crucial to the Keynesian theory of demand for money and the theory of interest. The relationship between the two is shown by a total-money-demand curve (M_d) in relation to the interest rate. The derivation of M_d-curve has been illustrated in Fig. 14.4. Panel (a) of the figure shows the transaction demand for money (M_T) in relation to the interest rate. Since transaction demand for money is assumed to be interest-inelastic, M_T is shown by a straight vertical line. As shown in the figure, whether the interest rate is i_1, i_2 or i_3, the transaction demand for money remains constant at M_T.

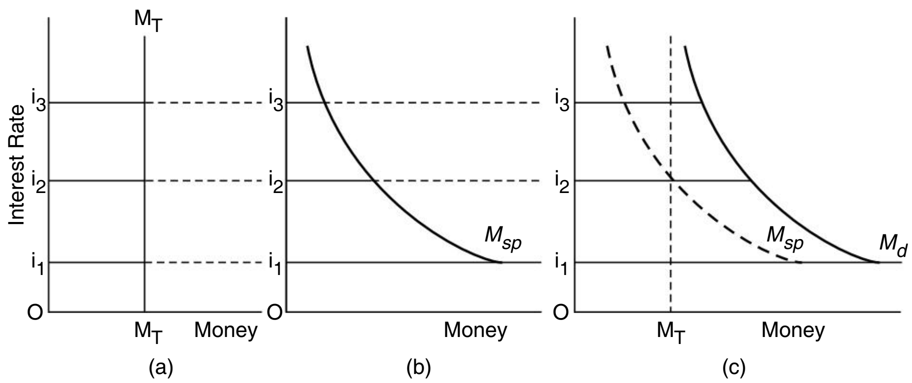

Fig. 14.4 The Total Demand for Money

Panel (b) presents the speculative demand for money (M_{sp}) in relation to the interest rate. The M_{sp} is inversely related with the interest rate.

Panel (c) presents the total demand for money (M_d). The total-money-demand curve, i.e., M_d curve, is simply a horizontal summation of M_T and M_{sp} curves. The M_T and M_{sp} curves of panels (a) and (b) are reproduced in panel (c) and shown by the dotted lines. The M_d curve gives the total demand for money (M_d) in relation to the interest rate. The curve M_d is the Keynesian demand curve for money.

14.2.5 Criticism of the Keynesian Theory of Demand for Money

The Keynesian theory of demand for money was undoubtedly a radical improvement over the classical and neoclassical theories of money. His theory has however been criticised on the following grounds.

First, Keynes' division of demand for money between transaction, precautionary and speculative motives is unrealistic. For, the people do not maintain a separate purse for each motive. They have one purse for all purposes. Besides, empirical evidence shows that, contrary to Keynes' postulate, even the transaction demand for money is interest-elastic.

Secondly, critics reject the Keynesian postulate that there exists a 'normal' rate of interest and the current rate of interest may not necessarily be the same as the normal rate: there may always be a difference between the two. According to Keynes, the speculative demand for money is governed by the difference between the 'normal' and the current rates of interest. But, the critics argue that if the current rate of interest remains stable over a long period of time, people tend to take it to be the normal rate. Consequently, the difference between the current rate and the normal rate disappears. With it, disappears the basis for speculation and the speculative demand for money.

Thirdly, Keynes assumed unrealistically that the people hold their financial assets in the form of either idle cash balance or bonds. In fact, people hold their assets in a combination of both the assets.

14.3 THE KEYNESIAN THEORY OF INTEREST AND MONEY MARKET EQUILIBRIUM

Having discussed the Keynesian theory of demand for money, we discuss now the Keynesian theory of interest rate determination and the money market equilibrium. According to the Keynesian theory of interest, market rate of interest is determined by the aggregate demand for money and the total supply of money. And, the equilibrium rate of interest is determined at the rate at which money market is in equilibrium. Money market is in equilibrium where

$$M_d = M_s$$

The determination of the equilibrium rate of interest is illustrated in Fig. 14.5. The derivation of the demand curve for money (M_d) has already been explained in the foregoing section. It is reproduced in Fig. 14.5, as shown by the M_d-curve.

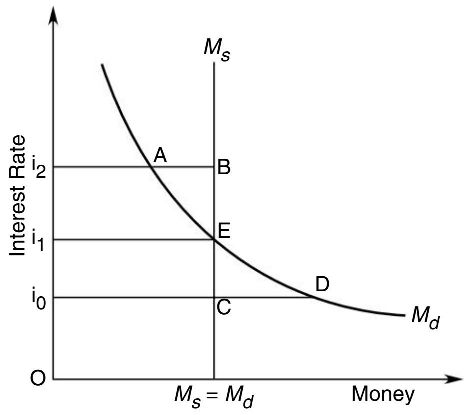

Fig. 14.5 Determination of the Interest Rate: The Keynesian Theory

As regards the supply of money, in the Keynesian model, the supply of money (M_s) is assumed to remain constant in the short run. It is constant because the supply of money in any country is determined by the central bank of the country in view the overall monetary needs of the country. The supply of money in India, for example, is determined by the Reserve Bank of India. Central banks do not increase or decrease the supply of money in response to the variation in the rate of interest. Therefore, the supply of money in any time period is assumed to be given, as shown by the vertical line M_s in Fig. 14.5. It is therefore deemed to be *interest-inelastic*.

As Fig. 14.5 shows, the money demand curve (M_d) and money supply schedule (M_s) intersect at point *E*. At this point, $M_s = M_d$. Therefore, the equilibrium rate of interest is determined at i_1. This rate of interest is supposed to be stable. For, at any other rate of interest, $M_d \neq M_s$. For example, if the interest rate rises to i_2 for some reason in any period of time, M_d will decrease by *AB*. The reason is, with the increase in the interest rate, bond prices go down and the speculative demand for money decreases. This situation of disequilibrium sets the market forces in motion to restore the equilibrium. *How*? When the interest rate goes up, people prefer to hold bond because of its low price and reduce their idle cash balances. The bearish factor in the market speculates a fall in the interest rate and the consequent rise in the bond price—an expectation that will fetch capital gain. This creates demand for an idle cash balance. This implies movement from point *A* towards point *E* on the M_d-curve forcing down the interest rate. As a result, the excess supply of money disappears and equilibrium is restored.

Similarly, when the rate of interest falls, for some reason, from i_1 to i_0, the speculative demand for money increases because at a lower rate of interest the preference for cash holding increases. As a result, the aggregate demand for money (M_d) increases by *CD*. Consequently, demand for money exceeds supply of money by *CD*. Since there is shortage of money in the money market, people begin to expect a rise in the interest rate and, therefore, demand for money begins to decrease and continues to decrease until the equilibrium point *E* is restored.

14.4 CHANGES IN THE MONEY MARKET AND THE INTEREST RATE

The changes in the conditions on the demand and supply sides of the money market bring about a change in the interest rate. In this section, we will discuss first the effects of the changes in money demand on the interest rate and then that of the change in money supply.

14.4.1 Change in Demand for Money and Interest Rate

Demand for money may change due to either change in transaction demand or change in speculative demand or both. We discuss here first the effect of change in the transaction demand for money on the interest rate and then that of speculative demand for money.

Change in Transaction Demand for Money The transaction demand for money may change for endogenous and exogenous reasons. Going by the Keynesian theory, however, let us assume that it changes endogenously due to a change in income. We have noted above (see Eq. 14.9.) that

$$M_d = kY + f(i)$$

Given the money demand function, let us suppose that income (Y) changes, speculative demand for money remaining constant. The change in income will cause a change the transaction demand for money by the factor k. As a result, the demand curve for money shifts upward or downward. The shift in the demand curve causes a change in the interest rate. When income increases, for any reason, the transaction demand for money increases which shifts the demand curve upward and the interest rate goes up and *vice versa*.

Fig. 14.6 presents the case of increase in income and its effect on the demand for money and on the interest rate. Suppose that the level of income in some period of time is Y_1. At this level of income, the transaction demand for money is M_{T1} and the total-money-demand curve associated with income Y_1 is given by the curve M_{d1}. The vertical line M_s represents the given supply of money. As the figure shows, the money demand and supply curves intersect at E_1 and the equilibrium rate of interest is determined at i_1.

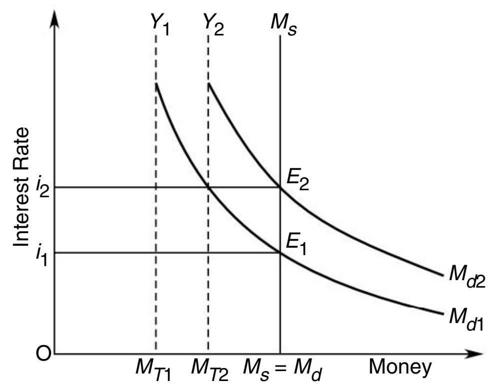

Fig. 14.6 Change in Income, Demand for Money and Interest Rate Determination

Given this equilibrium condition, let the level of income increase to Y_2 so that the transaction demand for money increases to M_{T2}. The speculative demand for money remaining the same, M_d-curve shifts rightward to the position of M_{d2}. The curve M_{d2} intersects the money supply curve (M_s) at point E_2. Thus, the equilibrium rate of interest rises to i_2. The rise in the interest rate from i_1 to i_2 is the effect of increase in the transaction demand for money on the rate of interest.

Where does the additional transaction cash balance come from? As Fig. 14.6 shows, with the rise in the level of income from Y_1 to Y_2, the transaction demand for money increases from OM_{T1} to OM_{T2}. It shows also that at both the equilibrium rates of interest—i_1 and i_2—the total demand for money, M_d, remains the same and it equals the total supply of money, M_s. So a question arises: Where does the additional transaction cash balance come from? The answer is: It comes from the speculative cash balance. That is, speculative cash balance is reduced to meet the additional transaction cash balance. This point can be verified from Fig.14.6. It can be seen in the figure that at equilibrium interest rate i_1, transaction cash balance is OM_{T1} and speculative cash balance is $M_D - M_{T1} = M_{T1}\, M_D$. When M_D increases causing an upward shift in M_D curve and the equilibrium interest rate rises to i_2, transaction cash balance increases from OM_{T1} to OM_{T2}, that is, it increases by $M_{T1}\, M_{T2}$. On the other hand, the speculative demand for money decreases from $M_D - M_{T1}$ to $M_D - M_{T2}$. That is, it decreases by $M_{T1}\, M_{T2}$. Note that the increase in transaction cash balance ($M_{T1}\, M_{T2}$) equals the decrease in speculative cash balance ($M_{T1}\, M_{T2}$).

How does it happen? When income level (Y) increases, the transaction demand for money increases inevitably. The bondholders then begin to sell their bonds to acquire the required transaction cash balance. In the process of converting bonds into transaction cash balance, bond prices go down and the interest rate goes up. This process continues until people acquire the required transaction cash balance. At the end of the process, the transaction cash balance increases to its required level and speculative cash balance decreases by the same amount. Finally, as shown in Fig. 14.6, a new point of equilibrium (E_2) is reached with (a) a higher transaction cash balance (OM_{T2}), (b) a lower speculative cash balance ($M_{T2}\, M_d$), and (c) a higher rate of interest (i_2).

Change in the Speculative Demand for Money Let us now assume that the speculative demand for money changes, all other things remaining the same—especially the transaction demand for money and the interest rate. This change in speculative demand for money causes a shift in the speculative demand for money.

Why does the M_{sp}-curve shift? The speculative demand for money is based on peoples' expectations regarding the changes in the normal rate of interest. If people expect a fall in the interest rate below its *normal level*, they expect bond prices to go up and therefore they demand more money for speculative purposes. The increase in speculative demand for money causes a rightward shift in the M_{sp}-curve.

The shift in the speculative-money-demand curve and its effect on the interest rate are illustrated in Fig. 14.7. Suppose that, in some time period, the total demand for money (M_d) and the total supply of money (M_s) are given as shown in Fig. 14.7 and the equilibrium rate of interest is determined at i_1. Suppose this is the normal rate of interest.

Now suppose that, given the normal rate of interest, majority of the people expect it to fall and a small number of people expect it to rise. As a result, speculative demand for money increases. This causes a shift in the demand curve for speculative money. As a result, the total-money-demand curve (M_d) shifts rightward intersecting the money-supply line (M_s) at point E_2 and a new equilibrium rate of interest is determined at i_2. This may not always be the case. If the rise in the demand for speculative money is more than M_d M_s, the new equilibrium rate of interest will be higher than i_2. A similar analysis can be performed by assuming a fall in the interest rate due to, say, recession in the economy. The result will then be opposite.

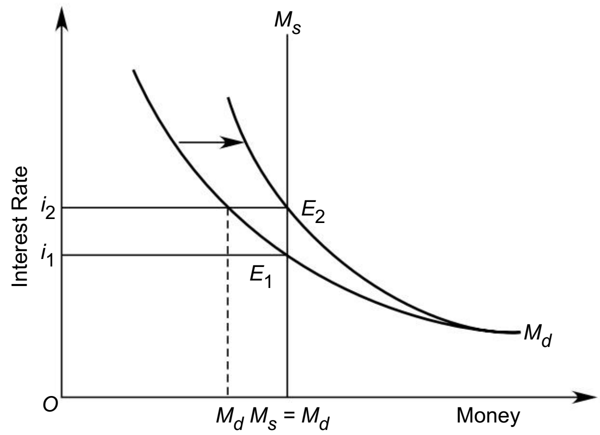

Fig. 14.7 Change in Speculative Demand for Money and Interest

14.4.2 Change in Money Supply and Interest

We had so far assumed that money supply (M_s) remains constant. But, in reality, money supply keeps changing. Let us now analyse the change in the money supply and its effect on the interest rate. It may be noted at the outset that the money supply and the interest rate are inversely related. An increase in the money supply, given the money demand curve, causes a decrease in the interest rate and *vice versa*. This relationship between the money supply and the interest rate is depicted in Fig. 14.8.

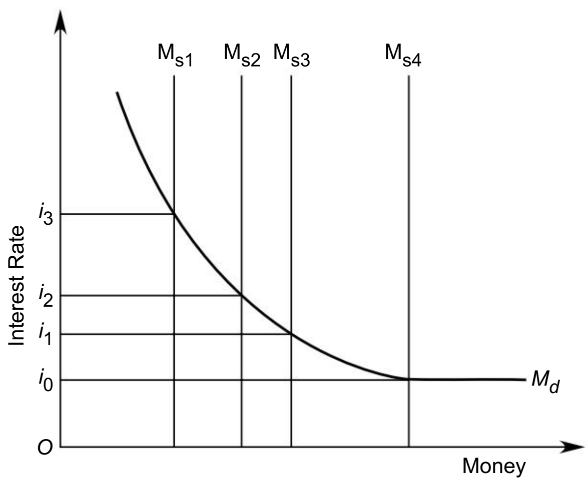

Fig. 14.8 Change in Money Supply and Interest Rate

Let us suppose that the total money-demand curve is given as M_d as shown in Fig. 14.8 and the money supply is given at M_{s1}. Given the money demand curve and money supply, the equilibrium rate of interest is determined at i_3. Let the central bank now increase the money supply so that the money supply curve shifts to M_{s2}. With the increase in money supply to M_{s2}, the interest rate falls to i_2, Therefore, the people tend to hold more cash balance for speculative purposes. As the money supply increases to M_{S4}, the interest rate falls to i_0. It is here that the stage of **liquidity trap** is reached. At this stage, no increase in money supply can push the interest rate further down.

14.5 CRITICISM OF THE KEYNESIAN THEORY OF INTEREST

The Keynesian theory of interest is undoubtedly superior to the classical and loanable funds theory of interest. Ironically, however, the Keynesian theory of interest has been criticised on the grounds Keynes criticised the classical theory. We may recall here Keynes' criticism of the classical theory of interest (see Chapter 13). Briefly speaking, Keynes argued that the classical theory of interest is indeterminate. Keynes' argument against the classical theory of interest can be summarised as follows. Since $S = f(Y)$, saving schedule cannot be known unless income (Y) schedule is known. Since $Y = f(I)$, income schedule cannot be known unless investment function is known. Since $I = f(i)$, investment schedule cannot be known unless interest rate (i) is known. And, interest rate (i) cannot be known unless saving and investment schedules are known. Thus, according to Keynes, the indeterminateness of the variables make the classical theory of interest indeterminate.

According to Hansen, 'exactly the same criticism applies to Keynesian theory in its simpler form.'[6] He reiterates, 'Keynes' criticism of the classical theory applies equally to his own theory."[7] His argument may be summarised as follows. 'According to the Keynesian theory the rate of interest is determined by the intersection of the supply schedule of money ... and the demand schedule for money ... .' This theory 'also is indeterminate' because, even if money supply is fixed by the monetary authority, 'the liquidity preference schedule will shift up or down with changes in the income level.' In the Keynesian system, we cannot know the liquidity preference schedule unless we know the income level. Income level cannot be known unless we know the speculative demand for money and speculative demand for money cannot be known unless interest rate is known. Thus, 'the Keynesian theory, like the classical, is indeterminate.'[8]

Leijonhufvud remarked that the Keynesian theory of interest is 'incredibly tortuous formulation.'[9] According to him, the main trouble lies in his definition of 'savings' as 'non-consumption' taken from the 'pure' theories of interest. This definition might be appropriate in the pure theories of interest, but not in the Keynesian system. Keynes' 'ex-ante savings' is not clearly distinguished from the demand for money for speculative purpose and demand for non-monetary assets.

Concluding Remarks The Keynesian theory of interest presented in this chapter, simple though, marks a radical departure from the classical theory of interest. The Keynesian theory has however its own weakness and shortcomings which have led many economists to make several

6. Alvin H. Hansen, *Guide to Keynes,* (McGraw-Hill, NY, 1953), p.140.
7. *ibid.* p.141.
8. Hansen, A.H., *ibid.*
9. Alex Leijonhufvud, *On the Keynesian Economics and the Economics of Keynes,* (London, Oxford University Press), 1968, p.28.

improvements and extensions in the Keynesian theory of interest. The extensions and improvements in the Keynes's theory of interest will be discussed in the next chapter.

SUGGESTED READINGS

Ackley, Gardner, *Macroeconomics : Theory and Policy,* (Macmillan, NY.), 1978, Chs. 5 and 9.

Laidler, D. W., *The Demand for Money: Theories and Evidence,* (Allied Publishers, Bombay, 1972).

Shapiro, E. *Macroeconomic Analysis,* (Galgotia, New Delhi, 1994), Ch. 11.

QUESTIONS FOR REVIEW

1. What are the reasons for holding money in the Keynesian system? How is the Keynesian theory of demand for money different from the classical theory?
2. Define and explain the speculative demand for money. Why is the speculative demand for money interest-elastic?
3. Why does the speculative demand for money change with the change in the interest rate? Explain in this regard the relationship between the interest rate and the bond prices.
4. When the transaction demand for money is interest-inelastic and speculative demand for money is interest-elastic, how can the total money demand curve be interest-elastic?
5. Why does an increase in the interest cause a decline in the bond prices? What is its effect on the demand for money?
6. What is the effect of simultaneous change in money demand and money supply if (a) both change in the same direction at equal and different rates, and (b) both change in opposite direction at equal and different rates?
7. What is meant by the 'Liquidity trap'. Why does a change in money supply up to a certain limit does not help the economy out of the liquidity trap?
8. Explain the Keynesian theory of the interest rate determination. How is the Keynesian theory different from the classical theory of interest?
9. Explain the derivation of the Keynesian money demand function. What factor causes the shift in money demand function?
10. Suppose money demand function is given as $M_D = kY + f(i)$. Explain and illustrate graphically how change in Y and i would affect M_D.
11. The Keynesian theory of interest is as indeterminate as the classical theory. Comment.
12. "Keynes's criticism of the classical interest theory applies equally to his own theory." Explain and justify this statement.

Chapter 15

The Post-Keynesian Theories of Demand for Money

15.1 AN OVERVIEW

As noted in the preceding chapter, the Keynesian theory of demand for money marked a significant improvement on the classical and neo-classical theories of demand for money and Keynesian monetary policy gained acceptance and popularity in the industrial world. "Under the influence of Keynesian ideas, country after country followed an easy money policy designed to keep interest rates low in order to stimulate, if only slightly, the investment regarded as needed to offset the shortages of demand that was universally feared. The result was an intensification of the strong inflationary pressure inherited from the war, a pressure that was brought under control when countries [adopted] orthodox measures to restrain the growth in the stock of money…"[1]—Italy in 1947, Germany in 1948, US in 1951, Great Britain in 1951 and France in 1961. The persistent inflation raised questions about the validity of the Keynesian theories, in general, and his theory of demand for money, in particular. The Keynesian theory was therefore put to empirical test during the post-Second World War period which revealed its shortcomings. This led many economists to make modifications in and extensions of the Keynesian theory of demand for money.

To look briefly at the areas of post-Keynesian developments in the theory of demand for money, recall that Keynes had postulated (i) that transaction demand for money is the function of current

[1] Milton Friedman, "Money : Quantity Theory" in the *International Encyclopedia of Social Sciences*, (Free Press, 1968), reprinted in A.A. Walters (ed), *Money and Banking*, (Penguin, 1973), pp. 36-66 (quote from p.50).

income, i.e., $M_T = f(Y)$ and (ii) that speculative demand for money is the function of the interest rate $M_{sp} = f(i)$. "Modern theoretical work on the transaction demand for money, due to both Baumol and Tobin, seeks to put the analysis on a more rigorous footing, and to draw more precise implications about the variables that determine it than did Keynes' analysis."[2] Baumol[3] and Tobin[4] showed in the early 1950s that, contrary to the Keynesian postulate, the *transaction demand for* money is also a function of interest and it is interest-elastic. Also, Tobin[5] criticised Keynes's rationalisation of *speculative demand for money* and offered a more realistic approach to the choice between idle cash balance and bonds, and a combination thereof. Later on, Ralph Turvey improved Keynes's liquidity preference theory. Milton Friedman, building on the Cambridge version of the quantity theory of money, developed a new monetary theory, often called 'Modern Quantity Theory'. These and other developments in the theory of demand for money are classified as post-Keynesian theories of demand for money. In this chapter, we will briefly discuss the following post-Keynesian theories of demand for money.

(i) Portfolio theories of demand for money,
(ii) Baumol-Tobin approach to transaction demand for money,
(iii) Tobin's theory of speculative demand for money, and
(iv) Friedman's Quantity Theory of Money.

15.2 PORTFOLIO THEORIES OF DEMAND FOR MONEY

The various theories of demand for money emphasise different functions of money. While classical theory of money demand emphasises the role of money as medium of exchange, the Keynesian theory links the demand for money to both its functions. However, most post-Keynesian theories of demand for money emphasise the store-of-value, i.e., the asset function of money. The theories of demand for money that emphasise the role of money as store of value are called *portfolio theories of money demand*. As we will see below, economists have used different determinants of demand for money as an asset. However, there is little empirical evidence to validate any of the portfolio theories of money demand.[6] Mankiw[7] presents a modified version of the portfolio theories, which reconciles the different views of the portfolio theorists.

According to portfolio theories, as Mankiw puts it, 'people hold money as a part of their portfolio of assets' because 'money offers a different combination of risk and return than other assets'. The alternative assets (like bonds and shares) are associated with a higher degree of risk whereas money 'offers a safe (nominal) return' without much risk. Therefore, households do hold money in their optimal asset portfolio. The amount of money held by the households is determined by an optimum

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2. Laidler, David, *The Demand for Money: Theories and Evidence*, (Allied Publishers, Bombay, 1972), p. 62.
3. Baumol, William J., "The Transaction Demand for Cash: An Inventory Theoretic Approach", *QJE*, 66, November 1952, pp. 545-56.
4. Tobin, James, "The Interest Elasticity of Transaction Demand for Money", *Rev, of Eco. & Stat.*, 38, August 1956, pp. 241-47.
5. Tobin, James, "Liquidity Preference as Behaviour Towards Risk", *Rev. of Eco. & Stat.*, February 1958.
6. For details, see Mankiw, N. Gregory, *Macroeconomics*, (Macmillan Worth Publishers, NY, 2000), pp. 499–500.
7. Mankiw, N. Gregory, *op. cit.*, 494–95.

combination of risk and return offered by money and the alternative assets. In addition to risk and return factors, demand for money depends also on the total wealth of the households. Thus, the money demand function corresponding to portfolio theories of money demand can be written as

$$(M/P)^d = L\ (r_s,\ r_b,\ \pi^e,\ W) \quad \textbf{(15.1)}$$

where $(M/P)^d$ = real money demand, r_s = expected real return on stocks, r_b = expected real return on bonds, π^e = expected rate of inflation, and W = real wealth.

As regards the relationship between the demand for money and its determinants, money demand is inversely related to r_s, r_b and π^e, and positively related to W.

15.2.1 Portfolio and Keynesian Money Demand Functions Compared

The Keynesian money demand function, which Mankiw considers 'a more general and realistic form of money demand function' is expressed as

$$M/P^d = L\ (i,\ Y) \quad \textbf{(15.2)}$$

A question that arises here is : Is the money demand function based on portfolio theories, as given in Eq. (15.1), significantly different from the Keynesian money demand function, as given in Eq. (15.2)? A careful comparison of the two money demand functions will show that, from 'standpoint of portfolio theories', money demand function (15.2) can be viewed 'as a useful simplification' of the function (15.1). This can be shown as follows. The real income variable Y in Eq. (15.2) can be taken as 'proxy' for real wealth (W). And, the nominal interest rate i in Eq. (15.2) is simply the sum of the real return on bonds (r_b) and the expected inflation rate (π^e), i.e., $i = r_b + \pi^e$. The only extra variable in Eq. (15.1) is r_s, i.e., the real return on stocks. It may thus be concluded that, if the returns on other assets are included in Eq. (15.2)—in fact, many authors do that—it becomes quite similar to money demand function (15.1). There is thus not much difference between the portfolio and the Keynesian money demand functions.

15.2.2 Usefulness of Portfolio Theories in Studying Money Demand

The usefulness and applicability of money demand function based on portfolio theories depends on which measure of money supply is being considered – $M0$, $M1$, $M2$ or $M3$. If narrow measures of money supply – $M0$ and $M1$—are taken into account, the portfolio theory of demand is of little use. The reason is $M0$ and $M1$ include only currency and other deposits, which earn 'zero or very low rates of interest'. Money ($M1$) is no doubt a **dominant asset**: the store of value. But, it does not include other important assets like 'saving account, treasury bills, certificate of deposit, and money market mutual funds'. These assets are preferable to $M1$ as the rate of returns on such assets is higher but the risk is the same (zero) as in case of currency and demand deposits. Therefore, people do not find it optimal to hold the dominant asset (money) as a part of their portfolio. Therefore, "portfolio theories cannot explain the demand for these dominant forms of money"[8].

However, portfolio theories offer a plausible explanation of demand for money if broad measures of money, ($M2$ or $M3$), are considered because such measures of money also include other forms of assets that dominate currency and demand deposits. To conclude, portfolio theories of money demand may not be plausible when applied to $M1$ measure of money supply but they may offer a reasonable explanation when applied to demand for $M2$ or $M3$.

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8. Mankiw, N. Gregory, *op. cit.*, pp. 495.

15.3 BAUMOL–TOBIN APPROACH TO TRANSACTION DEMAND FOR MONEY

The Baumol-Tobin approach[9] to the transaction demand for money, also known as ***Inventory Theoretic Approach***, is a significant improvement over the Keynesian theory of transaction demand for money. The two main points that mark the improvement over the Keynesian theory of transaction demand for money are following.

(i) While Keynes had considered transaction, precautionary and speculative demands for money separately, Baumol and Tobin clubbed them together as money for all purposes is held together as 'real cash balance.

(ii) While Keynes had linked the demand for money to only *income* and *interest*, Baumal-Tobin introduced another variables, i.e., the cost of transforming real cash balance into interest bearing bonds and other way round.

Baumol-Tobin have used a sophisticated analysis of bondholders' behaviour and shown that *the transaction demand for money is interest-elastic*. To prove their viewpoint, they have, especially Baumol, used business inventory approach, giving it the name "Inventory Theoretic Approach".

Let us look briefly at business inventory approach. Business firms hold a cash balance to facilitate their business transactions. This cash balance involves an opportunity cost in terms of loss of interest. Therefore, they hold an optimum cash balance, i.e., an amount that minimises the opportunity cost.

Baumol applies the same approach to analyse the behaviour of the individuals in respect of holding cash balance and bonds. Baumol makes the following assumptions in his theory of transaction demand for money.

(i) An individual—a firm and also a household—receives income once per time unit—weekly, monthly or annually—but spends his income regularly over the time unit.

(ii) The individual spreads his expenditure uniformly over the time unit of income receipt. For example, if he spends a total of Rs 100 per month, he spends Rs. 25 per week.

(iii) The individual combines his asset portfolio of cash and bond so as to minimise his cost.

(iv) He carries out his asset transactions—buys and sells bonds—in an environment of certainty.

Given these assumptions, suppose an individual receives his income (Y) annually on the first of January each year and converts his income into income-earning bonds.[10] Suppose also that he has the opportunity of instant buying and selling income-yielding bonds and he is not required to hold any cash balance in excess of his transaction needs. For, if he holds the idle cash balance, he loses

9. Baumol and Tobin had developed their theories independently—Baumol in 1952 in his article "The Transaction Demand for Cash: An Inventory Theoretic Approach" and Tobin in 1956 in his article "The Interest Elasticity of Transaction Demand for Money". Their approach to transaction demand for money is similar and they arrive at similar conclusions. The authors have, however, combined their thoughts together and presented them jointly. Since Baumol's approach is relatively simpler, the reviewers of their work and textbook authors generally follow his approach. The same practice has been followed in this edition of the book for the benefit of the students.

10. One may assume that the individual deposits his income in saving bank account. In that case, he will have to bear a cost on operating his account in terms of cost of visits to the bank.

interest on it over the year, though the cash balance goes on decreasing. It is therefore rational for the individual to buy income-yielding bonds for earning income and to sell some of the bonds to obtain cash for transaction as and when need arises. However, choice for income-yielding bonds involves two kinds of costs:

(i) the cost of bond transaction, including 'brokerage fee,' telephone expenses, cost of travelling to the bank, and so on, and
(ii) the loss of interest when bonds are converted into cash.

Consider first the cost of bond transactions. If an individual holds all his income in bonds, he will have to reacquire his total income (Y) over a period of one year through a number of bond sales. If he sells his bonds through a broker, he will have to incur **non-interest cost** or transaction cost each time. Let M_t be the value of a bond turned into cash for meeting the transaction demand for money, and b the fixed rate of transaction cost. Then the total transaction cost (C_1) can be expressed as

$$C_1 = b(Y/M_t) \tag{15.3}$$

As regards the **interest cost**, the bondholder loses interest when he converts bonds into cash. Let us suppose that the bonds of an equal value (M_t) are converted into cash at regular intervals, say, on the first of each month. When he converts bonds into cash, he loses interest on an increasing cash balance which he acquires by selling his bonds. On an *average*, he loses interest on half of his income,[11] i.e., on $Y/2$. The interest cost (C_2) may be algebraically expressed as

$$C_2 = i(Y/2) \tag{15.4}$$

where, i is the interest rate—the cost rate of cash holding.

Thus, the total operational cost (C) is composed of two components—C_1 and C_2. That is,

$$C = C_1 + C_2$$
$$C = b\ (Y/M_t) + i(Y/2) \tag{15.5}$$

Now a question arises: How does the individual combine his portfolio of cash and bonds to minimise his total cost (C)? The answer to this question can be found (assuming a given interest rate) by taking the first derivative of Eq. (15.5) with respect to M_t and setting the equation equal to zero. By solving it for M_t, we get

$$\frac{\delta C}{\delta M_t} = -\frac{bY}{M_t^2} + \frac{i}{2} = 0 \tag{15.6}$$

11. Suppose that an individual receiving an annual income of Rs 12,000 buys bonds for his entire income. He sells bonds to obtain Rs 1000 on the first of each month. In the process, he loses interest on Rs 1000 for 11 months, on Rs 2000 for 10 months, on Rs 3000 for 9 months and finally on Rs 11,000 for one month. The average amount on which he loses interest is calculated as follows.

$$\text{Rs } 1000 + 2000 + 3000 + \cdots + 11000 = \text{Rs } 66000/11 = \text{Rs } 6000.$$

Thus, given his annual income of Rs 12,000, he loses interest on an average of Rs 6000. Thus, the individual loses interest on half of his income, i.e., Rs 6000 = Rs12000 / 2. Since $Y = Rs$ 12000, $Y/2$ Rs 6000.

It means

$$\frac{i}{2} = \frac{bY}{M_t^2} \tag{15.7}$$

or

$$M_t^2\,(i) = 2bY \tag{15.8}$$

By solving Eq. (15.8) for M_t, we get

$$M_t = \sqrt{\frac{2bY}{i}} \tag{15.9}$$

or

$$M_t = (2bY)^{1/2} \times i^{-1/2}$$

Since the average money holding equals $M_t/2$, the transaction demand for money can be obtained by dividing both sides of Eq. (15.9) by 2, i.e.,

$$\frac{M_t}{2} = \sqrt{\frac{bY}{2i}} \tag{15.10}$$

The money demand function (15.10) suggests: (i) that the transaction demand for money depends on the rate of interest, cost of bond transactions and the level of income, and (ii) that transaction demand is inversely related to the square root of the interest rate and directly related to the square root of income. This rule is, therefore, called the ***square root rule***. The square root rule implies that if interest rate increases by 10%, the transaction demand for money decreases by 5%, and if income increases by 10%, the transaction demand for money increases by 5%.[12]

For example, suppose $Y = 100$, $b = 0.50$ and $i = 10\%$ or 0.10. By substituting these parameters in Eq. 15.10, we get

$$\frac{M_t}{2} = \sqrt{\frac{0.5 \times 100}{2 \times 0.10}} = \sqrt{250} = 15.80$$

and $M_t = 15.80 \times 2 = 31.60$

Now, let Y increase by 10%, i.e., Y increases from 100 to 110. In that case,

$$\frac{M_t}{2} = \sqrt{\frac{0.5 \times 100}{2 \times 0.10}} = \sqrt{\frac{55}{0.2}} = 16.58$$

and $M_t = 16.58 \times 2 = 33.16$.

Thus, when income increases from 100 to 110, transaction demand for money increases from 31.60 to 33.16, i.e., approximately a 5% increase in money demand.

Similarly, if i increases by 10%, i.e., from 10% to 11% or from 0.1 to 0.11, in that case,

$$\frac{M_t}{2} = \sqrt{\frac{0.5 \times 100}{2 \times 0.11}} = \sqrt{227.27} = 15.08$$

and $M_2 = 15.08 \times 2 = 30.16$.

It means when interest rate (i) increases from 10% to 11%, transaction demand for money decreases from 31.60 to 30.16, i.e., a decrease of 4.77% which approximates to 5%.

12. Baird, C.W., *Macroeconomics*, (University of California Press, Los Angeles, 1973), p.163.

Two important conclusions that emerge from these calculations are:

(i) *Income elasticity* of transaction demand for money is less than proportionate, and it equals 1/2, i.e., if income increases by 1 percent, transaction demand for money increases only by 1/2 percent; and

(ii) *Interest elasticity* of money demand is also less than proportionate and it equals – 1/2, i.e., if interest rate increases by 1 percent, demand for money decreases by 1/2 percent.

Two most important conclusions of Baumol-Tobin formulation are:

(i) The transaction demand for money is interest-elastic. This conclusion refutes the Keynesian postulate that the transaction demand for money is interest-inelastic.

(ii) The transaction demand for money rises less than proportionately to the rise in income. This implies that there are economies of scale in the use of money. This conclusion refutes the classical and neoclassical claims that transaction demand for money is proportionately related to income.

Graphical Illustration

We have so far discussed briefly the Baumol-Tobin model of demand for money and have highlighted the basic conclusions that can be drawn from their money demand model. The basic theme of the model is to prove mathematically that individuals optimise cash-and-bond asset portfolio or, in other words, they minimise cost of their asset portfolios of cash and bond holding. Their model assumes that cash holding involves loss of interest but bond holding involves cost of transaction, though it yields some income. Given the expected income from the bonds, the individuals minimise their cost of cash holding. This conclusion is illustrated graphically in Fig. 15.1.

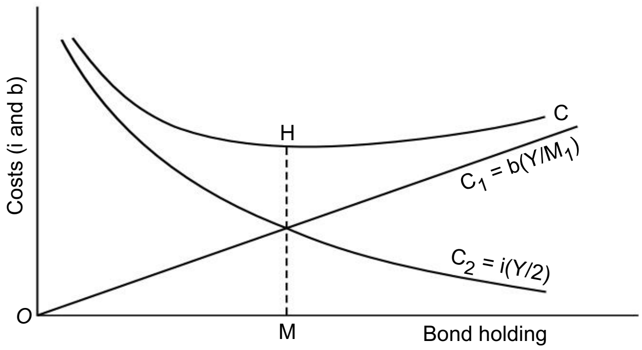

Fig. 15.1 Minimisation of Cost of Holding Money

Fig. 15.1 presents the total transaction cost function C_1 (Eq. 15.3) and interest cost function C_2 (Eq. 15.4). The line marked $C_1 = b(Y/M_t)$ shows the cost of bond transactions over a period, say, one year. The line shows that as bond holding increases, the bond transaction increases. This leads to increase in cost of selling bonds to acquire cash for transaction purpose. The constant slope of the line (C_1) implies a fixed cost per bond transaction. The curve $C_2 = i(Y/2)$ shows the trend in the interest cost, i.e., the loss of interest over the period. For example, if individual holds a small number of bonds, say *ON*, he holds a large amount of cash balance. As a result, his loss of interest is high. As cash holding goes on diminishing, the loss of interest goes on diminishing. The curve marked C shows the total cost: it is the vertical summation of C_1 and C_2 curves. The point H on the curve C shows the minimum cost of cash-and-bond holding. That is, the individual combines his cash and bond holding in such proportions that his cost is minimised. In Fig. 15.1, the cost of bond and cash holding is minimized at point M.

15.4 TOBIN'S THEORY OF SPECULATIVE DEMAND FOR MONEY: THE PORTFOLIO OPTIMISATION APPROACH

In his analysis of speculative demand for money, Keynes had postulated that individuals hold either all cash or all bonds depending on their *expectations* regarding the future rate of interest. Tobin[13] made two significant modifications in the Keynesian postulate: (i) that individuals hold assets in the form of both money and bonds, and (ii) that speculative demand for money is associated with *uncertainty*, not with individual's expectations. With these modifications in the Keynesian theory of liquidity preference, Tobin developed his own model to show how individuals optimise their cash and bond holdings. For this purpose, he used **portfolio optimisation approach.** Tobin's portfolio theory states that the demand for money depends on the risk and return associated with money and other forms of assets. Tobin used this postulate to derive the demand curve for money. In fact, *Tobin's theory of speculative demand for money is a part of his theory of portfolio optimisation.* We will therefore discuss first his theory of portfolio optimisation and then his theory of speculative demand for money.

15.4.1 Tobin's Portfolio Optimisation Approach

The gist of Tobin's portfolio optimisation theory can be stated in the form of two propositions:

(i) Keynes' postulate that individuals hold wealth in the form of either money or bonds is neither rational nor empirically true.[14] Tobin postulates instead that the individuals hold a combination of cash and bonds in their asset portfolio, not just cash or bonds. He claims that this postulate is more rational and it is empirically verifiable too.

(ii) Tobin has demonstrated that *the individuals hold not only a combination of both cash and bonds in their asset portfolio but also they attempt to hold a combination thereof that optimises the risk and returns on bonds*.

Assumptions Tobin's portfolio optimisation theory in its simplest form[15] is based on the following simplifying assumptions.

1. An individual has only money and bonds to choose from for his asset portfolio.
2. He prefers more wealth to less wealth.

13. Tobin, James, "Liquidity Preference as Behaviour Towards Risk," *Rev. of Eco. and Stat.,* 25, February 1958, pp. 65–86. This paper is rated among the classics in the theory of demand for money. An edited version of Tobin's paper is published in M.J.C. Surrey (ed), *Macroeconomic Themes*, (Oxford University Press, 1976), pp. 164–74.

14. In his own words, "Nearly two decades of drawing downward sloping liquidity preference curve in textbooks and classroom blackboards should not blind us to the basic implausibility of the behaviour they describe."

15. For a simple version of Tobin's theory, see Laidler, *The Demand for Money: Theories and Evidence,* (Allied Publishers, Bombay, 1972), pp. 67-76.

3. He prefers less risk to more risk.
4. His risk-and-return indifference curves are known to him.
5. The trade-off between risk and return is also known.

Tobin builds his theory by asserting that the benefits of liquidity and the interest on bonds are not of a great significance[16] in the asset portfolio choice of an individual. What is a matter of great significance in the choice of asset portfolio is *the possibility of a capital gain or a capital loss when money is put in bonds.* The capital gain on bonds arises due to fall in the interest rate and capital loss arises due to increase in the interest rate. When interest rate decreases, bond prices go up and bondholder makes a capital gain and *vice versa*. Thus, there is a risk associated with the returns on bonds. If an individual holds a higher proportion of bonds in his asset portfolio, he assumes a greater risk and expects a greater return. This point can be proved algebraically[17] and illustrated graphically as follows.

Suppose B is the value of bonds and r is the rate of return. Then total return (R) is given as

$$R = rB \tag{15.11}$$

Assuming j to be the rate of risk, the total risk (J) on bonds (B) can be written as

$$J = jB \tag{15.12}$$

The risk-adjusted value of bonds (B) can then be expressed by using Eq. (15.12), as

$$B = J/j = (1/j)\ J \tag{15.13}$$

Substituting Eq. (15.13) for B in Eq. (15.11), we get the total return (R) as

$$R = r\ (1/j)\ J$$

or

$$R = (r/j)\ J \tag{15.14}$$

Eq. (15.14) implies that given the r and j rates, the greater the amount of risk (J) bondholder takes, the greater the total return (R) he receives. This relationship between risk and returns is depicted in Fig. 15.2. The total return is measured on the vertical axis and risk on the horizontal axis. The line OZ shows the relationship between the risk and return—the higher the risk, the higher the return. The slope of line OZ is given by $\Delta R/\Delta J = r/j$. This line represents the risk-return conditions as they exist in the market.

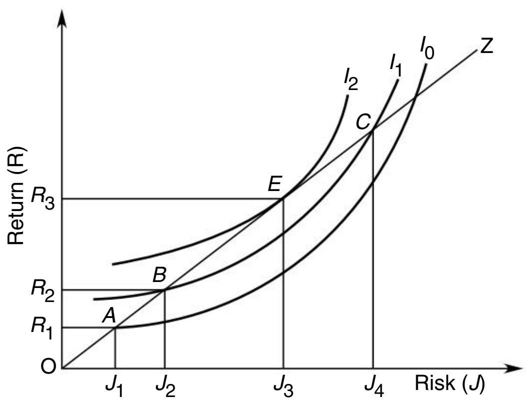

Fig. 15.2 Optimisation of Risk and Return

According to Tobin's theory, the point of optimum combination of risk and return lies on the line OZ. This point can be obtained by adding

16. Tobin gives the following reason. If an individual holds cash, he enjoys the benefits of liquidity but he loses interest that he could earn on bonds. And, if he puts his money in bonds, he foregoes liquidity but earns a return on bonds. Given a 'normal' interest rate, the loss of liquidity and returns on bonds may be compensatory. Therefore, this aspect is not of great significance.

17. See also Baird, C. W., *Macroeconomics, op. cit.,* p.163.

individual's risk-return indifference map to Fig. 15.2, as shown by the curves I_0, I_1 and I_2. The risk-return indifference curves are drawn on the basis of assumption (3). Given the risk-return line OZ and risk-return indifference curves, let us now explain the process of risk-return optimisation as illustrated in Fig. 15.2.

Optimisation of Risk and Return Suppose that the risk-and-return indifference curves of an individual are given as I_0, I_1 and I_2 in Fig. 15.2. The individual's risk-and-return indifference curves represent a locus of risk-and-return combinations between which he is indifferent. Given the indifference curves and line OZ in Fig.15.2, the individual finds his equilibrium at point E where his risk-return indifference curve (I_2) is tangent to the risk-return line OZ. No other point on the OZ line gives the optimum combination of risk and return. For example, suppose that the individual is initially at point A, the point of intersection between his risk-and-return indifference curve (I_0) and risk-and-return line OZ. At point A, the individual is willing to take OJ_1 risk for OR_1 return. But, point A is not an optimum point because it is not on the highest feasible indifference curve. It can be seen in the figure that the individual can move to an upper indifference curve only by assuming a higher risk for a higher return along the line OZ. This process of risk-return adjustment continues until he reaches point E where his indifference curve I_2 is tangent to the risk-return line OZ. At point E, he assumes OJ_3 risk and makes OR_3 return. It is at point E where he optimises his risk and return and maximises his total return. Let us explain the process in more details.

Optimising the Asset Portfolio Let us now explain the process of optimising asset portfolio. Tobin's theory of optimum asset portfolio is presented in Fig. 15.3. The upper half of the figure is the same as Fig. 15.2. In the lower half, the vertical axis (moving downward) measures the combination of money and bonds, such that when one increases, the other decreases. Note that money holding is riskless whereas bond holding involves a risk. The total wealth holding in the form of money is shown at point W_m. The upward movement from point W_m means decrease in money holding and increase in bond holding. Similarly, the movement from point O downward to W_m means increase in bondholding and decrease in money holding. For example, point B_0 means OB_0 of bond holding and $B_0 W_m = OW_m - OB_0$ is money holding. The horizontal axis measures the risk assumed by the bondholder. The line OW shows bondholding at different levels of risk. For example, if an individual assumes OJ_0 risk, he will hold OB_0 of bonds and B_0W_m of money which equal $OW_m - OB_0$.

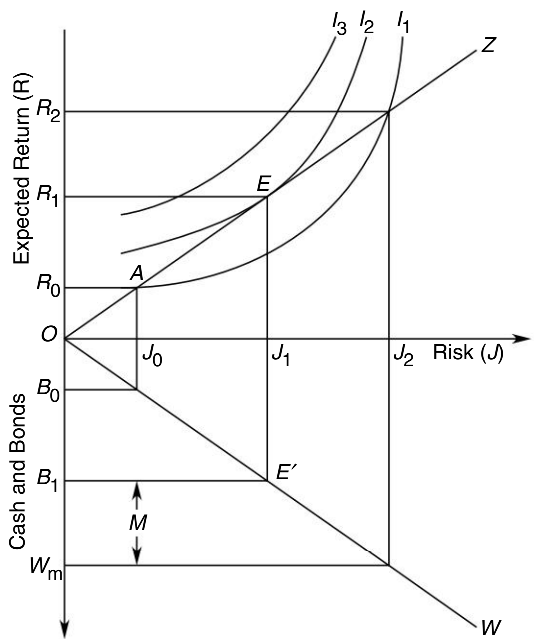

Fig. 15.3 Determination of Optimum Portfolio

Now suppose that an individual having a certain amount of savings decides to hold it partly in cash and partly in bonds. His problem is to find the optimum combination of bonds and money. The process of portfolio optimisation is illustrated in Fig. 15.3. To begin the analysis, suppose that the individual decides to hold his entire savings in cash. With this decision, he would be at point W_m where his asset portfolio consists of total money (OW_m) and zero bonds. His total (money) wealth (OW_m) is riskless but gives no return. But, if he decides to buy OB_1 bonds, he will move from point W_m towards point B_1. Now his money-bond combination is B_1W_m of money and OB_1 of bonds at OJ_1 of risk. If he buys OB_0 of bonds and holds B_0W_m of money, he assumes OJ_0 of risk. When a line is drawn representing bond-risk combination, it produces a line *OW*. The line *OW*, shows the possible combinations of money and bond with risk. The problem now is: how to find the optimum portfolio.

To optimise his portfolio, the individual will have to assume risk and convert his money into bonds. His optimisation path is given by the line *OZ*. Suppose he moves from his zero-sum position at *O* to point *A*. Here, he assumes OJ_0 risk for OR_0 return and he will convert his OB_0 money into bonds of an equal value. But, this is not his optimum point of risk-and-return. Recall that the optimum risk-and-return position of the individual is given at point *E*. At point *E*, he assumes OJ_1 risk and gets OR_1 return. The optimum money-bond combination conforming to optimum risk-return combination can be obtained by extending line EJ_1 to line *OW*. As shown in Fig. 15.3, the extended line EJ_1 meets the line *OW* at point E'. A line drawn from point E' to cash-bond axis determines the optimum portfolio at point B_1. Thus, point B_1 determines the optimum combination of cash and bond as OB_1 of bonds and B_1W_m of money. This is his optimum asset portfolio.

15.4.2 Change in the Interest Rate and Asset Portfolio

In the preceding section, we have explained how asset portfolio is optimised *at a given rate of interest*. In reality, however, interest rate keeps changing which changes both risk and return conditions. The change in risk and return conditions forces the bond holders to make a change in their optimum combination of money and bonds. The change in the interest rate and the consequent change in the asset portfolio are illustrated in Fig. 15.4. Its upper half presents change in optimum combinations of risk and return at three different rates of interest, and the lower half presents the corresponding change in asset portfolio. In the upper half, the lines $Z(i_0)$, $Z(i_1)$, $Z(i_2)$, represent risk-and-return relationship at three different rates of interest—i_0, i_1 and i_2 while $i_0 < i_1 < i_2$. Note that when the rate of interest increases, the *OZ* line rotates anti-clockwise. The reason is that when the rate of interest increases, investor's expected return increases for the same level of risk. This changes the slope of the risk-and-return line (*OZ*). As noted above, the slope of *OZ* line, $\Delta R/J\Delta = r/j$. Since *r* (expected return) is positively related to *i* (interest), when *i* increases, *r* increases too and, therefore, the slope *r/j* increases. Consequently, the *OZ* line rotates anti-clockwise with the rise in the interest rate and clockwise with the decrease in the interest rate.

The two parts of Fig. 15.4 read together give the change in the asset portfolio with the change in the rate of interest. In the upper part of the figure, the line $Z(i_0)$ shows the risk-and-return relations at the interest rate i_0. Given his indifference curve I_0, the individual optimises his risk and return at point E_0. That is, for OR_0 return, he takes OJ_0 risk. A line drawn from point E_0 through J_0 to line *OW* gives the worth of bond that the individual will be willing to buy—it is $J_0A = OB_0$. At interest rate i_0, his money holding equals $OW_m - OB_0 = B_0W_m = M_0$. When the interest rate increases to i_1, the *OZ* line rotates to $Z(i_1)$. The individual moves to point E_1. His expected return goes up to OR_1 and he takes a greater risk OJ_1. At these levels of risk and return, his bondholding increases to OB_1 and money holding decreases to $B_1W_m = M_1$. Similarly, when the interest rate rises further to i_2, individual's bond holding increases to OB_2 and money holding decreases to $B_2W_m = M_2$.

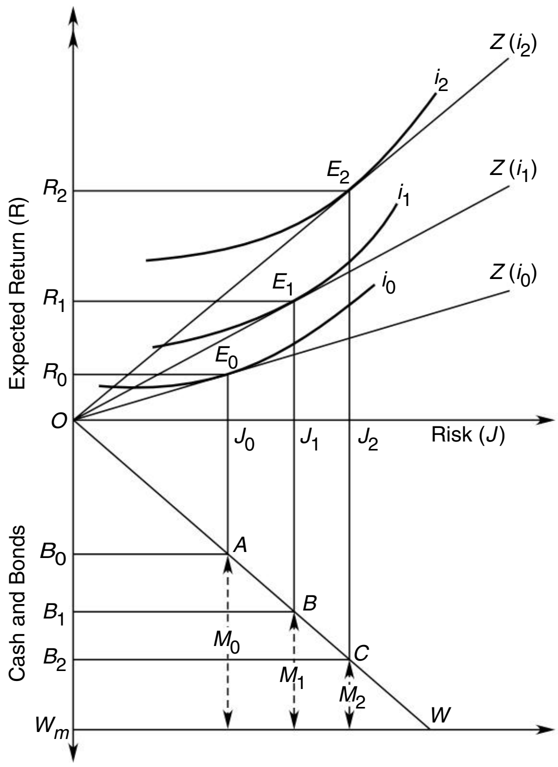

Fig. 15.4 Change in the Interest Rate and Asset Portfolio

To conclude, according to Tobin's theory of portfolio optimisation, individuals hold a combination of both cash and bonds in their asset portfolio—not only cash or only bonds. Since, there is a positive relationship between the interest rate and bondholding, and an inverse relationship between the interest rate and cash holding, people try to optimise their cash and bond holding.

15.4.3 The Speculative Demand for Money and Interest Rate

Having explained the impact of change in the interest rate on bond and money holding, let us now turn to explain Tobin's theory of speculative demand for money. Tobin's speculative-demand-for-money schedule can be derived straightaway from the information contained in Fig. 15.4. The upper half of the figure shows upward movement in the interest rate from i_0 to i_1 and then to i_2 while $i_0 < i_1 < i_2$. The lower half of the figure contains the data regarding the three levels of speculative demand for money associated with three interest rates. This information can be summarised as shown below and used to derive the demand schedule for speculative money.

Demand Schedule for Speculative Money

Interest rate	:	i_0	<	i_1	<	i_2
Speculative demand for money M_{sp}	:	$B_0W_m = M_0$	>	$B_1W_m = M_1$	>	$B_2W_m = M_2$

As this speculative money demand schedule shows, when interest rate increases, speculative demand for money decreases. This demand schedule when plotted produces a demand curve for the speculative demand for money, M_{sp1}, as shown in Fig. 15.5.

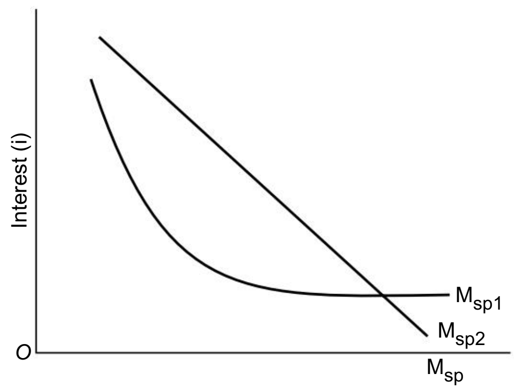

Fig. 15.5 Interest Rate and Speculative Demand for Money

In Fig. 15.5, the values for i (on the vertical axis) and M_{sp} (on the horizontal axis) are chosen arbitrarily to show the inverse relationship between the interest rate and the speculative demand for money and to present a speculative-demand-for-money curve conforming to the Keynesian *liquidity preference* curve. But, if M_{sp} and i are assumed to be constantly related, it may take the shape of a downward sloping straight line like M_{sp2}. Nonetheless, it shows an inverse relationship between the interest rate and the speculative demand for money.

To sum up, Tobin's theory of speculative demand for money produces results similar to the Keynesian speculative demand for money. Tobin's theory is, however, superior to Keynes's theory in at least two respects. *First*, it assumes a more rational and realistic behaviour on the part of the wealth-holders. *Second*, it explains why wealth-holders hold some safe wealth in the form of money even when it gives no return.

15.5 FRIEDMAN'S QUANTITY THEORY OF MONEY

The post-neoclassical developments in the theory of demand for money have taken two different paths. One path of development is represented by the Keynesian theory of money demand and its modifications and extensions made by Baumol, Tobin and others. The second line of development is represented by Friedman's quantity theory of money. The difference between the two lines of development is the difference in how money is treated in the formulation of the theory of demand for money. In the first line of development, pre- and post-Keynesian economists treated money as a sterile form of wealth and demand for money is prompted by different kinds of motives like transaction, precaution, speculation and store of wealth. Friedman, whose quantity theory represents the second line of development, treats money as any other durable good and 'he treats the demand for money in exactly the same way as an economist would treat any other durable good were he asked to construct a model for the demand for it.'[18] Therefore, he applies the standard theory of demand for durable goods to explain the demand for money as an asset or real wealth. In this section, we describe Friedman's quantity theory of money in its simple form.

[18] Laidler, D., *Demand for Money; Theories and Evidence*, *op. cit.*, p.57.

15.5.1 Determinants of Demand for Money as Wealth

Friedman has formulated his theory of demand for money—money treated as wealth. Money as wealth is defined in terms of *real money*. Real money is defined as *M/P* (where *M* is income in nominal terms and *P* is price index). For specifying the determinants of demand for real money—the wealth—Friedman makes a distinction between the two kinds of 'ultimate wealth-holders' viz.,

(i) the *individual households*, and
(ii) the *business firms*.

The demand for money by the ultimate wealth-holders, in general, and that by individual households and firms are discussed below in turn.

(i) *Demand for Money by Ultimate Wealth-holders: The Individual Households*

For ultimate wealth-holders, 'money is one form in which they choose to hold their wealth.' According to Friedman, the demand for money, in real terms, by the ultimate wealth-holders may be 'expected to be the function of the following variable.'

1. *Total wealth* Total wealth includes both non-human (physical) and human wealth. 'In practice, estimates of wealth are seldom available.' Therefore, he considers 'permanent income' as a more useful index of total wealth. It is important to note that "income is surrogate for wealth, rather than a measure of the 'work' done by money" or a purchasing power.

2. *Proportion of human wealth in total wealth* According to Friedman, the 'major asset of most wealth-holders is their personal earning capacity', i.e., their human wealth. Due to 'institutional constraints,' 'the conversion of human into nonhuman wealth or the reverse' is possible within 'narrow limits.' That is, one can buy physical assets by using one's current income or can finance his human capital formation by selling one's non-human assets, but within narrow limits. Therefore, 'the fraction of total wealth that is in the form of non-human wealth [is] an additional important variable.'

3. *The expected rate of return on money and other assets—the opportunity cost of holding money.* "This is the analogue of the prices of a commodity and its substitutes and complements in the usual theory of consumer demand." The rate of return on money is zero, some times even negative as is the case of demand deposits (i.e., deposits in the current account). But the rate of return on other forms of assets, like bonds, equities, securities, is greater than zero. There is therefore a relative cost of holding money. This relative cost fluctuates with the fluctuation in prices. During the period of hyper inflation, for example, the real rate of return may not be significantly different from zero. Therefore, the relative rates of real returns also work as a determinant of demand for money.

4. *Other variables determining the utility of money* Other variables that determine the utility of money include: (a) the services rendered by money as an asset compared to other forms of wealth, that is, in fact, the advantage of liquidity and convenience in carrying out planned transactions and in meeting unanticipated expenditure, and (b) the 'degree of economic stability expected to prevail in the future.' As regards (b), "Wealth-holders are likely to attach considerably more value to liquidity when they expect economic conditions to be unstable."

Wealth-holder's Demand Function for Money

Friedman has symbolised these determinants into a demand function for money by an individual wealth-holder as follows.

$$\frac{M}{P} = f(y;\ w;\ r_m;\ r_b;\ r_e;\ \Delta P/P;\ u) \tag{15.15}$$

where, M = demand for *nominal* money; P = price index; M/P = demand for real money, i.e., real cash balance; y = real income; w = fraction of wealth in non-human form, that is, the ratio of income derived from property; r_m = expected rate of return on money; r_b = expected rate of return on fixed-value securities, including expected change in their prices; r_e = expected return on equities, including expected change in their prices; $\Delta P/P$ = expected *rate* of change of prices of goods and hence the expected rate of return on real assets; u = any variable other than income which may affect the utility attached to the services of money, i.e., *portmanteau variable*.

Friedman has pointed out the problems in applying his demand function for the economy as a whole. The problems arise due to the problem of aggregation that may arise due to (i) change in the distribution of real income (y) and in the fraction of non-human wealth (w), and (ii) problems in defining y and w in estimating '*expected* rates of return as contrasted with actual rates of return,' and in quantifying the variables classified under u. However, if the problem of distribution of y and w are ignored, Eq. (15.15) may be applied to the economy as a whole, but the problem of quantifying variables under u will remain.

(ii) *Demand for Money by Business Firms* To business firms or enterprises, 'money is a producer's good like machinery or inventories'. However, Friedman suggests that the demand function for money specified for the ultimate wealth-holders can be used for business enterprises also with following modifications.

One, the demand for money by the business enterprises are not subject to the total wealth constraints applicable to the ultimate bondholders. The business enterprises 'can acquire additional capital through the capital market' in order to maximise their returns. 'Hence, there is no reason on this ground to include total wealth, or y as a surrogate for total wealth, as a variable in their demand function for money.' He suggests to include instead 'scale' of the enterprise as a substitute variable for 'total wealth.' However, as he points out, there are several measures of scale—total transaction, net value added, net income, total non-money capital, and net worth. But none of these is measurable satisfactorily and usable.

Two, the 'division of wealth between human and non-human form has no special relevance to business enterprises'.

Three, the rates of returns on money and alternative assets are as much important for business enterprises as for the ultimate wealth-holders, as these rates determine the net cost of holding the money balances. However, different kinds of rates of return on the alternative assets are relevant and important for the two kinds of wealth-holders. For example, rates charged by the banks on loans and advances may be of minor importance for the ultimate wealth-holders but of great importance for the business enterprises.

Four, the variables classified under *u* may be equally important for both kinds of wealth-holders, except, of course, 'scale' related productivity in case of ultimate bondholders.

The aggregate demand for money According to Friedman, "With these interpretations of the variables", the money demand function given in Eq. (15.15), "with *w* excluded, can be regarded as symbolising the business demand for money and, as it stands, symbolising aggregate demand for money ...." too.

Concluding Remarks Friedman's theory is "a theory that specifies certain variables as being potentially important determinants of the demand for money, and also specifies the sign of the relationship that the demand for money might be expected to bear toward them. It does not, however, say anything about how large or important any of these relationships might be, leaving these matters to empirical investigation. One cannot say more than this about [Friedman's] approach to the problem of demand for money without reference to empirical evidence, and this limitation is hardly surprising."[19] Friedman's theory of demand for money does not tell more about the relative importance of its determinants than the standard theory of demand tells about the relative importance of the determinants of demand for other consumer durables.

Furthermore, Friedman himself holds that his theory has closest link to Cambridge version of the monetary theory—it is rather a restatement of the old quantity theory of money. Many economists, however, find Friedman's theory closer to the Keynesian theory. For example, Don Patinkin[20] remarked, "Milton Friedman provided us in 1956 with a most elegant and sophisticated statement of modern Keynesian theory—misleadingly entitled 'The Quantity Theory of Money—a Restatement."

SUGGESTED READINGS

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19. Laidler, D., *Demand for Money: Theories and Evidence, op. cit.*, p. 61. For his comments on the estimated money demand functions and empirical evidence, see Chapter 6.

20. In his paper, "The Chicago Tradition, The Quantity Theory and Friedman," in *Journal of Credit, Money and Banking,* February 1969—quoted in Shapiro Edward, *Macroeconomic Analysis,* (Galgotia, 1994), pp.30n.

QUESTIONS FOR REVIEW

1. Explain the major shortcomings of the Keynesian theory of demand for money. Do the post-Keynesian developments in monetary theory replace the Keynesian theory of demand for money?
2. It is argued that Keynesian speculative demand for money is based on the assumption that there exists a 'normal rate' of interest. If people do not find a stable normal rate of interest, the speculative demand for money will disappear. Explain and justify this statement.
3. What is the basic postulate of the portfolio theories of money demand? How are the portfolio theories of demand for money from the Keynesian theory?
4. Is the transaction demand for money interest-inelastic or interest-elastic? Compare in this regard Keynes's and Baumol's demand function for transaction demand for money.
5. In his inventory approach to transaction demand for money, Baumol expresses the relationship between risk and return by the equation $R = (r/j)\ J$. Explain the derivation of the equation.
6. Explain Baumol's theory of transaction demand for money. Does it really show that the transaction demand for money is interest-elastic?
7. What are the interest and non-interest costs of bond holding? How does Baumol combine these costs in his theory of money demand?
8. According to Baumol-Tobin theory demand for money,

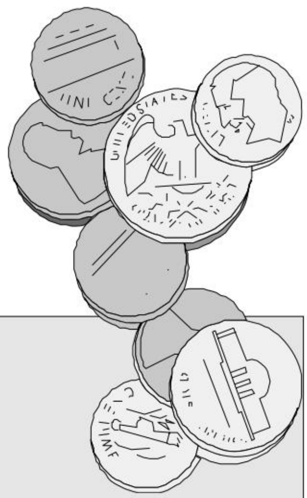
$$\frac{M_t}{2} = \sqrt{\frac{bY}{2i}}$$

show the derivation of this formula.

9. Explain and illustrate the Baumol-Tobin model of cost minimisation of money holding.
10. What is the difference between Keynes's and Tobin's demand function for speculative demand for money? Is Tobin's theory a replacement or an extension of the Keynesian theory of speculative demand for money?
11. Explain Tobin's approach to speculative demand for money and show graphically the process of optimisation of risk and return.
12. To arrive at the optimum combination of risk and return, Tobin uses individual's risk-and-return indifference curve. Explain and illustrate optimisation of risk and return following Tobin's approach.
13. How is Tobin's approach to speculative demand for money different from Keynes's approach? Illustrate and explain Tobin's method of deriving demand function for speculative money. Does his method yield *only* a downward sloping demand-for-money curve?
14. Explain the difference between the Inventory Theoretic Approach' and the 'Portfolio optimisation Approach' to demand for money. How do these approaches signify the improvement on the Keynesian theory of demand for money?
15. State and explain Friedman's quantity theory of demand for money. Is it close to classical or Keynesian approach to the aggregate demand for money? Give reasons for your answers.
16. What are the determinants of demand for money as wealth according to Friedman's quantity theory? How are the determinants related to money demand?

Part 5

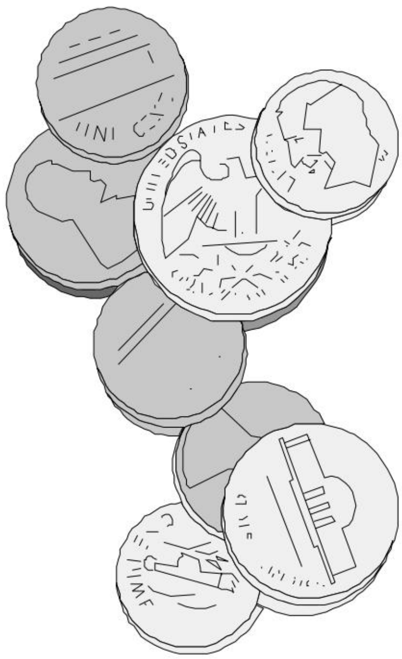
Integration of Product and Money Market Equilibrium



Part II of this book deals with the theory of *product market* equilibrium and Part IV deals with theory of *money market* equilibrium and interest rate determination. Keynes had analysed the product market and money market equilibrium in isolation of one another. This is considered to be a serious flaw in the Keynesian approach because, in reality, functioning of both the sectors is interrelated and interdependent. Therefore, unless both the markets reach equilibrium simultaneously at the same rate of interest and at the same level of income, none of these sectors can attain a stable equilibrium. It was John R. Hicks who integrated the Keynesian analyses of the product and money markets and developed a model, called *IS-LM* Model, to show how both the markets can attain equilibrium simultaneously at the same interest rate and national income. The post-Keynesian developments in macroeconomics do not end with Hicks' *IS-LM* Model. The economists of later generations have also constructed theories that integrate classical and Keynesian economics, and have developed different kinds of aggregate demand and supply models. This was followed by other developments with altogether new approach to deal with macroeconomic issues. This part of the book presents a detailed discussion on the Hicksian *IS-LM* model and a brief discussion on the other post-Keynesian developments in macroeconomics.

Chapter 16

The *IS-LM* Model in Two-Sector Economy



INTRODUCTION

Recall that Keynes had developed his product market theories in isolation of the product market, and money market theories in isolation of the product market, whereas the activities and variables of the two sectors are interrelated, interdependent and interactive. Therefore, changes in the variables of one sector affect the activities of the other sector. In simple words, changes in product market affect the money market equilibrium and *vice versa*. The Keynesian theory ignores the effect of changes in the money market on the product market and the effect of changes in the product market on the money market. Therefore, his theories related to the product and money markets are considered to be partial and incomplete. It was J.R. Hicks who highlighted this fact and developed his own model[1] in 1937—just one year after the publication of Keynes's *The General Theory*. He integrated Keynesian theories of product and money markets to show how equilibrium of both the sectors coincide at the same level of income and interest rate. His model is widely known as the ***IS-LM* model.** In this model, the term *IS* represents the product sector equilibrium condition ($I = S$) and the term *LM* represents

1. In his paper, "Mr. Keynes and the Classics: A. Suggested interpretation", *Econometrica,* 5 (April 1937), reproduced in W. Filner and B. F. Haley (eds.), *Readings in the Theory of Distribution* (Richard D. Irwin, 1946); L. Lindauer (ed.), *Macroeconomic Readings* (Free Press, 1968); E. Shapiro (ed.), *Macroeconomics: Selected Readings* (Harcourt, Brace and World, 1970); and in M.G. Mueller (ed.), *Readings in Macroeconomics* (Holt, Rinehart and Winston Corp., 1971).

the money market equilibrium condition ($L = M$), where L stands for *liquidity preference* or money demand (M_D) and M stands for money supply (M_S).

It is important to note here that Hicks has developed his *IS-LM* model in the framework of a simple, two-sector economy. The economists have, however, extended his model to three-sector and four-sector models also. In this chapter, we elaborate on the Hicksian *IS-LM* model in a simple, two-sector economy, including household and firm sectors only. The three-sector and four-sector *IS-LM* models are discussed in the two subsequent chapters.

We begin by showing the interdependence of the product and the money markets. We will then describe the Hicksian *IS-LM* model and show how an economy attains its general equilibrium. This is done by deriving the *IS* and *LM* curves and then presenting the general equilibrium model. Finally, we discuss the shift in the *IS* and *LM* curves and its impact on the general equilibrium.

16.1 THE INTERDEPENDENCE OF PRODUCT AND MONEY MARKETS

As mentioned above, working of the product and the money markets is interlinked and interdependent. The two most important variables that interlink the working of the two sectors are *investment* and *interest rate*. The investment (I) is a product-market variable—it determines the level of real output, i.e., the real income. And, the interest rate (i) is a money-market variable determined by the demand for and supply of money. Let us now look at the interdependence of the product and money markets in a simple economy model.

16.1.1 Dependence of Product Market on Money Market

The product market attains its equilibrium at the level where $Y = C + I$. Recall that in the Keynesian analysis of the product-market equilibrium, I was assumed to be a constant factor or an autonomously or exogenously determined variable. In reality, however, I is not only autonomously or exogenously determined: it is determined within the system also by the level of income and the interest rate. More importantly, given the income, investment (I) depends on the rate of interest. As shown in Chapter 10, there is an inverse relationship between the interest rate and investment. Assuming a constant $\Delta I/\Delta i$, the inverse relationship between the investment (I) and the interest rate (i) is stated by a linear investment function[2] of the following form.

$$I = \bar{I} - hi, \ (h > 0) \tag{16.1}$$

where, $\bar{I}$ = 'autonomous investment,' i = interest rate and $h = \Delta I/\Delta i$.

The implication of the *investment function* in the interdependence of the product and money markets can be shown as follows. Recall that the product market is in equilibrium where

$$Y = C + I$$

Here, C (consumption) is the function of income, and I (investment) is the function of interest. For the sake of brevity, let us denote consumption function as $C(Y)$ and investment function as $I(i)$. By substitution, the product market equilibrium condition can be rewritten as

$$Y = C(Y) + I(i) \tag{16.2}$$

[2] For simplicity sake, we assume a linear investment function. One may, however, use a non-linear investment function with the same results.

Eq. (16.2) implies that unless i (interest) is determined, I cannot be determined and unless I is determined Y cannot be determined. It means, unless i is determined, the equilibrium level of Y cannot be determined.

Also, recall (from Ch. 14) that interest rate (i) is determined in the money market and equilibrium rate of interest is determined where $M_d = M_s$. For interest rate to remain stable, money market must be in a stable equilibrium. It may thus be concluded that *unless money market reaches its equilibrium and interest rate (i) is determined, product market cannot attain its equilibrium.* This shows the dependence of the product market on the money market.

16.1.2 Dependence of Money Market on Product Market

Let us now look at the dependence of the money market on the product market. In the Keynesian system, money market reaches its equilibrium where

$$M_s = M_d$$

and interest rate (i) is determined where $M_S = M_D$.

As we have noted in Chapter 14, $M_d = M_t + M_{sp}$, where $M_t = kY$ and $M_{sp} = f(i)$. Therefore,

$$M_d = kY + f(i) \tag{16.3}$$

Eq. (16.3) implies that unless Y is determined, kY cannot be determined and, therefore, M_d cannot be determined. And, unless M_d is determined, money market equilibrium cannot be determined and interest rate (i) would not be determined. It may thus be concluded that *unless product market reaches its equilibrium and Y is known, money market cannot reach its equilibrium.* This shows the dependence of the money market on the product market. It needs to be emphasised here that *unless both product and money markets reach equilibrium simultaneously, the economy cannot attain its general equilibrium nor can any of the two sectors be in equilibrium*.

16.2 THE *IS-LM* MODEL: AN ELEMENTARY EXPOSITION

After having shown theoretically the interdependence of the product and money markets, we move on to present Hick's *IS-LM* model and show how product and money markets interact to reach their equilibrium simultaneously and also the same level of income and interest rate. The *IS-LM* model combines the equilibrium conditions of the product and money markets to arrive at the general equilibrium[3]. In order to show general equilibrium, Hicks had derived two curves, namely *IS* and *LM* curves. The *IS* curve (meaning $I = S$) represents the product market equilibrium and the *LM* curve (meaning $L = M$) represents the money market equilibrium, both at different rates of interest and level of the aggregate product or national income. In deriving his *IS* curve, Hicks made an important deviation from the Keynesian approach. While Keynes assumed investment (I) to be autonomous and determined exogenously, Hicks assumes that I is determined endogenously and is the function of the rate of interest i.e., $I = f(i)$.

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[3] The term 'general equilibrium' is used to denote the simultaneous equilibrium of all elements of the economy including individual products, individual decision-makers (households, firms, labour, etc.), money market, at both micro and macro levels. However, here the term 'general equilibrium' has been used in this book throughout to denote the simultaneous equilibrium of the product and money markets.

Likewise, his *LM*-schedule shows the equilibrium path of the money market at different rates of interest and levels of income. He has then combined the two schedules to show the general equilibrium of the economy. This has come to be widely known as the *IS-LM* model.

16.2.1 The Basic Model

In his *IS-LM* model, in its simplest form, Hicks integrates the equilibrium conditions of the product and money markets and produces condition for the general equilibrium. He incorporates a money-market variable, interest (i), into the income determination model by replacing Keynes' constant I with the investment function. With these modifications in the Keynesian model, Hicks defines the equilibrium level of income as

$$Y = C(Y) + I(i)$$

This function yields the *IS*-curve. It shows the relationship between Y and i at different equilibrium levels of saving and investment ($I = S$) and the product market equilibrium at different levels of Y and i.

Similarly, the *IS-LM* model incorporates income, Y, the main product-market variable, in the money market model by linking total demand for money to Y. This is done by using an M_t-function of the form $M_t = kY$, and an M_{sp}-function as $M_{sp} = L(i)$ into the money market model.[4] The money-market equilibrium condition is then written as

$$M_s = M_d = kY + L(i) \tag{16.4}$$

Eq. (16.4) yields the *LM*-schedule which shows the relationship between Y and i at different equilibrium levels of M_d and M_s. It shows also the money market equilibrium at different levels of Y and i.

Finally, the *IS-LM* model brings the *IS* and *LM* functions together and lays down the condition for the general equilibrium as

$$IS = LM \tag{16.5}$$

or

$$C(Y) + I(i) = kY + L(i)$$

If $C(Y)$, $I(i)$, kY, and $L(i)$ functions are known, the equilibrium values of Y and i can be easily obtained.

The *IS-LM* model can be presented both algebraically and graphically assuming $C(Y)$, $I(i)$, kY and $L(i)$ functions to be given. While algebraic determination of the general equilibrium gives a technically more sound and precise analysis, graphical presentation brings out inter-variable linkages and working system of the product and money markets. However, we present first the *IS-LM* model graphically. The *IS-LM* model is presented graphically in the following three stages:

1. Derivation of the *IS* curve,
2. Derivation of the *LM* curve, and
3. Presentation of the *IS-LM* model of General Equilibrium.

Derivation of the IS Curve ***The IS curve or schedule[5] is a curve which shows the relationship between the rate of interest and the equilibrium level of national income, that is, S = I at***

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4. This chapter onwords, we will use $L(i)$ for M_{sp}-function.

5. We will use the words 'curve' and 'schedule' interchangeably.

different rates of interest. Derivation of the *IS* curve requires, therefore, the knowledge of the functional relationship between interest and investment, between saving and investment at equilibrium and between saving and income. All these functional relations, except one between the interest rate and investment, have already been discussed in the previous chapters. The nature of relationship between the investment and the interest rate is given in the investment function (16.1). In order to derive the *IS* schedule, let us recall here all the functional relations that figure in the analysis of the product market equilibrium. According to the Keynesian theory, product market equilibrium, $I = S$.

Since $$I = I(i)$$

and $$S = Y - C(Y),$$

the product-market equilibrium condition can be specified as

$$I(i) = Y - C(Y) \tag{16.6}$$

In order to present these functions graphically, let us suppose that these functions are estimated factually and are given as follows.

$$I = 200 - 2000i$$

$$C(Y) = 10 + 0.5Y$$

$$S = Y - (10 + 0.5Y)$$

or $$S = -10 + 0.5Y$$

The derivation of the *IS*-schedule on the basis of these functions is illustrated graphically in Fig. 16.1. This figure is divided in four quadrants.[6] The use of these quadrants for the derivation of the *IS* schedule are narrated below.

Quadrant (a) presents the investment function: $I = 200 - 2000i$. The investment schedule shows an inverse relationship between the interest rate and investment. Recall that the product market is in equilibrium where $I = S$. This condition must hold for all the levels of investment at different rates of interest. For instance, as Fig. 16.1 shows, given the investment function, investment at the interest rate of 8 percent, is Rs 40 billion. So, for the product market to be in equilibrium, savings must equal Rs 40 billion. And, when the interest goes down to 6 percent, investment rises to Rs 80 billion. So, for the product market to be in equilibrium, savings must rise to Rs 80 billion. This relationship between the different levels of investment and savings is presented by the $I = S$ line in quadrant (b) of Fig. 16.1 with savings measured on the vertical axis and investment on the horizontal axis with the same scale as in quadrant (a). Since $S = I$ at all the levels of investment, the $I = S$ line is a straight 45°-line.

The 45°-line in quadrant (b) gives the equilibrium levels of savings which will keep the product market in equilibrium, at different levels of investment. It implies that when investment increases,

[6] There are several different ways of deriving the *IS* schedule. The most common practice is to divide the diagram in *four quadrants*, each quadrant showing the functional relations between (a) interest and investment, (b) saving and investment, the equilibrium condition, (c) savings and income, and finally (d) relationship between interest rate and equilibrium levels of income. Different authors arrange different quadrants in different ways. We have used here a more logical and straightforward arrangement of the quadrants. Some authors adopt an intuitive approach to derive the *IS* curve directly from the income determination graph showing $AD = AS$ (for example, see) Mankiw, N.G., *Macroeconomics, op. cit.,* Ch. 10 and Blanchard, O, *Macroeconomics* (Pearson Education, 4th Edn.), Ch. 5.

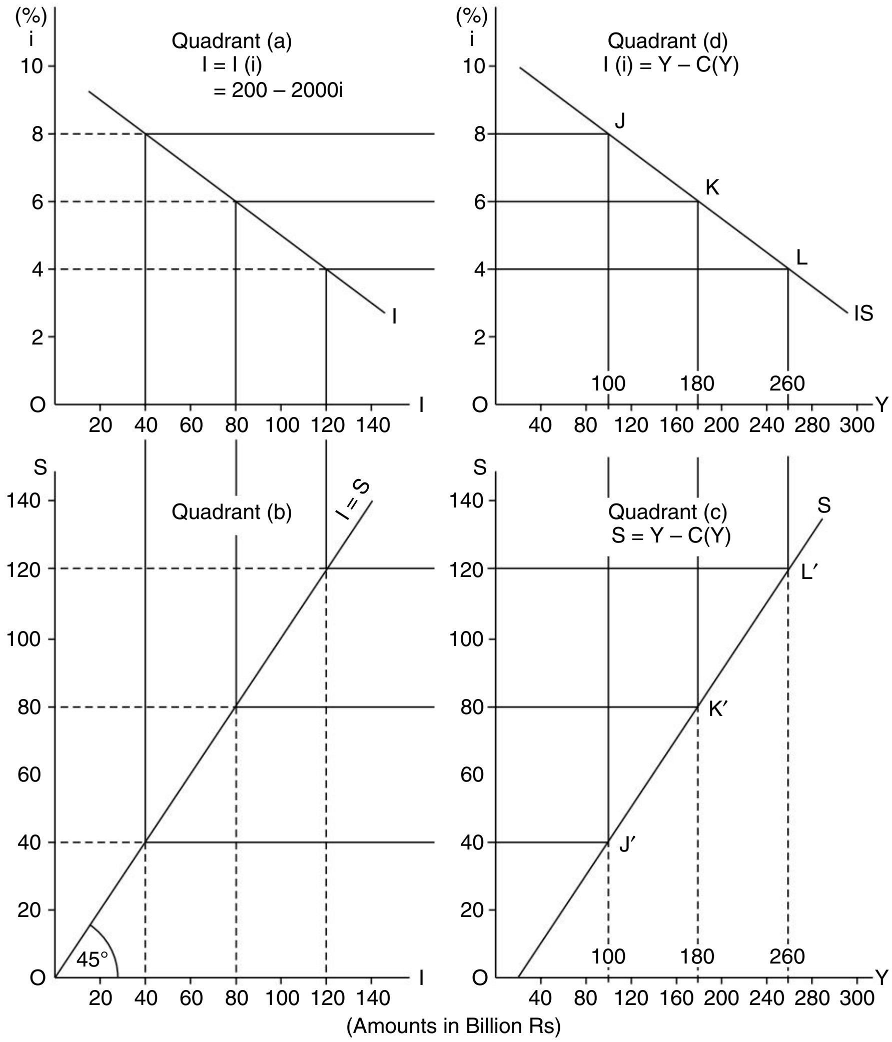

Fig. 16.1 Derivation of the *IS*-Curve

savings must increase to the same extent. Since $S = Y - C(Y)$ (or $S = -10 + 0.5Y$), income must increase for planned savings to increase. This relationship is given by the saving function in quadrant (c) with savings measured on the vertical axis and income on the horizontal axis. The saving function plotted in quadrant (c) gives the measure of the equilibrium levels of income at different levels of $I = S$. For example, at 8 percent interest, saving equal investment at Rs 40 billion. As shown in quadrant (c), a saving and investment of Rs 40 billion produces an equilibrium level of income of Rs 100 billion as shown by the point J'. Similarly, when interest rate goes down to 6%, $I = S$ rises to Rs. 80 billion. This level of $S = I$ generates income (Y) of Rs. 180 billion, as shown by the point K'. Similarly, point L' can be located on the saving function $S = Y - C(Y)$.

Now what we need to do is to link the equilibrium levels of income with the corresponding interest rate and derive the *IS* schedule. The *IS* schedule has been obtained in quadrant (d) by linking the interest rates and the equilibrium levels of income. Note that interest rate is measured on the vertical axis of quadrant (d) on the same scale as used in quadrant (a), and income (Y) is measured on the horizontal axis on the scale in quadrant (c).

The *IS* schedule has been derived as follows. Suppose that the equilibrium rate of interest is 8 percent. At this interest rate, $S = I$ at Rs 40 billion. The saving schedule in quadrant (c) shows that at the equilibrium level of saving and investment of Rs 40 billion, the equilibrium level of income is Rs 100 billion. When we link up this level of income with the interest rate of 8 percent, we get point J in quadrant (d). When interest fall to 6%, $S = I$ rises to Rs. 80 billion. With the rise in $S = I$ to Rs. 80 billion, the equilibrium level of Y rises to Rs. 180 billion. By linking this level of income to interest rate 6% in quadrant (d), we get a point K. We can similarly locate points L. By joining points J, K and L, we get the *IS*-schedule. *The IS curve is a locus of points showing equilibrium points of the product market at various combinations of* interest rate (i), investment (I), savings (S), and income (Y).

The *IS* curve has two *important implications. One,* it represents all the various combinations of interest (i) and income (Y), and investment (I) and saving (S) that keep the product market in equilibrium. The product market will not be in equilibrium at any point away from the *IS* curve. The reason is, all other points violate the equilibrium condition (I = S) of the product market. For example, at any point to the right of the *IS* curve, $S > I$, and at any point to the left of the *IS* curve, $S < I$. So the product market equilibrium has to be only on the *IS* curve. *Two,* the *IS* curve has a negative slope which implies that the level of the national income is inversely related to the interest rate.

Derivation of the LM Curve ***The LM curve shows the relationship between the interest rate and the equilibrium level of national income with money market in equilibrium.*** The *LM*-schedule can be derived straightaway from the money market equilibrium condition.

$$M_s = M_d$$

where, $M_d = M_t + M_{sp}$

$M_t = kY$

$M_{sp} = L(i)$

Thus, the money market equilibrium condition can be written as

$$M_s = kY + L(i) \tag{16.7}$$

Eq. (16.7) gives the *LM function.* It can be used to derive the *LM* curve. The derivation of the *LM* curve is illustrated in Fig. 16.2. This figure is also divided in four quadrants. Quadrant (a) presents a *hypothetical* Keynesian M_{sp} curve. The curvilinear M_{sp} function[7] for speculative demand for money is based on a function $M_{sp} = L(i)$. Quadrant (b) shows the relationship between *speculative* demand (M_{sp}) and *transaction* demand (M_t) for money. It gives the measure of M_t at the equilibrium of the money market, given the total supply of money (M_s). Since at equilibrium $M_s = M_d = M_t + M_{sp}$, with M_s constant, M_t decreases when M_{sp} increases and *vice versa*. In simple words, given the money supply, there is inverse relationship between M_t and M_{sp} i.e., if one increases, the other decreases. This relationship is shown by a line marked $M_t = M_s - M_{sp}$. The

[7] Here, we assume a nonlinear type of M_{sp} function, e.g., $M_{sp} = ai^{-2}$. In the following section, however, we will use, for convenience sake, a straight-line function for speculative demand for money.

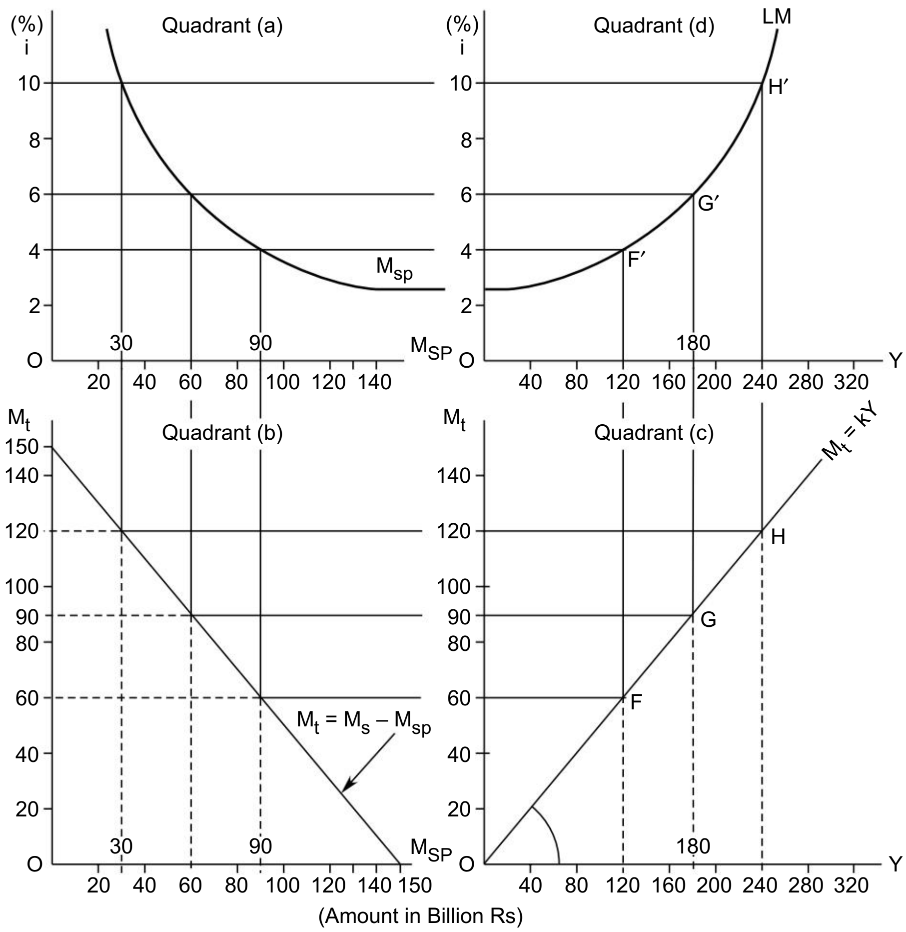

Fig. 16.2 Derivation of the *LM* Curve

significance of this line is that it gives M_t when M_{sp} is known at a given interest rate. For instance, given the supply of money (M_s), say, at Rs 150 billion and M_{sp} at Rs 60 billion at interest rate of 6 percent, the transaction demand for money, M_t = 150 – 60 = Rs 90 billion.

Quadrant (c) shows the derivation of M_t-demand curve at different levels of income (Y), assuming M_t-function to be given as $M_t = kY$ (where $k = 0.5$). The M_t-curve gives the relationship between M_t and Y given the M_t-function. Given the M_t-function, if interest rate (i) is known, M_{sp} and M_t can be easily known, given the supply of money. And, when M_t is known, the equilibrium level of income (Y) corresponding to M_t can be known. For example, if interest rate is 10 percent, then M_{sp} = Rs 30 billion and M_t = Rs 150 billion – Rs 30 billion = Rs 120 billion. Given the M_t function as $M_t = 0.5Y$, the equilibrium level of income can be obtained as

$$M_t = 0.5Y$$
$$Y = M_t/0.5$$

Since M_t = 120 billion,

$$Y = 120/0.5 = \text{Rs } 240 \text{ billion}$$

The equilibrium combination of M_t and Y at interest rate 10% is shown by point H in quadrant (c). Similarly points G and F show the combination of M_t and Y at interest rates 6 percent and 4 percent, respectively. By drawing a line through points *F, G* and *H,* we get M_t-function.

Quadrant (d) of Fig. 16.2 shows the derivation of the *LM* curve. The *LM* curve is derived by linking the different interest rates and the equilibrium levels of income as shown in quadrant (d). For example, at the interest rate of 10 percent, M_{sp} = Rs 30 billion, M_t = Rs 120 billion and the equilibrium level of income is Rs 240 billion. By linking the equilibrium income of Rs 240 billion with the interest rate of 10 percent, we get point *H'* in quadrant (d). Similarly, when the interest rate decreases to 6 percent, M_{sp} rises to Rs 60 billion, and M_t decreases to Rs. 90 billion. By linking the equilibrium income of Rs 180 billion with the interest rate of 6 percent, we get a point *G'*. A number of such other points, for example, points *F'* can be located. By joining these points we get the *LM* curve, as shown in quadrant (d). *The LM is a locus of points showing equilibrium points of the money market at different levels of interest, income and demand for money.*

It is *important* to note here that all possible money market equilibria lie on only the *LM* curve and at no other point. The reason is, all other points violate the equilibrium condition ($M_d = M_s$) of the money market.

16.2.2 The Product and Money Market Equilibrium: The Graphical Method

Having derived the *IS* and *LM* curves, we can now integrate them to find the general equilibrium, i.e., the simultaneous equilibrium of the product and money markets at the same interest rate and the level of income. Fig. 16.3 presents the *IS* and *LM* curves derived in figures 16.1 and 16.2, respectively. The *IS* curve shows the equilibrium levels of Y at different levels of i with the condition that $I = S$. Similarly, *LM* curve shows the equilibrium levels of Y at different levels of i with the condition that $M_d = M_s$. As shown in Fig. 16.3, the *IS* and *LM* curves intersect at point *E*. Point *E* gives the unique combination of i and Y that satisfies the equilibrium conditions of both the product and the money markets, that is, $I = S$ and $M_d = M_s$ at the same interest rate (i) and income (Y). Point *E* is, therefore, the point of *general equilibrium*. At point *E,* both product and money markets are in equilibrium at interest rate 6 percent and income of Rs 180 billion.

At all other interest rates, there is a divergence between the *IS* and *LM* curves. This divergence creates the condition of disequilibrium.

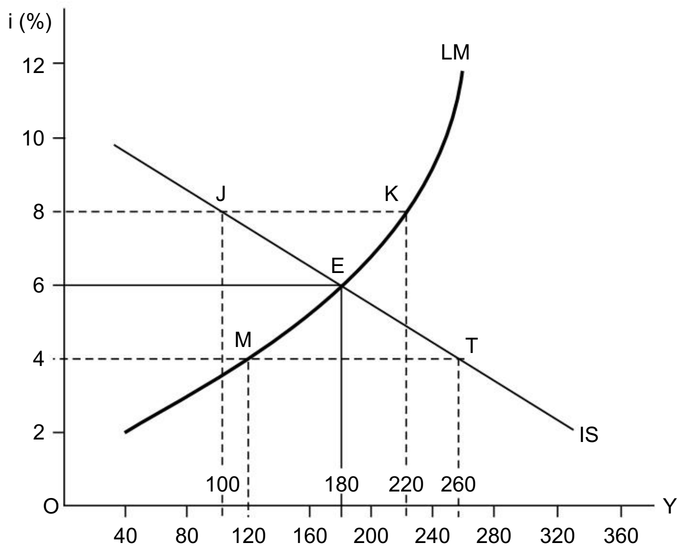

Fig. 16.3 The General Equilibrium of Product and Money Markets

For instance, suppose market rate of interest is given at 8%. At this interest rate, $I = S$ at the income level of Rs 100 billion, as indicated by point *J*. But, for the money market to be in equilibrium at this rate of interest, an income level of Rs 220 billion would be required, as indicated by point *K*. Thus, at interest rate of 8 percent, product and money markets are not in equilibrium at the same level of income. There is, therefore, no general equilibrium at this interest rate. Similarly, at interest rate of 4%, money market is in equilibrium at point *M*, with corresponding income of Rs. 120 billion, and product market is in equilibrium at point *T*, with corresponding income of Rs. 260 billion. The economy is, therefore, in disequilibrium. The system has, however, a tendency to converge to point *E*, the point of the general equilibrium. In fact, the disequilibrium conditions themselves create conditions for the sectoral adjustment making the economy move towards the point of general equilibrium. The adjustment mechanism of the markets to the conditions of the general equilibrium will be discussed in Section 16.4. Let us first look at algebraic derivation of the conditions for the general equilibrium.

16.3 ALGEBRAIC VERSION OF THE *IS-LM* MODEL

In this section, we present the *IS-LM* model in its algebraic form. We will first derive the fundamental equations that give the *IS* and *LM* curves and then combine them to present the general equilibrium model.

16.3.1 Derivation of *IS* Function: Algebraic Method

The *IS* function can be derived by using both the equilibrium conditions of the product market. The two equilibrium conditions are: (i) $AD = AS$, and (ii) $I = S$. We will show here the derivation of the *IS* curve by using both the conditions of the product-market equilibrium.

Derivation of IS Curve by the Equilibrium Condition AD = AS In order to derive the *IS* curve, let us recall the *product market model*. The product market is in equilibrium where

$$AD = Y = C(Y) + I(i) \tag{16.8}$$

Let us suppose that the terms $C(Y)$ and $I(i)$ are given in functional form as:

$$C(Y) = a + bY \tag{16.9}$$

$$I(i) = \bar{I} - hi \tag{16.10}$$

where $h = \Delta I/\Delta i$.

Given the consumption function in Eq. (16.9) and investment function in Eq. (16.10), the equilibrium condition for the product market given in Eq. (16.8) can be written as

$$Y = a + bY + \bar{I} - hi \tag{16.11}$$

$$= \frac{1}{1-b}(a + \bar{I} - hi)$$

Eq. (16.11) gives the IS schedule Recall that the term $1/(1\text{-}b)$ in Eq. (16.11) is the investment multiplier. Denoting *investment multiplier* by alphabet '*m*', Eq. (16.11) can also be written as

$$Y = m(a + \bar{I} - hi) \tag{16.12}$$

Eq. (16.12) can be used to derive the *IS*-schedule. This can be shown by a numerical example.

Numerical Example Let us suppose that Eqs. (16.9) and (16.10) are given, respectively, as

$$C(Y) = 10 + 0.5Y \qquad \textbf{(16.13)}$$

$$I(i) = 200 - 2000i \qquad \textbf{(16.14)}$$

The product market equilibrium condition given in Eq. (16.11) can now be expressed in terms of Eqs. (16.13) and (16.14) as

$$Y = 10 + 0.5Y + 200 - 2000i$$

$$= \frac{1}{1-0.5}(10 + 200 - 2000i)$$

$$= 2\ (210 - 2000i)$$

$$Y = 420 - 4000i \qquad \textbf{(16.15)}$$

Eq. (16.15) gives the IS-schedule in its numerical form. Since we have assumed a linear investment function, Eq.(16.15) gives a liner *IS*-schedule. The *IS*-schedule drawn on the basis of Eq. (16.15) is presented in Fig. 16.4.

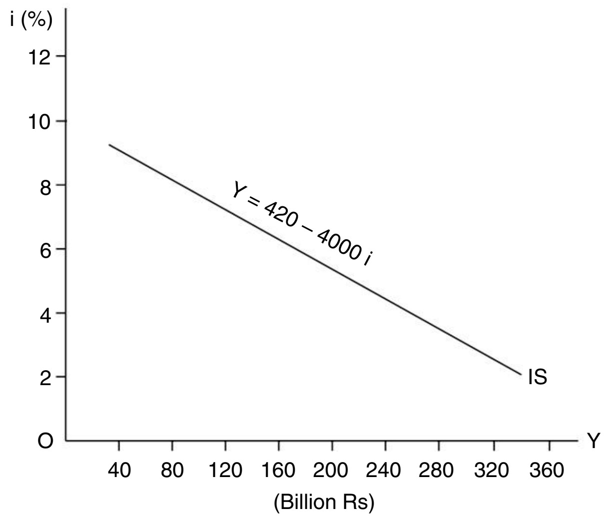

Fig. 16.4 Derivation of *IS*-schedule: Algebraic Method

Derivation of IS Curve by Equilibrium Condition I = S The *IS* schedule given in Fig. 16.4 can also be derived on the basis of the other equilibrium condition of the product market, that is, $I = S$. We have assumed above an investment function as $I = 200 - 2000i$. As regards the saving function, $S(Y)$, it can be derived from the consumption function $C(Y) = 10 + 0.5Y$. We know that

$$S(Y) = Y - C(Y)$$

By substitution, we get

$$S = Y - (10 + 0.5Y) \qquad \textbf{(16.16)}$$

$$= -10 + 0.5Y$$

Given the investment and saving functions, the equilibrium condition of the product market ($I = S$) can be expressed as:

$$200 - 2000i = -10 + 0.5Y \quad \textbf{(16.17)}$$
$$210 = 2000i + 0.5Y$$

Given Eq. (16.17), we get

$$Y = 420 - 4000i \quad \textbf{(16.18)}$$

Note that Eq. (16.18) is the same as Eq. (16.15) and will produce the same *IS*-schedule as shown in Fig. (16.4).

16.3.2 Derivation of *LM* Schedule: Algebraic Method

To derive *LM* schedule, let us recall here the condition for money market equilibrium. The money market equilibrium condition is reproduced here with some modification.

$$M_d = \bar{M}^s$$

where,

$$M_d = M_t + M_{sp}$$
$$M_t = kY, \ (k > 0)$$
$$M_{sp} = L(i)$$

In the Keynesian system, the M_{sp} demand function is a curvilinear schedule with a part made of straight horizontal line, that is, the part showing *liquidity trap* [see quadrant (a) of Fig. 16.2]. For convenience sake, however, we assume a straight-line demand function for M_{sp} given as

$$M_{sp} = \bar{L} - li$$

where $\bar{L}$ and l are constants, i is interest rate and $l = \Delta M_{sp}/\Delta i$.

Given the M_t and M_{sp} functions, the M_d-function can be expressed as

$$M_d = kY + (\bar{L} - li) \quad \textbf{(16.19)}$$

As regards the money supply ($\bar{M}^s$), it is assumed to remain constant in the entire analysis of the money market equilibrium. The price level (P) is also assumed to remain constant. Therefore, the *nominal* money supply ($\bar{M}^s$) equals the *real money* supply often denoted as $\bar{M}^s/P$. The money-market equilibrium condition can now be expressed as

$$\bar{M}^s = M_d$$

or

$$\bar{M}^s = kY + (\bar{L} - li) \quad \textbf{(16.20)}$$

Eq. (16.20) gives the money market equilibrium at different levels of income (Y) and the rate of interest (i). By rearranging the terms in Eq. (16.20), we get the *LM*-function as

$$Y = \frac{1}{k}(\bar{M}^s - \bar{L} + li) \quad \textbf{(16.21)}$$

Eq. (16.21) gives the *LM* function which can be used to derive the *LM* curve. Note that Eq. (16.21) produces a linear *LM* schedule unlike one given in Fig. 16.2.

Numerical Example Eq. (16.21) above gives the *LM schedule*. This can be shown by a numerical example. Let us assume that money-market model is given as

$$\bar{M}^s = 150 \quad \textbf{(16.22)}$$
$$M_t = kY = 0.5Y \quad \textbf{(16.23)}$$

$$M_{sp} = \bar{L} - li = 150 - 1500\,i \tag{16.24}$$

$$M_d = kY + \bar{L} - li = 0.5Y + 150 - 1500\,i. \tag{16.25}$$

By substituting relevant values from this model into Eq. (16.21), we get the *LM* function as

$$Y = \frac{1}{0{\cdot}5}\,(150 - 150 + 1500\,i)$$

$$Y = 3000\,i \tag{16.26}$$

Alternatively, the money-market equilibrium condition can also be expressed as:

$$M_d = \bar{M}^s$$

$$0.5Y + 150 - 1500\,i = 150$$

$$0.5Y = 1500\,i$$

$$Y = 3000\,i \tag{16.27}$$

Note that both the formulations produce the same equation for the *LM* curve. The *LM* schedule derived from Eqs. (16.26) and (16.27) is presented in Fig. 16.5. Note also that function (16.27) produces a linear *LM* shcedule, unlike the one drawn in Fig. 16.2. This is so because we have assumed a linear M_{sp}-function.

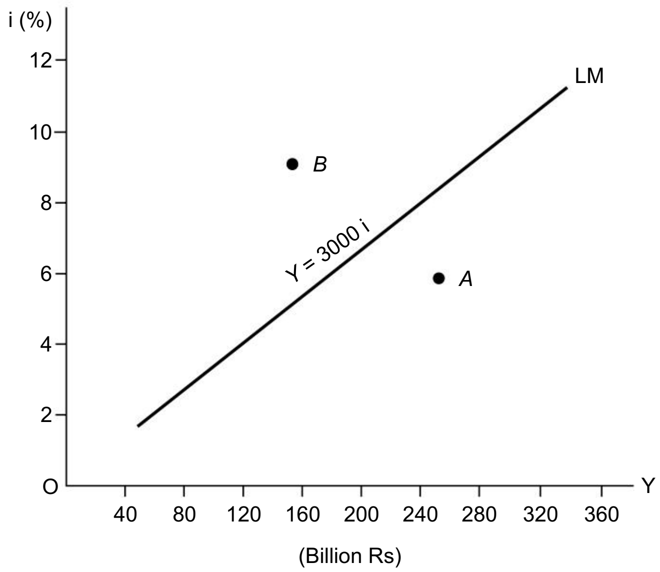

Fig. 16.5 Derivation of *LM* Schedule: Algebraic Method

16.3.3 Integrated Equilibrium of Product and Money Markets

Having derived the *IS* and *LM* functions, we may now combine the two functions and find the value of *Y* and *i* that conform to the general equilibrium—the equilibrium of the product and money markets at the same levels of *Y* and *i*. As noted earlier, the general equilibrium takes place where

$$IS = LM \tag{16.28}$$

Recall the *IS* and *LM* functions given in Eqs. (16.15) and (16.26), respectively.

IS function: $Y = 420 - 4000\ i$

LM function: $Y = 3000\ i$

By substituting these equations into Eq.(16.28), we get the equilibrium interest rate as

$$420 - 4000\ i = 3000\ i \tag{16.29}$$

$$7000\ i = 420$$

$$i = 0.06$$

Eq. (16.29) gives the equilibrium rate of interest at 6%.

The equilibrium Y can now be obtained by substituting 0.06 for i in the *IS* or *LM* function. For instance, consider the *IS* function.

$$\begin{aligned} Y &= 420 - 4000\ i \\ &= 420 - 4000\ (0.06) \\ &= 180 \end{aligned}$$

It means that, at the interest rate of 6%, the equilibrium level of income is Rs. 180 billion. The final conclusion that emerges from this exercise is that, given the *IS* and *LM* functions, the economy reaches equilibrium at the interest rate of 6% and national income of Rs 180 billion.

Alternative Method The *IS* and *LM* functions can be alternatively rewritten, respectively, as

IS function: $Y + 4000\ i = 420$ (1)

LM function: $Y - 3000\ i = 0$ (2)

Now we have two simultaneous equations with two unknowns, Y and i. The model can, therefore, be solved by the method of solving simultaneous equations. By subtracting Eq. (1) from Eq. (2), we get

$$7000\ i = 420$$

$$i = 0.06 \quad \text{(i.e., 6 percent rate of interest).}$$

By substituting 0.06 for i in Eq. (1) or (2), we can obtain the equilibrium value of Y. For example, using Eq. (2), we get

$$Y = 3000\ (0.06) = 180.$$

That is, the equilibrium level of Y is Rs 180 billion.

16.4 FROM DISEQUILIBRIUM TO EQUILIBRIUM—THE DYNAMICS OF ADJUSTMENT

Let us now look into the adjustment process by which an economy moves from the state of disequilibrium to its equilibrium. The economy is in disequilibrium on any other point than the point of intersection of the *IS* and *LM* schedules. In respect of disequilibrium analysis, *two important principles* need to be borne in mind for further analysis.

One, at any point that lies below and to the right of the *LM* schedule, say, at point *B* in Fig. 16.6, $M_d > M_s$. And, at any point that lies above and to the left of the *LM* schedule, say, at point *A*, $M_s > M_d$. Thus, any point away from the *LM* schedule marks the points of disequilibrium. Money market is in equilibrium, i.e., $M_d = M_s$, only at points that lie on the *LM* schedule.

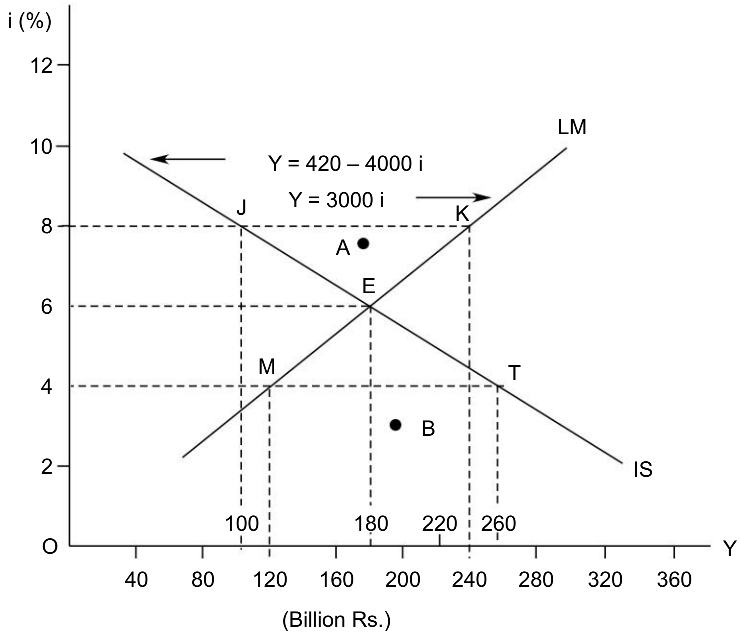

Fig. 16.6 The Process of Adjustment Towards the General Equilibrium

Two, at any point that lies below and to the left of the *IS* schedule, say, at point *B,* in Fig. 16.6, planned investment exceeds the planned savings. And, at any point that lies above and to the right of the *IS* schedule, say, at point *A,* planned investment falls short of planned savings. The product market is in equilibrium, i.e., $I = S$, only at the points that lie on the *IS* schedule.

Given these principles, let us now introduce the condition for disequilibrium and explain the process of adjustment. It must be noted at the outset that the conditions of disequilibrium themselves create the conditions for equilibrium. The process of adjustments is illustrated in Fig. 16.6. It presents the *IS* and *LM* curves drawn in Figs. 16.4 and 16.5, respectively. The *IS* and *LM* curves intersect at point *E* determining the general equilibrium at Y = Rs 180 billion and interest rate at 6 percent. Now let us suppose that the interest rate rises to 8 percent. A line drawn horizontally from 8 (percent) intersects the *IS* curve at point *J* and the *LM* curve at point *K.* It means that, at 8 percent interest, the product market is in equilibrium at point *J* where Y = Rs 100 billion and $I = S$. On the other hand, the money market is in equilibrium at point *K* where $M_d = M_s$ at the income level of Rs 240 billion. Obviously, the equilibrium of the two markets is not consistent with the condition of the general equilibrium. This marks the condition of general disequilibrium.

Let us now look at the process by which product and money markets interact to make the system converge to the point of general equilibrium, i.e., point *E*. Going by the *first principle,* since point *J* lies above and to the left of the *LM* schedule, $M_s > M_d$, at 8 percent interest rate. By assumption, M_s is given at Rs. 150 billion (Eq. 16.22). The amount by which money supply exceeds the money demand can be worked out as follows.

At point *J,* product market is in equilibrium at Y = Rs 100 billion. The total demand for money at this level of income can be obtained from the M_d-function given in Eq. (16.25), as

$$M_d = 0.5Y + 150 - 1500\, i$$

In our example, Y = Rs. 100 billion and i = 8 percent or 0.08. By substituting these values for Y and i, in this equation, we get

$$M_d = 0.5\ (100) + 150 - 1500\ (0.08)$$
$$= 80 \text{ (i.e., Rs 80 billion)}$$

Since money supply is given at Rs 150 billion (see Eq. 16.22), it exceeds the demand for money (i.e., Rs 80 billion) by Rs. 70 billion. This state of disequilibrium creates the conditions for and sets in motion a process of adjustment.

The process of adjustment begins as follows. Let us begin with the **product market**. The excess money supply, not needed for transaction, will flow to the bond market pushing up the bond prices. Since bond prices and the interest rate are inversely related, interest rate (i) will go down (below 8 percent). The fall in the interest rate will affect both the product and the money markets. The fall in the interest rate will affect the product market by increasing investment (I) because $I = f(i)$. Increase in I will increase Y which will increase the transaction demand for money. The product market equilibrium point J will shift downward along the *IS*-schedule towards point E.

In the **money market**, on the other hand, M_d will increase on account of two factors: (i) increase in transaction demand for money due to increase in Y, and (ii) M_{sp} will increase due to the fall in the interest rate. As a result, the money market equilibrium tends to shift from point K towards point E. This adjustment process continues until the system reaches the general equilibrium point E. Here, equilibrium rate of interest is 6 percent, $I = S$, and $L = M$ or $M_d = M_s$.

A similar analysis can be performed for an interest rate lower than the equilibrium interest rate of 6 percent. For example, suppose, for some reason, the rate of interest falls from the equilibrium rate of 6 percent to 4 percent. At 4 percent interest rate, the product market is in equilibrium at point T (in Fig. 16.6) which gives the equilibrium level of income at Rs 260 billion. Given the M_d-function (Eq. 16.25), at Y = Rs 260 billion, the total demand for money equals Rs 220 billion (i.e., $M_d = 0.5 \times 260 + 150 - 1500 \times 0.04$). This demand for money (Rs 220 billion) exceeds the supply of money (Rs 150 billion). It means that, people face shortage of transaction cash balance. Therefore, they begin to sell their bonds and securities. Consequently, bond and security prices go down and interest rate goes up. Due to the rise in the interest rate, I begins to decrease, and with it decreases the level of income (Y). Following the fall in Y, the transaction demand for money decreases. This process continues until the system reaches the general equilibrium point E, where interest rate is 6 percent, $I = S$ and $L = M$ or $M_d = M_s$.

16.5 SHIFT IN *IS* AND *LM* CURVES AND THE GENERAL EQUILIBRIUM

The general equilibrium is determined by the intersection of the *IS* and *LM* curves. Therefore, the point of general equilibrium shifts due to a shift in the *IS* and *LM* curves. The *IS* and *LM* curves shift upward or downward depending on the direction of change in their determinants—saving and investment in case of the *IS* curve, and money demand and money supply in case of the *LM* curve. Following the shifts in *IS* and *LM* schedules, there is a shift in the point of general equilibrium. In this section, we will analyse the shifts in the *IS* and *LM* schedules in turn and the consequent shift in the general equilibrium. Essentially, we will examine the effect of change in savings and investment and in money supply and demand on the general equilibrium.

16.5.1 The Shift in the *IS* Curve

Let us first analyse the shift in the general equilibrium caused by the shift in the *IS* schedule, assuming *LM* curve to be given. The shift in *IS* schedule is caused by the shift in the investment schedule (*I*) due to an autonomous investment[8]. Let us now suppose that the *I*-schedule shifts from I_1 to I_2 as shown in quadrant (a) of Fig. 16.7. The shift in the *I*-schedule implies an increase in investment at all the rates of interest. Therefore, shift in investment schedule is parallel. For instance, given the interest rate i_2, if *I*-schedule shifts upward from I_1 to I_2, it means that investment rises from OI_1 to OI_2, as shown in quadrant (a). Similarly, at the interest rate i_1, investment increases from OI_2 to OI_3. Note that $I_1I_2 = I_2I_3$. This means a parallel shift in the *I*-schedule.

With the increase in investment, the equilibrium levels of savings must increase too to match with a higher level of investment. Savings must increase from OS_1 to OS_2 at the interest rate i_2 and from OS_2 to OS_3 at the interest rate i_1, as shown in quadrant (b). This rise in the equilibrium levels of

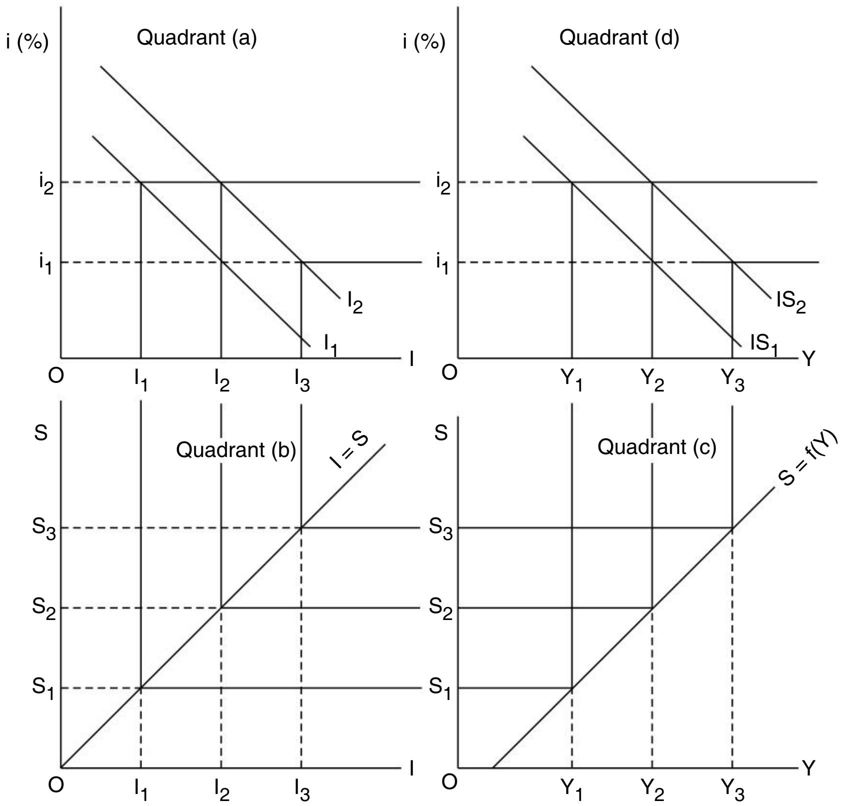

Fig. 16.7 Shift in the *I*-schedule and in the *IS* Curve

8. An outward shift in the *I*-schedule, implies that autonomous investment increases by a constant amount at each interest rate. This shift in *I*-schedule may be supposed to have been caused by exogenous factors like change in technology and hence a rise in the productivity of capital (indicated by an upward shift in *MEC* schedule), businessmen's expectations of market expansion in future, increase in foreign investment (in an open economy), and so on, all other things remaining the same.

saving and investment increases the equilibrium level of income. For example, given the interest rate i_2, when investment increases from OI_1 to OI_2, the level of income increases, as shown in quadrant (c), from OY_1 to OY_2 and savings increase from OS_1 to OS_2 to match with investment. Similarly, given the interest rate i_1, when investment increases from OI_2 to OI_3 the level of output increases from OY_2 to OY_3 and savings increase from OS_2 to OS_3. By linking the new levels of income (Y) with the corresponding rates of interest, we get a new *IS* curves shown by the schedule IS_2 in quadrant (d).

Shift in the General Equilibrium The shift in the general equilibrium, is illustrated in Fig. 16.8. Suppose that, at some point in time, the product and the money markets were both in equilibrium at point *E,* the point of intersection between IS_1 and *LM* curves. At point *E,* the equilibrium rate of interest is i_1 and the equilibrium level of income is Y_1, with $I = S$ and $M_s = M_d$. Let the IS_1 curve now shift upward to IS_2 for some extraneous reasons, the *LM* schedule remaining the same. The upward shifts in the *IS* schedule shifts the general equilibrium point from *E* to *A* which indicates a rise in the interest rate (i) from i_1 to i_2 and equilibrium income from Y_1 to Y_2.

An upward shift in the *IS* schedule implies also a rise in investment at a given level of savings. So the question arises: Where does the fund for additional investment come from? The funds for new investment come from reallocation of asset portfolio. Investors sell their bonds to acquire funds for new investment. As a result, bond prices go down and interest rate goes up and speculative demand for money goes down. This is how funds for new investment are obtained at a given level of *S* and *Y*.

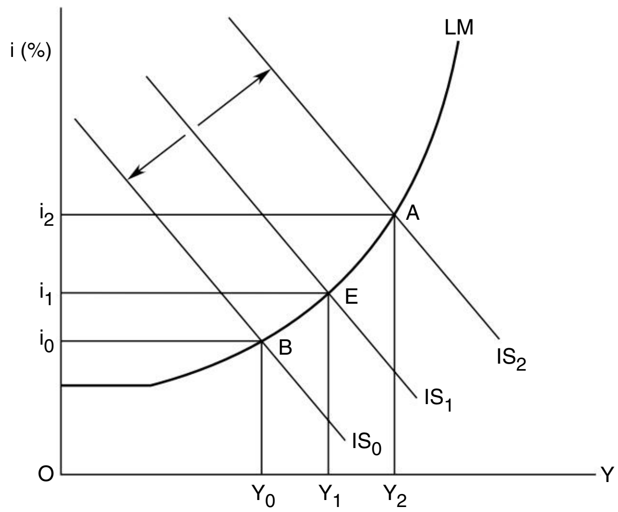

Fig. 16.8 Shift in the *IS* Schedule and the General Equilibrium

More importantly, when investment increases, *Y* increases too. As a result, savings increase, on one hand, and transaction demand for money, on the other. Thus, following the shift in the *IS* curve, all the variables of the model—I, i, Y, S, M_d—move upward, given the money supply. That is, both product and money market equilibria move from point *E* towards point *A*.

A reverse process comes into force when the *IS* curve shifts downward from IS_1 to IS_0 for some reason. A downward shift in the *IS* curve implies fall in *I* and, therefore, fall in *Y.* Following the decrease in *Y,* the transaction demand for money decreases. This results in excess liquidity, given the supply of money. The excess liquidity finds its way into the bonds and securities markets. As a result, bond and security prices go up and the interest rate goes down. This process continues till the product and money markets reach point *B*.

16.5.2 The Shift in *LM* Curve

Let us now examine the effect of a leftward shift in the *LM* curve on the general equilibrium, assuming a given *IS* curve. The *LM* curve shifts left-ward due to (i) increase in speculative demand for money, interest rate given, (ii) decrease in the supply of money, and (iii) decrease in the transaction demand for money. The shift of the *LM* curve by each of these factors is explained and illustrated in turn. Let us begin by explaining the shift in the *LM* curve due to shift in the M_{sp}-schedule. For our analysis here, we assume a curvilinear M_{sp}-function.

Shift in M_{sp} Schedule and LM Curve The shift in the *LM* curve due to a shift in M_{sp} schedule is illustrated in Fig. 16.9. Suppose that the M_{sp}-schedule is given as M_{sp1} in quadrant (a) of Fig. 16.9. Given the interest rate i_2, the speculative demand for money is *OL* and transaction demand for money is *OR*, as shown in quadrant (b). Suppose that the interest rate remains stable at i_2 and speculative demand for money increases from *OL* to *OK*. This kind of increase in the speculative cash balance makes the M_{sp}-schedule shift to the right to the position of M_{sp2}. Therefore, given the money supply, transaction demand for money decreases by the same amount. For

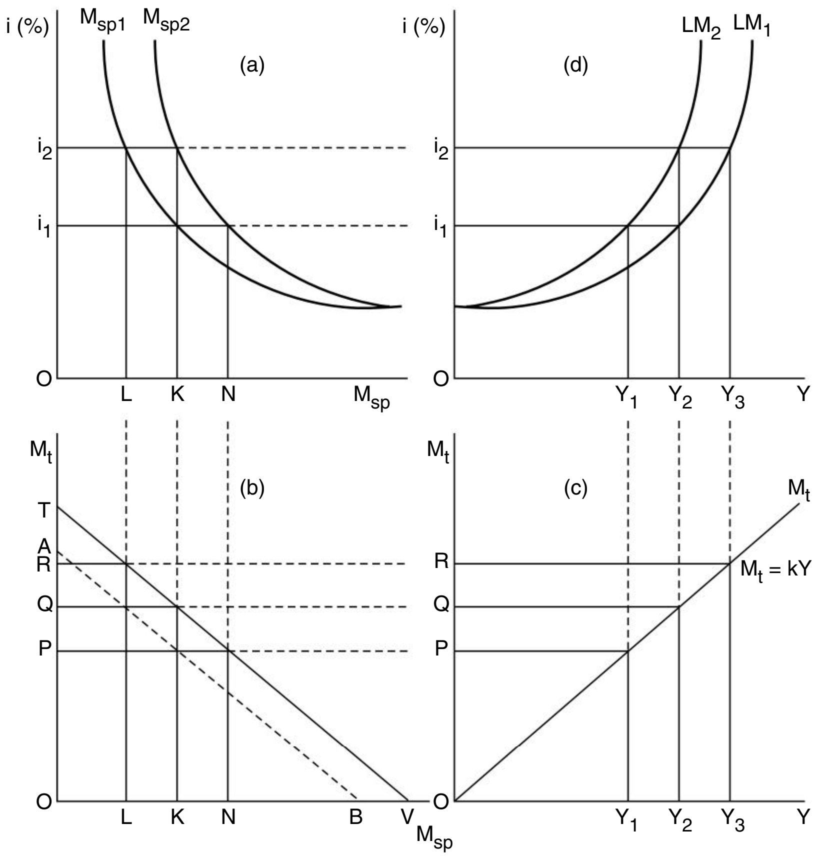

Fig. 16.9 Shift in the M_{sp} Curve and in the *LM* Curve

instance, when speculative cash balance increases by *LK*, the transaction demand for money decreases by *RQ*, as shown in quadrant (b).

With the fall in the transaction demand for money (M_t), the level of income must fall because a smaller transaction cash balance can support only a smaller level of output. The effect of fall in M_t on the level of income (output) is demonstrated in quadrant (c). For instance, when M_t decreases by *RQ,* the equilibrium level of income decreases from Y_3 to Y_2 and when M_t falls by *QP,* then *Y* decreases from Y_2 to Y_1. The decrease in the level of income at each interest rate is shown in quadrant (d). When we link each interest rate with lower levels of the equilibrium income, we get a new *LM*-curve, i.e., LM_2. This shows the shift of the *LM* curve from LM_1 to LM_2. The shift shows a fall in the equilibrium levels of income at each rate of interest.

Change in Money Supply and Shift in LM Curve A shift in the *LM* curve is also caused by the change in money supply. If supply of money decreases, *all other things remaining the same*, the line *TV* representing M_t in quadrant (b) shifts inward, as shown by the dashed line *AB*. This will alter the combination of M_{sp} and M_t. In effect, M_t will decrease, M_{sp} remaining the same. Since a smaller M_t can support only a smaller output, the equilibrium level of income will decrease at each interest rate. This will make the *LM* curve shift leftward from LM_1 to LM_2. By the same logic, an increase in money supply will make the *LM* curve shift rightward.

Change in M_t and Shift in LM Curve Another factor which makes *LM* curve shift is the change in M_t. Since $M_t = kY$, a change in factor *k* changes M_t. If factor *k* decreases, the M_t-schedule in quadrant (c) rotates clockwise and if *k* increases, M_t-schedule rotates anti-clockwise. In both the cases, the *LM* shifts leftward or rightward depending on whether *k* increases or decreases. A decrease in *k* makes the M_t curve rightward and therefore a rightward shift in the *LM* curve. An increase in *k* causes a leftward shift in the M_t curve, and a leftward shift in the *LM* curve.

Shift in the General Equilibrium The shift in the general equilibrium due to shift in the *LM* curve is illustrated in Fig. 16.10. Let us suppose that the product and the money markets are simultaneously in equilibrium at point E_0 where the interest rate = i_0, $Y = Y_0$, $I = S$, and $M_d = M_s$. Now let the *LM* curve shift from LM_0 to LM_1, say, due to increase in the money supply, while the *IS* schedule remains the same. When the money supply increases, given the level of *Y*, it leads to excess liquidity. This excess liquidity finds its way into the bonds and security markets. As a result, the bond and security prices go up and the interest rate goes down. A decrease in the interest rate encourages new investment which increases income (*Y*). Increase in *Y* leads to rise in the transaction demand for money. On the other hand, the speculative demand for money increases too due to fall in the interest rate. Thus, the total demands for money (M_d) increases. This process continues till both the product and the money markets reach a new equilibrium point E_1. At point E_1, all the variables of the model are in balance with one another, at a lower rate of interest, i_1, and a higher level of income Y_2.

Consider now the decrease in the money supply and a leftward shift in the *LM* curve from its original position LM_0 to LM_2. Given the income Y_0, a fall in the money supply results in shortage of transaction cash balance. To acquire additional transaction cash balance, the bondholders sell their bonds. This causes fall in the bond prices and increase in the interest rate. Increase in the interest rate leads to fall in the investment which in turn causes a fall in *Y.* With the fall in *Y,* the transaction demand for money decreases. This process continues till both the money and product markets reach a new equilibrium point at E_2.

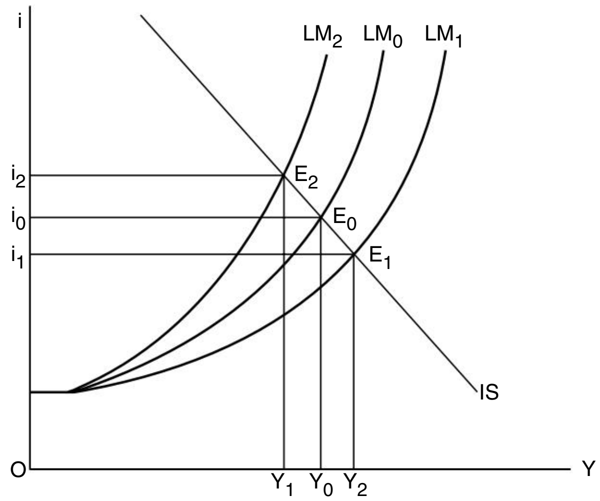

Fig. 16.10 Shift in the *LM* Curve and the General Equilibrium

16.5.3 Simultaneous Shift in the *IS* and *LM* Curves

We have discussed, in the preceding sections, the shift in the general equilibrium assuming first the shift in the *IS* curve and then the shift in the *LM* curve. In this section, we discuss the effect of a simultaneous shift in the *IS* and *LM* curves on the general equilibrium. For the sake of simplicity, we assume that both the curves shift in the same direction. The shift in the general equilibrium caused by the simultaneous shift in the *IS* and *LM* curves has been illustrated in Fig. 16.11. Suppose

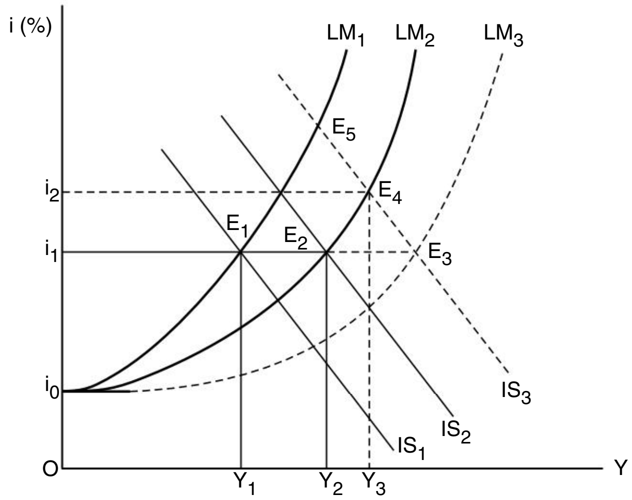

Fig. 16.11 Simultaneous Shift in the *IS* and *LM* Curves and the General Equilibrium

that the initial *IS* and *LM* curves are given as IS_1 and LM_1, respectively. The IS_1 and LM_1 curves intersect at point E_1—the point of general equilibrium—which determines the equilibrium levels of interest at i_1 and income at Y_1. Now, let the *IS* schedule shift from IS_1 to IS_2 and *LM* curve from LM_1 to LM_2. The IS_2 schedule and LM_2 curve intersect at point E_2. Thus, the general equilibrium shifts from point E_1 to E_2 and the equilibrium level of income increases from Y_1 to Y_2, interest rate remaining the same.

Note that the interest rate does not change—it remains the same (i_1). This is so because the magnitude of the shift in the *IS* and *LM* curves is the same at the given rate of interest, i_1. The equal shift in the *IS* and *LM* curves is indicated by the distance between E_1 to E_2. In reality, however, the shift in the *IS* and *LM* curves may not be the same. If the *IS* and *LM* curves shift with different magnitudes, even if in the same direction, the interest rate will change. For example, suppose that the *LM* curve shifts from LM_1 to LM_2 and the *IS* schedule shifts from IS_1 to IS_3. In that case, equilibrium shifts to E_4 where interest rate rises from i_1 to i_2 and the equilibrium level of income increases to Y_3. For the interest rate to be the same (i_1), the *LM* curve is required to shift to LM_3 and intersect with IS_3 at point E_3.

If the *IS* and *LM* curves shift in reverse directions, the change in the interest rate and income will depend on both the direction and the magnitude of the shifts. For example, if IS_2 shifts to IS_3 and LM_2 shifts backward to LM_1, the new equilibrium will take place at point E_5 which indicates a rise in the interest rate far beyond i_1 and fall in income below Y_2.

To sum up, a shift in *IS* and *LM* curves initiates a process of adjustment in the product and money markets. This process of adjustment brings about changes in the interest rate, demand for money and income, and guides them to a new equilibrium. This is a theoretical possibility.

SUGGESTED READINGS

(For Readings, see at the end of Chapter 17).

QUESTIONS FOR REVIEW

1. Distinguish between the product and the money markets? Explain the interdependence of the two markets? How does it matter in the determination of the general equilibrium?
2. Define the *IS* curve. Derive it graphically. Explain the relationship between the interest rate and income.
3. What factors cause upward and downward shifts in the *IS* curve? Suppose autonomous investment increases, interest rate remaining constant, how will it cause a shift in the *IS* curve. Illustrate graphically.
4. Suppose consumption and investment functions are given as:

$$C = 20 + 0.5Y$$

and $$I = 200 - 2000\,i$$

Find equilibrium level of income at interest rates 8%, 6% and 5%.

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5. How is the *IS* curve affected by an increase in marginal efficiency of capital, other things remaining the same. Show graphically the effect of upward shift in the investment schedule.
6. Define the *LM* curve. Derive it graphically and explain the relationship between the interest rate and income.
7. *Derive the *LM* function from the following money-sector model.

$$M_t = 0.5\,Y$$
$$M_{sp} = 100 - 1500i$$
$$M_s = 150$$

   Give economic interpretation of the *LM* curve.
8. How is the *LM* curve affected by the change in the money supply and the demand for money? Show it graphically.
9. Explain the concept and condition of the general equilibrium. Show graphically why an economy is in disequilibrium when the product market equilibrium is not consistent with the money market equilibrium.
10. *Suppose following functions are given.

$$C = 100 + 0.8\,Y$$
$$S = -100 + 0.2Y$$
$$I = 120 - 5\,i$$
(where i is percentage interest)
$$M_s = 120$$
$$M_d = 0.2Y - 5\,i$$
(where i is percentage interest)

   Find: (a) the *IS*-curve equation, (b) the *LM*-curve equation, (c) income at general equilibrium, and (d) interest rate at general equilibrium.
11. *By using the following functions, find Y and i at general equilibrium.

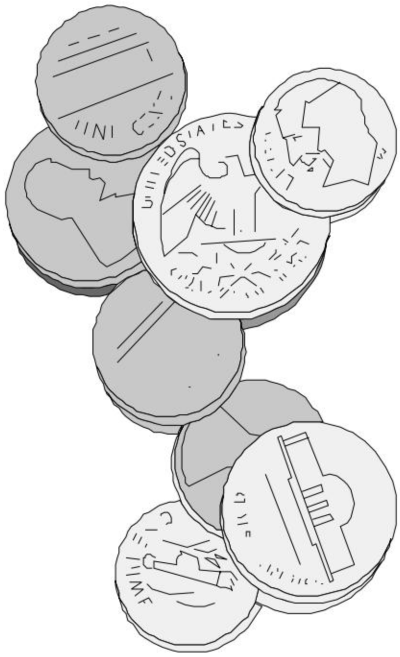
$$C = 15 - 0.5Y$$
and
$$I = 200 - 2000\,i$$
$$M_t = 0.5\,Y$$
$$M_{sp} = 110 - 1500\,i$$
$$M_s = 150$$

12. Suppose product and money markets are in equilibrium at some interest rate and level of income, and interest rate shoots up for external reasons. Explain and illustrate the process of adjustment of the product and money markets to return to the original equilibrium.

* For solution to the starred (*) problems, see *Appendix*

Chapter 17

The *IS-LM* Model with The Government Sector



INTRODUCTION

In this Chapter, we extend our discussion on the *IS-LM* model from two-sector to three-sector framework. In other words, we move on from a hypothetical two-sector model to a real world three-sector model, called as 'closed economy model'. The three-sector *IS-LM* model is formulated by adding ***government sector*** to the two-sector model. Adding government sector to the *IS-LM* model requires incorporating government related variables into the two-sector *IS-LM* model. The government related variables are classified under two categories: (i) ***fiscal variables*** including government expenditure (G) and taxes (T), and (ii) ***monetary variables***, *i.e.,* changes made in money supply and money demand. ***Fiscal variables*** refer to the *discretionary changes* made by the government in its expenditure and taxation. ***Monetary variables,*** on the other hand, refer to *discretionary changes* made by the government—specifically, the central bank of the country—in the monetary measures used to control money supply and demand, viz., interest rate, cash reserve ratio (CRR), bank rate, open market operations, statutory liquidity ratio (SLR), etc., in accordance with the monetary needs of the country.

Fiscal operations of the government affect, first and foremost, the product market by changing the aggregate demand. Therefore, fiscal variables are linked to the product market represented by the *IS* curve. On the other hand, ***monetary measures*** affect, first and foremost, the money market. Therefore, changes in money demand and supply are linked to the money market represented by the *LM* curve. To begin with, we will first discuss the effect of government expenditure and taxation on the product market and derive the *IS* curve. The effect of change in money supply and demand on the monetary sector and the derivation of the *LM* curve will be taken up next.

17.1 *IS*-CURVE WITH THE GOVERNMENT SECTOR

An easy way to derive *IS* curve with the government sector is to construct the three-sector product market model. The three-sector product market model can be constructed by incorporating government sector variables, G and T, into the two-sector model. Recall that the two-sector product market model is given as

$$C + I = C + S \tag{17.1}$$

Let us now incorporate the government expenditure (G) and taxes (T) into the model given in Eq. (17.1) to construct the three-sector model. After the addition of G and T, the three-sector product market equilibrium condition is expressed as follows.

$$C + I + G = C + S + T \tag{17.2}$$

Having recalled the Keynesian model of product-sector equilibrium for a three-sector economy, we may now proceed to construct the Hicksian *IS* model. The Hicksian *IS* model is presented here under two different conditions:

(i) *IS* Model-I: The *IS* Model with a lump sum tax, i.e., tax as a constant factor, and
(ii) *IS* Model-II: The *IS* Model with tax as a function of income (Y), i.e., $T = f(Y)$.

Let us begin by constructing the *IS* Model-I under Hicksian framework. The basic purpose of Model-I is to present a simple framework for the derivation of the *IS* schedule. Model-II will present a detailed elaboration of the *IS* model.

17.1.1 *IS* Model-I: Model with Lump-sum Tax

The Hicksian *IS* Model-I, as presented below, is based on the following assumptions.

(i) The government spending (G), determined exogenously, remains constant;
(ii) The lump-sum tax (T) also, determined exogenously, remains constant; and
(iii) The government follows a balanced budget policy, i.e., $G = T$.

Given these assumptions, the product-market equilibrium condition given in Eq. (17.2) can be reduced to

$$I + G = S + T \tag{17.3}$$

Eq. (17.3) provides the basis for the *IS* function for three-sector model. For the purpose of deriving the *IS* schedule, the variables in Eq. (17.2) need to be converted into functional form. For the purpose of specifying the *IS* model, let us suppose that the variables in Eq. (17.2) are given as follows.

$$C = a + b\,Y_d \text{ (where } Y_d = Y - T) \tag{17.4}$$

$$I = \bar{I} - hi \; (h = \Delta I/\Delta i \text{ and } h > 0) \tag{17.5}$$

$$S = -a + (1 - b)\,Y_d = -a + (1 - b)\,(Y - T) \tag{17.6}$$

$$G = \hat{G} \tag{17.7}$$

$$T = \check{T}, \text{ and} \tag{17.8}$$

$$\hat{G} = \check{T} \tag{17.9}$$

Given these functions, the *IS* model given in Eq. (17.3) can be expressed as follows.

$$I + G = S + T$$

$$\bar{I} - hi + \hat{G} = -a + (1 - b)(Y - \check{T}) + \check{T} \tag{17.10}$$

Eq. (17.10) gives the theoretical basis of deriving the *IS* curve. However, for the sake clarity and convenience in drawing the *IS* curve, let us suppose that the numerical forms of investment function (Eq. 17.5), saving function (Eq. 17.6), and G and T are given as follows.

$$I = 200 - 2000\,i \tag{17.11}$$

$$S = -10 + 0.5\,(Y - T) \tag{17.12}$$

$$\hat{G} = \check{T} = 40 \tag{17.13}$$

By substitution, the *IS* model given in Eq. (17.10) can be written as follows.

$$200 - 2000\,i + 40 = -10 + 0.5\,(Y - 40) + 40 \tag{17.14}$$

$$240 - 2000\,i = 0.5Y + 10 \tag{17.15}$$

$$Y = 460 - 4000\,i \tag{17.16}$$

Eq. (17.16) can be straightaway used to derive the *IS* curve. However, we would illustrate here the entire process of graphical derivation of the *IS* curve for three-sector model on the basis of Eq. (17.15).

The graphical derivation of three-sector *IS* curve on the basis of the Eq. (17.15) is illustrated in Fig. 17.1. For the sake brevity, LHS of Eq. (17.15) has been denoted as $I(i) + G$ and RHS of the equation as $S(Y) + T$. Quadrant (a) presents the $I(i) + G$ curve along the investment function, $I(i) = 200 - 2000\ i$. The $I(i) + G$ curve has been drawn on the basis of the LHS of Eq. (17.15). This curve shows $I + G$ at different rates of interest. For example, at the interest rate of 8 percent, $I + G = 240 - 2000\ (0.08) = 80$ as denoted by point A and at 6 percent, $I + G = 240 - 2000\ (0.06) = 120$ as denoted by point B. Thus, the $I + G$ schedule has been drawn by joining the points A and B. Once $I + G$ is determined, we need to find out $S + T$ equal to $I + G$ because for the product market to be in equilibrium, $S + T$ must be equal to $I + G$. The process of finding $S + T$ that equals $I + G$ is shown in quadrant (b) of Fig. 17.1. The line marked $I + G = S + T$ gives the $S + T$ at different levels of $I + G$.

After estimating the value of $S + T$ at different levels of $I + G$ at different rates of interest, what we need now is to find the equilibrium level of income (Y) that can generate the equilibrium levels of $S + T$. The process of estimating the equilibrium level of Y is illustrated in quadrant (c) of Fig. 17.1. The schedule marked $S(Y) + T$ is drawn on the basis of the RHS of Eq. (17.15), i.e., $S + T = 0.5Y + 10$. Given the $S + T$ function, the equilibrium level of income can be determined by linking the different equilibrium levels of $S + T$ with Y measured at the horizontal axis of quadrant (c). For example, point L shows that for $S + T = 80$, an equilibrium income of 140 is required. Similarly point M shows that for $S + T = 120$, an income (Y) worth 220 is required.

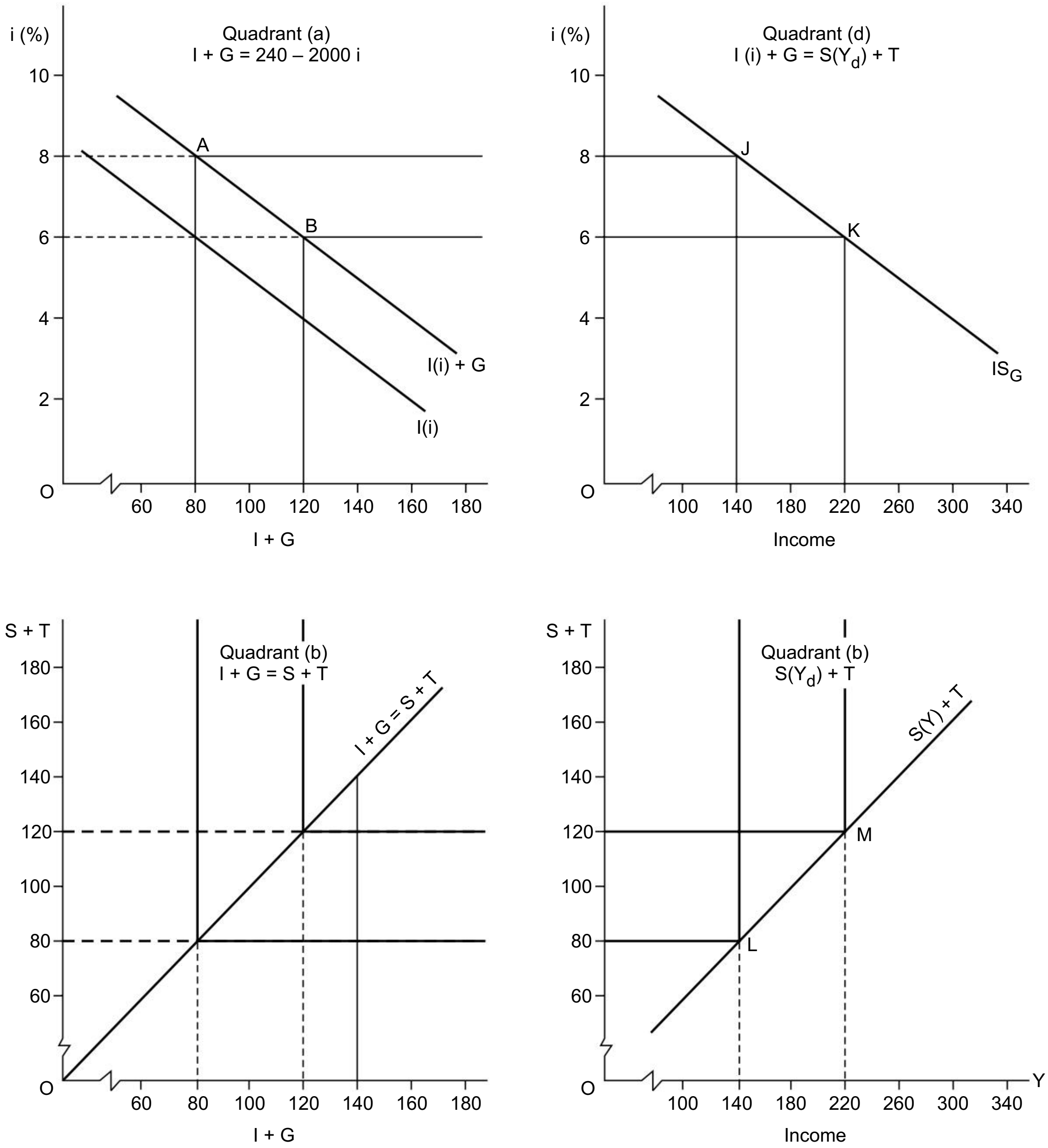


Fig. 17.1 Derivation of *IS* Curve for Three-Sector Model-I

Once equilibrium level of Y is determined for different levels of $I + G = S + T$, at different interest rates, the *IS* curve can be derived by linking the equilibrium levels of Y with different rate of interest. The process is illustrated in quadrant (d) of Fig. 17.1. The linking process is shown by the lines linking the values in different quadrants. For example, at the interest rate of 8 percent,

$I + G = 80$. For the product market to be in equilibrium $S + T$ *must* be equal to 80. To generate $S + T = 80$, an income of 140 is required. When we link $Y = 80$ with interest rate 8 percent, we get point J in quadrant (d). Similarly, we locate point K. By joining points L and K and extending it up and down, we derive the *IS* curve for the three-sector model.

17.1.2 *IS* Model-II: The *IS* Model with Tax Function

In the preceding section we have use Model-I to derived the *IS* curve with lump-sum tax. In this section, we take up the Model-II to derive the *IS* curve, i.e., *IS* curve with tax (T) as a function of income (Y), all other things remaining the same. Generally, two methods are used to derive the *IS* curve with tax function, which can be called a shortcut method and elaborate method. We use the first method first. Suppose aggregate variables are specified as follows.

$$C = a + bY_d \qquad \text{(where } Y_d = Y - T\text{)} \tag{17.17}$$

$$I = \bar{I} - hi \qquad \text{(where } h > 0\text{)} \tag{17.18}$$

$$G = \hat{G} \qquad (G \text{ is constant}) \tag{17.19}$$

$$T = \check{T} - tY \qquad \text{(where } 0 < t < 1\text{)} \tag{17.20}$$

Eqs. (17.17) through (17.20) present the basic three-sector product market model. The product-market equilibrium equation can now be rewritten in terms of the structural equations as follows.

$$\begin{aligned} Y &= C + I + G \\ &= a + b\,[Y - (\bar{T} + tY)] + \bar{I} - hi + \bar{G} \\ &= a + bY - b\bar{T} - btY + \bar{I} - hi + \bar{G} \end{aligned}$$

$$Y = \frac{1}{1 - b(1 - t)}\,(a - b\,\bar{T} + \bar{I} - hi + \bar{G}) \tag{17.21}$$

Following Dornbusch, Fischer and Startz[1], Eq. (17.21) can be simplified and converted into *AD* function. Note that the term $1/1 - b(1 - t)$ is fiscal multiplier which may be redesignated as F_M. Besides, there are four constants in Eq. (17.21), determined autonomously independent of income, *viz*., a, $b\bar{T}$, $\bar{I}$ and $\bar{G}$. So these variables can be summed up together. Let us assume that $a - b\bar{T} + \bar{I} + \bar{G} = \bar{A}$. By substituting $\bar{A}$ for $a - b\bar{T} + \bar{I} + \bar{G}$, Eq. (17.21) can be rewritten as:

$$Y = F_m(\bar{A} - hi) \tag{17.22}$$

Going by Dornbusch, *et al.,* Eq. (17.22) can be taken as *AD* function. Thus,

$$AD = F_m(\bar{A} - hi) \tag{17.23}$$

Eq. (17.22) gives the aggregate demand function in three-sector model which can be used to derive the *IS*-schedule. The derivation of the *IS* schedule in three-sector model is exhibited below.

17.1.3 Graphical Derivation of the *IS* Curve

The algebraic derivation of the *AD* curve, as shown above, can now be used to derive the *IS* curve graphically by using Keynesian Cross model of income determination, as shown in Fig. 17.2.

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1. The interested readers may refer to Dornbush, R., Fischer, S. and Startz, R., *Macroeconomics,* 9th Edn., pp. 246-47.

Panel (a) of the figure shows the determination of income at different levels of aggregate demand at different rates of interest (i_1 and i_2). For example, given the aggregate supply curve, $AS = AD$, the aggregate demand curve AD_1 intersects it at point E_1, determining the equilibrium level of income at Y_1. When aggregate demand curve shifts upward to AD_2 due to increase in investment caused a fall in the interest rate, the equilibrium level of income rises to Y_2. The information implicit in panel (a) of the figure, can now be used to derive the *IS* curve.

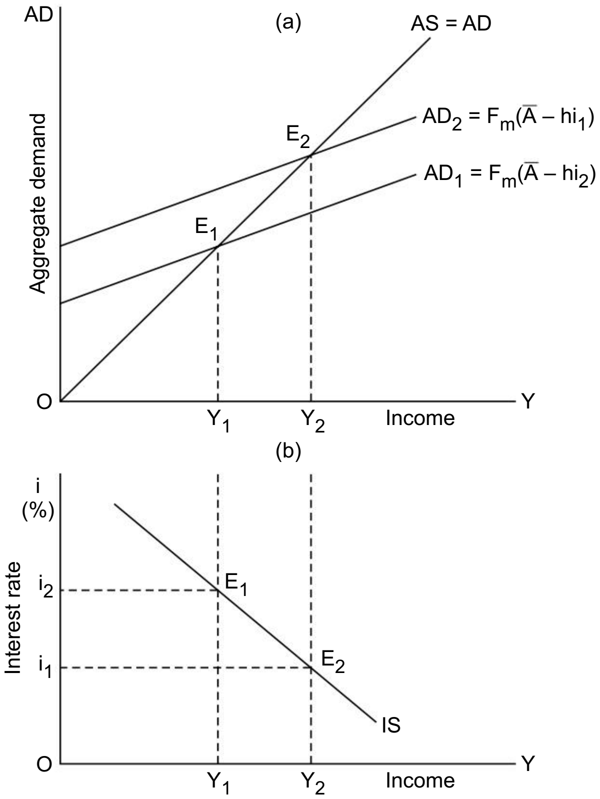


Fig. 17.2 Derivation of *IS* Curve

The important question that arises here is: What makes the *AD* curve shift upwards? The answer is 'the rise in investment'. To explain it further recall the investment function given in Eq. (17.19).

$$I = \bar{I} - hi$$

Given the investment function, when i increases, investment (I) decreases and *vice versa*. We know that I is a component of *AD*. It can thus be inferred that *AD* depends on the **interest rate (i), all other parameters, viz., F_m, $\bar{A}$ and h, assumed to be given**. For example, if interest rate is given at, say i_2, the *AD* function would be expressed as

$$AD_1 = F_m(\bar{A} - hi_2) \qquad \textbf{(17.24)}$$

The demand function given in Eq. (17.24) is presented graphically by the curve marked AD_1. The curve AD_1 intersecting with the *AS* curve at point E_1 determines the equilibrium level of income at Y_1. Now, let the interest rate decline, say, to i_1. With the decline in the interest rate, investment increases. With increase in investment, *AD* increases. Now the *AD*-function is $AD = F_m(\bar{A} - hi_1)$. With the new *AD*-function, the *AD* curve shifts upwards to AD_2. As panel (a) of Fig. 17.2 shows, AD_2, intersecting with *AS* curve at point E_2, determines the equilibrium level of income at a greater level, Y_2.

The conclusion that emerges from the foregoing discussion is that as interest rate decreases, the level of income increases. This kind of relationship between *i* and *Y* when presented graphically produces the *IS* curve. As panel (b) of Fig. 17.2 shows, interest rate i_2 and the associated income level Y_1 produce point E_1. Similarly, interest rate i_1 (a lower rate) and the associated income level Y_2 (a higher level of income) produce point E_2. One can trace a number of other points assuming different interest rates. By joining these points with a line (or curve), one gets the *IS* curve, as shown in panel (b) of Fig. 17.2.

An Alternative Method[2] We have used above a rather intuitive and short-cut method to derive the *IS* curve—a short-cut method because it does not reveal the linkages between the different variables. Here, we use an alternative and a detailed method of deriving the *IS* curve in the three-sector *IS-LM* model. This method is similar to the one used in Chapter 16 to derive the *IS* curve in the two-sector model.

Unlike Chapter 16, however, we will first describe the three-sector model and derive the *IS* function. We will then use the model to derive the *IS* curve graphically. Besides, we will use a different set of equations in this chapter just to add variety to our numerical examples. Suppose that a numerical model in line with one presented in Eqs. (17.4) through (17.8) is given below.

$$C = 100 + 0.75(Y - T) \tag{17.25}$$
$$I = 200 - 2000\, i \tag{17.26}$$
$$\bar{G} = 100 \tag{17.27}$$
$$T = 80 + 0.20Y \tag{17.28}$$

Given the numerical model, we can now use the product-market equilibrium condition to derive the *IS* function. Recall the product-market equilibrium condition.

$$I + G = S + T \tag{17.29}$$

The variables *I, G* and *T* in Eq. (17.29) are given in Eqs. (17.26), (17.27) and (17.28), respectively. What we need is to work out *S*, the *saving function*. Given the consumption function, $C = 100 + 0.75\ (Y - T)$, *S* function can be derived as

$$S = -\ 100 + 0.25\ (Y - T) \tag{17.30}$$

By substituting the relevant functions and values from the model and the saving function into Eq. 17.29, we get the product-market equilibrium condition as

$$\begin{aligned} 200 - 2000\ i + 100 = -\ 100 + 0.25\ [Y - (80 + 0.20Y)] \\ + 80 + 0.20Y \end{aligned} \tag{17.31}$$

By simplifying Eq. (17.31), we get,

$$Y = 850 - 5000\, i \tag{17.32}$$

2. Readers not interested in elaborate graphical derivation of the *IS* curve may skip this section.

Note that Eq. (17.32) gives the *IS* function for a three-sector model. The *IS* curve can be derived by assigning different values for i and working out the corresponding value of Y. For example, if $i = 0.08$, then $Y = 850 - 5000(0.08) = 450$, and if $i = 0.06$, then $Y = 850 - 5000(0.06) = 550$. By graphing these values, we get the *IS* curve. The *IS* curve so derived is shown by the IS_{GT} curve in Fig. 17.3. We will nevertheless show the graphical derivation of the *IS* schedule as it brings out the effect of the fiscal actions on the *IS* curve.

Graphical Derivation of IS Curve The effect of fiscal policy on the product-market equilibrium is presented graphically in Fig. 17.3. Incidentally, the entire process of the derivation of the *IS* curve for three-sector model is the same as one used for the two-sector model. Let us begin with the two-sector model. The investment function I_0 in quadrant (a) shows the investment without government expenditure (G). The *IS* curve corresponding to the investment function (I_0), is presented by the IS_0 schedule in quadrant (d). Given the IS_0 curve, if we assume an equilibrium interest rate of 6%, the product market will be in equilibrium at Rs 720 billion.

Let us now introduce the government sector to the model and suppose that the government spends Rs 100 billion on goods and services with no tax. With the government expenditure of Rs 100 billion, all other things remaining the same, the schedule I_0 shifts to the position of $I_0 + G$, as shown in quadrant (a). Consequently, the IS_0 schedule shifts to the position of schedule IS_G. Note that the shift is parallel and shift equals $G \times G$-multiplier.

The IS_G curve presents the *IS* schedule with $G = 100$ and $T = 0$. Note that IS_G schedule is parallel to IS_0 schedule. The parallel shift in the *IS* schedule implies the same increase in equilibrium income at all other rates of interest. For example, at the interest rate of 6%, equilibrium point shifts from A to B and the equilibrium income increases from Rs 720 billion to Rs 1120 billion. It means that a government expenditure of Rs 100 billion (with no tax) adds Rs 400 billion to the national output. The addition to income (ΔY) equals $G \times G$-multiplier. Given the consumption function in Eq. (17.25), $b = 0.75$, and therefore G-multiplier is 4. Thus,

$$\Delta Y = G \times 4 = 100 \times 4 = \text{Rs } 400 \text{ billion}$$

Let the government now impose income tax using a tax function given in Eq. (17.28), i.e., $T = 80 + 0.20Y$. The imposition of income tax affects both the household consumption and the saving functions. With the imposition of income tax, the saving function changes

from $$S_0 = -100 + 0.25Y$$

to $$S_0 + T = -100 + 0.25\,(Y - T) + 80 + 0.20\,Y$$

$$(\text{where } T = 80 + 0.20Y).$$

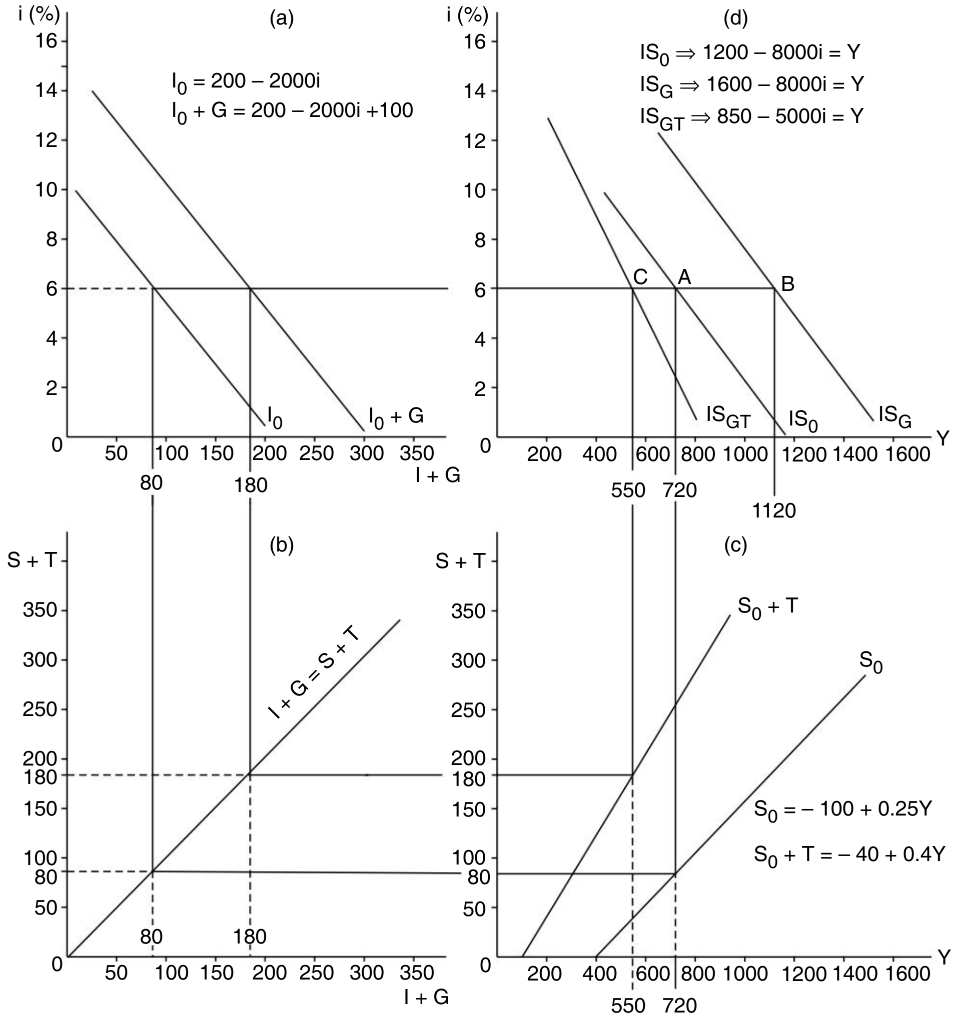
Thus, $$S_0 + T = -40 + 0.40\,Y \qquad \textbf{(17.33)}$$

The $S_0 + T$ function (17.33) is shown by the $S_0 + T$ schedule in quadrant (c) of Fig. 17.3. Note that, as a result of taxation, the S_0 schedule in quadrant (c) shifts to the position of schedule $S_0 + T$. With the incorporation of $S + T$ function in the product market model, the *IS function* changes

from $$IS_G = 1600 - 8000i$$

to $$IS_{GT} = 850 - 5000i$$

Note that, as shown in quadrant (d), with the introduction of tax function, the IS_G schedule shifts leftward to IS_{GT} due to the negative effect of tax-multiplier, and the slope of the IS_{GT} changes. Due to this shift, the point of equilibrium shifts from point B to point C. The shift in the equilibrium point from *B* to *C* causes a fall in the equilibrium level of *Y* from Rs 1120 billion to Rs 550 billion. Thus, the *net effect* of fiscal actions on the national income is negative which equals Rs 170 billion, that is, Rs 720 billion *less* Rs 550 billion.



(Amount in Billion Rs)

Fig. 17.3 Derivation of the *IS* Schedule in Three-Sector *IS-LM* Model

17.1.4 Measuring the Effect of Fiscal Changes on the Product-Market Equilibrium

The fiscal changes may take any one or many forms of changes such as (a) change in *G*, (b) change in tax rate (*t*), (c) simultaneous change in both *G* and *t*, and (d) different combinations of changes in *G* and *t*. However, we confine our discussion here to measuring the effect of only increase in *G* and decrease in tax rate (*t*). The method can be extended to analyze the effect of other kinds of fiscal changes.

Increase in G As noted above, product market equilibrium without change in fiscal policy is given by $I + G = S + T$. In order to measure the effect of change in G, let us assume that the government increase its spending so that G increases from Rs 100 billion to Rs 200 billion. With increase in G, the product market equilibrium can be expressed, in terms of Eq. (17.31), assuming $i = 0.6$, as follows.

$$200 - 2000\ (0.06) + 200 = -\ 100 + 0.25\ [Y - (80 + 0.20Y)]$$
$$+\ 80 + 0.20\ Y$$
$$280 = -40 + 0.40\ Y$$
$$Y = 800$$

It means that increasing G by Rs 100 billion increases the equilibrium level of income (at 6% interest) from Rs 550 billion to Rs 800 billion, that is, by Rs 250 billion. This will make the IS_{GT} shift to the right of point A in quadrant (d), its slope remaining the same.

Decrease in Tax Rate To measure the effect of tax cut, let us suppose that income tax rate is cut down from $t = 0.20$ to 0.15 with $\Delta G = 100$. With the tax cut, the equilibrium level of output will increase to about Rs 888.88 billion as shown below.

$$200 - 2000\ (0.06) + 200 = -100 + 0.25\ [Y - (80 + 0.15Y)]$$
$$+\ 80 + 0.15\ Y$$
$$280 = -40 + 0.36\ Y$$
$$Y = 888.88$$

Effect of fiscal change A fiscal change of an increase in G by Rs 100 billion and a simultaneous tax-cut from 20% to 15% have a positive effect on the product-market equilibrium. These fiscal changes lead to a rise in Y from Rs 550 billion resulting from Eq. (17.31) to Rs 889 billion approximately.

Deficit Financing and the IS Curve Let us now explain the effect of a deficit-budget policy, what is also called as 'pure budget policy,' on the product market equilibrium. Deficit financing means that ΔG is financed by borrowing from the central bank or from abroad.

Suppose that the product-market model is initially given as described in Eqs. (17.25) through (17.28) with investment function (17.14) modified as $I = 100 - 2000i$, and *tax function* (17.28) modified as $T = 0.20Y$. Given the structural model, the product-market equilibrium can be expressed in terms of equilibrium condition $I + G = S + T$, as given below.

$$100 - 2000\ i + 100 = -100 + 0.25\ (Y - 0.20Y) + 0.20Y$$
$$200 - 2000\ i = -100 + 0.4Y$$
$$Y = 750 - 5000\ i \qquad \textbf{(17.34)}$$

Eq. (17.34) gives the IS_0 schedule as shown in quadrant (d) of Fig. 17.4.

Now let the government decide to spend an additional amount of Rs 100 billion for which it acquires finances by way of deficit financing. It implies adding $\Delta G = 100$ to the model, all other things remaining the same. With the addition of ΔG, the product-market equilibrium condition is modified as follows.

$$I + G + \Delta G = S + T$$
$$200 - 2000\ i + 100 = -100 + 0.4Y$$
$$300 - 2000\ i = -100 + 0.4Y$$
$$Y = 1000 - 5000\ i \qquad \textbf{(17.35)}$$

Thus, the product-market equilibrium equation (with ΔG = 100) is given by Eq. (17.35). The *effect of deficit financing* on Y, at 6% interest rate can now be obtained by subtracting Eq. (17.34) from Eq. (17.35).

$$\Delta Y = (1000 - 5000i) - (750 - 5000i)$$
$$= (1000 - 5000 \times 0.06) - (750 - 5000 \times 0.06)$$
$$= 250 \text{ billion}$$

The product-market equilibrium with ΔG by means of deficit financing is presented graphically in Fig. 17.4. The $I + G$ schedule is shown in quadrant (a), the $S + T$ schedule in quadrant (c),

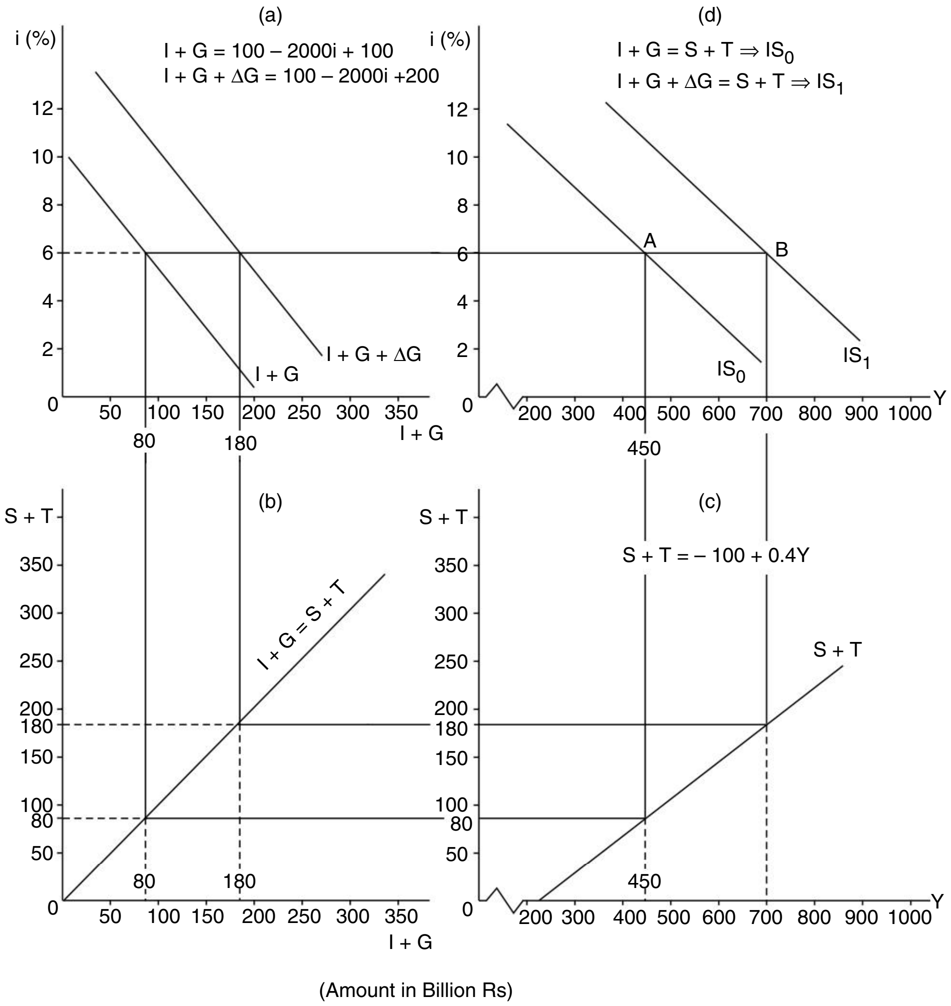


Fig. 17.4 Deficit Financing and Product-Market Equilibrium

and the corresponding *IS* schedule is given by IS_0 - curve in quadrant (d). After the inclusion of ΔG = 100 in the model, the $I + G$ schedule shifts to $I + G + \Delta G$. The $S + T$ schedule remaining the same, the *IS* schedule shifts rightward from IS_0 to IS_1.

We may now look into the effect of deficit financing on the product-market equilibrium. The effect can be measured at any rate of interest. For instance, at 6% interest rate, the product-market (without ΔG) is in equilibrium at point *A* showing Y = Rs 450 billion. With the inclusion of ΔG, the *IS*-schedule shifts from IS_0 to IS_1 and the equilibrium point shifts from point *A* to *B* where Y = Rs 700 billion. A comparison of the two equilibrium levels of income shows an increase of Rs 250 billion in Y as a result of deficit financed ΔG = Rs 100 billion.

17.2 MONETARY CHANGES AND MONEY-MARKET EQUILIBRIUM

In this section, we discuss changes in money supply and its effect on the money market and on the *LM* schedule. For the sake of convenience in deriving the *LM* schedule and analysing the effects of monetary changes, we assume *a linear aggregate money demand function*. We continue to assume that money supply (M_s) is determined exogenously and is interest-inelastic and is given at M_s = 200 (Rs billion).

In order to derive the *LM*-function, let us recall our M_d equation given as:

$$M_d = M_t + M_{sp}$$

For further elaboration of the model, let us use here our earlier M_t-function, given as

$$M_t = 0.5Y \qquad \textbf{(17.36a)}$$

and a modified M_{sp} function as

$$M_{sp} = 100 - 2500i \qquad \textbf{(17.36b)}$$

Given the M_t and M_{sp} functions, in Eq. (17.36a) and (17.36b), respectively, M_d-function can now be formulated by combining the two functions as

$$M_d = M_t + M_{sp}$$

$$M_d = 0.5Y + 100 - 2500i \qquad \textbf{(17.37)}$$

Given the money supply M_s = Rs 200 (billion), the money-market equilibrium condition can be expressed as

$$M_s = M_d$$

$$200 = 0.5Y + 100 - 2500i \qquad \textbf{(17.38)}$$

From Eq. (17.38), the *LM-function* can be derived as given below.

$$Y = 200 + 5000i \qquad \textbf{(17.39)}$$

The *LM* function given in Eq. (17.39) is shown graphically in Fig. 17.5 by the curve LM_0. The curve LM_0 shows the money-market equilibria at various rates of interest and corresponding levels of income.

17.2.1 Change in Money Supply and Shift in the *LM* Curve

Let us now explain the effect of change in money supply on the *LM* curve. A change in money supply causes a shift in the *LM* curve. Suppose that the central bank increases the money supply by Rs 100 billion so that the money supply rises to Rs 300 billion = 200bn + 100bn. The money-market equilibrium condition can then be written as

$$M_s + \Delta M_s = M_d \tag{17.40}$$

Since $M_s = 200$ (billion) and $\Delta M_s = 100$ (billion), by substitution, the money market equilibrium can be expressed as

$$200 + 100 = 100 + 0.5Y - 2500i$$

$$200 = 0.5Y - 2500i \tag{17.41}$$

Given the money market equilibrium in Eq. (17.41), the *LM* function can be derived as

$$Y = 400 + 5000i \tag{17.42}$$

Shift in LM-Curve The *LM* function given in Eq. (17.42) is graphically presented by the curve LM_1 in Fig. 17.5. Note that, with the increase in money supply, the *LM* curve makes a parallel shifts rightward from LM_0 to LM_1. The shift in the *LM* curve equals $1/k \times \Delta M_s$ where $k = M_d/Y$ = the ratio of money demanded for transaction to income. Thus,

$$\text{Shift in } LM\text{-curve} = \Delta M_s\ (1/k)$$

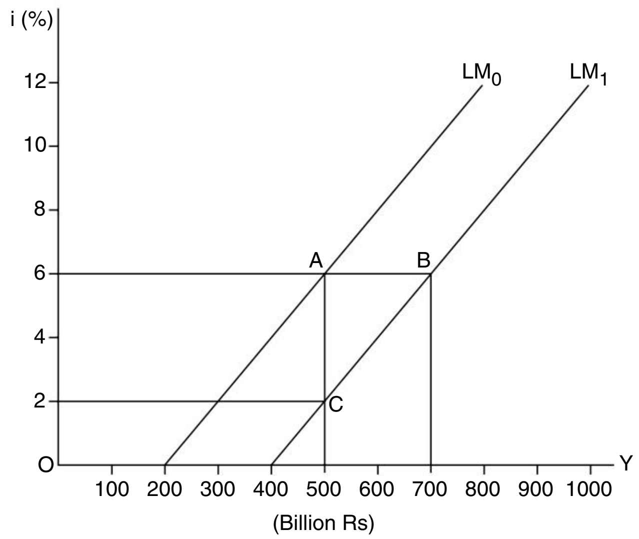


Fig. 17.5 The shift in *LM* curve

Since by assumption, $k = 0.5$ (see Eq. 17.36a) and $\Delta M_s = 100$ billion, the shift in the *LM* curve can be measured as

$$\text{Shift in } LM\text{-curve} = 100 \text{ bn } (1/0.5) = 200 \text{ billion}$$

There are two important points related to the shift in the *LM* curve caused by the increase in money supply which must be carefully noted.

(i) The shift in the *LM* curve makes the money sector equilibrium point shift from point *A* to point *B*. This shift should not be confused with increase in real income. It means simply that an increase in money supply can support a higher level of income, given the rate of interest, depending of the factor, k. For example, a ΔM_s = Rs 100 billion can support a ΔY = 100/(0.5) = Rs 200 billion.

(ii) Recall that $M_d = M_t + M_{sp}$. If households decide to keep their M_t constant (at constant prices), the equilibrium point will move from A to C. It causes a fall in the interest rate from 6% to 2% as indicated by point C in Fig. 17.5. The reason is, if households keep their M_t constant after the increase in money supply, they will have an excess M_{sp}. They will use this excess balance to buy bonds and securities. Consequently, bond and security prices go up and the interest rate goes down.

17.3 THE PRODUCT AND MONEY MARKET EQUILIBRIUM IN THREE-SECTOR *IS-LM* MODEL

In this section, we combine the analytical models of the two foregoing sections and show how the product and money markets attain equilibrium simultaneously. In other words, we will show how general equilibrium is determined in three-sector *IS-LM* model.

To present a complete analysis of the general equilibrium in the *IS-LM* model, let us recall the product and money market models used above.

Product Market Model

$$C = 100 + 0.75\ (Y - T)$$
$$I = 200 - 2000i$$
$$G = 100 \text{ and}$$
$$T = 0.20Y$$

Given the product-market model, the *IS* schedule can be derived (following the process given in Eq. (17.29) through Eq. (17.32)) as

$$Y_{IS} = 750 - 5000i \qquad \textbf{(17.43)}$$

Money Market Model

$$M_t = 0.5Y$$
$$M_{sp} = 100 - 2500i$$
$$M_s = 200$$

The money market model gives the *LM* schedule as

$$Y_{LM} = 200 + 5000i \qquad \textbf{(17.44)}$$

As noted above, **general equilibrium** takes place where product and money markets are simultaneously in equilibrium. This condition is satisfied where

$$IS = LM$$

The *IS*-schedule is given in Eq. (17.43) and *LM*-schedule in Eq. (17.44). So the general equilibrium condition can be expressed as

$$750 - 5000i = 200 + 5000i \qquad \textbf{(17.45)}$$

Now the equilibrium values of Y and i can be obtained from Eq. (17.45) shown below.

$$750 - 5000i = 200 + 5000i$$

$$550 = 10{,}000i$$
$$i = 0.055 \text{ or } 5.5\%$$

By substituting 0.055 for i in the *IS* function (or in the *LM* function), we get the equilibrium level of income (Y) as follows.

$$Y = 750 - 5000\ (0.055) = 200 + 5000\ (0.055)$$
$$= 475 \text{ (billion)}$$

Thus, the product and money markets are simultaneously in equilibrium at interest rate 5.5% and national income of Rs 475 billion.

17.3.1 Graphical Solution

The *IS* and *LM* schedules given in Eq. (17.43) and Eq. (17.44), respectively, are graphed in Fig. 17.6. As Fig. 17.6 shows, the *IS* and *LM* schedules intersect at point *E* where both the product and money markets are simultaneously in equilibrium. Thus, point *E* is the point of general equilibrium where Y = Rs 475 billion and i = 0.055 or 5.5%.

Given the *IS* and *LM* schedules, the economy cannot be in the state of the general equilibrium at any point other than point *E*. For, at no other point the product and the money markets are simultaneously in equilibrium. For example, at the interest rate of 8%, the product market is in equilibrium at point *B* and the money market is in equilibrium at point *C*. Between points *B* and *C*, the two markets will be in disequilibrium. Similarly, at interest rate of 3%, the product market is in equilibrium at point *D* and the money market is in equilibrium at point *A*. Between points *A* and *D*, the two markets will be in disequilibrium. This shows that at any interest rate other than 5.5% and income level other than Rs 475 billion, the two markets are not simultaneously in equilibrium. Therefore, there cannot be general equilibrium at any other point.

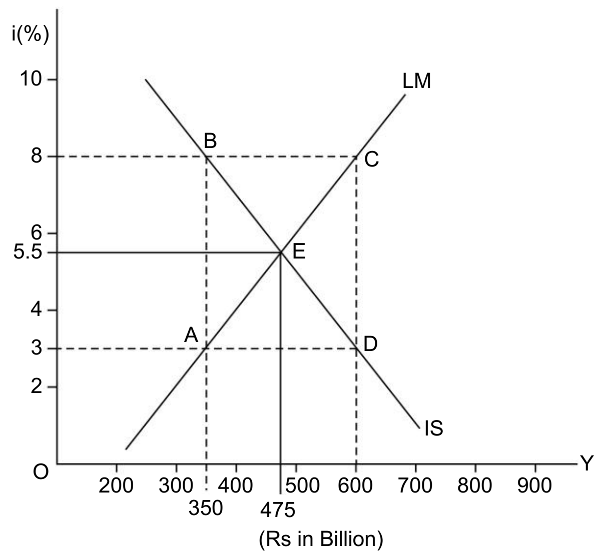


Fig. 17.6 The General Equilibrium in Three-Sector *IS-LM* Model

17.4 FISCAL AND MONETARY CHANGES AND GENERAL EQUILIBRIUM

With the general equilibrium framework in place, the stage is now set for introducing fiscal and monetary changes and analysing their effects on the general equilibrium. We will first introduce a fiscal change in the form of increase in deficit-financed expenditure, and then introduce a discretionary increase in money supply, and look into their effect on the equilibrium rate of interest and the income level. Finally, we will analyse the combined effects of the simultaneous fiscal and monetary changes.

17.4.1 Effect of Fiscal Changes in General Equilibrium Framework

We have already examined the effect of change in government spending on the national income, i.e., $\Delta Y = \Delta G \times G$-multiplier. But, in the general equilibrium framework, the result is significantly different. Why? This is the issue of this section. To begin with, recall the analysis of increase in deficit financed ΔG of Rs 100 billion on the product market equilibrium in Section 17.1.4. We have shown there how a ΔG causes shift in the *IS* curve. Here, we discuss the effect of ΔG of Rs 100 billion on the general equilibrium. We know that ΔG causes an upward shift in the *IS* curve and, thereby, a rise in the equilibrium income. The new *IS*-function can be estimated as follows.

Recall from Eq. (17.35), with ΔG = Rs 100 billion, the demand side of the product market equilibrium equation reads as

$$I + G + \Delta G = 200 - 2000i + 100$$
$$= 300 - 2000i$$

And supply side, in our example, reads as $S + T = -100 + 0.4Y$. Recall also that by using these equations, we can derive a new *IS* schedule with $\Delta G = 100$. The process is reproduced below.

$$I + G + \Delta G = S + T$$
$$300 - 2000i = -100 + 0.4Y,$$
$$Y = 1000 - 5000i \qquad \textbf{(17.46)}$$

Eq. (17.46) gives the IS_1 schedule as shown in Fig. 17.7. The IS_1 schedule intersects the LM_0 schedule at point *B*. Note that pre-ΔG equilibrium was at point *A*. The shift in the equilibrium point from *A* to *B*, shows that, with ΔG = Rs 100 billion and no change in money supply, the equilibrium level of income increases from Rs 475 billion to Rs 600 billion and interest rate rises to 8%.

This can also be proved algebraically. Given the IS_1 schedule in Eq. (17.46) and LM_0 schedule as $Y = 200 + 5000\,i$, given in Eq. (17.39), the product and money market equilibrium equation can be written as.

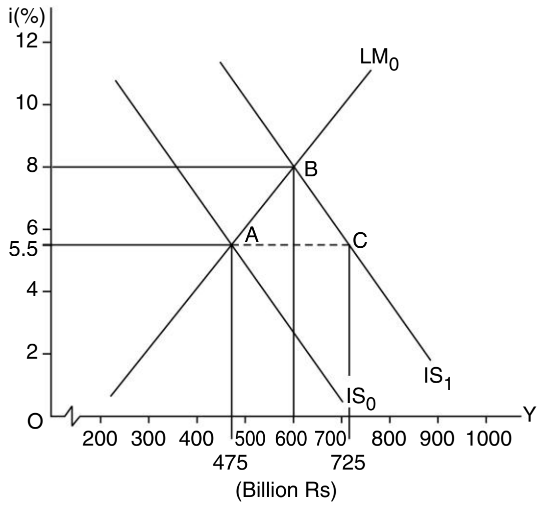


Fig. 17.7 Change in Fiscal Policy and the General Equilibrium

$$1000 - 5000i = 200 + 5000i \qquad \textbf{(17.47)}$$
$$i = 0.08 \text{ or } 8\%$$

By substituting 0.08 for '*i*' in Eq. (17.47), we get the equilibrium Y as

$$Y = 1000 - 5000\ (0.08)$$
$$Y = 600 \text{ billion}$$

It is **important** to note here that an increase in the government spending increases both the rate of interest and the level of income. It is more important to note that $\Delta Y < \Delta G \times$ *G-multiplier*. This is so because of what economists call **'crowding-out effect'** of public expenditure. This aspect is discussed below in some detail.

17.4.2 The Crowding-out Effect of the Government Expenditure

As discussed earlier in Chapter 7, simple Keynesian model, ΔY resulting from a given ΔG is computed by multiplying ΔG by fiscal multiplier. That is,

$$\Delta Y = \frac{1}{1 - b + bt}\ \Delta G = \frac{1}{1 - b\,(1 - t)}\ \Delta G$$

For example, if ΔG = Rs 100 billion, $b = 0.75$ and $t = 0.20$, then the increase in the equilibrium level of income equals Rs 250 billion, calculated as follows.

$$\Delta Y = \frac{1}{1 - 0.75(1 - 0.20)}\ (100)$$

$$= 2.5\ (100) = \text{Rs } 250 \text{ billion}$$

However, as Fig. 17.7 shows, an increase of Rs 100 billion in government spending results in only Rs 600 bn – Rs 475 bn = Rs 125 billion. A question that arises here is: Why is ΔY lower in *IS-LM* model than in simple Keynesian model? The answer lies in, what is called in economic jargon, the ***crowding-out effect*** of government expenditure. In simple words, government spending crowds out private investment, i.e., it causes reduction in private investment. The crowding-out effect arises because government expenditure causes a rise in demand for money which raises the rate of interest. Since private investment is inversely related to the rate of interest, a rise in the interest rate causes a reduction in the private investment. The fall in private investment reduces the income effect of the government expenditure. This is called 'crowding-out effect' of government spending. The crowding-out effect reduces the multiplier effect of the government spending on the national income.

Why and how does government spending lead to rise in the interest rate? The Keynesian reasoning for government spending causing a rise in the interest rate runs as follows. A rise in the government spending (ΔG) results in a multiple increase in household incomes (ΔY). In the Keynesian system, transaction demand for money is the function of income, *i.e.*, $M_t = f(Y)$. Therefore, ΔY leads to increase in demand for money (ΔM_t). Since money supply (M_s) is given, ΔM_t is sought through the sale of bonds and securities. As more and more households offer more and more bonds and securities for sale, bond and security prices go down. Since bond and security prices and interest thereon are inversely related, fall in bond prices results in a rise in the interest rate. It is this rise in the interest rate due to increase in government spending which causes a fall in the private investment. This is how government spending crowds out private investment.

Mankiw[3] and also Baumol and Blinder[4] offer a slightly different reasoning for the rise in the interest rate due to government borrowing. By using the classical framework, they argue that when government finances its additional spending through public borrowing, taxes remaining unchanged, or when it borrows more than it taxes, the loanable funds flow to the public sector and, therefore, supply of loanable funds to the private sector decreases. This causes a leftward shift in the supply-of-saving curve for the private sector. Consequently, given the downward sloping investment demand curve, the rate of interest rises.

Whether one goes by the Keynesian or by the classical approach, one arrives at the same conclusion, that is, the government spending causes a rise in the interest rate, which causes a fall in private investment. The fall in the private investment due to increase in government spending reduces the multiplier effect of the government expenditure. The *G-multiplier* adjusted for its crowing-out effect (G_{MC}) can be worked out as follows.

$$G_{MC} = \frac{\Delta Y}{\Delta G} = \frac{Y_2 - Y_1}{\Delta G}$$

where Y_2 is post-ΔG and Y_1 is pre-ΔG equilibrium income.

By substituting numerical values from Fig. 17.7, we get

$$G_{MC} = \frac{\Delta Y}{\Delta G} = \frac{\text{Rs } 600 \text{ bn} - \text{Rs } 475 \text{ bn}}{\text{Rs } 100 \text{ bn}}$$

$$= \frac{\text{Rs } 125 \text{ bn}}{\text{Rs } 100 \text{ bn}} = 1.25$$

Note that the crowding-out-effect adjusted G_{MC} (= 1.25) is much lower than the unadjusted simple Keynesian multiplier (2.5). A formally derived[5] *crowding-out adjusted G-multiplier* (G_{MC}) is given below.

$$G_{MC} = \frac{G_M}{1 + G_M k h / l}$$

where $k = \Delta M_t / \Delta Y$, $l = \Delta M_{sp} / \Delta i$ and $h = \Delta I / \Delta i$.

In our example, $G_M = 2.5$, $k = 0.5$, $h = 2000$ and $l = 2500$. By substitution, we get,

$$G_{MC} = \frac{2.5}{1 + 2.5 \times 0.5 \times 2000/2500} = 1.25$$

3. Mankiw, N. Gregory, *Macroeconomics*, (Macmillan Worth Publishers), 5th edn., p.61.

4. Baumol, W.J. and Blinder, A.S., *Economics: Principles and Policy, op. cit.,* p.335.

5. For the derivation of the adjusted *G*-multiplier in terms of notations used in this book, see *Appendix* to this Chapter. Different authors have used different notations in deriving the G_{MC}. See, for example, Dornbusch, R. Fischer, S. and Startz R., *Macroeconomics*, (Tata McGraw-Hill, New Delhi), 9th ed., 2004, Chapter 10, Section 10.5, and Richart T. Froyen, *Macroeconomics: Theories and Policies* (Pearson Education, Delhi, 2002), Chapters 7 and 8.

Alternative Method There is yet *another formula*[6] for measuring the crowding-out adjusted G-multiplier (G_{MC}). The formula is given below.

$$G_{MC} = \frac{1}{(1-b+bt)+i_1c_1/c_2} \tag{17.48}$$

where $b = mpc$, t = tax rate ($\Delta T/\Delta Y$), $i_1 = \Delta I/\Delta r$ (where r = interest rate), $c_1 = \Delta M_t/\Delta Y$, and $c_2 = \Delta M_{sp}/\Delta r$.

The G_{MC} is essentially G_M adjusted for factors that determine the crowding-out effect. The crowding-out effect is determined by the slope of the *IS* and *LM* schedules: the greater the slope of the *LM* schedule and the smaller the slope of the *IS* schedule, the smaller the crowding-out effect, and *vice versa*. The slope of the *IS* schedule is determined by the slope of the investment function and the slope of the *LM* schedule depends on the ratio of the transaction and speculative demand for money. Note that i_1 in Eq. 17.48 measures the slope of the investment function and c_1/c_2 gives the ratio of the transaction and speculative demands for money, i.e., $c_1/c_2 = (\Delta M_t/\Delta Y,)/(\Delta M_{sp}/\Delta r)$. These factors are accounted for by adding i_1c_1/c_2 to the denominator of the G_M to obtain G_{MC}, the crowding-out adjusted multiplier.

In our example, the numerical values for the constants are given as $b = 0.75$, $t = 0.20$, $i_1 = h = 2000$, $c_1 = k = 0.5$, $c_2 = l = 2500$. By substituting these values in the multiplier formula given in Eq. (17.48), G_{MC} can be worked out as follows.

$$G_{MC} = \frac{1}{(1-0.75+0.75\times 0.20)+2000\times 0.5/2500}$$

$$= \frac{1}{0.8} = 1.25$$

Note that both the methods of working out crowding-out adjusted multiplier yield the same result.

The Crowding-in Effect Whether government spending necessarily crowds out private investment has been a debatable issue. The economists have counter-argued, making a case for *crowding-in effect* of government spending on the private investment. Deficit spending during the period of economic slowdown encourages private investment and economic activities. As the economic trends are upturned, private sector finds it 'both necessary and profitable' to expand its business activities. This induces new investments. "Because of this *induced investment*,... and increase in G tends to *increase* investment rather than *decrease* it as predicted by the crowding-out hypothesis.[7]

Not only there appears to be a theoretically strong argument in favour of crowding-in effect of government expenditure, but also there are fairly large empirical evidences for crowding-in effect. Most *LDCs* striving to emerge out of their low equilibrium trap have used government expenditure as a measure to stimulate private investment. For instance, the Government of India has deficit financed its development programmes with the objective of promoting business opportunities and, thereby, encouraging private investment. Besides, most *DCs* hit by the recent global recession,

6. For details, see Richard T. Froyen, *Macroeconomics: Theories and Policies*, (Pearson Education Asia, Delhi), 7th edn., *Appendix* to Chapter 6 and Chapter 7. Froyen has used a constant tax (T) in his crowding-out effect adjusted multiplier formula. His formula has been modified by including the effect of tax as a function of income, i.e., $T = tY$, which adds bt to the denominator in line with our own fiscal multiplier used in this Chapter.

7. Baumol and Blinder, *op. cit.,* 335.

including US, Japan, China, France and also India, are using heavy government spending as a bailout measure to revive their own economy. The primary objective is to generate consumer demand, on the one hand, and to encourage private investment on the other.

However, the magnitude of crowd-in investment depends on the value of *real* ΔY generated by ΔG and the sensitiveness of the private investment to the growing business opportunities. It is quite likely that crowding-in effect dominates the crowding-out effect and that there is net ΔI due to government spending. Whether crowding-in or crowding-out dominates depends on the elasticity of *IS* and *LM* curves.

17.4.3 Change in Monetary Policy

In this sub-section, we introduce a change in monetary policy, assuming a given IS_0 curve, and analyse its effect on the general equilibrium. Let us suppose that the *LM* curve, with $M_s = 200$ billion, is given in Fig. 17.8 as LM_0. The IS_0 and LM_0 schedules intersect at point *A* determining the general equilibrium. Now let the money supply increase by Rs 100 billion. With the change in the money supply, the money-market equilibrium condition ($M_s = M_t + M_{sp}$) can be expressed as

$$M_s + \Delta M_s = M_t + M_{sp}$$
$$200 + 100 = M_t + M_{sp}$$

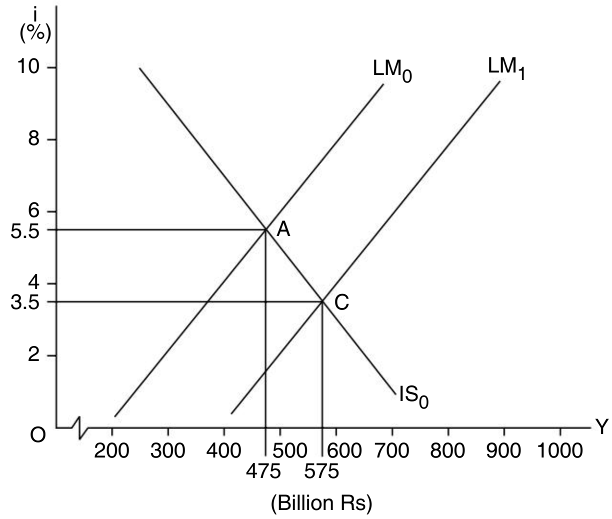


Fig. 17.8 Change in Money Supply and the Product and Money Market Equilibrium

In our example used above, $M_t = 0.5Y$ and $M_{sp} = 100 - 2500i$. Given these equations, the equilibrium condition for the money market can be expressed as

$$300 = 0.5Y + 100 - 2500\,i$$

This equilibrium equation gives the same *LM* function as given in Eq. (17.42), that is,

$$Y = 400 + 5000i$$

This *LM* function is presented by the curve LM_1 in Fig. 17.8. Obviously, the increase in money supply makes the *LM* curve shift from LM_0 to LM_1. The schedule LM_1 intersects the IS_0 schedule at point *C* which determines a new general equilibrium. The new equilibrium point *C* shows that, as a result of increase in money supply by Rs. 100 billion, the rate interest falls from 5.5% to 3.5% and income increases from Rs 475 billion to Rs 575 billion.

The process of fall in the interest rate and increase in income can be described as follows. Given the income level at Rs 475 billion, the increase in money supply creates excess liquidity. This excess liquidity finds its way into the bonds and security markets pushing their prices up and causing a fall in the interest rate. The fall in the interest rate, as indicated by the movement from point *A* to *C*, causes an increase in investment. The increase in investment results in the increase in the equilibrium level of *Y*. The increase in income causes an increase in M_t and decrease in interest rate cause an increase in M_{sp}, both resulting in increase in M_d. The process ends where aggregate demand for goods and services equals their aggregate supply (given by the *IS* schedule) with the demand for money (M_d) being equal to the supply of money M_s at the same levels of income (Y) and interest rate (i). This analysis shows how increase in money supply affects the economy.

17.4.4 General Equilibrium with Simultaneous Fiscal and Monetary Changes

Let us now analyse the effect of simultaneous fiscal and monetary changes on the general equilibrium and look into their net effect. Suppose that the government increases its expenditure by Rs 100 billion and money supply by an equal amount, so that $\Delta G = 100 = \Delta M_s$. This means deficit financing of public expenditure. The effects of these changes have been discussed separately in the preceding sections. The *IS*-schedule with fiscal change of $\Delta G = 100$ is given by the schedule IS_1 in Fig. 17.7, and *LM*-schedule with monetary policy change of $\Delta M_s = 100$ is given by the schedule LM_1 in Fig. 17.8. The IS_1 and LM_1-schedules have been reproduced along with the IS_0 and LM_0 schedules in Fig. 17.9. As the figure shows, the IS_1 and LM_1 schedules intersect at point *D* which represents the point of simultaneous equilibrium of the product and money markets. At point *D*, both product and money markets are simultaneously in equilibrium. That is, $I + G = S + T = M_S = M_d$. At the general equilibrium, Y = Rs 700 billion and $i = 0.06$ (or 6 percent).

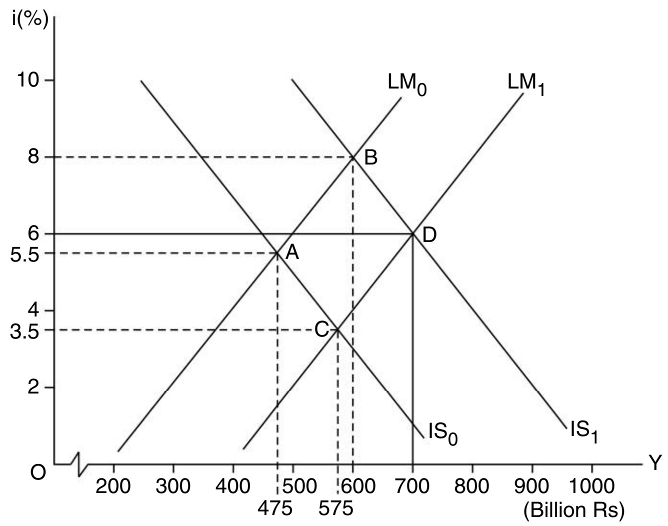


Fig. 17.9 The *IS-LM* Model with Fiscal and Monetary Changes

The determination of the general equilibrium at point D can be proved algebraically. Recall the IS_1 schedule given in Eq. (17.35) as

$$Y = 1000 - 5000i$$

and LM_1 schedule given in Eq. (17.42) as

$$Y = 400 + 5000i$$

By rearranging the terms of these equations, we get the IS schedule as

$$Y + 5000i = 1000 \quad \textbf{(i)}$$

and LM schedule as

$$Y - 5000i = 400 \quad \textbf{(ii)}$$

Thus, we have two simultaneous Eqs. (i) and (ii), with two unknown, Y and i. By solving these equations, we get the equilibrium rate of i and the equilibrium level of Y, as shown below.

By subtracting Eq. (ii) from (i), we get

$$10{,}000i = 600$$
$$i = 0.06 \text{ or } 6 \text{ percent.}$$

By substitution, we get equilibrium level of income from equation (ii) as:

$$Y = 400 + 5000\ (0.06)$$
$$= \text{Rs } 700 \text{ billion.}$$

Thus, at general equilibrium Y = Rs 700 billion and interest rate = 6%. It may thus be concluded that with $\Delta G = \Delta M_s = 100$ billion, given the IS and LM function, there is rise in both equilibrium level of income and interest rate.

17.5 APPLICATION OF THE THREE-SECTOR MODEL

We have illustrated above the determination of equilibrium income and interest rate in a three-sector model assuming fiscal and monetary changes implemented in isolation of one another. In the preceding section, we have explained the effects of a simultaneous and equal change in government expenditure and money supply on the equilibrium level of income and the interest rate. Here, we show the application of the three-sector model assuming *simultaneous* and *different changes* in fiscal and monetary matters by using another macroeconomic model.

Suppose that the macro-model of an economy is given as follows.

Consumption function	:	$C = 100 + 0.75Y_d$
Investment function	:	$I = 250 - 4i$
Government spending	:	$G = 150$
Tax function	:	$T = 40 + 0.20Y$
Transfer payments	:	$TR = 40$
Transaction demand for money	:	$M_t = 0.25Y$
Speculative demand for money	:	$M_{sp} = -20Y$
Nominal supply of money	:	$M_S = 1000$
Price level	:	$P = 5$

where Y_d is disposable income, i is interest rate and absolute amounts are in billion rupees.

Given the model, let us suppose that economic policy makers want to estimate the following aspects and the variables of the economy.

(a) The equilibrium rate of interest and the level of income,
(b) Fiscal multiplier in the Keynesian system,
(c) The crowding-out effect of additional government spending (ΔG) of Rs 50 billion on the equilibrium income and the interest rate,
(d) The effect of increase in tax rate from $0.20Y$ to $0.25Y$ on the equilibrium income, given the increase in the government spending, and
(e) Increase in real money supply (ΔM_s) required to counter-balance the crowding-out effect of government expenditure.

17.5.1 Equilibrium Level of Interest and Income

Working out equilibrium level of interest and income in *IS-LM* model requires estimating the *IS* and *LM* functions. Let us work them out one by one by using the functions and values given in the model.

Recall that *IS* function is derived on the basis of product market equilibrium condition given as

$$Y = C + I + G$$

To estimate ***IS* function,** let us first modify the consumption function by including T and TR.

$$\begin{aligned} C &= 100 + 0.75\ (Y - T + TR) \\ &= 100 + 0.75\ (Y - 40 - 0.20Y + 40) \\ &= 100 + 0.60Y \end{aligned} \qquad \textbf{(17.49)}$$

Given the consumption and investment functions and G, we get *IS* function, say, IS_0, as follows.

***IS*-function:**

$$\begin{aligned} Y &= 100 + 0.60Y + 250 - 4i + 150 \\ Y &= 1250 - 10i \end{aligned} \qquad \textbf{(17.50)}$$

Let us now find the ***LM*-function**. Given the M_t, M_{sp} functions and M_s, the *LM*-function can be worked out as follows.

$$M_d = M_s$$

$$0.25Y - 20i = M/P = 1000/5$$

(where M = nominal money supply and P = price)

***LM*-function:**

$$\begin{aligned} 0.25Y &= 200 + 20i \\ Y &= 800 + 80i \end{aligned} \qquad \textbf{(17.51)}$$

***Estimating equilibrium interest rate*.** Given the *IS* and *LM* equations in Eqs. (17.50) and (17.51), respectively, the equilibrium interest rate and income can be estimated as follows. In *IS-LM* model, at equilibrium,

$$\begin{aligned} IS_0 &= LM \\ 1250 - 10i &= 800 + 80i \\ 90i &= 450 \\ i &= 5 \end{aligned}$$

Estimating equilibrium income. Once equilibrium interest rate is known (i = 5), equilibrium income (Y) can be estimated by substituting 5 for i in either of *IS* and *LM* functions as shown below.

IS function:
$$\begin{aligned} Y &= 1250 - 10i \\ &= 1250 - 10(5) \\ &= 1200 \text{ (Rs. billion)} \end{aligned}$$

LM function:
$$\begin{aligned} Y &= 800 + 80i \\ &= 800 + 80(5) \\ &= 1200 \text{ (Rs. billion)} \end{aligned}$$

17.5.2 Estimating Fiscal Multiplier

Recall that fiscal multiplier (F_m) in the Keynesian system is given as

$$F_m = \frac{1}{1 - b(1 - t)}$$

In our example, b = 0.75 and t = 0.20. Thus, by substitution,

$$F_m = \frac{1}{1 - 0.75(1 - 0.20)} = \frac{1}{0.4} = 2.5$$

It is ***important*** to note here that F_m = 2.5, as estimated above, applies only to the Keynesian model of income determination. It does not apply to *IS-LM* model. In case of the *IS-LM* model, F_m has to be adjusted for crowding-out effect of government expenditure, assuming that crowding-out of private investment does take place.

17.5.3 Estimating Crowding-out Effect of ΔG

Let us suppose that ΔG = Rs 50 (billion) is made by the government. With ΔG, the *IS* curve shifts to the right, *LM* curve remaining the same. The new *IS* equation (say, IS_1) with ΔG = Rs 50 (billion), can be derived as follows. With ΔG, the pre-ΔG *IS*-schedule given in

Eq. (17.50) as $\quad Y = 1250 - 10i$

Changes to (IS_1)
$$\begin{aligned} Y &= 100 + 0.60Y + 250 - 4i + 150 + 50\ (= \Delta G) \\ &= 550 + 0.60\ Y - 4i \\ &= \frac{1}{0.40}(550 - 4i) \end{aligned}$$

$$Y = 1375 - 10i \qquad \textbf{(17.52)}$$

Equation (17.52) gives the new *IS* equation, IS_1. Once the new *IS* equation is estimated, the new equilibrium interest rate with ΔG can be easily worked out.

(i) Equilibrium Interest Rate with ΔG

$$\begin{aligned} IS_1 &= LM \\ 1375 - 10i &= 800 + 80i \\ 90i &= 575 \\ i &= 6.39 \end{aligned}$$

It implies that, given the IS_1 and LM equations, a ΔG of Rs 50 billion causes a rise in the interest rate from 5 (percent) to 6.39 (percent).

(ii) Equilibrium Income with Crowding-out Effect of ΔG

$$\begin{aligned} Y &= 1375 - 10i \\ &= 1375 - 10(6.39) \\ &= 1311.10 \text{ (billion)} \end{aligned}$$

(iii) Crowding-out Effect on Equilibrium Income

The crowding-out effect of ΔG on equilibrium income can be worked out by using the crowding-out adjusted multiplier G_{MC} developed in section 17.4 reproduced here in a modified form. The crowding-out effect of ΔG = Rs 50 billion can be worked out through the adjusted multiplier as follows.

$$G_{\text{MC}} = \frac{1}{(1 - b + bt) + hk/l} \tag{17.53}$$

In our three-sector model, the numerical values for the constants in the G_{MC} formula, are given as $b = 0.75$, $t = 0.20$, $h = 4$, $k = 0.25$ and $l = 20$. By substituting these values in Eq. (17.53), G_{MC} can be worked out as given below.

$$G_{\text{MC}} = \frac{1}{(1 - 0.75 + 0.75 \times 0.20) + 4 \times 0.25/20}$$

$$= \frac{1}{0.45} = 1.22$$

With estimated G_{MC} as 1.22, the change in equilibrium income (ΔY_c) with crowding-out effect of ΔG = Rs 50 billion can be obtained as follows.

$$\begin{aligned} \Delta Y_c &= \text{Rs } 50\ (1.22) \\ &= \text{Rs } 61 \text{ billion} \end{aligned}$$

Now crowding-out effect of ΔG can be computed as follows.

$$\begin{aligned} \text{Crowding-out effect} &= \Delta G\ (G_m) - \Delta G\ (G_{\text{MC}}) \text{ (where } G_m \text{ is } G\text{-multiplier)} \\ &= \text{Rs } 50 \text{ bn } (2.5) - \text{Rs } 50 \text{ bn } (1.22) \\ &= \text{Rs } 125 \text{ bn} - \text{Rs } 61 \text{ bn} \\ &= \text{Rs } 64 \text{ billion} \end{aligned}$$

It means that given the IS and LM equations, a ΔG of Rs 50 billion causes reduction in the private investment. This effect of ΔG prevents the application of Keynesian multiplier and reduces expected ΔY from Rs 125 billion to Rs 64 billion.

17.5.4 The Effect of Increase in Tax Rate

A change in tax rate changes the IS equation, LM equation remaining the same. Let us suppose that the government raises the tax rate from 20 percent to 25 percent. The rise in tax rate from $t = 0.20$ to $t = 0.25$ would change the IS equation by changing the *consumption* function. With increase in tax rate, the consumption function changes from $C = 100 + 0.60Y$, given in Eq. (17.49) to

$$C = 100 + 0.75\ [Y - (40 + 0.25Y + 40)]$$
$$= 100 + 0.5625Y$$

With change in the consumption function, the new *IS* schedule (say, IS_2) can be obtained as follows.

IS_2 Schedule: $$Y = C + I + G + \Delta G$$
$$= 100 + 0.5625Y + 250 - 4i + 200$$
$$= 1257.14 - 9.14i \tag{17.54}$$

Given the new *IS* function (IS_2) in Eq. (17.54), the **new equilibrium interest rate** can be worked out as follows.

$$IS_2 = LM$$
$$1257.14 - 9.14i = 800 + 80i$$
$$89.14i = 457.14$$
$$i = 5.13 \text{ (percent)}$$

Once interest rate is known, **equilibrium income with tax effect** can be computed by substituting the interest rate (5.13%) into the IS_2 or *LM* equation. By using IS_2 function, we get

$$Y = 1257.14 - 9.14i = 1257.14 - 9.14\ (5.13)$$
$$= \text{Rs } 1210.25 \text{ billion}$$

The *negative effect of increase in tax rate* on the equilibrium income equals income before tax-rise *less* income after tax-rise. That is,

$$\text{Tax Effect} = \text{Rs } 1311.10 \text{ bn} - \text{Rs } 1210.25 \text{ bn}$$
$$= \text{Rs } 100.85 \text{ billion}$$

This calculation shows that increasing tax rate from $t = 0.20$ to $t = 0.25$ decreases equilibrium income by Rs 100.85 billion.

17.5.5 Counter-balancing the Crowding-out Effect with Real Money Supply

As noted above, the crowding-out effect arises due to increase in the interest rate caused by the additional demand for money. In order to counter-balance the crowding-out effect, as a matter of policy, the real money supply has to be so increased that the *interest rate does not increase*. Thus, the policy-makers need to find ΔM_s required to countervail the crowding-out effect. The required ΔM_s can be estimated by using the money sector equilibrium equation Eq. (17.51).

$$M_d = M_s$$
$$0.25Y - 20i = 200 + \Delta M_s$$
$$0.25Y - 20i - 200 = \Delta M_s \tag{17.55}$$

Since interest rate has to remain constant at pre-ΔG level of 5 (percent) and income constant at Rs 1200 billion, by substituting these values in Eq. (17.55), we get ΔM_s as:

$$\Delta M_s = 0.25Y - 20i - 200$$
$$= 0.25\ (1200) - 20\ (5) - 200$$
$$= \text{Rs } 31.25 \text{ billion}$$

It means that if real money supply is increased by Rs 31.25 billion along with ΔG = Rs 50 billion, it will counter-balance the crowding-out effect ΔG. Whether an increase in real money supply by Rs 31.25 billion will counter balance the crowding-out effect can be tested as follows.

With increase in real money supply by Rs 31.25 billion, *LM* equation (17.55) will read as

$$0.25Y - 20i = 200 + 31.25 = 231.25$$

$$0.25Y = 231.25 + 20i$$

$$Y = \frac{1}{0.25}(231.25 + 20i)$$

$$= 925 + 80i$$

This *LM* equation can be used to find equilibrium level of income with increase in government spending by Rs 50 billion and a simultaneous increase in real money supply of Rs 31.25 billion as shown below.

$$Y = 925 + 80\ (5)$$

$$= \text{Rs } 1325 \text{ billion}$$

Recall that equilibrium level of income without ΔG has been worked out at Rs 1200 billion. A ΔG = Rs 50 billion, given the Keynesian *G*-multiplier as 2.5, would have increased the equilibrium level of income by 50 bn (2.5) = Rs 125 billion. This addition would have increased the income (without crowding-out effect) to Rs 1200 bn + Rs 50(2.5) = Rs 1325 billion.

From the estimated increase in real money supply, one can find the required increase in *nominal money supply* to countervail the crowding-out effect. The required increase in nominal money supply = $\Delta M_s\ (P)$ = Rs 31.25 bn (5) = 156.25 billion.

Conclusion Our discussion on the application of the three-sector *IS-LM* model show how the integrated equilibrium analysis of the product and money markets can be applied, at least theoretically, to work out various macroeconomic variables that can be used in economic planning and to project the possible consequence of the fiscal and monetary changes made by the government. This discussion takes us to the end of this chapter. In the next Chapter, we will discuss the four sector *IS-LM* model, i.e., the model with the foreign sector.

SUGGESTED READINGS

Ackley G., *Macroeconomics: Theory and Policy* (Macmillan, NY, London, 1978), Ch. 11.

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QUESTIONS FOR REVIEW

1. How does inclusion of the government sector in two-sector model affect the *IS-LM* model of equilibrium analysis? What new variables are added to the model and how do they affect the *IS* and *LM* schedules?
2. (a) Explain the factors that determine the slope of the *IS* and *LM* curves.
   (b) What is the implication of a lump-sum tax and of a tax function as $T = \bar{T} + tY$ for the *IS* curve?
3. *Suppose a product-market model is given as follows.
   $C = a + b\,(Y - T)$
   (where, $Y - T$ = disposable income)
   $S = -a + s\,(Y - T)$
   (where, $s = 1 - b = mps$)
   $I = \bar{I} - hi$
   $G = \bar{G}$
   $T = \bar{T} + tY$ (where $0 < t < 1$)
   Derive the product-market equilibrium condition and the *IS* curve.
4. *Suppose structural model for the product market is given as follows.
   $C = 100 + 0.80\,(Y - T)$
   $S = -100 + 0.20\,(Y - T)$
   $I = 200 - 1080\,i$
   $G = 100$
   $T = 50 + 0.20Y$
   Find (a) Equilibrium equation ($G + I = S + T$) for the product market.
   (b) Function for the *IS* curve.
5. *Assuming that the model for the product market is given as in Q.4. Find the following.
   (a) Shift in the *IS* schedule if deficit-financed $\Delta G = 72$
   (b) Shift in the *IS* schedule if tax rate (t) is raised from 0.20 to 0.25
   (c) Shift in the *IS* schedule if $\Delta G = 72$ and $\Delta t = 0.05$
   (d) Net effect of fiscal policy change on the equilibrium level of income and interest.
6. *Suppose money supply and demand-for-money function are given as:
   $M_s = 250$ billion
   $M_d = 100 + 0.5Y - 2500\,i$
   Find the *LM*-function. Also find the shift in the *LM*-curve if $\Delta M_s = 50$.
7. *Suppose product market model is given as in Q. 4 and money market model is given as Q. 6. Find the following.
   (a) Function for the *IS* curve
   (b) Function for the *LM* curve
   (c) Equation for the general equilibrium
   (d) Income at the general equilibrium, and
   (e) Interest rate at the general equilibrium.
8. *The product-market model is given as $C = 100 + 0.8\,Y$; $S = -100 + 0.2\,Y$; $I = 120 - 0.5\,i$; and money-market equations are $M_s = 120$; and $M_d = 0.2Y - 5\,i$ (where, i is a percentage interest rate). Assuming a change in money supply as $\Delta M_s = 30$, find the level of Y and i at the general equilibrium.
9. The *IS* and *LM* schedules are given, respectively, as follows.
   $Y = 800 - 5000\,i$
   $Y = 250 + 5000\,i$
   Find the levels of income and the interest rate at general equilibrium.
10. *Suppose the product-market model is given as $C = 100 + 0.75Y$; $S = -100 + 0.25\,Y$; and $I = 120 - 0.5\,i$, and money-market model is given as $M_s = 150$ and $M_d = 0.2Y - 4i$. Find equilibrium Y and i. Assuming a lump-sum tax = 20, find the effect of tax on the equilibrium level of Y and i.
11. *Suppose money-market model is given as $M_s = 120$; and $M_d = 0.2Y - 5i$ (where i is in percentage) and a product market model is given as
    $C = 100 + 0.75Y$;
    $S = -100 + 0.25Y$; and
    $I = 120 - 0.5i$
    Assuming a lump-sum tax, $T = 20$ and $\Delta M_s = 30$, find Y and i at the level of the general equilibrium.

12. *An economy shows the following features:

Consumption $C = 80 + 0.8Y_d$

(where, Y_d = Disposable income)

Tax $T = 60 + 0.2Y$

(where, Y = National income)

Investment $I = 200 - 10r$

(where, r = Rate of interest, percentage)

Transfers $T_R = -40$

Government Expenditure $G = 160$

Transaction and precautionary demand for money,

$$M_1 = 0.4Y$$

Speculative demand for money

$$M_2 = 300 - 20R$$

Supply of money (Amounts in Rs) $M_s = 476$

(i) Calculate the equilibrium values of Y and R.

(ii) Is the government budget in surplus or deficit.

(iii) What is the level of consumption at equilibrium level of income?

13. Suppose Consumption

$$C = 40 + 0.75(Y - 80)$$

Investment

$$I = 140 - 10i$$

Government expenditure

$$G = 100$$

Money demand

$$M^d = 0.2Y - 5i$$

Money supply

$$M^s = 85$$

(i is % interest rate; other figures in Rs crore).

(a) Compute the equilibrium income, Y and interest rate, i.

(b) Suppose the government increases its expenditure on education and health services by Rs 65 crore. What would be the impact on equilibrium income?

14. *(a) For the economy with the following specifications:

Consumption

$$C = 100 + 0.9Y_d$$

Income tax

$$t = (1/3)Y$$

Investment

$$I = 600 - 30i$$

Government expenditure

$$G = 300$$

Transaction demand for money

$$M_1 = 0.4Y$$

Speculative demand for money

$$M_2 = -50i$$

Nominal money supply

$$\overline{M} = 1040$$

Price level

$$P = 2$$

Full employment level of income

$$= 2500$$

[where, Y_d stands for disposable income, and i for rate of interest]

(i) Derive the *IS* and *LM* equations and compute the equilibrium levels of income and rate of interest.

(ii) Compute the change required in the level of government expenditure to achieve full employment level of income.

(iii) Explain the change in position of *IS* and *LM* curves if *MPC* changes to 0.6.

(b) What is budget surplus? Explain why an increase in the government purchases will reduce the budget surplus by less than increase in government purchases?

15. *(a) For the economy with the following specifications:

Consumption

$$C = 200 + 0.75Y_d$$

Investment

$$I = 200 - 25r$$

Government purchases

$$G = 200$$

Taxes $T = 200$

Real demand for money function

$$M_d = 0.5Y - 100r$$

Nominal money supply

$M_s = 900$

Price level

$P = 2$

[where Y_d stands for disposable income, Y is income, and r is percent interest rate, and other figures are in Rs crores].

(i) Derive the *IS* and *LM* equations and compute the equilibrium level of income and interest rate;

(ii) Suppose the government purchases are raised from 200 to 250 crores and nominal money supply is raised from 900 to 1100. What is the magnitude of shift in the *IS* and *LM* curves? What are the new equilibrium levels of income and interest rate?

(iii) With the initial values of monetary and fiscal policy, derive an equation for the aggregate demand curve.

(b) Show the effect of an increase in the government expenditure on income and budget surplus in a proportional tax model.

16. (a) Consider an economy with the following specifications:

Consumption function

$C = 200 + 0.8Y_d - 500r$

Investment function

$I = 200 - 500r$

Government purchases

$G = 196$

Taxes $T = 20 + 0.25Y$

Real demand for money

$M_d/P = 0.5Y - 100r$

Real money supply

$M_s/P = 900$

[Here Y_d stands for disposable income, Y for national income, and r for real rate of interest in percent terms

All other figures are in Rs crores]

Answer the following questions. Elucidate also with the help of diagram.

(a) Write down the equations for the *IS* and *LM* curves. Solve the system for the equilibrium values of output and the rate of interest.

(b) If government purchases increase by Rs 300 crores, what should be the corresponding increase in the real money supply to realise the full simple Keynesian multiplier effect?

(c) Without solving for the output and the rate of interest can you deduce whether contractionary fiscal policy will increase or decrease investment?

[Note. For solution to the starred questions, see *Appendix*.]

APPENDIX TO CHAPTER 17

Derivation of G_{MC} Formula

In this Appendix, we show briefly the derivation of crowding-out-effect-adjusted G-multiplier used by Dornbusch, *et.al.*

We know that, in the *IS-LM* model, the economy is in equilibrium at the level of income and interest which satisfy the equilibrium condition, *i.e.*, at the point where *IS-LM*. Let us first derive the *IS* schedule. Given the product sector model in Eq. 17.4 through Eq. 17.9 in the text of this Chapter, the *IS schedule* can be expressed as follows.

$$Y = a + b\,[Y - (\bar{T} + tY)] + \bar{I} - hi + G$$

$$= \frac{1}{1-b+bt}\,[a - b\,\bar{T} + \bar{I} - hi + G]$$

Let $1/(1 - b + bt) = G_{FM}$ and $(a - b\,\bar{T} + \bar{I} + G) = \bar{A}$. Then

IS Schedule $\Rightarrow$ $$Y = G_M(\bar{A} - hi) \qquad \textbf{(1)}$$

Let us now find the *LM* schedule. Money market is in equilibrium where $M_d = M_s$. That is,

LM Schedule $\Rightarrow$ $$kY - li = M/P$$

$$Y = \frac{1}{k}\,[M/P - li] \qquad \textbf{(2)}$$

and $$i = \frac{1}{l}\,[kY - (M/P)] \qquad \textbf{(3)}$$

Having derived the *IS* and *LM* schedules, we can now find the equilibrium level of Y. As shown above, at equilibrium,

$$Y = G_M\,(\bar{A} - hi)$$

By substituting Eq. (3) for i in Eq.(1), we get

$$Y = G_M[\bar{A} - h\{1/l\,(kY - M/P)\}]$$

$$= G_M[\bar{A} - h/l(kY - M/P)]$$

$$= G_M\,\bar{A} - G_M(hk/l)(Y) - G_M\,h/l(M/P)$$

$$Y + G_M(hk/l)(Y) = G_M[\bar{A} - h/l(M/P)]$$

$$Y\,(1 + G_M hk/l) = [\bar{A} - h/l(M/P)]$$

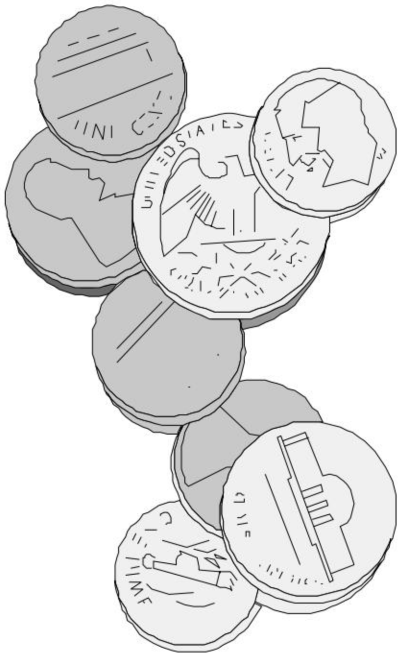
$$Y = \frac{G_M}{1+G_M\,hk/l}\,[\bar{A} - h/l(M/P)] \qquad \textbf{(4)}$$

In Eq. (4), the term,

$$\frac{G_M}{1+G_M\,hk/l} = G_{MC} \qquad \textbf{(5)}$$

Chapter 18

The *IS-LM* Model with Foreign Sector



INTRODUCTION

In Chapter 17, we have discussed *IS-LM* model pertaining to the *closed economy*. This Chapter deals with the *IS-LM* model of an *open economy*—the economy open to economic transactions with the rest of the world. The open economy model—also called as four-sector model—is constructed by including *foreign sector* into the three-sector model. The inclusion of foreign sector into the model requires incorporating the international economic transactions into the model. International economic transactions can be broadly classified as (i) *autonomous transactions*, and (ii) *induced transactions*. In general, *autonomous transactions* are need based and business-purpose transactions. Such transactions include *exports* (*X*) and *imports* (*M*) of consumer and capital goods. Exports and imports by a country generate two other kinds of transactions—receipts of money for exports and payments for imports. These kinds of receipts and payments fall under the category of *induced transactions*. The sum total of the autonomous and induced transactions is called the *balance of payments* (*BOP*).

In order to incorporate international transactions into the *IS-LM* model, let us consider first the autonomous transactions, the foreign trade, i.e., the exports (*X*) and imports (*M*). Exports mean outflow of domestic goods and services, and inflow of incomes. Increase in income results in an increase in the *aggregate demand* and, therefore, a rightward shift in the *IS* curve. On the other hand, *imports* mean inflow of foreign goods and services and outflow of incomes which reduces the aggregate demand and causes a leftward shift in the *IS* curve. The exports and imports may not always be in balance. The net of *exports* over *imports* (i.e., *X*–*M*), called the *balance of trade* (*BOT*), gives a measure of the net effect of foreign trade on the aggregate demand. Thus, the *trade* *balance*, whether positive or negative, alters the aggregate demand function. Therefore, the inclusion of foreign sector in the *IS-LM* model alters the position and the slope of the *IS* curve. This causes a displacement of the equilibrium of the internal economy, even if the *LM curve* remains unaffected.

What about *LM* curve? As we know, the *LM* curve is linked to the money market—the demand for and supply of money. The foreign trade does affect the money demand and supply and, therefore, the *LM* curve. The effect of change in money demand and supply depends on the *BOP*. Therefore, a new schedule, called *BOP* schedule, is added to the open economy *IS-LM* model. We will, however, first discuss the *IS-LM* model without *BOP* schedule. The *BOP* schedule will be derived and added to the model at a later stage of analysis.

To analyse the general equilibrium in four-sector *IS-LM* model, we will first explain algebraically how introduction of foreign trade affects the product market equilibrium and derive the *IS* function. We will then recall our money market model and combine it with the *IS-LM* model. This will be followed by a graphical derivation of the *IS* curve with exports and imports included in the aggregate demand and supply and compare the *IS* curve without and with foreign trade. We will then explain briefly the *BOP* and derive the *BOP*-function. We will finally illustrate graphically the general equilibrium of an open economy in the *IS-LM* framework with a *BOP* schedule added to the model. Let us begin our study with *product-market equilibrium* with foreign trade.

18.1 THE PRODUCT-MARKET EQUILIBRIUM WITH FOREIGN TRADE

To begin with, let us recall our three-sector product-market equilibrium model given as

$$C + I + G = C + S + T \tag{18.1}$$

To this three-sector model, we now add the foreign trade—the exports (X) and imports (M). With the addition of X and M, the four-sector product-market equilibrium condition is written as

$$C + I + G + (X - M) = C + S + T \tag{18.2}$$

The variables X and M need some explanation and quantification. Exports (X) of a country depend on a variety of factors governing the foreign demand for its goods and services. The inclusion of foreign demand parameters in the domestic model of a country is neither an easy task nor a necessity for a simplified model. Therefore, X is assumed to be a constant factor, that is,

$$X = \bar{X} \tag{18.3}$$

As regards imports, imports (M) of a country are a function of a number of factors. However, for the sake of analytical simplicity, imports are treated as the function of the country's national income (Y). That is, import function takes the following form.

$$M = \bar{M} + mY \tag{18.4}$$

where, $\bar{M}$ is autonomous import and m is *marginal propensity to import*, i.e., the proportion of marginal national income spent on imports.

With X and M defined, the four-sector product-market equilibrium condition given in Eq. 18.2 can be rewritten as

$$C + I + G + \bar{X} - \bar{M} - mY = Y = C + S + T \tag{18.5}$$

The product-market equilibrium condition can also be expressed as

$$Y = C + I + G + \bar{X} - \bar{M} - mY$$

where $C = a + bY_{d,}$ (where $Y_d = Y - T$ = disposable income)

$S = -a + (1 - b)Y$, (where $1 - b = mps$)

$I = \bar{I} - hi$, (where $h > 0$)

$G = \bar{G}$, (where G is constant)

$T = \bar{T} + tY$, (where $\bar{T}$ is constant tax and t is tax rate < 1)

By substitution, the equilibrium level of income can be expressed as

$$Y = a + b\,[Y - (\bar{T} + t\,Y)] + \bar{I} - hi + \bar{G} + \bar{X} - \bar{M} - mY$$

$$= a + bY - b\,\bar{T} - btY + \bar{I} - hi + \bar{G} + \bar{X} - \bar{M} - mY$$

$$Y = \frac{1}{1 - b + bt + m}\,(a - b\,\bar{T} + \bar{I} - hi + \bar{G} + \bar{X} - \bar{M})$$

or
$$Y = \frac{1}{1 - b(1-t) + m}\,(a - b\,\bar{T} + \bar{I} - hi + \bar{G} + \bar{X} - \bar{M}) \qquad \textbf{(18.6)}$$

The Eq. (18.6) can be further simplified as follows. Note that the term $1/(1 - b + bt + m)$ is *tax-trade multiplier* which may be redesignated as m_{tt}. Also, let us designate the sum of the five constants, *viz.* a, $\bar{I}$, $\bar{G}$, $\bar{X}$, and $\bar{M}$ as $\bar{A}$. By substituting these value, Eq. (18.6) can now be reduced to

$$Y = m_{tt}\,(\bar{A} - b\,\bar{T} - hi) \qquad \textbf{(18.7)}$$

(where m_{tt} is tax-trade multiplier and $\bar{A} = a + \bar{I} + \bar{G} + \bar{X} - \bar{M}$)

Equation (18.7) gives the aggregate demand (*AD*) function in a four-sector model.

18.2 DERIVATION OF THE *IS* CURVE

Following the usual process, the *IS* curve can be derived by using the *AD* function given in Eq. (18.7). The derivation of *IS* curve by using Eq. (18.7) has been illustrated in Fig. 18.1. Assuming interest rate to be given as i_2, the aggregate demand (*AD*) is shown by the line $AD_1 = m_{tt}(\bar{A} - b\bar{T} - hi_2)$ in panel (a). The line AD_1 intersects with line $AE = AD$ at point E_1 and thus determining the equilibrium level of income at Y_1.

When interest rate falls to i_1, all other things remaining the same, investment increases causing *AD* line to shift upward to $AD_2 = m_{tt}(\bar{A} - b\bar{T} - hi_1)$. As a result, equilibrium of the product-market shifts upward to point E_2 – the point of intersection of *AE* and AD_2—determining the equilibrium income at a higher level, Y_2. It may, thus, be concluded from panel (a) of Fig. 18.1 that equilibrium level of income increases as interest rate decreases. This relationship between income and interest rate is depicted in panel (b) of Fig. 18.1 by the *IS* schedule.

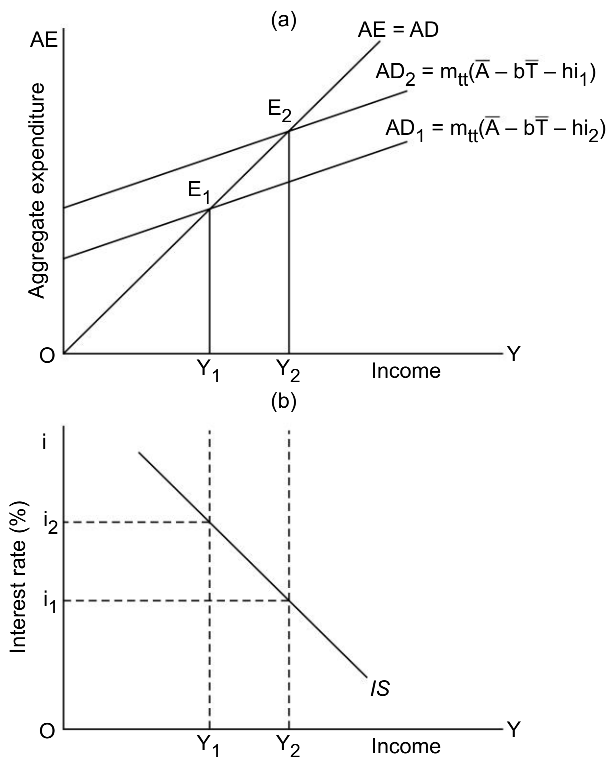


Fig. 18.1 Derivation of *IS* curve

Numerical Example We recall here our numerical example of three-sector model used in Chapter 17 and add to it foreign trade—export ($\bar{X}$) and M-function. The three-sector product-market model is given as follows.

$$C = 100 + 0.75\ (Y - T)$$
$$I = 200 - 2000i$$
$$\bar{G} = 100$$
$$T = 80 + 0.20Y$$

Let us now add foreign trade to this model, assuming

$$\bar{X} = 50 \tag{18.8}$$
$$M = 20 + 0.10Y \tag{18.9}$$

By substituting values of three-sector model and values of $\bar{X}$ and M given in Eqs. (18.8) and (18.9), respectively, into Eq. (18.6), we get the *IS-function* as

$$Y = 100 + 0.75\ [Y - (80 + 0.20Y)] + 200 - 2000i + 100$$
$$+ 50 - 20 - 0.10Y$$
$$= \frac{1}{1 - 0.75(1 - 0.20) + 0.10}\ (370 - 2000i)$$

$$= \frac{1}{0.5}(370 - 2000i)$$

$$Y = 740 - 4000i \qquad \textbf{(18.10)}$$

Note that substitution of relevant values in Eq. (18.7) will produce the same *IS*-function as given in Eq. (18.10).

The *IS*-function (18.10) can be converted in an *IS* schedule by assigning different numerical value to i and working out the value of the corresponding Y. For example, if $i = 0.10$, $Y = 740 - 4000(0.10) = 340$, and if $i = 0.05$, then $Y = 740 - 4000(0.05) = 540$. By graphing these values, we get the *IS* curve for the four-sector model.

However, this method of deriving the *IS* curve does not reveal the effect of exports (X) and imports (M) on the *IS* curve—it does not show how X and M change the slope of the *IS* curve. We will, therefore, use an alternative method to derive the *IS* curve which solves this problem.

18.3 DERIVATION OF THE *IS* CURVE: AN ALTERNATIVE METHOD

The derivation of the *IS* curve with foreign trade has already been explained in section 18.2 by using a simple method. However, the method used there does not reveal how inclusion of foreign trade changes the slope of the *IS* curve related to the closed economy. In this section, we use an alternative method to derive the *IS* curve for four-sector model to illustrate how foreign trade alters the slope and elasticity of the three-sector *IS* curve.

To begin with, let us recall the equilibrium condition given in Eq.(18.2) and rewrite it as

$$C + I + G + X = C + S + T + M$$

$$I + G + X = S + T + M \qquad \textbf{(18.11)}$$

By substituting the export and import functions given in Eqs. (18.3) and (18.4), respectively, into Eq. (18.11) the product-market equilibrium condition can be written as

$$I + G + \bar{X} = S + T + \bar{M} + mY \qquad \textbf{(18.12)}$$

Eq. (18.12) provides the basis for the derivation of the *IS* curve in the four-sector model. Fig. 18.2 illustrates the derivation of the *IS*-curve without and with foreign trade. The $I + G$ schedule in quadrant (a), $S + T$ schedule in quadrant (c), and IS_c schedule in quadrant (d) present the product-market equilibrium conditions for an economy without foreign trade—subscript 'c' of IS_c denotes the closed economy. Let us now look at the change in all these functions caused by the inclusion of foreign trade into the model.

As noted earlier, exports are *injections* and imports are *withdrawals*. The net of injections and withdrawals is measured as $X - M$. With the inclusion of foreign trade in the model, the net injection (assuming $X > M$) increases from $I + G$ to $I + G + (X - M)$ and, therefore, the $I + G$ curve in quadrant (a) shifts to $I + G + (X - M)$ curve. Note that the shift is parallel because exports (X) are assumed to be exogeneously determined and $X - M$ is assumed to remain constant. The rest of the process of deriving *IS* function is the same as one used in Chapters 16 and 17.

With the inclusion of foreign trade, the product market equilibrium condition is given by $I + G + X = S + T + M$. This condition is shown in quadrant (b) of Fig. 18.2 by the 45^0 line. The relationship between $S + T + M$ and income (Y) is shown by the $S + T + M(Y)$ function with foreign trade. Note that the gap between the $S + T$ and $S + T + M(Y)$ schedules goes on increasing with the increase in income. The divergence between the $S + T$ and $S + T + M(Y)$ schedules depends on the value of m (the marginal propensity to import) in the import function given as $M = \overline{M} + m\,Y$. The greater the value of m, the greater the divergence and *vice versa*. The $S + T + M(Y)$ function when linked to Y and i produces schedule IS_0 in quadrant (d) which represents the IS function with foreign trade—subscript 'o' denotes 'open economy'. Note that the IS schedule becomes steeper with the inclusion of the foreign trade.

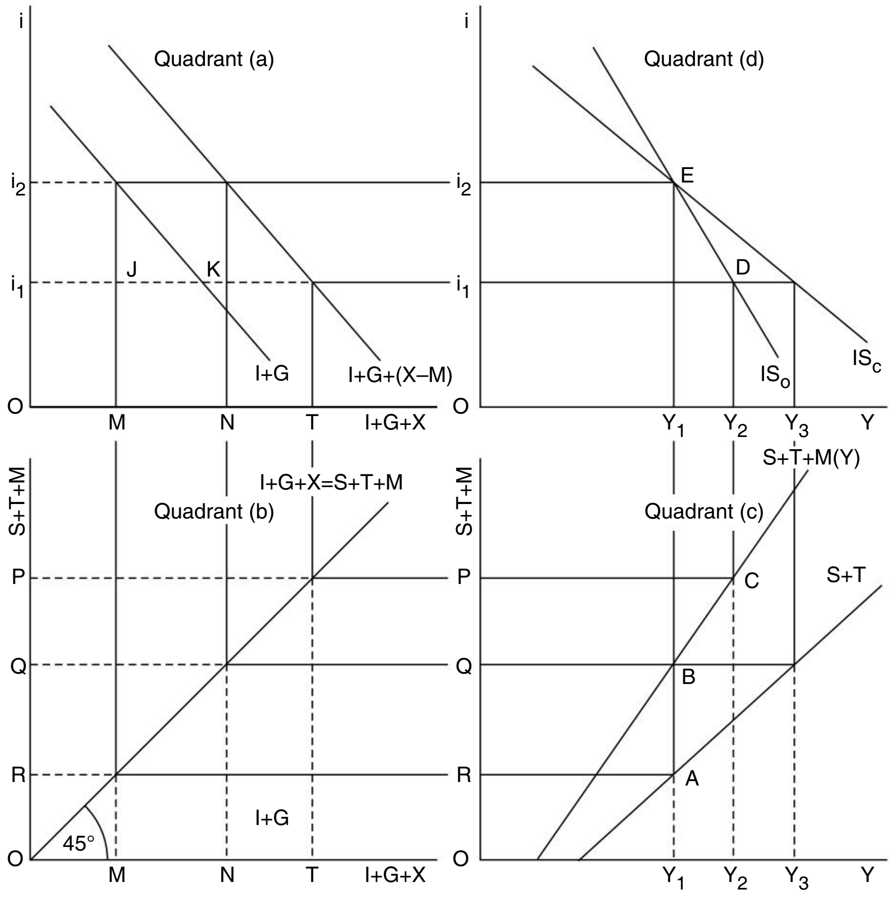


Fig. 18.2 Derivation of the *IS* Curve in Four-Sector Model

Let us explain briefly the derivation of *IS* schedule with foreign trade, as exhibited in Fig. 18.2. The IS_c schedule represents the closed economy, i.e., three-sector model, drawn on the basis of $I + G$ schedule in quadrant (a). Now, given the interest rate i_2, let us add $X - M$ to $I + G$. As a result, the $I + G$ schedule shifts to $I + G + (X - M)$, under the condition that $X > M$. Note that $X - M = MN$. So for the economy to be in equilibrium, imports (M) must rise by MN. This is shown by QR in quadrant (b). The rise in M by QR, given the income at Y_1, makes point A shift to point B in quadrant (c). When Y_1 and i_2 are linked, as shown in quadrant (d), point E on IS_c is arrived at. Note that point E falls also on the IS_c schedule. It implies that there is no change in product-market equilibrium.

Now let the interest rate fall to i_1. As a result, I increases by NT which equals JK. Increase in investment causes an increase in income (Y). In the absence of foreign trade, income would have increased to Y_3 as shown in quadrant (c). But with foreign trade, increase in income causes increase in M because $M = f(Y)$. Imports, being a leakage, reduce the income expected from $\Delta I = NT$. As a result, income increases but less than expected Y_3. Without imports, the income would have increased by

$$\Delta Y = \frac{1}{1 - b(1 - t)} \Delta I.$$

But with imports, Y increases by

$$\Delta Y = \frac{1}{1 - b(1 - t) + m} \Delta I$$

When we link the new $S + T + M$ with a relatively lower level of income (say, Y_2), we get point C in quadrant (c). By linking Y_2 with i_1, we arrive at point D in quadrant (d). By joining points E and D by a line and extending it further, we get open economy IS-schedule as shown by IS_o. Note that the IS_o curve is steeper than the IS_c curve.

18.4 THE FOUR-SECTOR *IS-LM* MODEL

To present the complete *IS-LM* model, we need to combine the *IS* and *LM* functions. For this purpose, we will use *IS* function derived in Eq. (18.10) and the simple *LM* function of the three-sector model derived in Chapter 17—simple three-sector *LM* function because foreign trade does not *directly* affect the money supply and demand.

To build the four-sector *IS-LM* model, we recall here our *IS* function given in Eq. (18.10) and *LM* function from Chapter 17 [Eq. (17.39)].

IS-function $\Rightarrow$ $Y = 740 - 4000i$

LM-function $\Rightarrow$ $Y = 200 + 5000i$

By using these *IS* and *LM* functions, we can find the equilibrium levels of interest rate (i) and income (Y).

$$IS = LM \tag{18.13}$$

$$740 - 4000\,i = 200 + 5000i$$

$$540 = 9000i$$

$$i = 0.06 \text{ (6 percent)}$$

It means that the four-sector economy is in equilibrium at the interest rate of 6%. By substituting 0.06 for i in the *IS* function, we get

$$Y = 740 - 4000\ (0.06)$$

$$Y = 500$$

Thus, at the general equilibrium in four-sector model, $Y = 500$ and $i = 6\%$.

18.5 THE SHIFT IN THE *IS* CURVE AND THE GENERAL EQUILIBRIUM

Having explained the derivation of the four-sector *IS* function, we proceed now to explain the determination of the general equilibrium in the open economy model. We will also explain the effect of shift in the *IS* schedule on the equilibrium level of the output and the interest rate. Let us assume once again that money market is not affected by the introduction of foreign trade and that the *LM* function remains unaffected. Figure 18.3 illustrates the general equilibrium based on these assumptions. Suppose that the initial *IS* schedule is given by IS_2—it represents IS_0 schedule in quadrant (d) of Fig. 18.2. The IS_2 and *LM* schedules intersect at point E_2. Point E_2 is therefore the point of general equilibrium in the four-sector model. This point of equilibrium will remain stable until there is a shift in *IS* and *LM* schedules.

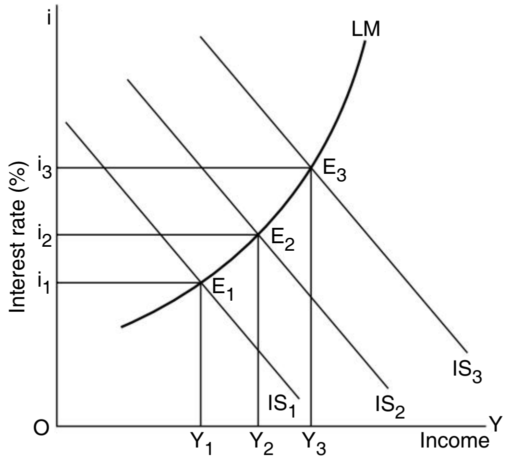


Fig. 18.3 Shift in the *IS* Curve and the General Equilibrium

Let us now look at the effect of the shift in the *IS* schedule on the general equilibrium, assuming no shift in the *LM* schedule. A shift in the *IS* curve is caused by a change in the internal factors including, *I*, *G*, *S* and *T* and external factors including *X* and *M*. Confining our analysis to the foreign sector, however, let us assume that the internal factors—*I*, *G*, *S* and *T*—remain constant and the shift in the *IS* curve is caused by the change in the external factors (*X* and *M*).

The shift in the initial IS_2 curve (leftward or rightward) results either from a change in *X* or a change in *M* or in both, other things remaining the same. When *X* increases or $\overline{M}$ in the import function ($M = \overline{M} + mY$) decreases, the *IS* curve shifts rightward as shown by its shift from IS_2 to IS_3. And, when *X* decreases or $\overline{M}$ increases, the *IS* curve shifts leftward as shown by its shift from IS_2 to IS_1 in Fig. 18.3. In case *X* and *M* change simultaneously, and if $\Delta X > \Delta M$, *IS* schedule shifts upward and if $\Delta X < \Delta M$, the *IS* curve shifts downward. Let us now look at the consequences of upward and down shifts in the *IS* schedule, *LM* schedule remaining the same.

It can be seen in Fig. 18.3 that with the shift in the *IS* curve, the point of the general equilibrium shifts too. Note that an upward shift in the *IS* schedule, *LM* curve remaining the same, causes a rise in the equilibrium levels of both the interest rate and the income. For example, with an upward shift in the *IS* schedule from IS_2 to IS_3, the equilibrium point shifts from E_2 to E_3. With this shift in the equilibrium point, the equilibrium rate of interest increases from Oi_2 to Oi_3 and the equilibrium level of income increases from OY_2 to OY_3. Similarly, a downward shift in the *IS* schedule from IS_2 to IS_1, *LM curve remaining the same*, the equilibrium point shifts from E_2 to E_1. The downward shift in the *IS* schedule causes a fall in the equilibrium interest rate from Oi_2 to Oi_1 and the equilibrium level of income decreases from OY_2 to OY_1. To conclude, in case $X > M$, equilibrium levels of both the output and the interest rate tend to rise, and *vice versa*.

18.6 THE *IS-LM* MODEL WITH THE BALANCE OF PAYMENTS

In section 18.5, we have examined the effect of change in *X* and *M* on the general equilibrium. In other words, our analysis so for has been confined to the effect of change in *balance of trade*. However, the overall effect of the change in *X* and *M* on the economy depends on change in the balance of payments (*BOP*). The *BOP* includes the final effect of both the international flows of goods and services and capital (or monetary) flows. In this section, we introduce the *balance of payments* (*BOP*) to the *IS-LM* model and show how it affects and gets affected by the changes in the model. We will first describe very briefly the 'balance of payment' and then derive the *BOP function.* Finally, we will introduce the *BOP* function to the *IS-LM* model and show the general equilibrium with *BOP* function.

18.6.1 The Balance of Payments (*BOP*)

The method of working out the balance of payments and the balance of payments adjustment are discussed in detail ahead in Chapter 25. Here we give a brief account of the balance of payments with the purpose of introducing it to the four-sector *IS-LM* model. Briefly speaking, balance of payment is a summary of all economic transactions between the residents (households, firms and the government agencies) of a country and the rest of the world, during a period of time, usually one year. The economic transactions between a country and the rest of the world are categorised under: (a) current account transactions, and (b) capital account transactions.

The **current account transactions** include current receipts and payments on account of (i) exports and imports of goods and services, (ii) tourism services, (ii) transportation and insurance services, (iii) foreign investment incomes and payments, (iv) private transfer payments, including inter-personal, inter-bank payments, and (v) inter-government transfer payments (gifts, donations, pensions, etc.). The current account transactions may have a surplus or a deficit.

The **capital account transactions** include (i) the balance of trade, (ii) commercial borrowings, (iii) external assistance, (iv) IMF borrowings, (v) non-residents deposits, (vi) foreign direct and portfolio investments, and (vii) debt servicing. The capital account may show a surplus or deficit depending on whether capital inflows are greater or smaller than capital outflows. The capital account balance is reflected by the change in gold and foreign exchange reserves.

In *BOP* accounting system, the *BOP* is always in balance, i.e., debit and credit sides are always equal. However, there is a system of working out whether a country's overall receipts are equal, greater than or less than overall payments. When foreign receipts exceed foreign payments, it shows *BOP surplus* and when foreign payments exceed foreign receipts, it shows *BOP deficit*. In both the cases, the *BOP* is said to be in disequilibrium.

Let us now derive the *BOP* function and introduce it to the four-sector model and show the effect of *BOP deficit* on the general equilibrium in the four-sector *IS-LM* model.

Derivation of the BOP Function To derive the *BOP* function, let us make some simplifying **assumptions**. ***One***, we assume a 'small country' case in which the imbalance in balance of trade (*BOT*) does not affect the *BOP* of other countries. ***Two***, exchange rate remains fixed and therefore the relative prices between the nations remains undisturbed. ***Three***, relative prices between any two nations remain constant.[1]

The basic premise on which the *BOP* function is derived is that an economy attains the state of general equilibrium only when its product and money markets are simultaneously in equilibrium with its *BOP* in equilibrium. The *BOP* is in equilibrium when a surplus on the current account is matched with a deficit in the capital account and a deficit on current account is matched with a surplus on the capital account. It means that the current account surplus (or deficit) and capital account deficit (or surplus) sum up to zero. The *BOP* equilibrium may thus be expressed as

$$BOP = X - M - K = 0, \ (if\ X > M) \tag{18.14}$$

or

$$BOP = X - M + K = 0, \ (\text{if } X < M)$$

where X = exports; M = imports; and K = net capital transfers including government transfers.

The variables X and M in Eq. (28.14) are defined in the functional form as given below.

$$X = \overline{X} \tag{18.15}$$

$$M = \overline{M} + m\,Y \tag{18.16}$$

Capital outflows and inflows. As regards the capital transfer (K), it is assumed to be a function of the interest rate (adjusted for risk, if any). However, the nature of relationship between capital transfers and interest rate depends on the direction of capital transfer. When domestic interest rate is lower than the foreign interest rate, it leads to outflow of capital, and when the domestic interest rate is higher than the foreign interest rate, it causes capital inflow. By the same logic, *net capital inflow* is regarded as a positive function of interest rate. That is, given the interest rate in foreign countries, the higher the domestic interest rate, the higher the inflow of capital. And, *the net capital outflow is an inverse function of the domestic interest rate.* With this kind of capital transfers and the interest rate, the ***net capital outflow*** (K_0) may be written in a functional form as

$$K_0 = K(i) \tag{18.17}$$

where, $K < 0$ and $\Delta K_0/\Delta i > 0$.

We can now specify the *BOP* function in terms of *X, M* and *K* functions as given below.

$$BOP = \overline{X} - (\overline{M} + mY) - K(i) \tag{18.18}$$

It may be noticed that, given the exports and exchange rate, the *BOP* becomes a function of Y and i (percent).

Numerical Example To derive the *BOP* function algebraically, let us assume:

$$\overline{X} = 100$$
$$M = 20 + 0.1Y$$
$$K_0 = 80 - 500i$$

By substitution, the *BOP* function in Eq. (18.18) can be written as

$$BOP = 100 - (20 + 0.1Y) - (80 - 500i) = 0$$

1. The second and the third assumptions will be dropped and the effects of change in exchange rate and relative prices will be examined later.

$$= 100 - 20 - 0.1Y - 80 + 500i = 0$$
$$= -0.1Y + 500i = 0$$
$$= 500i - 0.1Y = 0 \qquad \textbf{(18.19)}$$

Equation (18.19) reveals that, under the assumptions of fixed exchange rate and constant relative prices, the *BOP* is a function of *Y* and *i*. Given the *BOP* function in Eq. (18.19), we can find the level of *Y* and *i* that maintain *BOP* in equilibrium or where *BOP* = 0, provided *Y* or *i* is known. For instance, given the *BOP* function in Eq. (18.19), if *Y* = 100, *i must* be 2% for the *BOP* to be in equilibrium. And, if *Y* = 500, then *i* must be 10 percent for the *BOP* to be in equilibrium. This relationship between *Y, i* and *BOP* is graphically presented in Fig. 18.4. Quadrant (a) presents

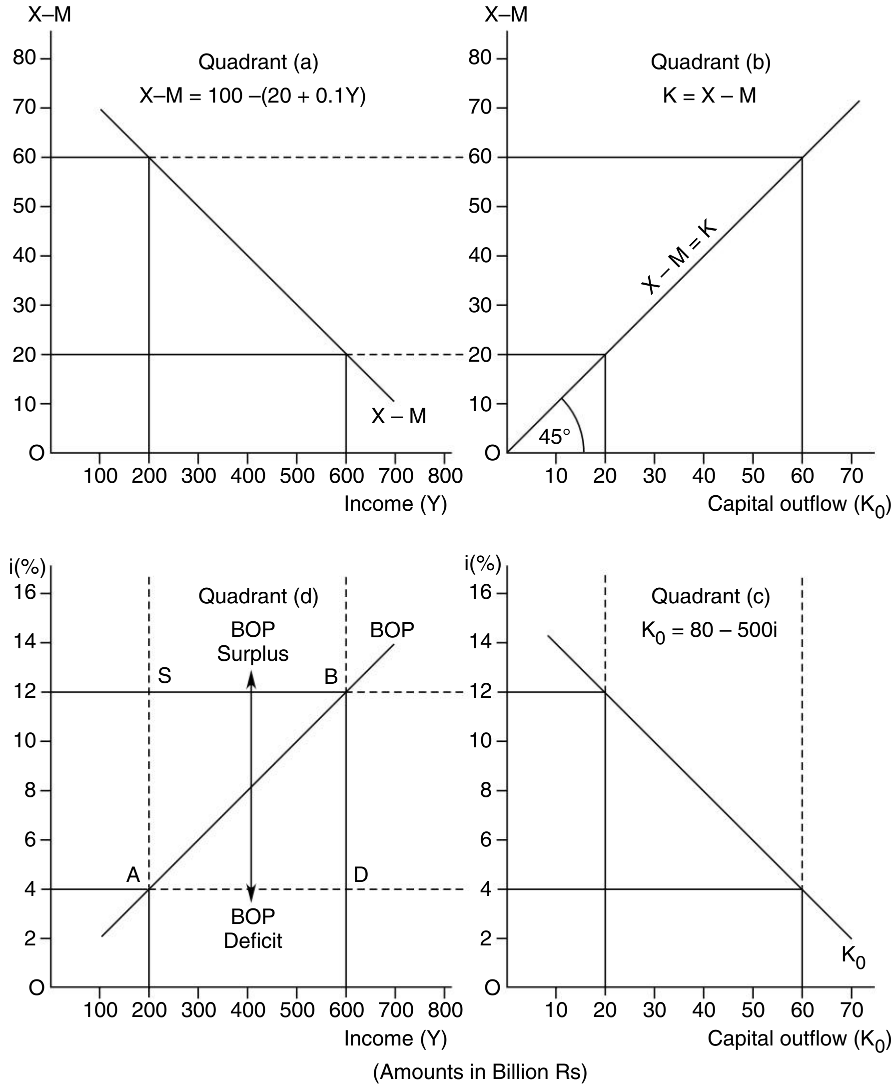


Fig. 18.4 Derivation of the *BOP* Function

the $X - M$ schedule under the assumption that $\bar{X} = 100$ and $M = 20 + 0.1$ Y. It shows an inverse relationship between $X - M$ (where $X > M$) and income. It means that the current account *surplus* ($X - M$) decreases with increase in Y because it results in increase in imports.

The current account surplus has to be matched by an equal amount of capital outflow for the *BOP* to be in equilibrium. This relationship between the current account surplus and the capital outflow has been shown by a 45^0 line in quadrant (b). Each point on the 45^0 line shows equality between the current account balance ($X - M$) and the capital outflow. Now the capital outflow shown in quadrant (b) has to be linked to the interest rate. The relationship between capital outflow and the interest rate is shown by the capital outflow function, (i.e., $K_0 = 80 - 500i$) in quadrant (c). By linking K-function to income (Y), we get the *BOP* function as given in quadrant (d).

The derivation of the *BOP* function can be explained as follows. Suppose income level is given at Rs 200 billion. As shown in quadrant (a), at income level of Rs. 200 billion, $X - M$ = Rs 60 billion, worked out as follows.

$$X - M = 100 - (20 + 0.1 \times 200) = 60 \text{ (billion)} \qquad \textbf{(18.20)}$$

It means, for *BOP* to be in equilibrium, a capital outflow of Rs 60 billion is required. Given the K-function as $K_0 = 80 - 500i$, a capital outflow of Rs 60 billion requires that the rate interest must be at 4%, as shown in quadrant (c). When we link the interest rate 4% to the income level of Rs 200 billion, we get point A in quadrant (d). Similarly, at income level of Rs 600 billion, current account surplus is worth Rs 20 billion. And, for the *BOP* to be in equilibrium a capital outflow of Rs 20 billion, i.e., a lower outflow of capital,[2] is required. As shown in quadrant (c), a capital outflow of Rs 20 billion requires that the rate of interest must be of 12%. When we link the interest rate 12% to the income level of Rs 600 billion, we get point B. By joining points A and B, we get the *BOP* function. As shown in quadrant (d), *the BOP function has a positive slope. It slopes upward to the right with increasing Y and i.*

Two things are **important** to be noted here. ***One,*** at each point on the *BOP* schedule, $X - M = K$ or $(X - M) - K = 0$ and that the *BOP* is in equilibrium. By the same logic, any point that does not fall on the *BOP* schedule shows disequilibrium in the *BOP*. *BOP* disequilibrium means

$$(X - M) > K \text{ or } (X - M) < K$$

and,
$$(X - M) - K > 0 \text{ or } (X - M) - K < 0.$$

Two, any point that falls above and to the left of the *BOP* schedule implies a ***surplus*** in the *BOP*, and any point below and to the right of the *BOP* schedule implies a ***deficit*** in the *BOP*. For example, point S implies a *BOP* surplus, and point D implies a *BOP* deficit. The implication of points S and D can be explained as follows. Let us consider point S. This point is associated with an income of Rs. 200 billion, interest rate of 12% and a current account surplus of Rs 60 billion. At this combination of Y, i and the current account surplus, *BOP* equilibrium requires that capital outflow equals Rs 60 billion. But at 12% interest rate, a capital outflow of only Rs 20 billion is possible. There is, therefore, a *BOP* surplus of Rs 40 billion. By the same reasoning, point D implies a *BOP*

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2. Note that there is an inverse relationship between the interest rate and outflow of capital. A high rate of interest in the domestic economy reduces the outflow of capital and a low interest rate causes a high outflow of capital. That is why a capital outflow of Rs 60 billion is linked a lower interest rate of 4% and a lower capital outflow of Rs 20 billion is linked to a higher rate of interest (4%).

deficit of Rs 40 billion. Point D is associated with an income of Rs 600 billion, interest rate of 4% and current account surplus of Rs 20 billion. Here, for the *BOP* to be in equilibrium, a capital outflow of Rs 20 billion is required. However, at 4% interest, capital outflow equals Rs 60 billion. There is thus a *BOP* deficit of Rs 40 billion.

Shift in BOP Function Having explained the derivation of the *BOP* function and *BOP* curve, let us now discuss the shift in the *BOP* curve and its effect on the equilibrium levels of income (Y) and interest rate (i). A shift in the *BOP* function is caused by the change in exchange rate and/ or relative prices of exports and imports or change in both. Under free exchange system, exchange rate and relative prices are interdependent. A change in exchange rate causes a change in relative prices, and a change in relative prices causes a change in exchange rate. The change in exchange rate and relative prices may be autonomous. However, be it a change in exchange rate or a change in relative prices, both of these changes cause a shift in the *BOP* function in a similar way. A change in exchange rate affects the *BOP* function through a change in relative prices. Therefore, to explain the shift in the *BOP* function, let us consider an autonomous change in the exchange rate and look into its effect on the *BOP* function. This will explain also the effect of autonomous change in relative prices.

18.6.2 Change in Exchange Rate and Relative Prices and Shift in the *BOP* curve

A change in exchange rate changes the relative prices of exports and imports. A rise in the exchange rate, all other things given, increases exports and decreases imports. For example, suppose dollar-rupee exchange rate is given as \$1 = Rs 50 and for some reason, dollar-rupee exchange rate changes to \$1 = 40. This means that rupee has *appreciated* against dollar by 20%. It implies that Indian goods have become costlier by 20% for the US buyers. If US imports of the Indian goods has a price elasticity greater than zero, India's exports to the US will decrease. By the same reasoning, India's imports from the US will increase. That is, with appreciation of rupee, India's exports will decrease and imports will increase. It means that India's current account surplus ($X - M$) will decrease, all other things remaining the same. As a result, the $X - M$ curve will shift leftward. This shift is illustrated in quadrant (a) of Fig. 18.5. Note that the $X - M$ curve shifts from $(X - M)_2$ to $(X - M)_1$. With this shift in the $X - M$ curve, the current account deficit increases by $C_2\ C_3$ at income level of Y_1.

Now, any of the of two conditions must be fulfilled for the *BOP* to be in equilibrium. Either capital outflow decreases from C_3 to C_2 or income increases from Y_2 to Y_1 so that imports decrease to wipe out the additional $C_2\ C_3$ deficit. For decrease in capital outflow, interest rate must rise above i_1. But, since money market conditions are assumed to be given, there is no reason for the interest rate to rise. Therefore, income has to decrease for the imports to decrease to the extent of current account deficit ($C_2\ C_3$). This is more plausible in the event of decrease in exports. Quadrant (a) of Fig. 18.5 shows that income decreases to Y_1 with capital outflow requirement remaining at C_2 and the corresponding interest rate i_1. Consequently, the *BOP* equilibrium point shifts from point K to point J as shown in quadrant (d). The same argument can be used for any other level of income and interest rate to show the shift in the *BOP* function from BOP_2 to BOP_1. By the same reasoning, the *BOP* function shifts leftward when the rate of exchange increases.

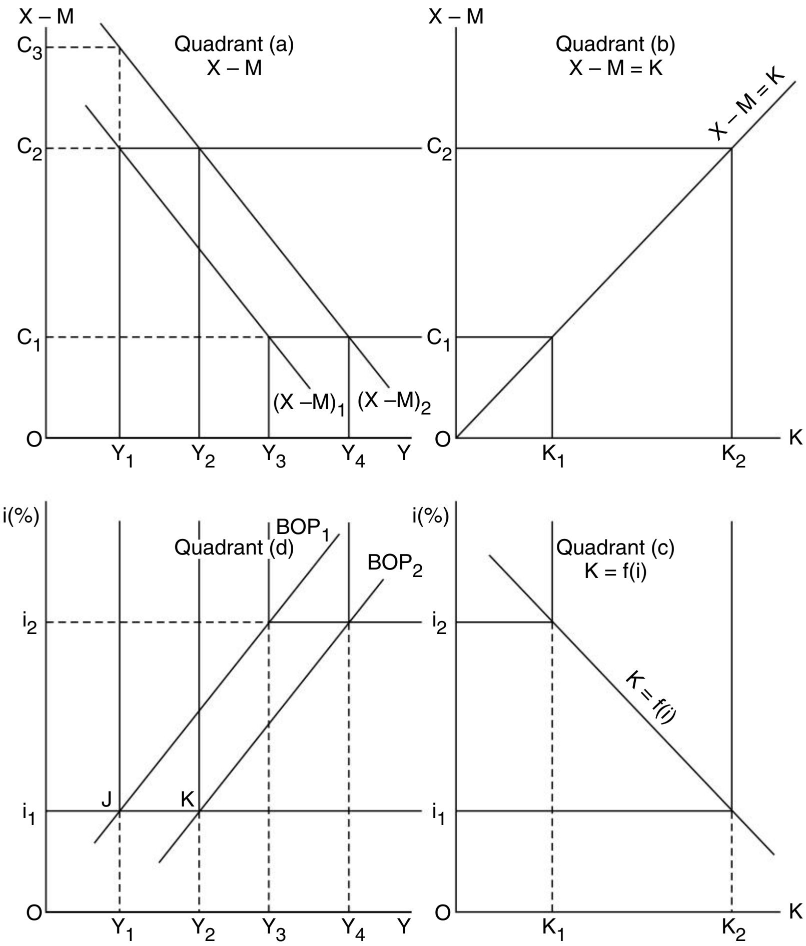


Fig. 18.5 Shift in *BOP* Function

18.6.3 The *IS-LM* Model with the *BOP* Function

Now that we have explained the derivation of the *BOP* function and the nature of its shift, we turn to explain the general equilibrium situation in a four-sector *IS-LM* model. For the sake of convenience in analysis, the four sectors in the four-sector model can be regrouped into two broad sectors: (i) ***domestic sector*** including households, firms and the government, and (ii) the ***foreign sector***. As a matter of rule, as noted at the outset of the model, an open economy attains the general equilibrium when its domestic and foreign sectors are simultaneously in equilibrium at the same level of income and interest. This equilibrium situation is shown at point *E* in Fig. 18.6.

Note that *IS* and *LM* curves and the *BOP* schedule intersect with one another at point *E*. Point *E* is, therefore, the point of general equilibrium of an open economy. The intersection of *IS* and *LM* curves at point *E* marks the equilibrium of the domestic sector at income level of Y_e and interest rate i_e. At point *E*, therefore, both product and money markets of the domestic economy are simultaneously in equilibrium. As shown in Fig. 18.6, the *BOP* function is also passing through the point E. It means that the foreign sector, represented by the *BOP* schedule is also simultaneously in equilibrium with the domestic sector. The open economy is therefore in general equilibrium at point E at income Y_e and interest rate i_e.

No other point than E in Fig. 18.6 satisfies the equilibrium condition. Consider, for instance, point F which conforms neither to the domestic markets nor to the foreign sector. However, for the sake of example, let us suppose that point E marks the equilibrium level of the domestic income and the interest rate. Suppose also that the *BOP* function passes through point F which is placed above the point E. Since point E falls below point F, it means *BOP deficit,* that is, disequilibrium in the *BOP*. Similarly, if the *BOP* function passes through point G, it means the *BOP surplus*. This also shows the disequilibrium in the *BOP*. Thus, any point away from point E indicates disequilibrium in the *BOP* and therefore, disequilibrium in the open economy. Point E is therefore the only point of general equilibrium of an open economy.

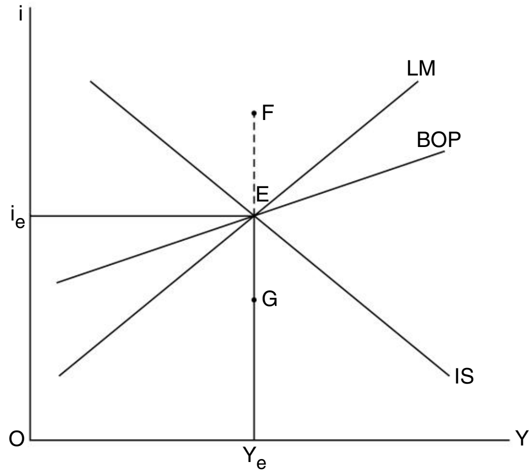


Fig. 18.6 The *BOP* Function in the *IS-LM* Model

The *BOP* disequilibrium may be automatically corrected in a free market economy through the market forces of demand and supply. If not, then government intervention is required to correct the *BOP* disequilibrium. Automatic adjustment in the *BOP* disequilibrium and *BOP* adjustment through policy measures will be discussed in Chapter 25.

SUGGESTED READINGS

(For Readings, see at the end of Chapter 17).

QUESTIONS FOR REVIEW

1. What is an open economy? Define the external sector of an economy. What changes are required to convert a three-sector model into a four-sector model?
2. What are the determinants of exports and imports of a country? Why are exports considered as injections into and imports as leakages from the economy?
3. Explain graphically how exports and imports affect the *IS* curve. Is it the export or the import which affects the *IS* curve?
4. Suppose following conditions are given.

$$I + G = S + T$$

(closed economy equilibrium)

$$X = \overline{X}$$
$$M = \overline{M} + mY$$

Derive *IS* curves for both the closed and the open economies. Point out difference between the two curves. (Hint : See Section 18.1).

5.* Suppose an economy with following specifications:

Consumption
$$C = 50 + 0.8Y_d$$
(Y_d is the disposable income)

Investment $I = 70$

Government expenditure
$$G = 200$$

Transfer payments
$$TR = 100$$

Income tax
$$T = 0.20Y$$

Find out the following.

(a) Equilibrium level of income and the value of the multiplier.

(b) If the economy is opened up with
Exports $X = 25$
Imports $M = 5 + 0.2Y$
Calculate the new equilibrium level of income and balance of trade.

(c) If X is increased to 40, what would be the new values of equilibrium level of income and the balance of trade?

D.U., B. A. Eco.(H), 1991

6.* For an economy with following specifications:

Consumption
$$C = 80 + 0.8Y_d$$
(Y_d = Disposable income)

Investment $I = 52$

Tax $T = -10 + 0.25Y$

Government expenditure
$$G = 50$$

Exports $X = 20$

Imports $M = 0.2Y$

(a) Calculate equilibrium level of income.

(b) Find the combined effects of withdrawal of subsidy by 10 and an annual increase in exports by 20.

(c) As a result of combined policies, how will balance of trade position change?

D.U., B. A. Eco.(H), 1992

7.* An economy shows the following features:

Consumption, Rs
$$C = 86 + 0.8Y(d)$$
(where, $Y(d)$ = Disposable income, Rs)

Transfers, Rs $F = -20$

Investment, Rs $I = 240 - 20R$

Government Expenditure, Rs
$$G = 60$$

Exports, Rs $X = 40$

Imports $M = 30 + 0.05Y$

(where, Y = National income, Rs)

Transaction and precautionary demand for money, Rs.
$$M(1) = 0.5Y$$

Speculative demand for money, Rs
$$M(2) = 300 - 40R$$

Supply of money, Rs $M(s) = 440$

National income, Rs at full employment,
$$Y(f) = 1100$$

(a) What are the equilibrium values of income and rate of interest?

(b) What shall be the additional exports in order to achieve full employment?

(c) How will the additional exports be affected if the tax function, $T = 10 + 0.1Y$ is introduced?

D.U., B. A. Eco.(H), 1994

8.* Suppose:

Consumption,
$$C = 50 + 0.6Y_d,$$
(Y_d = disposable income)

Investment, $I = 35$

Government expenditure,
$$G = 25$$

Taxes $T = 20$

Exports $X = 30$

Imports $M = 8 + 0.1Y$

(Figures in Rs Crores)

(a) Calculate equilibrium level of income.
(b) Find the combined effects of withdrawal of subsidy by 10 and an annual increase in exports by 20.
(c) As a result of combined policies, how will balance of trade position change?
D.U., B.A. Eco.(H), 1995

9.* (a) Suppose:
Consumption,
$$C = 50 + 0.9(Y - T_n)$$
Government's net tax revenue
$$T_n = 100$$
(i.e., Tax revenue less transfers)
Investments
$$I = 150 - 5i$$
Government's Expenditure
$$G = 100$$
Money demand
$$L = 0.2Y - 10i$$
Real money supply
$$M/P = 100$$
Exports $E = 20$
Imports $IM = 10 + 0.1Y$
(where, Y = income; i = rate of interest, and figures in Rs crore)
(i) Find the *IS* and *LM* equations.
(ii) Find equilibrium rate of interest and income.
(iii) Find the balance of trade.

(b) Using *IS-LM* framework trace the effect of increased government spending on output and rate of interest.

10.* (a) The major macro aggregates for an economy are given as follows.
Consumption
$$C = 60 + 0.8Y_d$$
(Y_d is disposable income)

Investment	$I = 100 - 5i$
% Interest rate	$i = 6$
Government expenditure	$G = 50$
Lump-sum Tax	$T = 15$
Transfer payments	$TR = 60$
Exports	$X = 70$
Imports	$M = 12 + 0.2Y$

Calculate the following:
(i) Equilibrium level of income.
(ii) Foreign trade multiplier.
(iii) New equilibrium level of income if government expenditure increases by 20.

(b) Show the effect of wholly tax-financed increases in the transfers on the equilibrium level of income.

11. What is meant by the balance of payments? Distinguish between (a) current account and capital account, and (b) autonomous and induced or adjustment transactions.

12.* Define the balance-of-payment function. Suppose
$$X = 200$$
$$M = 40 + 0.1Y$$
$$K = 120 - 5\,i$$
(where, i is an absolute number)
Find the balance-of-payment function. Also illustrate graphically the derivation of the balance-of-payment function.

13. Explain and justify the following statements.
(a) A balance-of-payment function has a positive slope.
(b) Each point on the balance-of-payment function shows equilibrium.
(c) A point above the balance-of-payment function shows a surplus and a point below it shows a deficit in the balance of payments.

14. What are the factors that cause a shift in the balance-of-payment function? Assuming export and import functions, illustrate the shift in the balance-of-payment function.

15.* The following equation describe an economy:

Consumption $C = 100 + 0.8Y_d$
Investment $I = 150 - 6i$
Government Expenditure
$$G = 100$$
Income tax $T = 0.25\,Y$
Real demand for money
$$M^d = 0.2Y - 2i$$
Nominal money supply
$$M_s = 300$$
Price level $P = 2$

[where Y_d stands for disposable income, and i is % interest rate, and other figures are in Rs crores].

(i) Compute the equilibrium level of income, Y and interest rate, i.

(ii) Suppose the economy opens up with the following exports (X) and import (M) equations.

$$X = 100$$

$$M = 20 + 0.1Y$$

Find the new level of equilibrium income and interest rate if all other equations remain unchanged.

(iii) Find the direction and magnitude of the shift in the LM curve if the nominal money supply is doubled.

(iv) How is your answer in part (i) affected if price is also doubled along with nominal money supply?

[D.U. B.A.(H.), 2001]

16. Suppose in an economy:

Consumption function

$$C = 150 + 0.75Y_d$$

Investment spending

$$I = 100$$

Government spending

$$G = 115$$

Tax $\quad T_x = 20 + 0.2Y$

Transfer Payments

$$T_r = 40$$

Exports $\quad X = 35$

Imports $\quad M = 15 + 0.1Y$

where Y and Y_d are income and personal disposable income, respectively. All figures are in rupees.

Find :

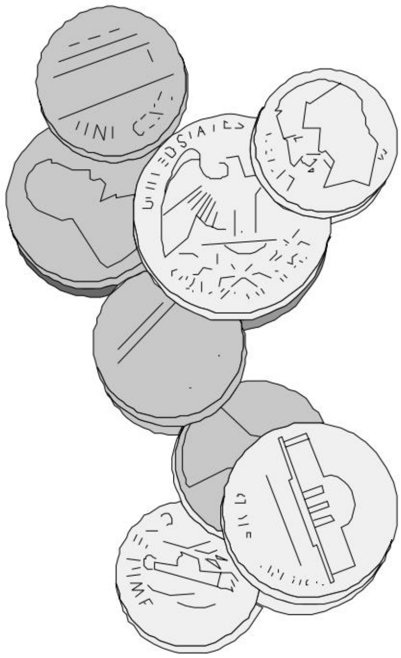
(a) The equilibrium level of income,
(b) Consumption at equilibrium income.
(c) Net exports ($X - M$) at equilibrium income,
(d) By how much the equilibrium income changes if investment increases by Rs 50,
(e) The increase in the government spending required to ensure that the economy reaches full employment level of income at Rs 1200.

D.U., B.Com(H), 2003

Note: For solution to the starred (*) problems, see *Appendix*.

Chapter 19

Determination of Output, Prices and Employment: A Keynesian-Classical Synthesis



INTRODUCTION

We have so far discussed the classical and the Keynesian theories of price and output determination. Both classical and Keynesian theories have their own shortcomings. Consider first the shortcomings of the Keynesian theory which we have just discussed. The Keynesian theory of income and output determination discussed in the previous three chapters is 'incomplete' in many respects. The ***first*** and ***foremost shortcoming*** of the Keynesian model of income determination is that it considers only the *demand-side factors*. It ignores altogether the *supply-side factors* even though the supply factors play an equally important role in the determination of output, price and employment. In respect of the supply-side factors, the Keynesian model does not go beyond assuming a given aggregate supply curve with perfect elasticity. ***Second***, some of the basic assumptions of the Keynesian model are unrealistic and empirically untenable. For instance, it assumes aggregate supply to be perfectly elastic as shown in Fig. 19.1. This assumption holds only under the conditions of (i) excess production capacity, (ii) production function with constant returns, (iii) constant wages, and (iv) neutrality of government's fiscal and monetary actions. In reality, however, these conditions hold rarely. Besides, the Keynesian model assumes the general price level to remain constant, as shown in Fig. 19.2. The general price level has been ever since fluctuating with a rising trend all over the world except during the Depression of 1930s.

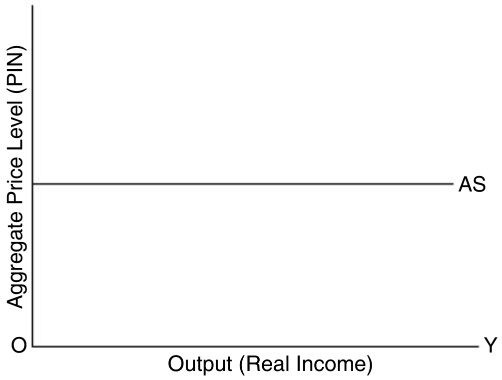


Fig. 19.1 Constant Aggregate Supply at Constant Price Level in the Keynesian Model

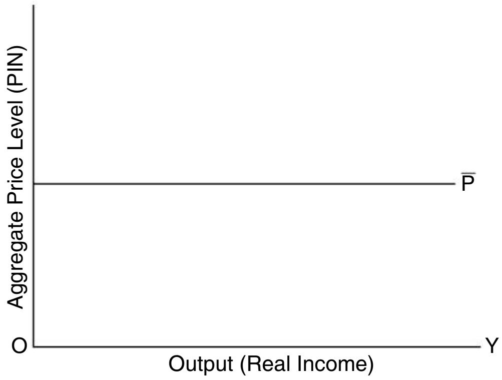


Fig. 19.2 The Constant General Price Level

Although there have been phases of price decline, prices have, in general, shown a rising trend. For example, India and US faced a serious inflation problem in 2008 with inflation rate of 13 percent in India, and about 5 percent in the US in 2008. But in the first quarter of 2009, inflation rate declined sharply in both the countries. So has been the case in other countries also. Thus, the assumption that prices remain constant is not a realistic one. In fact, the Keynesian theory leaves out altogether the question of general price determination.

Let us now look at the **shortcomings of the classical theory**. In sharp contrast to the Keynesian theory, the classical theory of output and employment emphasises the role of the supply-side factors, *viz.*, production function, labour market, wages and employment. It ignores the demand side factors and relies on the Say's law – "Supply creates its own demand". But, as has already been pointed out in Chapter 5, the classical theory has its own shortcomings and is as much one-sided as the Keynesian theory. It does not offer a satisfactory explanation to the determination of income and employment. However, the classical theory of output and employment brings the supply-side factors to focus.

In nutshell, while classical economics lays emphasis on the *supply side* of the market, Keynes economics is concentrated on the *demand side* of the economy. In reality, however, both supply and demand factors of the market play an equally important role in determining the equilibrium level of output, employment and the price level. The modern economists have attempted to make a synthesis of the Keynesian and classical theories and have proposed a more complete theory of output, price and employment determination. In brief, the modern theory is essentially a synthesis of the Keynesian theory of aggregate demand and the classical theory of aggregate supply.

In this chapter, we present the synthesis of the Keynesian and classical theories of output and employment determination as formulated by the modern economists. We will first take an overview of how the general level of price is determined by the aggregate demand (*AD*) and aggregate supply (*AS*) curves. We will then explain the derivation of *AD* and *AS* curves from the *IS* and *LM* curves and show the determination of income and the aggregate price level. Finally, we will explain the effects of shifts in *AD* and *AS* curves on the equilibrium level of income and prices.

19.1 DETERMINATION OF AGGREGATE PRICE AND OUTPUT: A PREVIEW

Prior to embarking on a detailed discussion on the classical-Keynesian synthesis, let us have a glance at the final outcome of the synthetical approach adopted by the modern economists. In their approach to synthesise the classical and Keynesian theories of price and output determination, the modern economists have adopted the classical fundamentals of demand and supply theories, and have extended them to the derivation of aggregate demand and aggregate supply curves to develop the theory of price and output determination at the aggregate level[1]. The aggregate demand and aggregate supply curves are drawn from the Hicksian *IS* and *LM* curves. The aggregate demand and supply curves, as derived by the modern economists, and the determination of the aggregate output and price[2] are illustrated in Fig. 19.3.

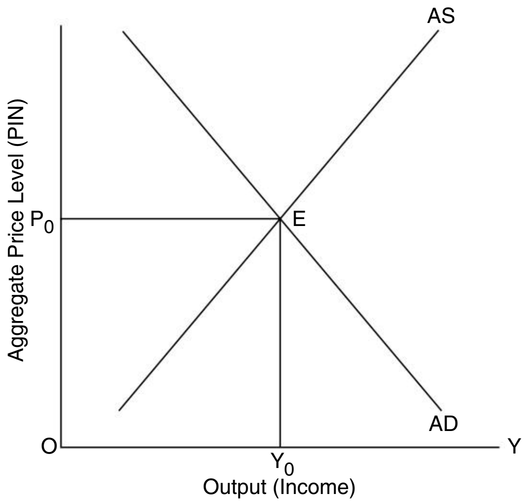


Fig. 19.3 Determination of the Price Level and Output

In Fig. 19.3, the aggregate demand and aggregate supply curves, are shown by the *AD* and *AS* curves respectively. They are analogous to the market demand and market supply curves. As is usually the case, the *AD* curve has an inverse relation with the aggregate price level and the aggregate supply (*AS*) is positively related to the general price level. As shown in Fig. 19.3, the *AD* and *AS* curves intersect at point *E* determining the equilibrium level of aggregate output at Y_0 and the price level at P_0. At point *E*, *AD* equals *AS*, implying that product markets are cleared because at price P_0 buyers are willing to buy what suppliers are willing to supply. The entire economy is in equilibrium. This analysis gives an idea of how output and prices are determined at the macro level.

The Shift in *AS* and *AD* Curves and the Price Level

The aggregate output and price level do not remain constant for a long time—they keep rising and falling. The change in the aggregate price level and the output is caused by the shift in the *AS* and *AD* curves. The shift in the AS curve is caused by the change in resources and technology, and market factors like "supply shocks" of 1973 and 2008 caused by oil price crisis. And, the shift in *AD* is caused by change in its determinants, viz., *C*, *I* and *G*. Let us now look at the effect of a shift in the *AD* and *AS* curves on the prices and output.

To begin with, let us suppose that the government increases its expenditure for developing infrastructure. As a result, income of the people increases, causing a rise in the *AD*. Consequently, the *AD* curve shifts rightward from AD_1 to AD_2 as shown in Fig. 19.4. Note that the curve AD_2

1. See also Samuelson, P. A. and W.D. Nordhaus, *Economics,* (McGraw-Hill, Inc., New York) 15th Edn, Ch. 21, pp. 391-98.

2. Here, the price level is expressed by Price Index Number (PIN).

intersects the AS_1 curve at point E_2. Thus, the equilibrium point shifts from point E_1 to E_2 that shows a rise in the price level from P_1 to P_2 and output level from Y_1 to Y_2.

Similarly, if there is an equal and upward shift in the supply curve, say, due to increase in labour productivity, from AS_1 to AS_2, the equilibrium shifts from point E_2 to E_3. Note that an equal and upward shift in the AS curve, keeps the price level constant at OP_1, but the level of output rises from Y_2 to Y_3. However, if AD and AS curves shift in different directions and by different measures, the price and output are affected differently.

With this simple analysis of price and output determination at the macro level, we turn to the main theme of this chapter—the determination of price and output in the *IS-LM* framework. For this, we need to derive the aggregate demand and supply curves within the framework of the *IS-LM* model. The aggregate demand curve is derived in the following section and derivation of the aggregate supply curve follows in the next section.

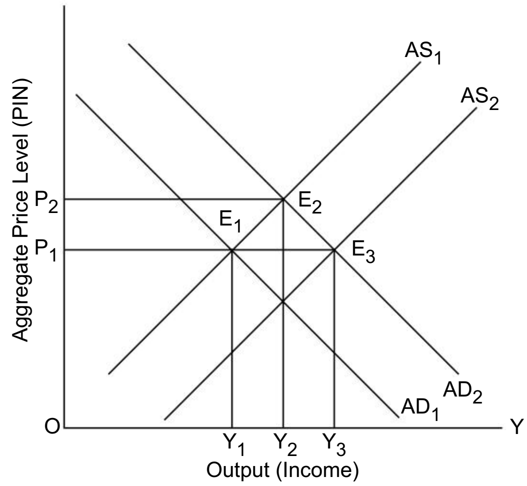


Fig. 19.4 The Effect of Shift in *AD* and *AS* Curves on Price and Output

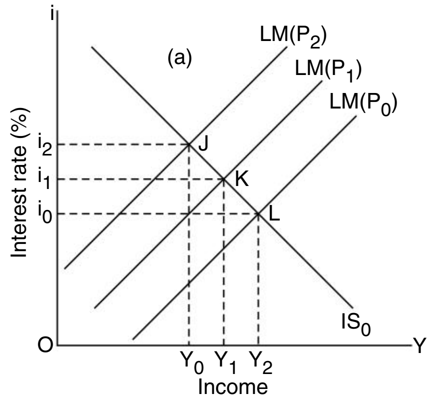
19.2 DERIVATION OF AGGREGATE DEMAND CURVE

The aggregate demand curve used in the previous section is drawn following the basic law of demand. In this section, we will formally derive the aggregate demand curve from the *IS-LM* model. The *AD* curve is derived on the basic law of demand, i.e., when price increases, demand decreases and, *vice versa*, all other things remaining the same. The derivation of the *AD* curve is illustrated in Fig. 19.5. Suppose that the initial *IS* and *LM* curves are given as IS_0 and LM (P_2) curves, respectively, as shown in panel (a) of the figure. The IS_0 and LM (P_2) curves intersect at point *J*. Since at point *J*, *IS* = *LM*, point *J* is the point of general equilibrium. It means that the product and money markets are simultaneously in equilibrium at output Y_0 and interest i_2.

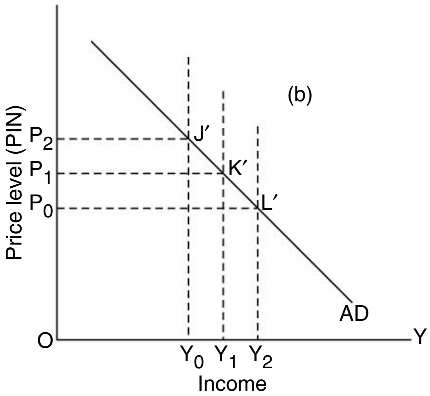
At the equilibrium point *J*, there prevails a price level which conforms to the equilibrium level of output. Let us suppose the price level at point *J* is given by P_2 in panel (b) of Fig. 19.5. Now, let us introduce a change in price level —a decrease in the price level from P_2 to P_1— and examine its effect on the *IS* and *LM* curves.

Let us consider first the **effect of price change on the *IS* curve**. The *IS* curve remains unaffected by the change in price because all its components—*I*, *G*, *S* and *T*—are by assumption constant.

What happens to the *LM* curve? We know that a change in price level changes the stock of real money (*M/P*) in the reverse direction. Therefore, when prices decrease, the stock of real money increases. As a result, the *LM* curve shifts to the right. The rightward shift in the *LM* curve is shown in panel (a) by the shift of the curve $LM(P_2)$ to the position of $LM(P_1)$. Note that the curve $LM(P_1)$ intersects IS_0 curve at point *K*. Thus, the equilibrium point shifts from *J* to *K* and the interest rate falls from i_2 to i_1. The fall in the interest rate encourages new investment and income level rises from Y_0 to Y_1. Thus, the economy reaches a new equilibrium at point *K*.



(a) IS-LM Model with Variable Price



(b) The Keynesian Aggregate Demand Curve

Fig. 19.5 Derivation of the Aggregate Demand Curve from the *IS-LM* Model

When the price falls further from P_1 to P_0, the *LM* curve shifts further rightward to $LM(P_0)$. As a result, the equilibrium point shifts downward from point *K* to point *L*. The shift in the equilibrium point shows a further increase in income from Y_1 to Y_2 and a further decrease in the interest rate from i_1 to i_0.

Note that at all the points of equilibrium—*J, K* and *L*—the aggregate demand equals the aggregate supply represented by the *IS* curve. Panel (a) shows that the level of income increases from Y_0 to Y_1 and from Y_1 to Y_2, caused by the shifts of the *LM* curve from $LM(P_2)$ to $LM(P_1)$ and from $LM(P_1)$ to $LM(P_0)$. Since at equilibrium, $Y = AD$, increase in Y means increase in *AD*. Recall that the shifts in the *LM* curve has been caused by the decrease in prices from P_2 to P_1 and from P_1 to P_0. It may thus be concluded that the aggregate demand increases following the decrease in prices. This inverse relationship between the three levels of price and the corresponding aggregate demand is shown below.

Decreasing Price	*Increasing Aggregate Demand*
P_2	Y_0
P_1	Y_1
P_0	Y_2

The inverse relationship between the general price level and the aggregate demand is graphically presented in panel (b). The vertical axis measures the price level and the horizontal axis measures income. By linking the different levels of $Y = AD$ in panel (a) to the corresponding levels of price in panel (b), we get points *J', K'* and *L'*. By joining these points, we get the aggregate demand curve *AD*. As a general rule, the aggregate demand increases with the decrease in the price level, and *vice versa*.

19.2.1 The Impact of Changes in Government Policies on *AD* Curve

Let us now look into the effects of government policies—monetary and fiscal policies—on the aggregate demand curve, a point of great significance in the analysis to follow. It may be recalled here that a change in the fiscal policy shifts the *IS* curve upward or downward depending on the nature of the fiscal changes. Similarly, a change in monetary policy shifts the *LM* curve rightward or leftward depending on the nature of the policy changes. Here, we discuss first the effect of change in monetary policy on the *AD* curve and then the effect of change in the fiscal policy.

Change in monetary policy. The effect of change in the monetary policy on the aggregate demand is depicted in Fig. 19.6 under the assumptions (i) that prices remain constant, and (ii) that the supply of nominal money changes. Let us begin with the economy to be initially in equilibrium. In Fig. 19.6, the curves *IS* and $LM_1(P_0)$ in panel (a) represent the initial *IS* and *LM* curves, price level given at P_0. The *IS* and $LM_1(P_0)$ curves intersect at point E_1. At point E_1, therefore, the product and money markets are simultaneously in equilibrium. It means that at income level Y_1 and interest rate i_2, the aggregate demand equals aggregate supply, and demand for money equals nominal money supply. The aggregate demand corresponding to the *IS* and $LM_1(P_0)$ curves is given by AD_1 in panel (b), drawn as illustrated in Fig. 19.5.

Now, let the government increase the money supply. The increase in money supply increases the real stock of money, prices remaining constant. In consequence, people's desire to hold money increases. This is reflected by the shift in the curve $LM_1(P_0)$ to $LM_2(P_0)$ as shown in Fig. 19.6(a). The curve $LM_2(P_0)$ intersects the *IS* curve at point E_2. Consequently, the equilibrium point shifts from E_1 to E_2. This shift in equilibrium causes an increase in income from Y_1 to Y_2 and a fall in the interest rate from i_2 to i_1. That is, an increase in money supply causes the interest to fall and incomes to increase. An increase in income causes an increase in the

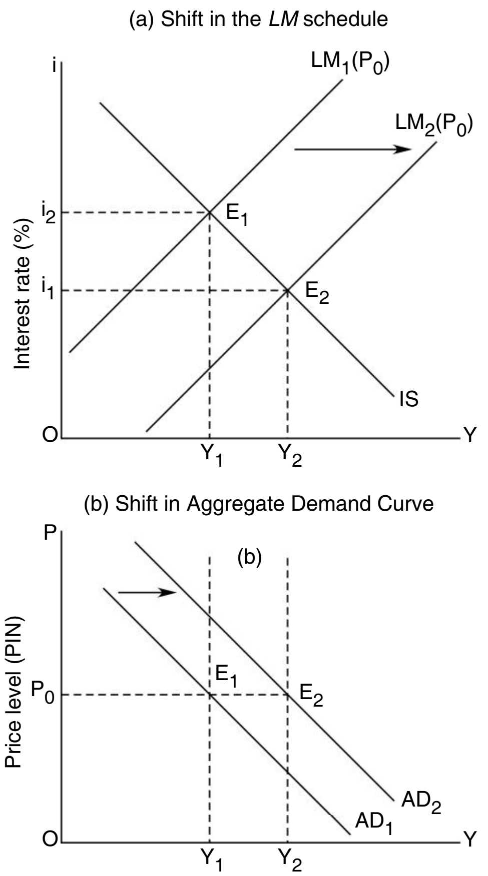


Fig. 19.6 The Effect of Increase in Money Supply on the Aggregate Demand

aggregate demand, prices remaining the same. As a result, the aggregate demand curve shifts from AD_1 to AD_2, as shown in panel (b) of Fig. 19.6. To conclude, increase in money supply causes AD curve to shift upward.

Change in fiscal policy. A change in fiscal policy shifts the *IS* curve and, thereby, the aggregate demand curve. The shift in the *IS* curve due to a change in fiscal policy has already been explained in Chapter 17 (see Section 17.1). The conclusion of that analysis is reproduced in Fig. 19.7. In this figure, the $IS_1(P_0)$ and *LM* curves in panel (a) represent, respectively, the initial *IS* and *LM* curves. The $IS_1(P_0)$ and *LM* curves intersect at point E_1 where both product and money markets are in equilibrium. The aggregate demand curve corresponding to the $IS_1(P_0)$ and *LM* curves is given by AD_1 in panel (b) of Fig. 19.7.

Now, let the government adopt an expansionary fiscal policy and increase its spending so that the *IS* curve shifts upward to the right—from $IS_1(P_0)$ to $IS_2(P_0)$. Prices remaining constant at their initial level (P_0), the equilibrium point shifts from E_1 to E_2. As a result, income level increases from Y_1 to Y_2 and interest rate goes up to i_2. Due to increase in income, aggregate demand increases from

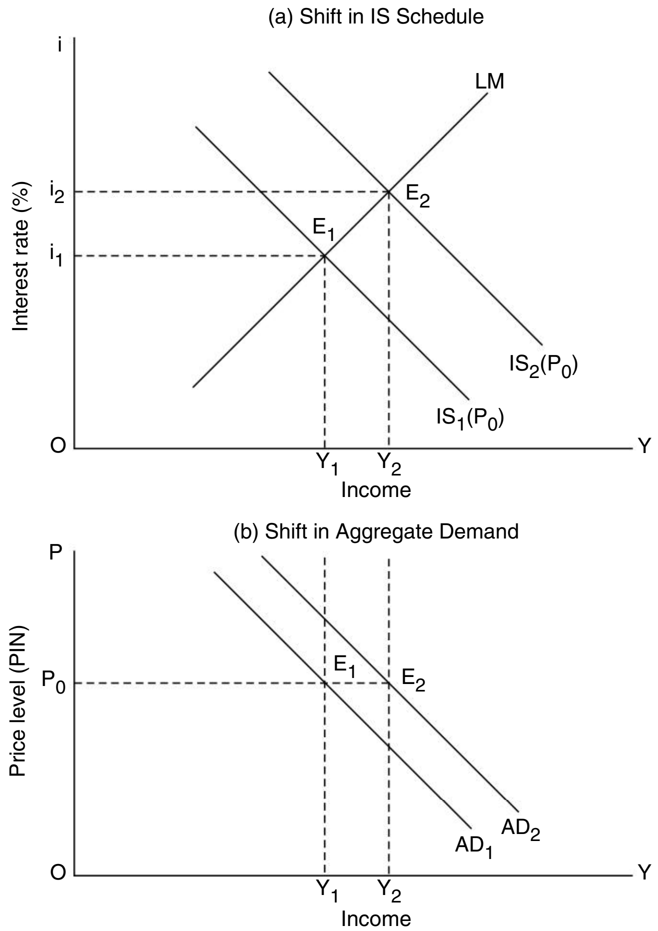


Fig. 19.7 The Effect of Change in Fiscal Policy on the Aggregate Demand Curve

Y_1 to Y_2. Recall that $Y = AD$ in the *IS-LM* model. The increase in the aggregate demand, prices remaining the same, make the *AD* curve shift upward to the right, from AD_1 to AD_2 as shown in panel (b) of Fig. 19.7.

19.3 THE CLASSICAL AND KEYNESIAN APPROACHES TO AGGREGATE SUPPLY CURVE

In the preceding section, we have explained and illustrated the derivation and the shift in the *aggregate demand curve*. In this section, we explain the derivation of the *aggregate supply curve*. Some economists believe that 'the theory of aggregate supply is one of the least settled areas of macroeconomics.'[3] The nature of the classical and Keynesian aggregate supply curves has been at the centre of controversy between the Keynesians and classical economists. The reason is that while Keynes assumed a *horizontal* aggregate supply line as shown in Fig. 19.8, the classical theory of output and wage determination postulates a *vertical* aggregate supply line as shown in Fig. 19.8. The two contrasting views, however, provide the basis of deriving a positively sloping aggregate supply curve. Let us first review the logic behind the classical vertical aggregate supply line.

19.3.1 The Classical Aggregate Supply Curve

The classical theory of output and wage determination has already been discussed in Chapter 4. Here, we summarize the classical theory to show why the classical aggregate supply is a vertical line. According to classical theory of output determination, given the production function, the maximum level of output is determined at the level of full employment. The classical economists postulated that an economy is always at full employment. Since the economy is always at full employment, the maximum level of output is always fixed. This implies that aggregate supply (*AS*) is always constant, whatever the level of price. Thus, the classical *AS* is given by a straight vertical line as shown in Fig. 19.8.

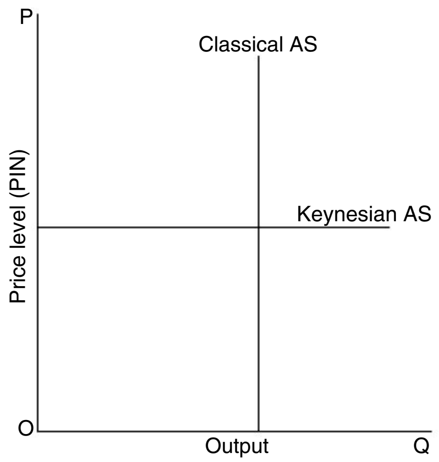


Fig. 19.8 The Keynesian and Classical *AS* Curves

Now the question arises: Why does the output not increase if price level increases? The reason is when prices increase, real wage rate goes down. As a result, given the labour demand and supply curves, the demand for labour increases while labour supply decreases. At a lower real wage rate, therefore, labour demand exceeds labour supply. Therefore, wages tend to rise and continue to rise until labour market equilibrium is attained. Exactly reverse happens when real wage rate rises and labour supply exceeds labour demand. In the classical system, labour market is assumed to be highly sensitive to change in demand and supply conditions. Therefore, whenever labour market goes into disequilibrium, the market readjusts quickly to the equilibrium. In the classical system, therefore, labour market is always in equilibrium and *there*

3. Rudiger Dornbusch and Stanley Fischer, *Macroeconomics,* 6th Edn (McGraw-Hill), p.213.

is always full employment. Since there is always full employment, the output is always fixed at its maximum level. The output does not change, whatever the level of price. Therefore, the classical aggregate supply curve takes the shape of a vertical line. The classical aggregate supply curve (*AS*) is presented along with Keynesian *AS* curve in Fig. 19.8.

In reality, however, neither the Keynesian horizontal nor the classical vertical aggregate supply curve is compatible with the actual aggregate supply curve. In reality, the aggregate supply curve (*AS*), as shown in Fig. 19.3, has a positive slope: $\Delta S/\Delta P > 0$ but less than ∞. Clearly, neither the Keynesian nor the classical *AS* curve conforms to the normal upward sloping *AS* curve.

19.3.2 The Keynesian View on Wage Rigidity and Supply Curve

A major source of difference in the classical and the Keynesian approaches to the aggregate supply curve is the assumption that they made about the variability of wages in response to the changes in demand for and supply of labour. The classical economists assumed an idealised, perfectly competitive labour market and highly *flexible wages*. In the classical system, therefore, due to flexibility of wages, the labour market adjusts instantly to the full employment equilibrium, whenever there is any discrepancy between labour demand and supply. Therefore, the labour market is always in equilibrium and there is always full employment in the economy.

On the other hand, Keynes believed that wages are *rigid*, especially in their downward adjustment. That is, wages do not adjust downward quickly in the short run to ensure full employment. Keynes attributed wage rigidity to the following factors.

One, he believed that labour market is, by and large, imperfect because of labour union influence—not perfectly competitive as assumed by the classical economists. In a 'contractual' labour market, wages are bargain-determined rather than market-determined. Contractual wages do not vary during the period of contract following the change in labour demand and supply.

Two, workers are interested in their absolute as well as relative wages. Absolute wage is what a worker gets in money terms, and relative wage is worker's absolute wage in relation to the absolute wage of workers with similar skill, qualification and jobs. In wage bargaining, both unions and employers recognise the need for relative parity in wage rate structure. Therefore, wages do not fall even when there is a sudden fall in labour demand or a sudden increase in labour supply.

Three, even in the labour market segments where there are no unions (e.g., India's agricultural labour market), there is an understanding between the labour and employers that wages once fixed will not be cut down if there is sudden decline in the demand for labour.

In conclusion, Keynes believed that a downward movement in wages is resisted by the workers and an upward movement is resisted by the employers. Therefore, wages tend to be rigid. Under the condition of wage rigidity, employment increases with increase in labour. Increase in employment cause increase aggregate supply, even if prices remain constant.

Some of Keynes's arguments found empirical support in the works of A. W. Phillips,[4] famous for his Phillips Curve, and Arthur Okun.[5] Some of the findings of their works will be discussed later.

4. A. W. Phillips, "The Relation between Unemployment and the Rate of Change in Money Wages in the United Kingdom—1861-1957," *Economica,* November 1958.

5. Arthur Okun, *Prices and Quantities,* (Brookings Institution, Washington, D. C., 1981).

19.3.3 Reconstruction of the Keynesian Aggregate Supply Curve: A Classical and Keynesian Synthesis

The Keynesian economists reconstructed the Keynesian aggregate supply curve by using the classical apparatus with some modification. This is one of the areas of classical-Keynesian synthesis. Keynes and his followers had no objection to the classical theory of output and employment determination. What they objected to was the classical assumptions that the labour market is perfectly competitive and wages are fully flexible. They assumed instead that the *labour market is contractual and wages are sticky in the short run*. By combining the classical theory of output and employment with Keynesian assumptions, the Keynesian economists reformulated the Keynesian aggregate supply curve. Thus, the Keynesian aggregate supply curve is the result of the synthesis of the classical theory of output and wages and Keynesian assumption of wage-rigidity in the short run.

Fixed Money-Wage and Employment The two main propositions of the classical theory, relevant to our purpose here, are: (i) the demand for labour is governed by the *money value of marginal productivity of labour*, defined as $MP_L \times P$ (where, MP_L is marginal productivity of labour and P is price of commodity it produces)—it is, in fact, the marginal revenue productivity of labour (MRP_L)—and (ii) profit-maximising firms employ labour to the extent where, $W = MP_L \times P$ (where, W is money wage). The demand for labour under the condition of *fixed wage rate* is illustrated in Fig. 19.9. The curves labeled $D_N = MP_L \times P$ and S_N represent the demand for and supply of labour, respectively. Suppose that the money wage rate is fixed at $\overline{W}_1$. At this wage rate, the profit maximising firms will employ only $\overline{W}_1B = ON_0$ of labour, whereas the supply of labour is $\overline{W}_1M$. Clearly, the labour supply exceeds the labour demand by BM. Had wages been flexible, the system might converge to the equilibrium point E. But, under fixed wage system, the excess labour supply (BM) cannot be absorbed. It is, therefore, called *involuntary unemployment,* that is, the people remaining unemployed despite their willingness to work at the prevailing wage rate. Similarly, if wage is fixed at $\overline{W}_0$, the labour demand will exceed the labour supply by JK. Thus, JK is *voluntary unemployment,* that is, the people are unemployed because they are unwilling to work at the prevailing wage rate. It may thus be concluded that, *under fixed-wage system, the labour supply curve has no role to play. It is only the labour demand curve which matters in the determination of employment.* With this brief description of the classical view on fixed wages and employment, we now turn to derive the aggregate supply function.

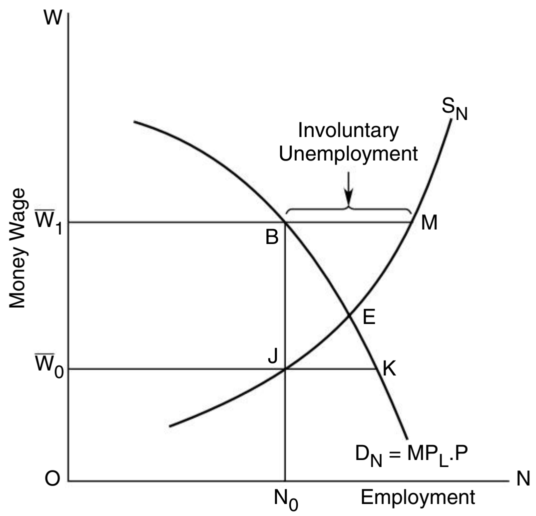


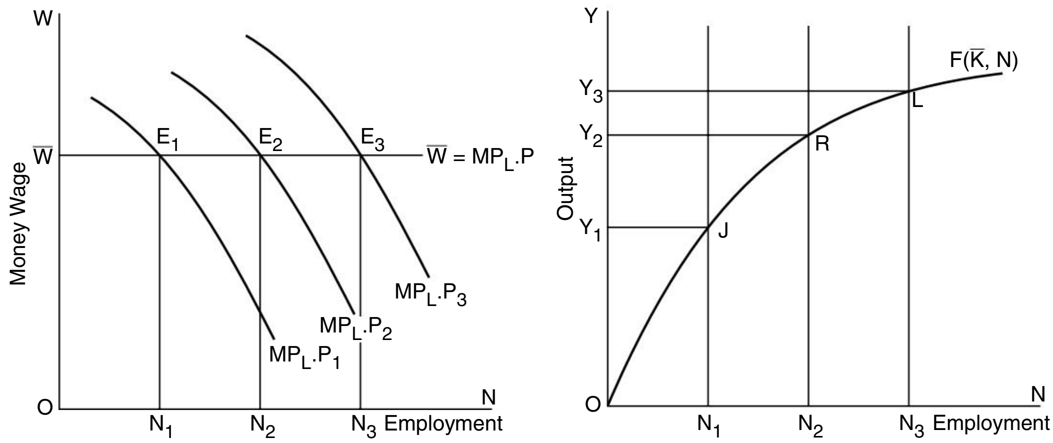
Fig. 19.9 Fixed Money Wage Rate and Employment

Derivation of the Aggregate Supply Function We show here the derivation of the aggregate supply function under the conditions of sticky money wage and variable prices. Different authors have used different methods to derive the Keynesian aggregate supply curve under these conditions. The two common methods are: (i) by linking the price change to the MP_L .(P) curve, labour employment and then to output, (ii) by using the effect of price change on the real wage (W_r) and its effect on employment and output. We will illustrate the derivation of the aggregate supply curve by using these two approaches alternatively. Each of the two methods may be treated as an alternative of each other.

(i) Derivation of AS curve through $MP_L \times P$ and production function. The derivation of the aggregate supply curve by using the $MP_L \times P$ curve and production function is shown in Figs. 19.10 and 19.11. Panel (a) of Fig. 19.10 presents the effect of change in the price level on employment, given the money wage rate, and panel (b) links the conclusion of panel (a) to the production function and shows the effect of change in price on output. The conclusions derived from panels (a) and (b) of Fig. 19.10 are graphed in Fig. 19.11 to derive the aggregate supply curve.

Let us now return to Fig. 19.10 and describe it in some detail. If money wage is fixed at $\overline{W}$, the profit maximising firms will employ labour until $\overline{W} = MP_L \times P$. Let us assume that the price is initially given at P_1. The $MP_L \times P$ curve, at price P_1, is given by the curve $MP_L \times P_1$. It intersects the $\overline{W} = MP_L \times P$ line at point E_1. Therefore, the firm will employ only N_1 number of labour. When price rises from P_1 to P_2, the $MP_L \times P_1$ curve shifts to $MP_L \times P_2$ which intersects the $\overline{W} = MP_L \times P$ line at point E_2. It indicates that the profit maximising employment increases to N_2. Similarly, when price rises further to P_3, employment rises to N_3. These facts show that, wages remaining constant, when prices go up, employment goes up too.

The relationship between employment and output has been shown in panel (b). Suppose that the production function is given as $F(\overline{K}, L)$. When the different levels of employment, N_1, N_2 and N_3 are linked to the production function, the corresponding points J, R and L reveal the different levels of employment and output. The simple conclusion that emerges from panel (b) of Fig. 19.10 is that output (income) increases with the increase in employment of labour. The conclusions derived from panels (a) and (b) of Fig. 19.10 can be summarised as follows. A rise in the price level, money



(a) Change in Price and Labour Demand

(b) Employment and Output

Fig. 19.10 Change in Price, Employment and Output wage given, increases the $MP_L \times P$ and leads to rise in employment which results in rise in output. The information contained in panels (a) and (b) of Fig. 19.10 is arranged as follows.

Price Level (1)	$MP_L \times P$ (2)	*Employment* (3)	*Output* (4)
P_1	$MP_L \times P_1$	N_1	Y_1
P_2	$MP_L \times P_2$	N_2	Y_2
P_3	$MP_L \times P_3$	N_3	Y_3

Note that increasing subscripts, 1, 2, 3, imply increasing quantities. Therefore, quantities in all the columns are increasing. A clear conclusion that emerges from the above table is that there exists a direct relationship between price level and output. By graphing the data in columns (1) and (4) in the table, we get the Keynesian aggregate supply curve (*AS*) as shown in Fig. 19.11.

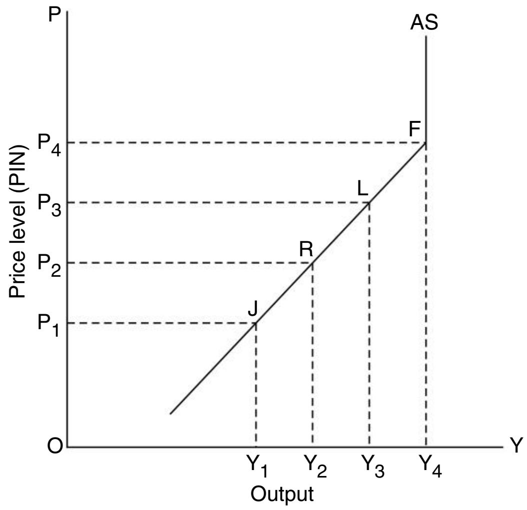


Fig. 19.11 Derivation of Keynesian Aggregate Supply Curve with Rigid Wages

The points *J, R* and *L* along the *AS* curve correspond to the same points in panel (b) of Fig. 19.10, indicating an increase in output with the increase in price. The output increases with an increase in price till point *F*, denoting the point of full employment. Beyond this point, prices increase but output does not. Point *F*, therefore, represents the price and output combination at full employment. At full employment, given the money wage rate, no further employment is possible. Therefore, further increase in output is not possible even if prices continue to increase. Beyond point *F*, the aggregate supply curve becomes vertical, i.e., it take the shape of the classical *AS* curve.

(ii) Derivation of AS curve through change in real wage. The derivation of *AS* curve through the change in real wage is illustrated in Fig. 19.12. Given the money wage rate (*W*), when prices (*P*) change, then real wage (*W/P*) changes. For example, given the money wage (*W*), a rise in prices (*P*) reduces real wage (*W/P*). The real wage rate is denoted by W_r. The relationship between *W, P* and *W/P* takes the form of a rectangular hyperbola.[6] This relationship is shown by a rectangular hyperbola with *P* measured on the vertical and *W/P* (= W_r) on the horizontal axis, in quadrant (a). It can be called *constant money-wage curve*. Quadrant (b) presents the labour market situation with labour demand curve (D_N) and labour supply curve (S_N). Quadrant (c) presents the production function. The *AS* curve is derived in quadrant (d). Let us now describe the process of derivation of the *AS* curve.

[6] A rectangular hyperbola is defined mathematically as:

$$xy = constant$$

In our case, *W* is the constant money wage rate and *x* and *y* are *P* and *W/P,* respectively.

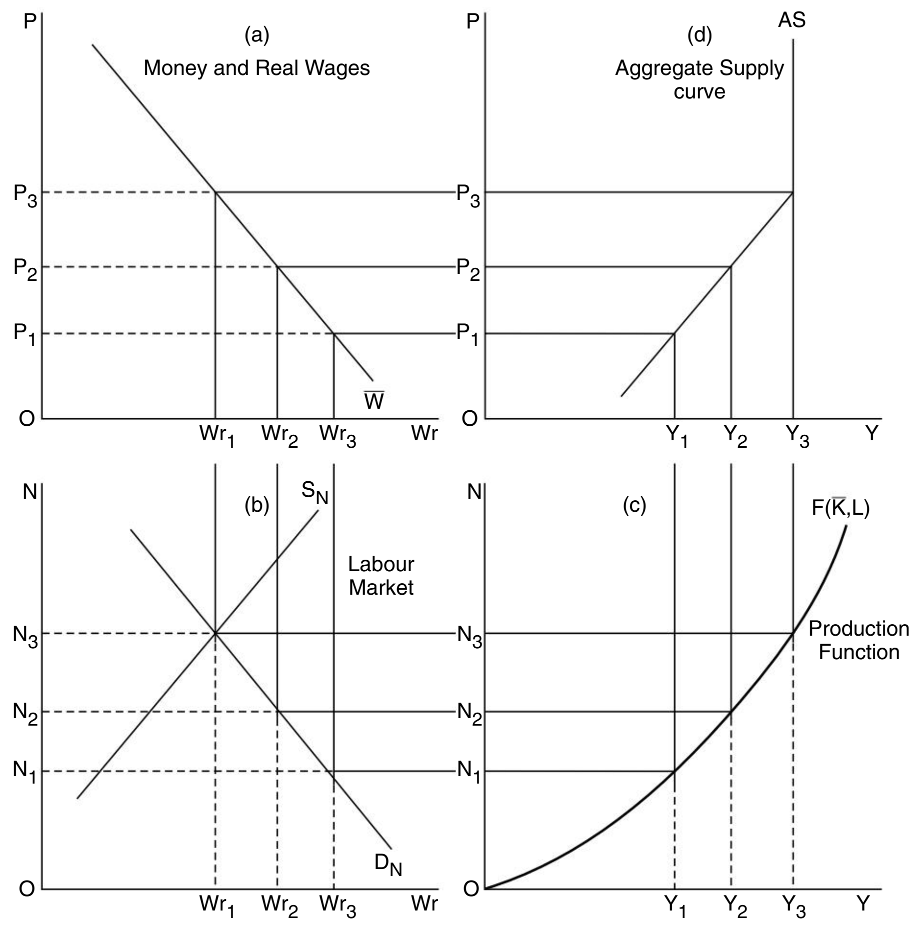


Fig. 19.12 Derivation of the Aggregate Supply Curve

As quadrant (b) shows, the labour market is in equilibrium with real wage Wr_1 and employment N_3. The labour market equilibrium is associated with price level P_3 as shown in quadrant (a). When prices decrease, the real wage, (W_r) increases from W_{r1} to W_{r2} in quadrant (a). As a result, demand for labour decreases from N_3 to N_2. Similarly, when prices decrease to P_1, real wage rises to W_{r3} and employment falls to N_1. When falling employment from N_3 downward is linked to the production function in quadrant (c), it shows output decreasing from Y_3 to Y_2 and then to Y_1. By linking various levels of output in quadrant (c) to corresponding different levels of prices in quadrant (d), we get the *AS* curve. The *AS* curve shows the positive relationship between prices and output till the point of kink in the *AS* curve. The *AS* curve becomes vertical beyond the point of kink, the point of full employment. The reason is, as shown in quadrant (b), the labour market is in full employment equilibrium at employment N_3 which yields the maximum possible output, Y_3. At full employment level, additional labour supply would not be forthcoming. Therefore, there will be no increase in output, whatever the rise in prices.

19.4 THE AGGREGATE DEMAND–SUPPLY MODEL: THE FINAL VIEW

In the preceding sections, we have derived the aggregate demand (*AD*) and aggregate supply (*AS*) curves by synthesising the classical and the Keynesian approaches to *AD* and *AS* curves. In this section, we show the determination of the general level of price and output by using *AD* and *AS* curves. We will finally use this model to analyse the role of fiscal and monetary policies in determining the levels of general prices, output and employment.

Figure 19.13 presents the aggregate demand curve derived in Fig. 19.5 and the aggregate supply curve derived in Fig. 19.11. The point of intersection between *AD* and *AS* curves determines the level of employment, output and the general price level for the model economy. For example, the aggregate demand curve (AD_2) intersects the *AS* curve at point *F* determining the full-employment level of output (Y_2) and prices (P_2). Recall that the equilibrium point *F* marks the level of full employment.

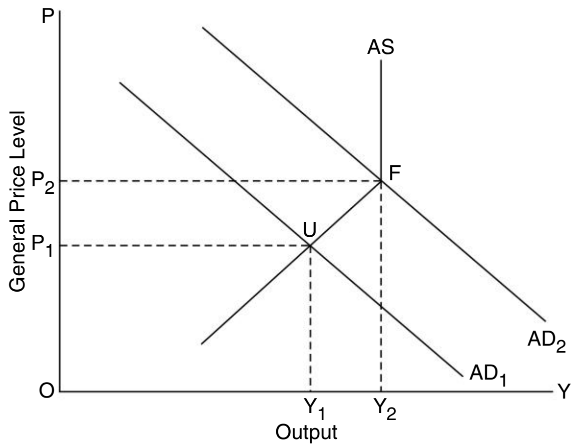


Fig. 19.13 Determination of the General Price Level and Output

According to the classical theory of output and employment (with flexible wage), the economy will always be in equilibrium at point *F*, the point of full-employment level of output and prices. Any short-run disturbance[7] causing shift in the equilibrium will itself create conditions for an immediate restoration of the equilibrium at point *F*. For instance, if *AD* curve shifts downward to AD_1, the output will decrease to Y_1 and prices to P_1. Decrease in output from Y_2 to Y_1 means fall in employment and, therefore, labour supply exceeds labour demand. In a perfectly competitive labour market, the money wage rate will fall instantly. With the fall in money wages, $MP_L \times P > W$. This will induce demand for labour. Therefore, employment will increase; income and expenditure will increase; and the curve AD_1 will shift back to AD_2. The equilibrium point *F* will thus be restored and would remain stable until any further disturbance shifts the aggregate demand curve.

According to the Keynesian theory (with rigid wage assumption), however, an economy may not necessarily be always in full employment equilibrium. Rigidity of wages may not permit the economy to reach full employment level. The Keynesian position is shown at point *U*, the point where the curve AD_1 intersects the *AS* curve. The curve AD_1 indicates the aggregate demand at less than full employment level. Thus, under the condition of wage rigidity, the economy may stagnate at less than full employment and at lower level of output (Y_1) and prices (P_1). This is the common experience of most developed and underdeveloped economies. In India, for example, Minimum Wage Acts (applicable mainly to agricultural and factory labour) prevent downward adjustment in the wage rate, though there is large scale unemployment in the country. According to NSS estimates,

[7] In the short run, the production function is given and, therefore, the aggregate supply curve is given. Therefore, disequilibrating forces are most likely to arise from the demand side.

nearly 7 percent of the labour force remained unemployed in 2000-01. Nearly 5 percent of the labour force remained unemployed in 2000. One of the main reasons for unemployment is the rigidity of the wage rate.[8]

19.5 ACHIEVING FULL EMPLOYMENT: POLICY OPTIONS UNDER THE KEYNESIAN SYSTEM

In the preceding section, we have shown how a free economy attains the equilibrium level of its output and prices. When an economy attains the equilibrium of price and output, it is supposed to have attained the level of full employment. In general, however, most economies get settled at less-than-full employment. In that case, one of the main tasks of the policy makers is to devise policy measures to achieve full employment. In fact, achieving full employment, or at least a high level of employment has been the central objective of the fiscal and monetary policies of most countries in post-War II period. Whether fiscal or monetary policy or a combination thereof will be a more effective tool of achieving full employment with stability has been a matter of controversy and a prolonged and unsettled debate. The controversy has been discussed in detail in Chapter 23. Here, we show how fiscal and monetary policies work, at least theoretically, and make the economy move towards full employment.

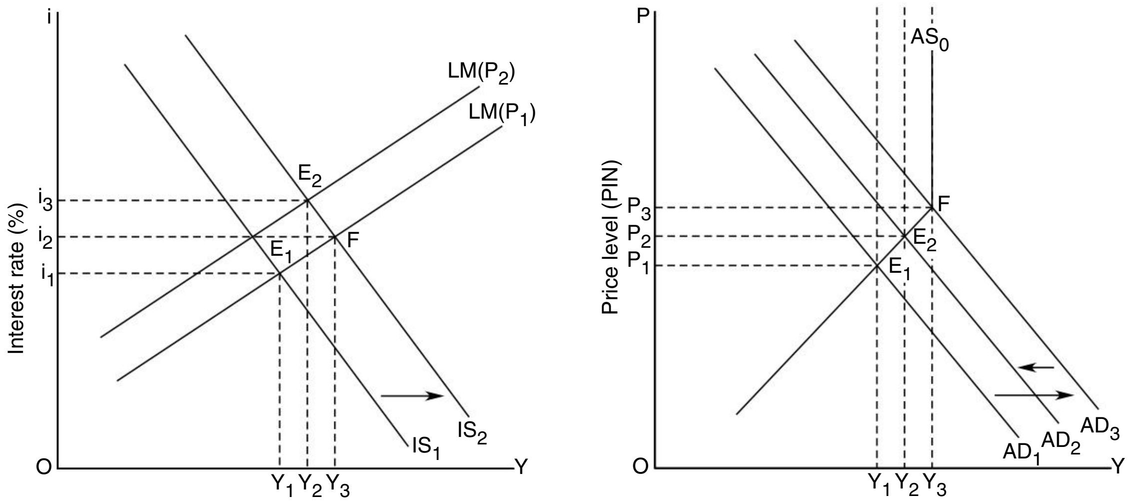
19.5.1 Employment Effect of the Fiscal Policy

Fiscal policy measures used for achieving full-employment level of output and price include increase in the government expenditure and cut in tax rates. A cut in tax rates eliminates only the adverse effect of high tax rates, whereas an increase in government expenditure is expected, under normal conditions, to generate additional employment. We will therefore explain here the employment and output effect of increase in the government expenditure.

Suppose the initial *AD* and *AS* curves are given as AD_1 and AS_0 intersecting at point E_1 in Fig. 19.14(b). Here, equilibrium level of output and prices are given by Y_1 and P_1 , respectively. Suppose also that point *F* is the hypothetical point of full-employment equilibrium with output Y_3 and prices P_3. Since point E_1 falls much below the point *F*, there is unemployment. Let the government decide to increase its expenditure to achieve full employment and the maximum potential level of output, while *prices are constant*. With this purpose, the government must increase its spending so that curve AD_1 shifts to AD_3 which passes through point *F* in panel (b). This requires that the government increases its spending by an amount that makes the *IS* curve shift from IS_1 to IS_2 in panel (a). The curve IS_2 intersects the $LM(P_1)$ curve, at point *F*, the point of full employment. With the shift in the *IS* curve to IS_2, *AD* curve will shift to AD_3 and income level will increase to Y_3 and the interest rate will rise to i_2. This will happen only when prices remain constant at P_1. Prices remaining constant, the point of general equilibrium shifts from E_1 to *F*, the point of full employment, in panel (b).

However, since ***prices do not remain constant***, the equilibrium point *F* is *not stable*. The reason is that increase in the government expenditure creates a chain of actions and reactions between the real wage, prices, real cash balances, output and employment, which make these variables finally settle at a less-than-full-employment level of output.

8. For details, see Mankiw, N.G., *Macroeconomics* (Worth Publishers, 5th Edn., 2003), pp. 160–67.



(a) *IS-LM* Model (b) Aggregate Demand and Supply Model

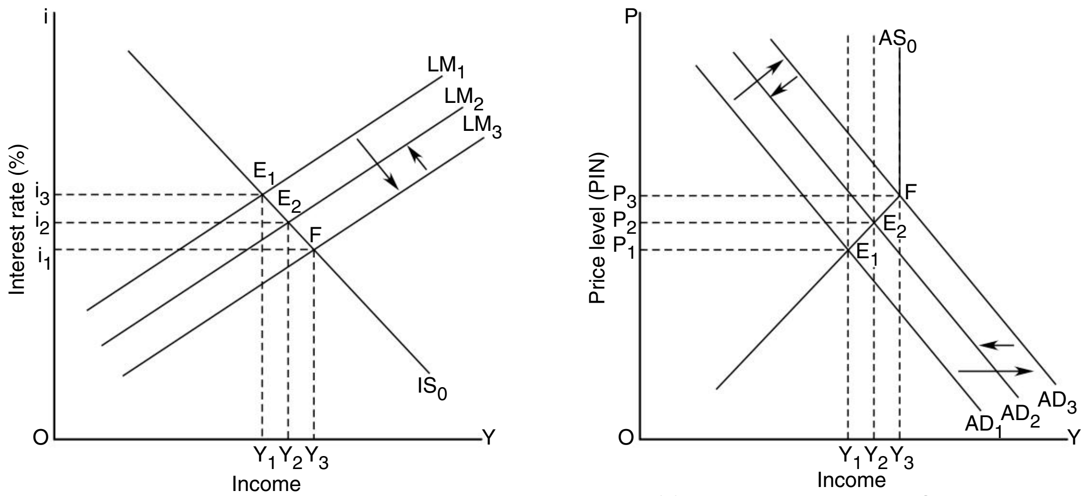
Fig. 19.14 The Effect of Increase in Government Expenditure on the Price and Output

The process of transition from point E_1 to a new point of equilibrium can be explained as follows. The government expenditure causes the shift in the *IS* curve from IS_1 to IS_2 in panel (a). As a result, *AD* curve shifts from AD_1 to AD_3 and the equilibrium shifts from point E_1 to point *F* in panel (b); prices go up to P_3 and output to Y_3. Due to an increase in the price level, money holding in real terms goes down. As a result, the *LM* curve shifts leftward from $LM(P_1)$ to $LM(P_2)$ in panel (a). The curve $LM(P_2)$ intersects IS_2 at point E_2 causing the interest rate to go up to i_3. Due to rise in the interest rates, the investment decreases due to the crowding-out effect and hence income falls to a lower level, Y_2. Therefore, the curve AD_3 shifts backward to AD_2 showing a fall in output to Y_2. Note that at output Y_2 and interest rate i_2, both product and money markets are simultaneously in equilibrium at point E_2 in panel (a). Corresponding to the equilibrium point E_2 in panel (a), aggregate demand equals aggregate supply at output Y_2 and price P_2, as shown by point E_2 in panel (b). The economy thus settles at a *less than full employment level* of output and prices. It may thus be concluded that *the government expenditure does not work to its full potentials under variable prices*. The variable price dampens the effect of the fiscal policy. The foregoing analysis shows that fiscal policy is not fully effective in achieving the target employment.

19.5.2 Employment Effect of Monetary Policy

Let us now examine the effectiveness of monetary policy in achieving a target employment. The effect of monetary policy on the output and employment is shown in panels (a) and (b) of Fig. 19.15. Suppose that the initial conditions are given by curves IS_0 and LM_1 in panel (a) and aggregate demand and aggregate supply curves AD_1 and AS_0, respectively, in panel (b). The point *F* in both the panels represents the point of full employment. In panel (b), the initial aggregate demand curve, AD_1, and the AS_0 curve intersect at point E_1. Point E_1 falls much below the full-employment equilibrium point *F*. It implies that, there is unemployment in the economy.

Suppose that the government plans to achieve full employment through monetary policy. In that case, it will be required to increase the supply of money so that the curve AD_1 shifts to AD_3



(a) *IS-LM* Model

(b) Aggregate Demand and Supply Model

Fig. 19.15 The Effect of Increase in Money Supply on Price and Output

intersecting AS_0 curve at point *F*, the point of full employment. The money supply has to be so increased that LM_1 shifts to LM_3. As panel (a) of Fig. 19.15 shows, the curve LM_3 intersects the IS_0 curve at point *F* which ensures full employment and the maximum level of potential output, Y_3.

However, under the flexible price condition, point *F* is not attainable with an increase in money supply that shifts LM_1 to LM_3. Let us see why. It can be seen in Fig. 19.15 that when LM_1 shifts to LM_3 in panel (a), AD_1 shifts to AD_3 in panel (b). As a consequence, output increases to Y_3 and prices increase to P_3. If prices remain stable at P_3, the output-price combination (Y_3, P_3) would remain stable. But, prices would not remain stable at P_3. The reason is under flexible price system, a rise in prices causes the real cash balance to decrease and, hence, LM_3 shifts leftward to, say, LM_2. This causes a leftward shift in AD_3 to AD_2. The curve AD_2 intersects AS_0 at E_2. The new equilibrium point (E_2) is in line with equilibrium point E_2 in the *IS-LM* model. Note that with equilibrium point shifting to E_2 in panel (b), price decreases and comes in alignment with LM_2. The system is therefore supposed to remain stable at E_2. It may thus be concluded that *monetary policy, like fiscal policy, is less effective with flexible prices*.

19.6 SUPPLY SHOCKS AND POLICY DILEMMA

A 'supply shock' refers generally to a sudden and large deterioration in the aggregate supply position in a country disturbing the structural balance of the economy, leading to a high rise in prices and unemployment.[9] A supply shock of this nature may be caused by a sudden fall in the supply of raw materials and/or a rise in input prices. The most oft-quoted case of supply shock in recent economic history is of one caused by oil-price-crisis of the 1970s. The OPEC oil price had risen by 422% between September 1973 and January 1974. This more-than-fourfold increase in the oil price had severely affected the prices, output and employment levels in the oil-importing industrialised nations. For instance, in the United States, the real *GNP* had fallen by 1.8%; unem-

9. A supply shock may also be caused by a sudden and large increase in the aggregate supply leading to fall in prices and, therefore, in output and employment.

ployment rate had risen by about 5%; and prices had gone up by 19.8% between 1973 and 1975. This was the second worst recession in the US economy in the post-War II period—the worst being the 2008-09-recession in the US economy. Incidentally, the supply shock caused by the rise in oil price continues in recent times too. Oil prices shot up by more than 300 percent in 2007-08. The oil price shock has been aggravated further by food shortage in the world economy.[10]

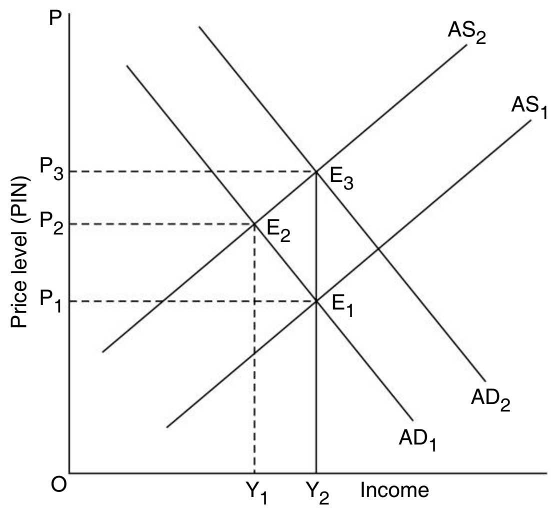


Fig. 19.16 Supply Shock and Accommodating Policy

The adverse supply shocks often create a dilemma for the policy-makers. The nature of dilemma is illustrated in Fig. 19.16. Suppose that the pre-shock aggregate demand and supply curves are given as AD_1 and AS_1, respectively, in Fig. 19.16. Let the supply shock shift the AS curve from AS_1 to AS_2. As a result, equilibrium shifts from E_1 to E_2. Output decreases from Y_2 to Y_1 causing a fall in employment and a rise in price to P_2. The post-shock situation is characterised by a lower output, a lower employment and a higher price level. This is a situation of ***inflation with unemployment***.

The question now is how to increase the employment and reduce the price level. One method is to go the classical way and leave the economy to the market forces to restore the original equilibrium point E_1. In the classical system, unemployment will cause money wages to adjust downward. Because of the fall in money wages—real wages already down due to rise in prices—the demand for labour will increase and, therefore, employment and output will increase until the system is back to point E_1.

In the Keynesian system, wages are assumed to be rigid, especially downward. If wages are not allowed to fall following the shift in the AS curve, the economy will continue to suffer from inflation and unemployment. Therefore, government policy intervention becomes necessary. Under the given aggregate supply curve, the government's option is limited to make the AD curve shift upward to the right so that the pre-shock level of output (Y_2) is restored. This objective can be achieved through an expansionary fiscal and/or monetary policy which shifts the curve AD_1 to AD_2. Note that the AD_2 intersects AS_2 at point E_3. Point E_3 implies achieving full employment level of output but exacerbating the inflation as the prices are pushed up from P_2 to P_3. An inflation of this magnitude may go beyond the tolerance limit of the economy and may cause other problems, especially when it affects the purchasing power of the lower income groups. This creates a policy ***dilemma***. The dilemma is that policy-makers have to make a choice between undesirable options: (a) a relatively lower rate of inflation, less than potential output and a lower level of employment, and (b) a high rate of inflation, full employment and the potential level of output. In general, the policy-makers have to find a compromise between the two options.

10. The US President, George Bush, has blamed the Indian and Chinese population for consuming more food, thus causing world food crisis in 2008, even though Americans consume five times more food.

SUGGESTED READINGS

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Branson, William, *Macroeconomic Theory and Policy* (NY, Harper & Row, 1989), Ch. 6-9

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Mundell, Robert A., "An Exposition of some Subtleties in the Keynesian System," in *Macroeconomics : Selected Readings,* (ed.) By W. L. Johnson and D. R. Kamerschen, (Boston, Houghton Mifflin, 1970).

Smith, Warren L., "A Graphical Exposition of the Keynesian System," *Southern Eco. JL.*, October 1956.

QUESTIONS FOR REVIEW

1. Describe briefly the shortcomings of the classical and Keynesian theories. Why did modern economists feel the need for synthesising the classical and the Keynesian theories?
2. Why is classical *AS* curve perfectly inelastic and Keynesian *AS* curve perfectly elastic? Why did economists feel the need for synthesising the classical and Keynesian *AS* curves?
3. Why is the Keynesian assumption of a perfectly elastic aggregate supply curve is not consistent with the classical production function? Explain and illustrate graphically the derivation of the aggregate demand curve through the *IS-LM* model.
4. What is meant by the downward rigidity of the money wage rate? Why are money wages supposed to be rigid downward, not upward?
5. Explain and illustrate graphically the derivation of the aggregate supply curve with flexible and downward rigid money wage.
6. How does the implication of classical assumption of flexible money wage for output and employment differ from that of the Keynesian assumption of rigid money wage? Show the difference graphically.
7. What are the basic assumptions that create divergence in the classical and Keynesian *AS* curves?
8. Explain graphically the synthesis between the classical and Keynesian aggregate supply curves. Why is *AS* curve price inelastic beyond a level of output?
9. Using a downward sloping aggregate demand curve and an upward sloping aggregate supply curve, show the existence of unemployment. Explain why unemployment is automatically eliminated if wages are flexible and will persist if wages are rigid.
10. Explain and illustrate graphically how a rise in government spending affects price, output and employment.
11. Is fiscal or monetary policy more effective in combating unemployment under the flexible money price system? Give reasons for your answer.
12. What is meant by 'supply shock'? What kind of policy dilemma does it create? Is in your opinion classical or Keynesian approach more effective in tackling problems arising out of supply shock?

Chapter 20

Post-Keynesian Macroeconomics

INTRODUCTION

We have so far discussed basically the Keynesian macroeconomics and its modifications, which is still the mainstream of macroeconomics. In this chapter, we will discuss briefly the post-Keynesian developments in macroeconomics, *viz.,* the **modern monetarism, new classical macroeconomics** and the **supply-side economics.** The post-Keynesian developments in macroeconomics may be attributed to the controversy on the relevance and applicability of Keynesian theories and thoughts to the goals of macroeconomic management. The controversy on macroeconomics has been so extensive that "If you listen to the debates about key macroeconomics such as the budget deficit, monetary policy or inflation, economists seem to agree on little beyond the definition of GDP".[1] An extensive discussion on the post-Keynesian developments in macroeconomics falls outside the purview of this book. However, post-Keynesian developments in macroeconomics are discussed here briefly. The post-Keynesian schools of thought discussed here include:

(i) the modern monetarism,
(ii) the new classical macroeconomics or radicalism, and
(iii) the supply side economics.

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1. Samuelson, P.A and Nordhaus, *Economics*, 15th Edn. (McGraw-Hill, NY, 1995), p.600.

Will confine our discussion here to the central theme of these schools of thought. However, we will also point out the controversy and debate that post-Keynesian theories and thoughts have generated. Let us begin with modern monetarism.

20.1 THE MODERN MONETARISM: A COUNTER-REVOLUTION

The modern monetarism has its roots in the *classical monetary theory*. The classical economists held the view that monetary policy was the most powerful tool of achieving economic growth and full employment. This view is called 'classical monetarism.' The classical monetarism was formalised in the classical quantity theory of money as developed by Irving Fisher and later by the Cambridge economists. However, the advent of the Keynesian revolution in the late 1930s pushed the classical economics into the background. The Keynesian economic thoughts had global appeal and application during the period between the Second World War and the early 1960s. The classical monetary theory had gone into oblivion during this period. The classical monetarism was, however, revived during the late 1950s and the 1960s which is known as 'modern monetarism'. Before we take up the main theme of the modern monetarism, let us look at the conditions that led to the advent of modern monetarism.

20.1.1 The Advent of Modern Monetarism

It was Milton Friedman of Chicago University who revived the classical quantity theory of money. Milton Friedman, a Nobel Laureate, and his associate Anna Schwartz carried out in 1950s a monumental study of the monetary history of the United States.[2] In their study, they found, contrary to the Keynesian orthodoxy, a strong relationship between economic fluctuations and money supply.[3] Most further evidence collected by the monetarists confirmed a strong link between money supply, *GNP* and price behaviour. In Friedman's own words, "Long-period changes in the quantity of money relative to output determine the secular behaviour of prices. Substantial expansions in the quantity of money over short periods have been a major *proximate* source for the accompanying inflation in prices."[4] Friedman is more dogmatic on the relationship between price rise and money supply. He says, "Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output."[5]

Monetarists believe that "only money matters." In support of their views, Friedman and other monetarists have produced a tremendous amount of empirical evidence.[6] The modern monetarism received so extensive support during the 1970s and 1980s that it is considered as a *counter-*

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2. Milton Friedman and Anna J. Schwartz, *A Monetary History of United States: 1867 -1960* (Princeton University Press, NJ, 1963).

3. See Stanley Fischer (ed.), *Rational Expectations and Economic Policy* (Chicago University Press, Chicago, 1966).

4. "Monetary Studies of the National Bureau," in his *The Optimum Quantity of Money and Other Essays,* (Aldine Publishing Co, Chicago, 1969), p. 277.

5. M. Friedman in *The New Palgrave Dictionary of Economics,* 1987, quoted in P. A. Samuelson, *Economics* (1995). An earlier version of it was published in "Inflation and Wages," in *Newsweek,* September 28, 1970.

6. Some major works on empirical evidence are published in M. Friedman (ed), *Studies in the Quantity theory of Money* (University of Chicago Press, Chicago, 1956).

revolution—counter to the Keynesian revolution. The monetarism had gained widespread popularity and was the basis of economic stabilisation policy in the late 1970s in many developed countries.

The essence of modern monetarism can be stated as follows.

(i) The supply of money plays the dominant role in determining the level of nominal *GNP* in the short run and price level in the long run. More precisely, an increase in money supply increases the nominal *GNP* in the short run and prices in the long run.
(ii) Fluctuation in money supply is the main factor causing fluctuation in the nominal *GNP* and in the price level.
(iii) Economic fluctuations are primarily the result of wrong fiscal policies of the government. The corrective and stabilisation policy should be based primarily on the monetary measures.

Monetarist Postulates The views and thoughts of the modern monetarism, mentioned above, are based on the following postulates:

(a) demand for money is completely *insensitive* to interest rates;
(b) velocity of money ($V = PQ/M$) remains fairly stable (nearly constant) and predictable;
(c) prices and wages are relatively flexible;
(d) free and uninterrupted market forces provide final solution to all economic problems;
(e) the government intervention with the market system leads to distortion of market forces of demand and supply; and
(f) the government intervention with the market system is desirable and advisable only to the extent it promotes and strengthens the market system.

Based on their postulates, the monetarists argued that money supply works through interest rate and portfolio adjustments by the wealth-holders and finally affects the output and prices. As regards the causation process, they argued that *increase in money supply reduces the rate of interest* and fall in the interest rate *increases investment, resulting, finally, into increase in output.* According to monetarists, in the initial stage of this transmission process, both prices and output increase but nominal output increases at a rate higher than the price rise. Consequently, in the short run, real income increases. However, if the authorities continue to increase money supply, output does not keep pace with the rising money supply in the long run. Therefore, in the long run, prices rise at a higher pace than the output leading to inflation. The price rise may not necessarily be inflationary.

20.1.2 A Critique of Monetarist Evidence and Postulates

Nicholas Kaldor, a staunch Keynesian, and James Tobin, a modern Keynesian, criticised modern monetarism strongly. These economists used and analysed the monetary data collected and used by the monetarists themselves including Milton and Schwartz,[7] and arrived at conclusions contrary to monetarist view. They argued that money supply is, for all practical purposes, endogenous to the system—it increases during the boom period and decreases during the recession. No wonder, therefore, that there is a high correlation between money supply and output. But, high correlation does not mean that there is cause-and-effect relationship between money supply and output, i.e., it does mean that increase in money supply causes increase in output. Kaldor argued instead that

[7] Milton Friedman and A. J. Schwartz, *op. cit.* For a short summary of the empirical evidence and its critique, see Fred R. Glahe, *Macroeconomics, Theory and Policy* (NY, Harcourt, Brace & Ivanosevich, 1973), Ch. 13.

there is reverse causation between boom and money supply. In his view, if the central bank does not increase money supply during the boom period, "a complete surrogate money-system[8] and payments-system would be established, which will exist side by side with official money".[9] James Tobin[10] argued that the monetarists' postulate of a direct link between money supply and output does not hold in short-run recessions because businessmen take time to adjust their short-run demand for cash which they need for wage payments and retail transactions. However, neither Kaldorian argument nor Tobin's criticism has been found to be strong enough to challenge the moneterists' view. In fact, there has been a prolonged debate on the validity of Keynesian and moneterist views. The arguments of both the sides are discussed briefly in the following section.

20.2 THE KEYNESIAN VS. MONETARIST DEBATE: DOES MONEY MATTER?

The emergence of moneterism as a counter-revolution led to a prolonged, though inconclusive, debate between the Keynesians and the monetarists. While Keynesians hold the view that the level of output and prices is determined *mainly* by the effective demand, monetarists hold the view that the quantity of money is the prime factor that determines the level of output and prices. The debate finally zeroes in on a specific question: **'Does money matter'** in determining output and prices? Keynesians argue that **'money does not matter'** in determining the aggregate demand, whereas extreme monetarists hold the view that **'only money matters.'** We discuss here briefly the arguments of the monetarists and the Keynesians put forward in support of their views.

20.2.1 The Monetarist View: Only Money Matters

The monetarist view that 'only money matters' is based on Friedman's restatement of the quantity theory of money, i.e., $M\bar{V} = PY$ (where M is money supply determined exogenously by the monetary authorities, $\bar{V}$ is constant velocity of money, P is price, and Y is real output). Friedman considers this equation as the theory of nominal income. Friedman concluded from this equation that 'money is all that matters for changes in nominal income and for short run changes in real income.'[11] This point is central to the monetarism.

This monetarist view is illustrated in the *IS-LM* framework in Fig. 20.1 and compared with the Keynesian *IS* and *LM* curves. The *IS* and *LM* curves conforming to the monetarists' view are drawn on the basis of the following assumptions: (i) the *interest elasticity* of demand for money is quite low, close to zero; and (ii) the aggregate demand is highly sensitive to the interest rate.

In Fig. 20.1, IS_M and LM_M curves represent monetarist's *IS* and *LM* curves and IS_K and LM_K curves represent Keynesian *IS* and *LM* curves. Note that monetarist's *IS* and *LM* curves—IS_M and LM_M—are different from the Keynesian *IS* and *LM* curves—shown by dashed curves IS_K and

8. A surrogate money system refers to a practice in which businessmen devise a payment system which works through unofficial token money, scrips, promissory notes, etc. during the days of currency shortage.

9. N. Kaldor, "The New Monetarism," Lloyds Bank Review, July 1970, p.7.

10. James Tobin, "The Monetary Interpretation of History," *Am. Eco. Rev*., June 1965, pp. 646-85.

11. Milton Friedman, "A Theoretical Framework for Monetary Analysis," in Robert Gordon (ed), *Milton Friedman's Framework of Monetary Theory* (Chicago University Press, 1974), p.27.

LM_K. The monetarist LM curve, LM_M, is much steeper because monetarists assume a very low interest-elasticity of demand for money. As regards the IS curves, the monetarist IS curve (IS_M) is much flatter than the Keynesian IS curve (IS_K), because investment is assumed to be highly interest-elastic.

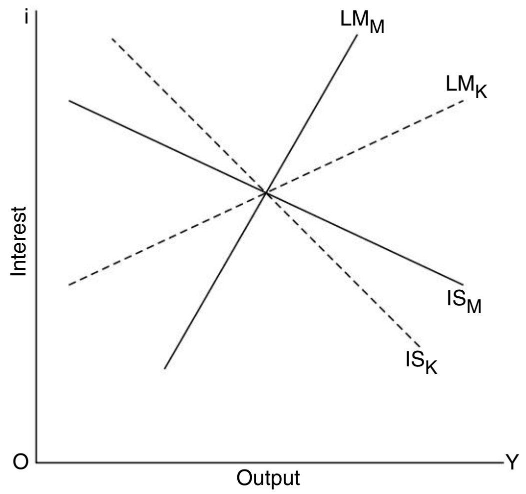

Fig. 20.1 The Monetarist and Keynesian Versions of *IS* and *LM* Curves

The difference between the monetarist and Keynesian IS and LM curves makes a difference in their corresponding AS and AD curves.[12] The difference between the two sets of curves is shown in Fig. 20.2. The curves labeled AD_M and AS_M are monetarist aggregate demand (AD) and aggregate supply (AS) curves, respectively. Similarly, the Keynesian AD and AS curves, corresponding to the Keynesian IS and LM curves, are shown by the dashed lines AD_K and AS_K.

It can be seen in Fig. 20.2 that the difference between the monetarist and Keynesian IS and LM curves is only a matter of degree as shown by the slope of these curves. It is, in fact, this difference which distinguishes monetarism from Keynesianism. This point is explained and illustrated below.

The monetarist view on whether fiscal policy matters has been clearly stated by Friedman: "... in my opinion, the state of the budget by itself has no significant effect on the course of nominal income, on deflation, or on cyclical fluctuations."[13] He added a year later: "monetarists ... maintained that fiscal policy by itself is largely ineffective, ... what matters is what happens to the quantity of money."[14]

The monetarists' view is illustrated in Fig. 20.3. Suppose monetarists' initial IS and LM curves are given as IS_0 and LM_0, respectively. These curves

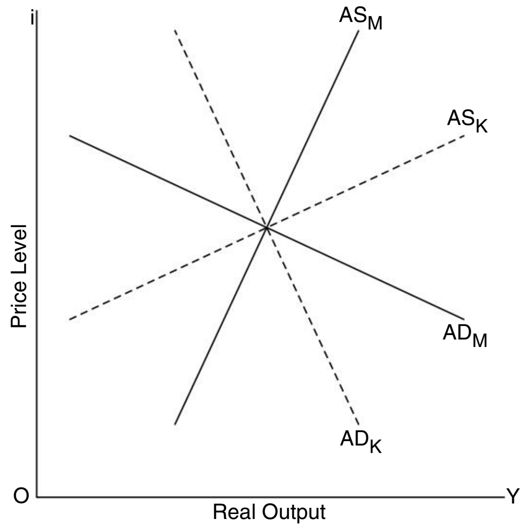

Fig. 20.2 The Monetarist and Keynesian *AD* and *AS* Curves

12. The readers are advised here to review the process of deriving *AS* and *AD* curves from the *IS* and *LM* curves in Chapter 19, especially Figs. 19.5 and 19.12.

13. Milton Friedman and Walter Heller, *Monetary Versus Fiscal Policy* (NY, NY University Press, 1969), p.51.

14. Milton Friedman, *The Counter-Revolution in Monetary Theory* (London, Institute of Economic Affairs, 1970), p.18.

intersect at point E_1 determining equilibrium output at Y_1 and interest rate at i_2. Now, let the money supply so increase that the LM_0 curve shifts LM_1 which intersects the curve IS_0 at point E_2. Thus, with the shift in the LM curve, the output increases substantially from Y_1 to Y_3 and interest rate falls from i_2 to i_1. This proves the monetarist point of view that monetary policy does matter.

Figure 20.3 shows also the monetarist view that *fiscal policy does not matter*. Look at the effect of fiscal policy (increase in the government expenditure) on output and interest. Given the initial IS_0 and LM_0 curve, let the government increase its spending, money supply remaining the same, so that the curve IS_0 shifts to IS_1 and the equilibrium point shifts from E_1 to E_3. This shift causes a very small increase in output from Y_1 to Y_2 while interest rate shoots up from i_2 to i_3. In monetarist view, fiscal policy does not work because of 'crowding-out effect.' However, it should be borne in mind that the monetarists' argument applies only in the monetarist framework of the *IS-LM* model which assumes high interest-elasticity of the *IS* curve and low interest-elasticity of the *LM* curve.

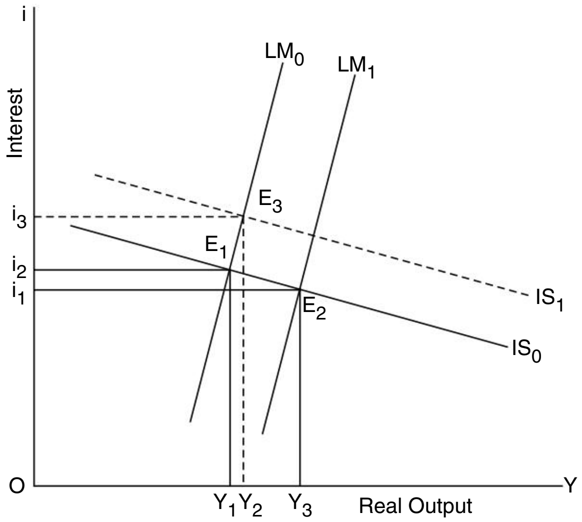

Fig. 20.3 Only Money Matters: The Monetarist View in *IS-LM* Model

20.2.2 The Keynesian View: Money Does Not Matter

The Keynesians argue, in contrast, that *money does not matter*: it is the fiscal policy that matters. The Keynesian point of view is illustrated in Fig. 20.4. The initial equilibrium position is shown at point E_1. Here equilibrium output is Y_1 and interest rate is i_2. Suppose now that money supply so increases that the LM curve shifts from LM_0 to LM_1 and the equilibrium point shifts to E_2. Here new equilibrium output is Y_2 and interest rate is i_1. Note that there is a small rise (Y_1 Y_2) in the output despite a steep fall in the interest rate from i_2 to i_1. This proves the Keynesians' view point that money does not matter, if it does, it matters a little.

To show that fiscal policy matters, suppose that the government increases its spending, instead of increasing money supply, so that the IS curve shifts from IS_0 to IS_1 and the equilibrium shifts from point E_1 to point E_3. Point E_3 indicates

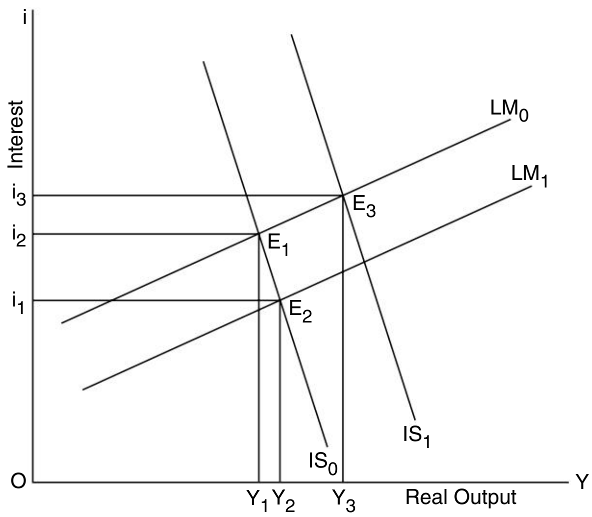

Fig. 20.4 The Keynesian View: Money does not matter

that the equilibrium output increases to Y_3 and interest rises from i_2 to i_3—a relatively small rise in the interest rate. Note that fiscal policy makes a substantial increase in output (Y_1 Y_3) compared to a small increase of Y_1 Y_2 in the output caused by the rise in money supply. This proves Keynesian view that fiscal policy matters and monetary policy matters a little.

20.3 THE RECONCILIATION OF KEYNESIAN AND MONETARIST CONTROVERSY

As we have shown in the preceding section, monetarists and fiscalists hold controversial views on whether the monetary or the fiscal policy is a more powerful tool of managing the economy. This question has been, in fact, one of the most important issues of debate and a matter of controversy in modern macroeconomics. As noted above, monetarists hold the view that 'only money matters' and that monetary measures are more powerful and effective tools of managing the economy and fiscal measures are ineffective. On the contrary, fiscalists hold the view that *money does not matter*. Instead, they hold the view that fiscal measures are more powerful tools of macroeconomic management. There has been a prolonged, though inconclusive, debate[15] between the monetarists and the fiscalists. The modern economists have, however, tried to point out the source of the controversy and have attempted to make a reconciliation between the two contradicting views. In this section, we look first at the source of controversy and then point out the conditions under which the monetary and the fiscal policies are effective or ineffective in achieving the macroeconomic goals.

20.3.1 The Source of Controversy: The Elasticity of the *LM* Curve

The source of controversy is the assumption that fiscalists and monetarists make in respect of the elasticity of the *LM* curve—there is not much controversy on the *IS* schedule. The fiscalists assume a usual Keynesian liquidity preference curve with its *liquidity trap* portion. That is, they assume that the speculative demand for money is interest-elastic ($0 < e < \infty$) up to a certain minimum[16] rate of interest and it is perfectly elastic ($e = \infty$) below that minimum rate of interest. This assumption results in an *LM* curve with a unique feature as shown in Fig. 20.5. (For its derivation, see Chapter 16, Fig. 16.2). The *LM* curve based on the fiscalist assumption is represented by i_0 to B part of the *LM* curve including 'pure Keynesian' and 'intermediate' ranges as shown in Fig. 20.5.

On the other hand, the monetarists go by the classical proposition that money is demanded only for transaction purpose and *transaction demand for money is interest-inelastic*. This proposition produces a vertical *LM* curve. The *LM*-curve based on monetarist assumption is represented by the vertical part of the *LM* curve, i.e., point B upward, in Fig. 20.5.

Figure 20.6 presents *IS-LM* model with the *LM* curve which combines the features of both fiscalist and monetarist *LM* curves. For the sake of convenience in further analysis, the *LM*-curve is divided into three parts. The part of the *LM* curve from i_0 to B corresponds to the Keynes's liquidity preference curve. It has two parts. The horizontal part of it—from i_0 to B—is purely **'Keynesian range'** conforming to the Keynesian Liquidity Trap. Note that pure Keynesian range

15. For details, see Milton Friedman and W. W. Heller, *Monetary vs. Fiscal Policy* (New York University Press, 1969).

16. The 'certain minimum' rate of interest is undefined. It depends on the people's perception of what they consider to be the opportunity cost of liquidity preference or of holding idle cash balance.

of the *LM*-curve is perfectly elastic ($e = \infty$) at interest i_0. The vertical part of the curve—point *E* onwards—is purely **'classical range'** of the *LM* curve. The classical range of the *LM* curve is completely interest-inelastic ($e = 0$) at the interest rate i_4 onwards. The horizontal and vertical parts of the *LM* curve present the *extreme fiscalist* and *monetarist cases*, respectively. Between the two parts, lies an **'intermediate range,'** between points *B* and *E*. In the intermediate range, the *LM* curve is interest-elastic where $0 < e < \infty$.

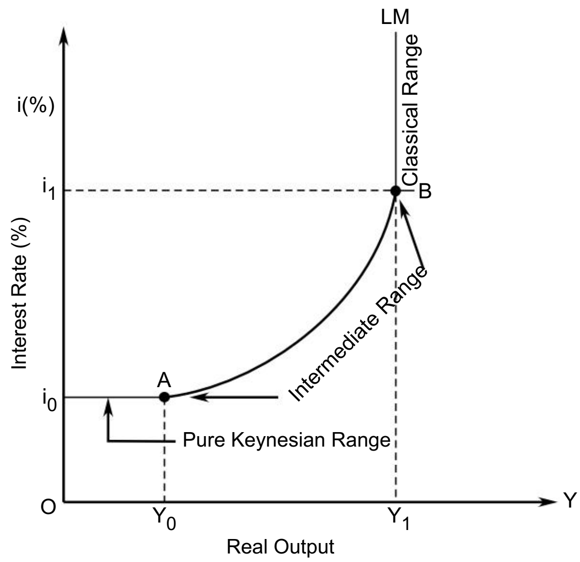

Fig. 20.5 The *LM* Curve with Keynesian and Classical Range

The effectiveness of fiscal and monetary policy varies from range to range of the *LM* curve. Let us now look into the effectiveness of the two policies in the different ranges of the *LM* curve. This will clarify the fiscalists' and monetarists' views and the source of controversy.

Efficacy of Fiscal Policy Let us first examine the effectiveness of fiscal policy under the three alternative assumptions of demand for money and the corresponding shapes of the *LM* curve on the equilibrium level of interest and income. Figure 20.6 presents the *LM* curve with its three ranges and two *IS* curves in each range to show the effectiveness of fiscal policy. We will examine the effect of fiscal policy in different ranges of the *LM* curve separately.

The Keynesian range. The pure Keynesian range is the horizonatal part of the *LM* curve, i.e., from point i_1 to point *B*. A change in fiscal policy, that is, an increase in the deficit-financed government expenditure, has over this range a clear, positive effect on the income and no effect on the interest rate. This effect is shown by the shift in the *IS*-schedule from IS_0 to IS_1 due to an increase in the government expenditure. The shift of the *IS* curve causes a shift in the equilibrium point from *A* to *B*. In case of deficit-financed government expenditure (ΔG), the effect equals ΔG times *G*-multiplier. Let us suppose that ΔG is financed through the **sale of government bonds.** Since there is an excess liquidity with the people, the purchase of the government bonds will not affect the transaction demand for money, nor the interest rate and the private investment. Thus, the Keynesian range of the *LM* curve confirms to the fiscalist view that only fiscal policy matters.

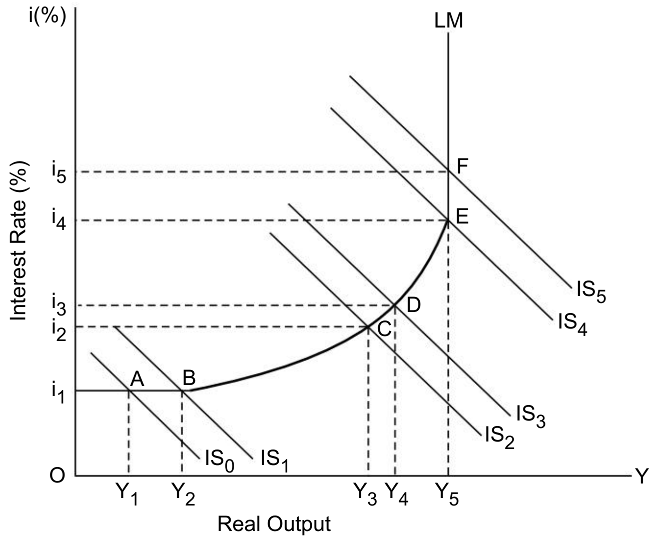

Fig. 20.6 The Effectiveness of the Fiscal Policy in the *IS-LM* Model

The result will be the same even if government finances its expenditure by **printing currency notes.** In that case, the supply of money increases. But, since the demand for money is in the Keynesian liquidity trap range, the increase in money supply does not affect the interest rate. Therefore, the private investment is not adversely affected, nor is there any crowding-out effect. Income increases by ΔG times G-multiplier.

The intermediate range. In the intermediate range, the increase in the government expenditure increases both the equilibrium level of income and the interest rate. Let us suppose that the economy is at point C (Fig. 20.6), which falls on the curve IS_2, which passes through the intermediate range of the LM curve. An increase in the government expenditure makes the curve IS_2 shift to the position of IS_3 and the equilibrium point from C to D. This shift increases the level of income from Y_3 to Y_4 and interest rate from i_2 to i_3. Clearly, fiscal policy is effective also in the intermediate range but not as effective as in the Keynesian range. As it is evident from the figure, a shift of IS schedule from IS_0 to IS_1 increases national income by Y_1Y_2. But an equivalent shift of the IS schedule from IS_2 to IS_3 in the intermediate range results in a smaller increase in income which equals Y_3Y_4 and also causes a rise in the interest rate from i_2 to i_3. The reason is *crowding-out effect*. A shift in the IS curve in the intermediate range causes a rise in the interest rate which crowds-out some of the private investment. The rise in the interest rate can be easily explained. Given the money supply, ΔG is to be financed through public borrowing through public bonds. For selling public bonds, the rate of interest on the bonds has to be higher than the market rate of interest to induce the people to make adjustments in their speculative balances. This causes the rise in the interest rate which affects the private investment and hence income adversely. However, the system will work differently if ΔG is financed through currency creation.

The effect will be similar if the shift in the IS curve from IS_2 to IS_3 is caused by a **tax cut**. A tax cut increases disposable income. This increases consumption expenditure which increases transaction demand for money. Given the money supply, the additional transaction cash balance is acquired through the sale of bonds. This reduces the bond price and increases the interest rate. The rest of the process follows.

The classical range. Consider now the classical range of the *LM* curve. Suppose that the economy is operating in the classical range—point *E* upwards. It can be seen in Fig. 20.6 that a change in fiscal policy does not have any impact on the level of income—it only increases the interest rate. For example, suppose the government expenditure is so raised that the *IS* schedule shifts from IS_4 to IS_5 and the equilibrium point from *E* to *F*. The shift in the *IS* curve leaves the income level at Y_5 but the interest rate rises from i_4 to i_5. Why? In the classical range, there is no speculative balance. Therefore, if the government decides to make debt-finance ΔG, it has to offer a rate of interest higher than the market rate of interest. The interest on bonds has to be attractive enough for the investors to convert their investment in capital goods into the government bonds. In that case, ΔG will be exactly equal to the fall in the private investment. In the classical range therefore the *crowding-out* is matched by ΔG. There is, therefore, no increase in the level of *Y*. This is the monetarist view on the effectiveness of fiscal policy.

Conclusion. Fiscal policy is fully effective in the Keynesian range, less effective in the intermediate range and totally ineffective in the classical range of the *LM* curve.

Efficacy of Monetary Policy Let us now discuss the effects of monetary policy on the level of income and the interest rate in different ranges of the *LM* curve. It may be pointed out at the outset that, given the *IS* curve, monetary changes yield opposite results.

The Keynesian range. The case of monetary policy is presented in Fig. 20.7. The LM_0 and LM_1 curves represent the money-market equilibria before and after the change in monetary policy, respectively. If the economy is working in the Keynesian range, *change in money supply is not at*

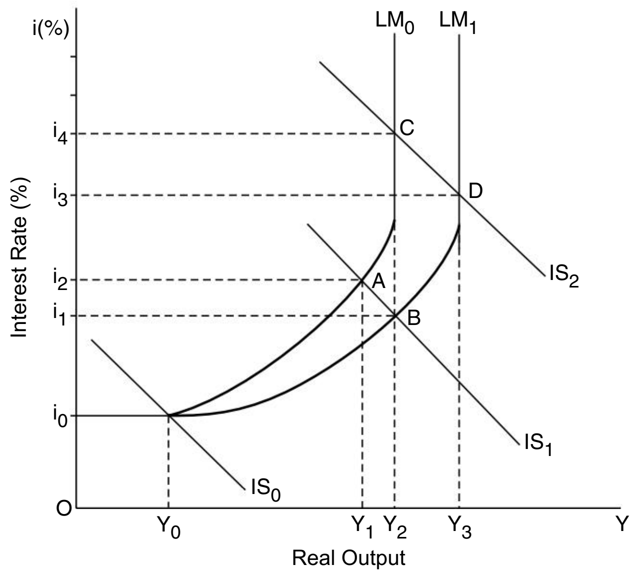

Fig. 20.7 The Effectiveness of Monetary Policy in the *IS-LM* Model

all effective in influencing the level of equilibrium income. The economy being in the Keynesian liquidity trap range, the total increase in money supply is maintained as idle cash balance and no part of it moves into transaction balance. Therefore, the equilibrium rate of interest remains unchanged at i_0; investment remains the same; and hence the equilibrium level of income remains the same (Y_0). This conclusion conforms to the fiscalist view that 'money does not matter.'

The intermediate range. If the economy is operating in the intermediate range, monetary policy will be effective in changing the level of both the income and the interest rate. Let us suppose that initial *IS* and *LM* curves are given as IS_1 and LM_0, respectively, in Fig. 20.7. Given the curve IS_1, if money supply increases, the *LM* curve will shift from LM_0 to LM_1. The LM_1 curve intersects IS_1 at point *B*. Thus, the equilibrium point shifts from *A* to *B*. This shift shows an increase in income from Y_1 to Y_2 and a decrease in the interest rate from i_2 to i_1. This can be easily explained. Given the level of income at Y_1, the increase in money supply results in excess liquidity. A part of it moves to the bonds and security market, leading to a rise in the bond and security prices and to a fall in the interest rate from i_2 to i_1. This fall in the interest rate induces new investments, and rise in investment increases income. Since an increase in income increases transaction demand for money, the remaining part of the additional money supply is absorbed in the transaction balance. The conclusion is that monetary policy is effective in the intermediate range of the *LM* curve, but *not very effective*. It can be seen in Fig. 20.7 that the fall in interest rate ($i_2 i_1$) is quite substantial but the rise in income (Y_1Y_2) is very low.

The classical range. Monetary policy is fully effective in the classical range. As shown in Fig. 20.7, given the IS_2 schedule, economy is initially in equilibrium at point *C*. The economy being in equilibrium, an increase in the money supply shifts the *LM* curve from LM_0 to LM_1 and the equilibrium from point *C* to *D*. The interest rate decreases from i_4 to i_3 and income increases from Y_2 to Y_3. This can be explained as follow. Suppose that the government increases money supply by buying back its bonds at a price high enough to make the returns on bonds decrease. As a result, bondholders find other kinds of assets more profitable and they start selling their bonds at a high price, causing the interest rate to go further down. The returns on bonds going down, people prefer to invest in capital goods and, therefore, investment increases. An increase in investment increases the level of income and, thereby, the transaction demand for money. This process will continue so long as there is an idle cash balance. At the end of the process, the interest rate decreases from i_4 to i_3 and income rises from Y_2 to Y_3. This shows the full impact of the monetary policy on the levels of interest and income. It can, thus, be concluded that monetary policy is highly effective in the *classical* range of the *LM* curve. This result conforms to the monetarists' point of view.

Conclusion. Monetary policy is *ineffective* in the Keynesian range, effective but not very effective in the intermediate range and fully effective in the classical range. This takes us to the end of our discussion on the monetarist and Keynesian debate on the effectiveness of monetary and fiscal policies. The main conclusion that emerges from the foregoing discussion is that both fiscal and monetary policies are effective or ineffective under different conditions of the economy.

20.4 THE NEW CLASSICAL MACROECONOMICS: THE RADICALISM

Both Keynesian and monetarist remedies failed to cure inflation and unemployment problems which persisted during the 1970s in many developed countries. This raised doubts in the mind of a section of economists—notably Robert E. Lucas, Thomas J. Sergeant and Robert Barrio—called the '**radicalists**', about the relevance and effectiveness of both monetary and fiscal policies in managing the economy. In fact, the radicalists held the view that both monetary and fiscal policies are ineffective in solving the economic problems of a country because people, who are well informed, can easily anticipate government's policy move and can circumvent the anticipated policy measures.

The radicalists argued that the people are as well informed about the economy as the government, if not more. So the people are capable of predicting future course of economy almost accurately. They can therefore anticipate well in advance the government's fiscal and monetary policies and can guess their effect on their economic interests, their earnings, consumption and investment expenditure, and so on. Therefore, they make necessary adjustments in their economic plans even before an anticipated policy is implemented. This kind of adjustment pre-empts the effectiveness of monetary and fiscal policies.

Keynes did recognise the importance of consumers' and producers' expectations in his *General Theory* of employment[17] but he treated 'expectations' separately and did not combine it with his income and employment theory. Until the early 1980s, not much attention was paid to the importance of people's expectations in determining the output and employment, and equilibrium of the economy. Nor was any serious effort made to incorporate the role of peoples' expectations in macroeconomic formulations. During the 1980s, however, Robert E. Lucas of Chicago University, the 1995-Nobel Laureate, incorporated peoples' expectations into macroeconomic analysis. Two other notable contributors to the analysis of peoples' expectation in determining the scope of macroeconomic variables are Thomas J. Sergeant of Stanford University and Robert Barrio of Harvard University. Since their macroeconomic thought had a radical deviation from Keynesian and monetarists thought, they were called 'Radicals' and their macroeconomic propositions were closer to the classical macroeconomics, and their contribution was recognised as **new classical macroeconomics.** In this section, we will discuss radical's approach to price expectations and its role in macroeconomics. Let us begin by looking at the radical's attack on Keynesian macroeconomics.

20.4.1 'Radicalist' Attack on Keynesian Macroeconomics

The new classical macroeconomics is primarily radicals' attack on the Keynesian macroeconomics, especially the Keynesian approach to the role of people's expectations in the formulation of their economic plans and its effect on government policies. The radicalists reject the Keynesian and also the monetarist approach to *formation of price expectations based on the past experience*. According to the radicalists, in the Keynesian and also in monetarist models, people—the consumers and the producers—are assumed to make their price expectations in response to the government policy actions on the basis of their *past experience* regarding policy changes and prices. The people continue to do so even if their past experience does not hold under present and future conditions. According to radicals, such expectations are *irrational expectations* because they involve *systematic error* in the sense that the people are assumed to commit the same error time and again. Therefore, they reject especially the Keynesian approach to the formation of price expectations.

The radicalists reject *not only* the Keynesian approach to formation of price expectations but also the policy implications of the Keynesian economics. In brief, they reject "Keynesian economics

[17] J. M. Keynes has devoted two chapters (5 and 12) of his *The General Theory* to analyse peoples' 'expectations.'

completely and fundamentally."[18] In the words of Lucas, "Keynes's contribution has been completely superseded, not only from the point of view of economic policy but also from that of theory and methodology."[19] Lucas and Sargent added, "Existing Keynesian macroeconomic models cannot provide reliable guidance in the formulation of monetary, fiscal, or other types of policy"[20] and there was 'no hope' of making Keynesian models useful by making 'minor or even major modifications of these models.' The radicalists consider 'Keynesianism as temporary deviation from the mainstream of scientific progress in economics'. The Keynesian economics succeeded because 'the theory of general economic equilibrium, in the versions available in the thirties, was unable to account for the empirical evidence.' In their view, Keynesianism 'has become useless if not actually harmful', and since it lacks 'a rigorous foundation in terms of general economic equilibrium', it 'cannot predict how the economy will react to changes in economic policy, and hence cannot provide reliable criteria for choosing between different economic policies.'[21]

20.4.2 The Foundation of New Classical Macroeconomics: The Rational Expectations

The new classical macroeconomics is built on (a) the theory of rational expectations developed by John F. Muth,[22] and (b) some radical assumptions made by the new classical macroeconomists.

The ***theory of rational expectations*** lies in the foundation of the new classical macroeconomics. *According to the radicalists, the rational expectations are those expectations which are formed by an efficient use of all available past and present relevant information and anticipated events.* The radicalists' claim that their approach to the formation of rational expectations has two unique features: (i) it does not involve *systematic errors,* and (ii) it is *forward-looking*. Rational expectation, however, does not mean error-free expectations. It simply means that economic decision makers—households, firms and labour—use the available information intelligently and efficiently, and the predictions do not involve a systematic error.

The new classical macroeconomic formulations are based on two **assumptions:** (i) prices and wages are flexible—this is a classical assumption. (ii) economic agents—producers, consumers and labour—possess all the information they need to form their expectations and use them intelligently—this is a *'radical' assumption*.

20.4.3 The Main Conclusions of the New Classical Macroeconomics

The radicalists arrive at the following three conclusions from their theory of rational expectations and their assumptions: (i) monetary and fiscal policies do not matter, (ii) unemployment is voluntary, and (iii) there is no trade-off between inflation and unemployment, form the basis of their policy

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18. Jerome L. Stein, *Monetarists, Keynesians & New Classical Economics,* (New York University Press, NY, 1982), p.10.

19. Alessandro Vercelli, *Methodological Foundations of Macroeconomics* (Cambridge, 1991), p.4.

20. Robert E. Lucas and Thomas J. Sargent, "After Keynesian Macroeconomics," in *After the Phillips Curve : Perspective of High Inflation and High Unemployment,* Federal Reserve Bank of Boston, Boston, 1978.

21. Alessandro Vercelli, *op. cit.*, p.128-29.

22. The concept of 'rational expectations' was developed by a microeconomist, J. F. Muth in his paper "Rational Expectations and the Theory of Price Movements," *Econometrica*, July 1961. He has used a microeconomic assumption that 'people behave rationally' to build his theory of rational expectations. A rational behaviour means acting in one's own self-interest, given the market conditions.

formulations for macroeconomic management. The radicalists' reasoning behind these conclusions are discussed below.

(i) Monetary and fiscal policies do not affect employment and output. The radicalists reject the basic Keynesian and monetarist view that *a systematic fiscal or monetary change influences the aggregate demand and, therefore, real variables—output and employment.* The radicalist argue that the real variables (output and employment) are ***insensitive*** to the change in aggregate demand. Therefore, fiscal or monetary policies do not affect output and employment.

The radicalist proposition that fiscal and monetary policies do not matter is illustrated[23] in Figs. 20.8 and 20.9 in the juxtaposition of the Keynesian and monetarist view. Fig. 20.8 presents the equilibrium output and employment in the new classical system and Fig. 20.9 illustrates the new classical argument. In fact, Fig. 20.8 provides the basis for further analysis of new classical model. Panel (a) of Fig. 20.8 presents the new classical aggregate demand (AD_{NC}) and aggregate supply curve (AS_{NC}). The general equilibrium is shown at output Y_0 and price level P_0. In panel (b), the curve labeled $N_D(P_0)$ represents the new classical labour demand curve at a given price level (P_0) and the curve labeled $N_{S(NC)}$ represents the new classical labour supply curve. The labour market is in equilibrium at employment level N_0.

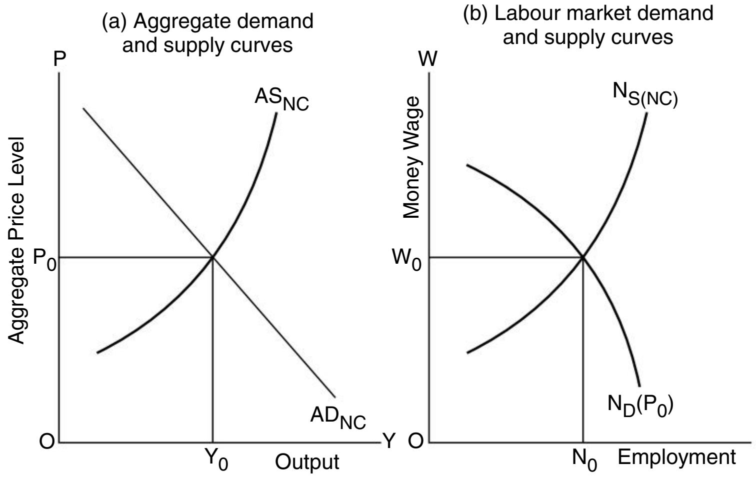

Fig. 20.8 The Output and Employment in the New Classical Model

Let us first look at the **Keynesian and monetarist view** on the employment effect of change in money stock in the radicalist model. Suppose that the initial new classical aggregate demand and supply curves are given as AD_{NC0} and AS_{NC0}, respectively, in panel (a) of Fig. 20.9. The equilibrium point E_0 gives equilibrium level of output at Y_0 and price level at P_0. At point E_0, the actual output and employment are the same as *rational expectations*. Let us now examine the effect of a fully anticipated change in money supply on the level of output and employment. Suppose that the anticipated money supply so increases that the aggregate demand curve AD_{NC0} shifts to AD_{NC1}. Since aggregate supply curve (AS_{NC0}) remains unaffected in the short run, as postulated in the

23. For further details, see Richard T. Froyen , *Macroeconomics: Theory and Policy* (Macmillan, 1990), Ch. 11.

Keynesian and monetarist models, the equilibrium point E_0 shifts to E_1; output increases from Y_0 to Y_1; and prices rises from P_0 to P_1. With the rise in prices, demand for labour increases and labour demand curve, $N_D(P_0)$, shifts to $N_D(P_1)$ in panel (b) of Fig. 20.9. Since in the Keynesian and monetarist model, labour supply curve ($N_{S(NC0)}$) remains unaffected in the short run, employment will increase from N_0 to N_1. Thus, *according to the Keynesians and monetarists, an expansionary policy affects the aggregate demand and, thereby, increases output and employment in the short run.*

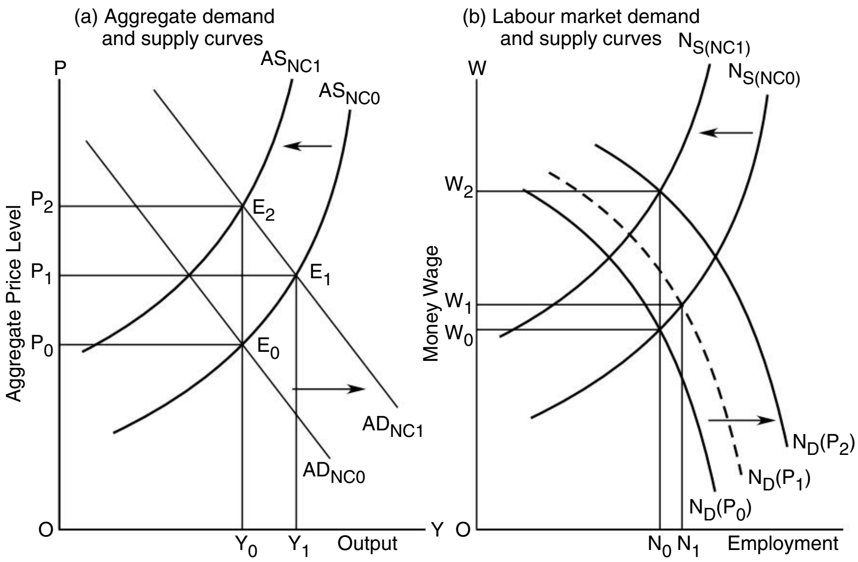

Fig. 20.9 The Effect of Change in Money Stock on Output and Employment

The radicalists reject the Keynesian and monetarist propositions. They argue that *output and employment are insensitive to the change in aggregate demand in the short run*. They question the basis of the Keynesian and monetarist assumption that labour supply curve remains fixed in the short run. In their opinion, with rational expectations, the rise in money stock is well anticipated. Therefore, *rise in money wage* is well anticipated. Hence, *fall in real wages* is also well anticipated. With the *anticipated* fall in real wage, labour supply will decrease and the labour supply curve will shift leftward. It is, in fact, this shift in the labour supply curve which makes the difference between Keynesian-monetarist and new classical conclusions.

Graphically, as shown in panel (b) of Fig. 20.9, with *rational expectations,* the expected increase in money supply makes the labour supply curve shift to the left from $N_{S(NC0)}$ to $N_{S(NC1)}$. With this shift in labour supply curve, the aggregate supply curve AS_{NC0} in panel (b), shifts leftward to AS_{NC1}. This indicates a fall in aggregate supply. With the fall in aggregate supply, prices increase from P_0 to P_2. When prices increase, the expected real wage decreases. In consequence, labour demand curve shifts to $N_D(P_2)$. With this shift in labour demand curve, labour market reaches equilibrium at wage W_2 and employment remains at the initial level of N_0. In the final analysis, monetary expansion results in wage rise from W_0 to W_2 but employment remains unaffected at N_0.

What happens in the product market? With employment level remaining saturated at N_0 and other things remaining the same, output remains unaffected. As shown in panel (a) of Fig. 20.9, monetary expansion shifts the aggregate demand AD_{NC0} to AD_{NC1}, and leftward shift of labour supply curve from $N_{S(NC0)}$ to $N_{S(NC1)}$ shifts the aggregate supply curve from AS_{NC0} to AS_{NC1}. These shifts settle the product market equilibrium at E_2 which gives equilibrium output at its initial level, Y_0, though prices rise to P_2. In conclusion, the monetary expansion does not influence output and employment levels—it results only in inflation. This analysis vindicates the new classical view that, *in the short run, expansionary monetary (or fiscal) policy does not influence the real output and employment. They only push wage and prices up.*

(ii) Unemployment is not involuntary—it is voluntary. In the Keynesian view, a major part of unemployment during recession is *involuntary.* On the contrary, new classical economists believe that *there is nothing like involuntary unemployment* because 'the market for labour is always cleared.'[24] The radicals insist that the phrase 'involuntary unemployment' be discarded in all 'serious thinking about the actual options unemployed people are faced with.'[25] In their view, unemployment, if any, especially of non-frictional nature, *is mostly voluntary*. They argue that if people are unemployed, they are unemployed not because they are *not getting jobs* but because they are looking for *better jobs*. In their own words, "Measured unemployment (more exactly, its non-frictional component) is ...viewed as consisting of persons who regard the wage rate at which they could be currently employed as temporarily low and who therefore choose to wait or search for improved conditions rather than invest in moving or occupational change."[26]

(iii) There is no trade-off between inflation and unemployment The relationship between inflation and employment has been one of the widely contested issues in macroeconomics. One of the most prominent views on this issue is represented by the Phillips curve, constructed by A. W. Phillips[27] on the UK data. The Phillips curve proves that *there is a stable inverse relationship between the inflation rate and the unemployment rate*. This relationship between inflation and unemployment implies that there is a *trade-off* between inflation and unemployment. This proposition supports the Keynesian theory. Lucas and Sargent 'made it central to their attack on Keynesian economics.'[28] They argue that there is *no trade-off between the rate of inflation and the unemployment rate.* They produced a new classical Phillips curve which is *vertical.* The vertical Phillips curve is based on the classical reasoning that, in the long run, the economy is always at full employment level. In new classical view, therefore, there is no trade-off between inflation and unemployment rates.

Policy Implications The new classical macroeconomic propositions yield two radical policy implications in sharp contrast with the Keynesian and monetarist policy prescriptions.

(i) A policy change must come as a surprise to the people. According to radicalists, systematic fiscal and monetary changes can be anticipated by the people well in advance, especially if prices and wages are flexible. Therefore, households, firms and labour adjust their demand and supply

24. Alessandro Vercelli, *op. cit.*, p.131.
25. Blinder, A. S., *Macroeconomics Under Debate* (Harvester Wheatsheaf, NY, 1989), p.118.
26. R. E. Lucas and T. J. Sargent (eds), *Rational Expectations and Econometric Practice,* Allen and Unwin, London, 1981, p.42.
27. A. W. Phillips, "The Relation between Unemployment and the Rate of Change in Money Wages in the United Kingdom—1861-1957," *Economica,* November, 1958
28. Blinder, A. S., *op. cit.,* p.120.

plans well in advance to the expected situation and hence policy changes become ineffective. This is called **policy ineffectiveness theorem.** The theorem reads "With rational expectations and flexible prices and wages, anticipated government policy cannot affect real output and employment.[29] Therefore, policy measures must come as a surprise to the people.

(ii) Discretionary changes in policy must be avoided. The new classical macroeconomists argue that discretionary policy changes are 'predictable' and private sector can forecast the future economic scene better than the policy-makers. Therefore, private sector buyers and sellers adjust their purchase and sale plans so as to ward off the expected adverse effects of the discretionary policy. In radicalists' view, discretionary policies not only leave the output and unemployment unaffected but also cause market distortions.

Concluding remarks. The advent of new classical macroeconomics has tended to upset the apple cart of the Keynesians and, to a great extent, also of the monetarists. However, 'new classical macroeconomics was not favourably received by mainstream macroeconomists.' The debate continues mainly between the neo-Keynesians and new classical macroeconomists. However, the support for new classical macroeconomics is increasing, perhaps, because of neatness of the new classical model. However, the Keynesians hold the ground firmly. As Solow has remarked, it is "much too early to tear up the *IS-LM* chapters in the text books of your possibly misspent youth."[30]

20.5 THE SUPPLY-SIDE ECONOMICS

The **supply-side economics** is the most recent macroeconomic thought. It has added a new dimension to macroeconomic thoughts as it has shifted the emphasis from demand side to supply side. Recall that both Keynesian and monetarist macroeconomists concentrate on the demand-side analysis of the market system and they stress on demand management to fight inflation, stagflation, recession and unemployment. Supply side of the market and supply management were almost totally ignored by them and demand management in macroeconomic policy was overly emphasised. In fact, the mainstream macroeconomics is virtually the **demand-side macroeconomics.** A group of economists argued successfully that *supply management* is more effective than demand management in fighting inflation and unemployment. They were therefore called 'supply-siders' and their thoughts as 'supply-side economics.' Supply-side economics attracted much attention and reached its pinnacle during the 1980s when policy formulations of supply-side economics were adopted by the British Prime Minister, Margaret Thatcher, during 1979-90 and by the US President, Ronald Reagan, during 1981-89. The main proponents of the supply-side economics are Arthur B. Laffer, the most famous of all, Paul Craig Roberts[31] and Norman Ture.

Supply-siders built their thesis mainly on classical assumptions: (i) perfect competition, (ii) wage and price flexibility, (iii) upward-sloping supply curve, and (iv) the economy being in the state of full employment. Supply-siders argue that real output of an economy is determined in the medium term by the supply of real factors—labour and capital—and change in technology. Following

29. Samuelson P. A. and W. D. Nordhaus, *Economics, op. cit.,* p.614.

30. Robert Solow, "Alternative Approaches to Macroeconomic Theory : A Partial View," *The Canadian Journal of Economics,* August 1979.

31. An editorial writer for the *Wall Street Journal* and an Assistant Treasury Secretary during the first Reagan administration.

classical economics, supply-siders postulate: (i) labour supply has a positive slope, (ii) investment is the function of the interest rate, and (iii) interest rate is determined by the supply of savings and demand for investment funds. In line with the classical view, supply-siders advocate the case for a free-enterprise capitalist system with minimum government intervention. Supply-side economics is, in a way, resurrection of classical economics.

20.5.1 The Central Theme of the Supply-Side Economics

The central theme of the supply-side economics can be summarised as follows.

(i) Factor supply and technology determine medium term growth rate of output;
(ii) Factor supply is determined by *post-tax return* on saving, investment and work effort;
(iii) Excessively high rate of taxation reduces tax-revenue and factor supply, and prevents growth;
(iv) *Tax cut* is the most effective *incentives* for saving, investment and work effort; and
(v) Excessive control and regulation of business discourages investment and efficiency.

Policy implications of supply-side economics can be briefly stated as. Let us now look into the theoretical underpinning of major supply-side propositions listed above.

(i) Factor supply determines output growth. The logical basis of proposition (i) can be explained through aggregate supply (AS) and aggregate demand (AD) curves, as shown in Fig. 20.10. Supply-side economists argue that output is determined by factor supply (labour and capital) and technology. Both long-term and medium-term growth rates in output are determined by the growth in factor supply and change in technology. According to supply-side economists, given the factor supply and state of technology, the medium-term-aggregate-supply curve (AS) can be represented by a vertical line, as shown by AS_0 curve in Fig. 20.10. As a corollary of this, increase in factor supply and change in technology cause a rightward shift in the aggregate supply curve, say, from AS_0 to AS_1.

To carry on the analysis further, suppose that the initial AS and AD curves are given as AS_0 and AD_0, respectively, intersecting at point A. Thus, the medium-term level of output is determined at Y_0 with general price level at P_2. Let factor supply now increase and technology improve so that AS_0 shifts to AS_1, AD curve remaining the same. As a result, equilibrium point shifts to point B. With this shift in the AS curve, real output increases to Y_1 and prices fall to P_1. This presents the supply-siders' argument that, in medium term, growth in real output is supply-determined.

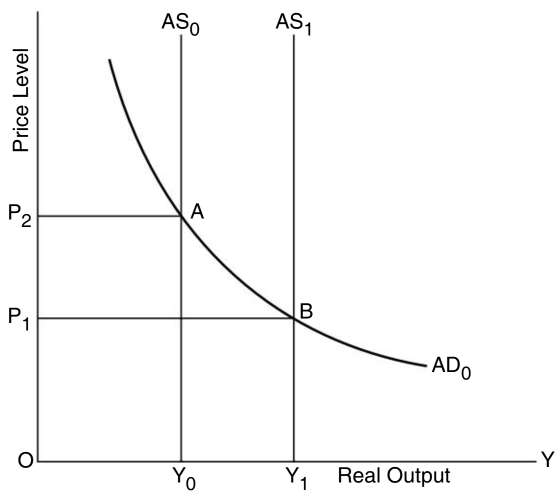

Fig. 20.10 Factor Supply and Output Growth

(ii) Tax cuts increase aggregate supply. Supply-side economists hypothesize that a tax reduction enhances *post-tax return* on labour and capital and, thereby, increases factor demand, both labour and capital. The increase in factor demand, given the factor supply, causes rise in factor prices. This causes increase in factor supply. The increase in factor supply shifts the aggregate supply curve rightward which means increase in output.[32] The effect of tax reduction on output is illustrated in Fig. 20.11. The aggregate demand curve is given by AD and vertical line AS_C represents the classical aggregate supply curve and also the potential output. The curves AD and AS_C intersect at point A determining the equilibrium level of output at Y_0. Suppose now that the government reduces income tax rate. As a result, incentive for work effort, saving and investment increases. Consequently, factor supply increases and AS_C shifts to AS'_C. With this shift in AS curve, equilibrium shifts to point C and output increases from Y_0 to Y_2. This, according to supply-siders, shows the effect of tax cut on the output.

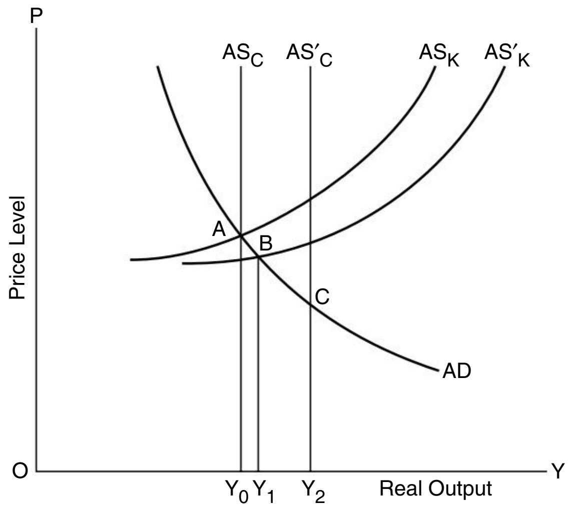

Fig. 20.11 The Effect of Tax Cut on Output

However, the effect of tax cut on the output depends on the nature of the AS curve. If AS curve is assumed to be of Keynesian type, as shown by the curves AS_K and AS'_K, the tax cut will make a marginal impact on the output. As shown in Fig. 20.11, tax cut shifts the AS curve from AS_K to AS'_K and equilibrium to point B. This shows only a modest increase in output by Y_0Y_1.

(iii) Tax rate determines the tax revenue: The Laffer curve. During the Keynesian era, most countries had adopted a taxation policy aimed mainly at raising revenue for public investment but, neither the policy-makers nor the economists were sure about the relationship between tax rates and tax revenue. A supply-side economist, Arthur B. Laffer, brought out this relationship in the form of a curve, called **Laffer curve.**[33] The Laffer curve suggests that raising tax rate up to a limit increases revenue, but beyond a limit it decreases tax revenue. The Laffer Curve is presented in Fig. 20.12. The curve labeled LC is the Laffer curve. As Fig. 20.12 shows, tax revenue increases till tax rate rises to H. It begins to decline when tax rate exceeds H and tax revenue decreases to zero when tax rate rises to 100 percent.

The Laffer curve is regarded as a very important contribution of the supply-side economics as it has a very important policy implication. It suggests that taxation should be only moderately high—so high that its revenue elasticity is approximately equal to 1. Raising tax rate beyond this point not only begins to yield revenue at a lower rate but also works as a disincentive for saving, investment

32. Supply-siders ignore the effect of tax-cut on the aggregate demand in their analysis. In their view, a tax cut increases household savings and business investment, not the household consumption. This view has however been strongly criticised. For a brief comment on supply-side economics, see W.J. Baumol and A.S. Blinder, *Economics : Principles and Policy, op. cit.,* pp. 236-37.

33. It is said that Arthur Laffer had supposedly drawn this curve first on a cocktail napkin in a Washington, D. C. restaurant.

and work effort and proves disastrous for the economy. The Laffer curve was initially drawn in reference to the US economy during the 1970s. Laffer and other staunch new classical economists believed that the US taxation had increased beyond the point *H* in Fig. 20.12. However, many other economists, including moderate new classical economists, believed that the US taxation rate had not gone beyond the point *H*. The empirical evidence in this regard is not conclusive.

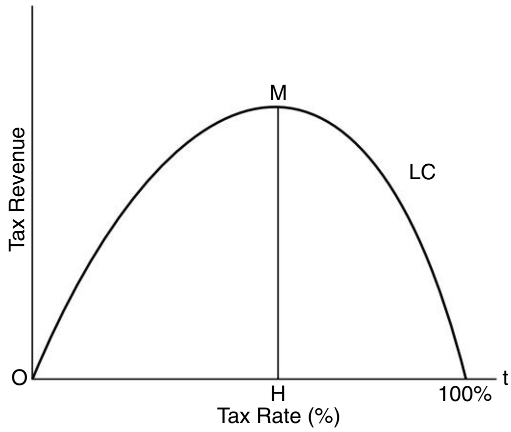

Fig. 20.12 The Laffer Curve

A Critical Evaluation. The 'Supply-side economics' was and still remains a controversial point of view. Supporters have touted it as a painless remedy to the economic problems of the US economy. Critics have derided it as wishful thinking and branded it "voodoo economics."[34] Impartial evaluators reveal the realities and myths of the supply-side economics. They say that supply-side economics has its own pros and cons.[35] Critics agree with the goals of supply-side programmes and tax cuts but they criticise supply-siders for exaggerating the benefits of tax cuts and for ignoring its undesirable effects on the economy. For instance, unemployment in Great Britain increased from 2.6 percent in 1970 to 3.8 percent in 1972. The British government adopted a fiscal expansionary policy including both tax cut and increase in government spending, with the objective of reducing unemployment rate. Unemployment did decline in Britain rapidly from 3.8 percent in 1972 to 2.6 percent in 1974. However, this gain of the expansionary fiscal policy was very short-lived. Unemployment shot back to 5.5 percent in 1976 and inflation rose from 7.1 percent in 1972 to 9.2 percent in 1973 and to 24.3 percent in 1975.[36]

The following are the major criticisms against the supply-side policy measures.

1. *Moderate supply-side effect.* If one goes by the US experience, tax cut brings about a moderate effect on output and employment, not as much as suggested by the supply siders. Tax cuts do not necessarily guarantee that people will work for more hours. Instead, they find it easier to maintain their consumption expenditure with less hours of work. "Most of the statistical evidence suggests that it is unrealistic to expect tax reduction to lead to substantial increase in either labor supply or household saving".[37] Therefore, the effect of tax cut on supply is only moderate.

2. *The effect of tax cut on aggregate demand ignored.* The supply-siders either ignored or underestimated the effect of tax cut on the aggregate demand whereas it does affect aggregate demand in a substantial way. A cut in personal income tax induces households to spend more on consumer goods and services and a cut in business tax encourages investment spending. In both

34. William J. Baumol and Alan S. Blinder, *Economics: Principles and Policies,* 4th Edn. (Harcourt Brace Jovanovich, NY, 1988), p.237.

35. For details, see Michael K. Evans, *The Truth About Supply-Side Economics* (Basic Books, NY, 1983).

36. Stiglitz, J.E. and Driffil, *Economics* (W.W. Norton & Co., London, 2000), p.470.

37. Baumol, W.J. and Blinder, A.S., *Economics: Principles and Policy, op. cit.,* 237.

the cases, the aggregate demand increases shifting *AD* curve rightward. Although supporters of supply-side economics argue that a cut in tax reduces the government expenditure and thereby the aggregate demand. In reality, however, especially in the US, the reduction in government spending was much smaller than the tax cut. This is what generally happens in most other countries because it is neither practically feasible nor economically desirable to cut government spending as much as the tax cut.

3. *Limited effect on inflation.* Supply-siders had suggested also the policies which were aimed at controlling inflation. But their policy measures have been found to have had a small effect on inflation. Instead, a policy measure like tax cut may even create inflationary conditions, as was experienced by Britain during the mid-1970s.

4. Adverse effect on income distribution. The supply-side policy measures have been found to have enhanced income inequality. The reason is that most supply-side measures like tax cut benefit the rich sections of the society more than the poor sections. This widens the gap between the incomes of the low-income and high-income households. As a result, supply-side policies tend to increase income inequalities.

5. Fall in tax revenue. Most supply-side policy measures relate to tax cut of one kind or another. This leads to loss of revenue and finally to budgetary deficits. Although Arthur Laffer, a staunch supply-sider, defended the tax cut by arguing that cutting tax rate increases tax revenue (as shown in Fig. 20.12), a vast majority of economists have found this claim to be 'implausible'.[38]

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38. Baumol and Blinder, *op. cit.,* p.240.

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QUESTIONS FOR REVIEW

1. What is monetarism? Describe the essence of monetarism and its assumptions. How does the causation process work from change in money supply to change in output?
2. What are the main monetarist arguments against the Keynesian views in respect of the main determinant of the levels of output and price level? Illustrate their arguments graphically.
3. What are the Keynesian arguments against the monetarist view that the quantity of money is the prime determinant of the output and price levels in short as well as long run?
4. Monetarists believe that 'only money works' and Keynesians argue that 'money does not work'. What do you think is the basis of the extremely opposite views held by the monetarists and the Keynesians?
5. What is meant by rational expectations? What is the difference between rational expectations and irrational expectations? Why is irrational expectation called 'backward looking?'
6. What is the central theme of the new classical macroeconomics? How does it differ from Keynesian and monetarist views on macroeconomic management?
7. Enumerate and explain the main propositions made by the new classical macroeconomists.
8. New classical macroeconomists are of the view that fiscal and monetary policies affect output and employment neither in the short run nor in the long run. Explain and illustrate this view of new classical macroeconomists.
9. Keynesians hold that, during the period of recession, unemployed persons are involuntarily unemployment. New classical macroeconomists claim that there is nothing like involuntary unemployment. What is the basis of this claims?
10. What are the main postulates of supply-side economics? How do they differ from the Keynesian postulates?
11. Discuss elaborately the central theme of supply-side economics. Is supply side economics theory or policy oriented?
12. What is supply-side hypothesis in respect of incentives and factor supply? Explain in regard to (i) tax cut and labour supply, and (ii) tax cut and growth of capital.
13. What is meant by Laffer curve? What are its policy implications?
14. Supply-siders' claim that tax cuts increase tax revenue is implausible. Explain and evaluate the statement.
15. Examine critically the supply-side economics and its applicability to economics facing the problem of recession and unemployment.

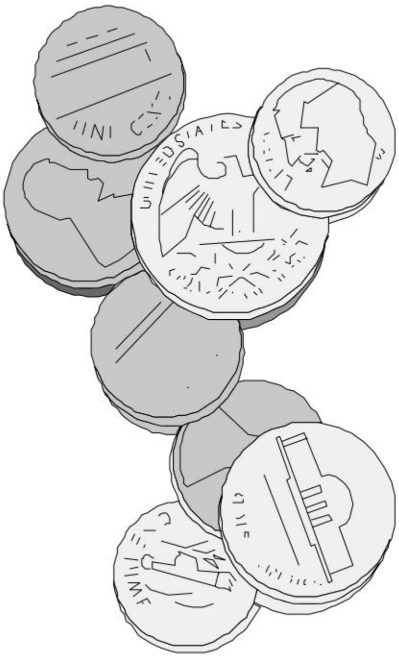
Part 6

Economic Growth and Business Cycles

We have so far dealt with purely theoretical aspects of macroeconomics. In this part of the book, we discuss two major aspects of macroeconomics which have serious empirical implications. These aspects are related to the problems of achieving and sustaining a reasonably high growth rate of economy and preventing the recurrence of business cycles. The growth related issues, in themselves, make a vast subject of study under a different branch of economics, called 'Economics of Growth'. However, our basic objective here is to present a brief discussion on the growth factors and the eminent modern theories of economic growth. Wherever there is growth, there are business cycles. In addition to growth theories, therefore, we discuss here also the theories of business cycles and the measures to stabilize the economy. We will substantiate our discussion on the theories of economic growth and business cycles with the practical problems faced by different countries during different phases of their economic growth.

Chapter 21

Theories of Economic Growth



INTRODUCTION

Achieving and maintaining a reasonably high rate of economic growth has been one of the most important objectives of most countries of the world, especially after the Second World War. While some countries—grouped as 'developed countries' (DCs)—did succeed in attaining and maintaining a high growth rate over a period of time, some other countries—known as 'less developed countries' (LDCs)—have achieved a low growth rate. For instance, during the 19th and the 20th centuries per capita *GDP* increased more than 16 times[1] in the US, more than 20 times in Japan, and about 25 times in Norway. On the other hand, Ghana had nearly zero growth in its per capita *GDP* during this period[2]. According to available data[3], India too had an almost zero percent growth in its per capita *GDP* in the first half of the 20th century – from 1910 to 1950. However, the economic growth rate in DCs has declined during the past three decades[4] whereas it has increased in the LDCs. As shown in Table 21.1, the per capita *GDP* growth rate in DCs has not only declined but also is much lower than that in the erstwhile less developed countries (LDCs).

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1. Between 1870 and 1999, the US national income had grown at an annual average rate of 3.5 percent and per capita income at an annual average rate of 1.8 percent – per capita income doubling every 40 years. (Froyen, *op. cit.*, p. 431).
2. See, Dornbusch, *et. la., op. cit.,* (2004), p. 53-54.
3. For details, see Angus Maddison, *Monitoring the World Economy: 1820-1992* (Paris, Organization for Economic Cooperation and Development, 1995).
4. In fact, in 2008–09, all the DCs had negative growth rate due to global recession.

Table 21.1 Per Capita GDP Growth Rate in Some DCs and LDCs

Country	*Growth Rate (%)*	
	1970-1990	*2004-05*
United States	2.9	2.5
Germany	2.2	0.9
France	2.4	0.9
UK	2.9	1.2
Italy	2.9	0.2
Canada	2.4	2.0
Japan	4.2	2.6
India	4.4	7.1
China	7.0	9.2

Source: World Development Reports. Figures for 2004-05 obtained from World Development Report – 2007. Table 1. Key Indicators of Development, pp. 288–89.

For example, during the period. 1970-90, the US had a real *GDP* growth rate of 2.9 percent, Germany 2.2 percent, France 2.4 percent, UK 2.9 percent, and Italy 2.9 percent, whereas India had a real *GDP* growth rate of 4.4 percent and China had a growth rate of 7 percent[5]. More importantly, the former Soviet Union had a negative growth rate of (–)5.7 percent[6] in its per capita *GDP* during 1988–1998 (over the period of one decade). What is more surprising, the US economy—the richest economy of the world—is currently facing economic recession—its *GDP* growth has come down to 1.2 percent in 2008. On the other hand, the erstwhile LDCs, India and China, continue to grow at a very high growth rate of 9 percent and 11 percent, respectively. However, according to WB Report "Global Economic Prospects -2008", the global growth is likely to slow down in 2008—global GDP growth rate is predicted to decline from 3.6 percent in 2007 to 3.3 percent in 2008. Similar projections were made by the IMF, the UN and other international bodies for 2008. However, they have been revising their growth projections downward for 2009. For instance, in December 2009, the IMF predicted negative growth rate for most DCs—for US (– 1.6%), UK (– 2.8%). Japan (– 2.6%), Germany (– 2.5%) and Euro Area (– 2.0%)—for the year 2009.

This kind of growth and depression scenario raises certain questions:

- What factors determine the economic growth of a country?
- How do the growth factors contribute to economic growth?
- Why do some economies succeed in achieving a higher growth rate than others?
- What determines the limit of economic growth of a country?
- What factors are responsible for economic recession or depression?

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5. GDP growth data from CMIE, *World Economy and India's Place In It*, October 1993, Table 7.1,

6. Angus Maddison, *The World Economy: A Millanial Perspective* (Paris: Organization for Economic Cooperation and Development, 2001). Quoted in R. Dornbusch, *op. cit.* (2004), p. 78.

The growth economists have attempted to answer these questions and, in the process, have developed theories of economic growth. This chapter presents a brief discussion on the sources of economic growth and some modern growth theories.

21.1 THE MEANING OF ECONOMIC GROWTH

Economic growth is generally defined as a sustained increase in per capita national output over a long period of time. It implies that for economic growth of a nation, the rate of increase in its total output must be greater then the rate of population growth. It may be asked here 'Is there no growth in a country where nation's output and population increase at the same rate so that per capita output remains constant? And, is there growth in a country where both output and population decrease—output decreasing at a lower rate than population—so that per capita output increases? The answer to these questions is certainly in negative. For, if output and population grow at the same rete, there would be no increase in per capita income, and there would be no improvement in the general standard of living, despite increase in the output. Such a growth is considered to be as good as stagnation in the economy.

On the other hand, increase in per capita income as a result of a faster decrease in population than the decrease in output amounts to general decay in the economy: there is no growth despite per capita increase in income. Thus, economic growth implies increase in per capita income along with increase in population.

Another feature of economic growth is that the national output should be composed of goods and services that satisfy the maximum number of wants of the people. Also, increase in national output must be sustained over a long period of time. This is an important condition of economic growth. Short-run increase in output in one period followed by a similar decrease in it in the next period does not mean economic growth. Note that seasonal, occasional or cyclical increase in output does not satisfy the conditions of sustained economic growth.

21.2 FACTORS IN ECONOMIC GROWTH

The views of economists on growth factors have been changing with the change of time and emergence of new factors of economic growth. Briefly speaking, the classical economists, especially Adam Smith and David Ricardo, had used only three factors in their growth theories and also in their production function. These factors are identifies as **land, labour,** and **physical capital**. The later developments in production and growth theories identified certain invisible factors that contribute to the growth of output, often more than the physical factors—land, labour and physical capital. The invisible or non-physical factors that often figure in modern theoretical discussions are **human capital, technological change** and **institutional change**. In this section, we will discuss the role of both physical and non-physical factors in economic growth.

21.2.1 Land as a Growth Factor

Land as a growth factor and also as a factor of production refers to all the '**natural resources**' of a country. The term 'land' in this sense includes arable land, plain land surface, fertility of soil, water resources, forests, underground resources (minerals), topography, climate, weather conditions, and rainfall. In economic growth analysis, land has always been considered as a very important factor. However, "In the [modern] production-function approach to the analysis of the sources of growth, land as a separate factor of production tends to be assumed away or subsumed into capital. There are two reasons for this. The first is the traditional classical notion of land as a fixed factor of production, which in the long-run is undoubtedly true. The second is the practical fact that land without the application of capital is of little use..."[7]

Nevertheless, a vast area of fertile land endowed with adequate supply of water, large deposits of minerals, and favourable climatic conditions help economic growth of a country in many ways.

One, apart from air and water, fertile land is the most important source of food, the basic need of human life. Countries having fertile land with plain surface of land, suitable for cultivation, are able to produce sufficient food for their population. Countries not having this quality of land, for example, Saudi Arabia and other Middle East countries depend on imports for their food requirement. They have to spend a considerable part of their export earnings on food imports.

Two, land endowed with vast area of natural resources is the richest *source of industrial raw materials*. The experience of industrially advanced countries today reveals that industrial growth is a necessary condition for the economic growth and development of a country. A large number of industries are based on raw materials available in a country. For example, all agro-based industries like sugar, coffee, cocoa and tea, textile (cotton, silk, woollen and jute) industries are based on agricultural raw materials. Leather, rubber, furniture and cement industries are based on direct produce of land. All mineral-based industries, like steel, copper, aluminium, zinc, bauxite, oil and natural gas, etc. depend on the new materials produced from land. The development and growth of these industries depends on the availability of their raw materials.

However, the availability and usability of the natural resources depends on the availability and use of capital and technology.

21.2.2 Labour as a Growth Factor

If mother nature is the source of all life-support systems, labour is the father of all usable goods. The extent to which natural resources can be harnessed and goods and services produced depends on the number of hands that can be put to work and the number of hands depend on the population of the country. Growth of population results in the growth of labour force. And, labour force has proved historically a positive factor in the early stages of economic growth. Countries with shortage of labour, e.g., Middle East countries, have to meet about 30 percent of their demand for labour through labour imports from abroad. Now, countries like the US and the UK have to rely heavily on migrant labour.

However, population beyond its optimum level is a big obstacle to economic growth as is the case in India today. For example, India has the second largest population of 1.11 billion (2005-06)—first being China with about 1.31 billion population. India's excess population has proved a big barrier in economic growth of the country.

Labour as a means of production has two aspects—*number* and *quality*. The numerical aspect of labour refers to its physical form, the natural or crude form of labour. The quality of labour refers to the skill and training ingrained in labour. The qualitative aspect of labour is called 'human capital'. The role of human capital is discussed below in detail.

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7. Thirlwall, A.P., *Growth and Development* (ELBS/Macmillan, London, 1983) p. 91.

21.2.3 Capital as a Growth Factor

The term 'capital' is used in both a narrow sense and a broad sense. In narrow sense it refers to only productive assets which produce goods and services directly, like machinery, tools, equipments, and building. In broad sense, capital means all 'man-made means of production'. The man-made means of production can be classified under three categories: (i) physical capital (machinery, equipments, etc.) (ii) social overhead capital, and (iii) human capital. ***Physical capital*** includes tools and equipment, machinery, building and plant, etc. The ***social overhead capital*** includes educational institutions (schools, colleges universities, research and training institutions) dams, bridges and canals, electricity generation plants, telecommunication equipments, roads, railways, airports, seaports, planes, ships, trucks and buses, etc. ***Human capital*** refers to educated and skilled manpower. It improves the technique of production through innovations and inventions which convert improbables into probables. Human capital aspect has been discussed below in detail.

Capital contributes to economic growth by increasing labour productivity per unit of time. That is why, perhaps, the early development economists considered capital as the single most important factor in the economic growth of a country. The post-War-II experience of many underdeveloped countries, however, shows that *capital formation is only a necessary condition, not the sufficient condition of economic growth*. The growth rate of saving and investment is no doubt a very strong indicator of capital accumulation. However, if one examines the growth rate of savings and investment over the past half-a-century, one will find that the rate of saving and investment has increased considerably in the LDCs but their growth rate does not commensurate with their rate of saving and investment. In India, for example, the percentage of 'gross fixed capital formation' to GDP increased from about 5 percent[8] in the early 1950s to about 20 percent[9] in the early 1980s. This shows a 4 times growth in 'gross fixed capital formation'. During this period, however, economic growth rate was only 3.4 percent, what is sometimes referred to as 'the Hindu-growth rate'. The economic growth rate in India, however, rose to 5–6 percent in the 1980s and 1990s, due mainly to *economic liberalization*. The GDP growth rate in India was 9 percent in the first half of 2008. Due to the impact of global recession, however, India's GDP growth rate declined to about 5% by the end of 2008. Nonetheless, capital formation is undoubtedly an important determinant of economic growth.

21.2.4 Human Capital as a Growth Factor

The knowledge and skill embedded in human beings is called *human capital*. *Human capital includes the stock of knowledge and skill, people's ability to think, perceive, conceive and create new ideas and thoughts, their capability to discover, invent and innovate, and their ability to convert the ideas and the thoughts into productive physical assets (i.e. the physical capital), and to devise a system of reorganizing labour and capital which can enhance productivity of both labour and capital*. To the knowledge part of human capital may be added the mental and physical health of the labour force. Human capital is developed by (i) formal and informal education, (ii) on-job training and apprenticeships, and (iii) health services. Of these, education, in broad sense of the term, is most important element of human capital formation.

8. According to the First and Second Five Year Plans.

9. According to *Economic Survey*, 1997–98 (Statistical Appendix, Table 1.5).

Human capital plays the most important role in economic growth. Economists right from the early days recognized knowledge, the mental power, of human beings, as the most important factor in human survival and its material prosperity. As mentioned above, for over two decades in post-War II period, most development economists considered physical capital formation as the main factor in economic growth. This approach to development was based largely on the experience of the developed countries, in the early stages of their economic development. But a closer look at the growth process in the developed countries and the experience of the LDCs in the post-War II period has demonstrated that human capital formation—not physical capital formation—is the key to rapid and sustained economic growth. As Todaro has observed, "Most economists would probably agree [today] that it is the human resource of a nation, not its capital or its material resources, that ultimately determines the character and pace of the economic and social development.[10] Fredrick H. Harbison puts it very succinctly: "Human resources constitute the ultimate basis for wealth of nations. Capital and natural resources are passive factors of production [whereas] human beings are the active agents who accumulate capital, exploit natural resources, build social economic and political organizations, and carry forward national development".[11]

More significantly, while natural resources (land, labour and mines), and physical capital are subject to diminishing returns, ***human capital is subject to increasing returns***. In the words of Alfred Marshall, "[while] nature is subject to diminishing returns, man [his knowledge] is subject to increasing returns… Knowledge is our most powerful engine of production; it enables use to subdue nature and satisfy our wants."[12] Just as land provided with fertilizers and irrigation produces more than its natural capacity or productivity, labour with education and training in the use of tools and equipment produces more than what it could otherwise.

Human Capital and Economic Growth: Some Empirical Evidence Statistical investigations reveal that output in developed countries has increased at a much higher rate than can be explained by the increase in labour and capital inputs. The "residual" difference between the rate of increase in output and the rate of increase in physical capital and labour can be attributed to many unidentified factors of which the qualitative improvement in inputs is prominent. But qualitative improvement in labour input is most significant.[13] The developed countries have had grown at a high rate because, among other things, human capital formation in these countries has been much faster than the physical capital formation. In the United States, for example, "the stock of human capital increased at a rate that exceeded by wide margin the rate at which the stock of reproducible material capital had increased".[14]

10. Todaro, Michael P., *Economic Development in the Third World*. (Orient Longman, Hyderabad, Indian Edn., 1993), p. 330.

11. Frederick H. Harbison, *Human Resources as the Wealth of Nations* (Oxford University Press, New York, 1973), p. 3, quoted from Todaro, M.P., *op. cit.*

12. Meier, Gerald M., *Leading Issues in Economic Development* (Oxford University Press, New Delhi, 1995), p. 265.

13. For empirical evidence on contribution of education to productivity based on the experience of different countries, see *World Bank Development Report*, 1990, pp. 80–81.

14. Schultz, T.W., *The Economic Value of Education*, (Columbia University Press, New York, 1964), p. 11. For an emperical estimate of relative contribution of *capital* and *human capital* to economic growth of the US, see Appendix to this chapter.

Some economists have attempted to measure the proportion of the *GNP* that can be attributed to human capital. Edward F. Denison has estimated, for the US economy, the return on education and physical capital per person employed by using Cobb-Douglas type of production function. Denison concluded that, during the period from 1929 to 1957, education and skill contributed to the *GNP* of the United States at an annual average rate of 0.67 per cent while the increase in the quantity of physical capital employed per person contributed only 0.15 per cent annually.[15] According to Denison's estimate, the contribution of education and skill to economic growth was nearly 4.5 times greater than that of the physical capital. Robert M. Solow has estimated the share of human capital and that of the physical capital in the total national product of the United States, assuming a linear homogeneous production function. According to his estimates, 87.5 per cent of increase in national output during 1909–49 was attributable to the increase in human capital. It is for this reason that, in recent times, the emphasis has shifted from physical capital formation to human capital formation. "Many studies of farm productivity, family enterprises and wage earners have demonstrated the [substantial positive] effects of education on output and productivity" and "virtually all studies on agricultural productivity show that better-educated farmers get a higher return on their land."[16]

21.2.5 Technology as a Growth Factor

Francis Stewert[17] defines 'technology' as all the "skills, knowledge and procedures for making, using and doing useful things". Technology so defined includes, in general, the following aspects.

- Innovating a product (product technology),
- Designing a technique of production (production technology)
- Devising a system of organizing labour, machinery and production (management technology), and
- Organizing sales (marketing technology), and so on.

Technical progress is a continuous process and the result of people's endeavour to achieve a larger output from the given resources.

"Many economists claim (though the view has its critics) that technical change is the most powerful and most dependable engine of economic growth in the developed countries, and is also very important in the performance of the most successful LDCs. Technical improvement, they argue, is a major cause of higher productivity which in turn is key to economic growth".[18] Technological progress contributes to economic growth in the following specific ways.

15. Edward F. Denison, *The Sources of Economic Growth in the United States and the Alternative before the US*, Supplementary Paper No. 13, published by the Committee for Economic Development, New York, 1962.

16. World Bank, *World Development Report*, 1990, p. 80 (Box 5.2). For international comparison of productivity of human capital see N. Gregory Mankiw, David Romer and David N. Weil, "A Contribution to the Empirics of Economic Growth; *Quarterly Journal of Economics* (May 1992).

17. In his *Technology and Development* (ed.), 2nd Edn. (Macmillan, London, 1977), pp. 1–3, reproduced in G.M. Meier, *Leading Issues in Economic Development op. cit.*, pp. 368–71.

18. Jan S. Hogendorn, *Economic Development* (Harper Collins, New York, 1996), p. 242.

(i) Increase in factor productivity Technological improvement increases productivity of both labour and capital per unit of time. For example, given the total cost of capital and labour, a power-driven loom produces more meters of cloth than a man-operated loom per unit of time, and an engine-operated boat covers a longer distance than a hand-rowed boat. One important example of technological breakthrough was made in 1960 by the agricultural scientists of International Rice Research Institute in the Philippines, in the field of rice production. The scientists invented a new seed of *rice IR-8*, commonly known as 'miracle rice'. This new seed combined with other scientific improvement helped many South-East countries to double and triple their rice production per hectare over a period of few years.[19]

(ii) Technical progress saves cost Technological progress reduces the waste of inputs and raw materials. For example, construction of a building with antiquated labour-intensive technology requires more of both labour and construction material due to wastage. Modern construction technology, on the other hand, uses less labour and materials for a given size of building. This reduces the cost of production.

(iii) Technical progress saves space Technological improvement saves space which is becoming now rare and costly. For example, old computer machines which occupied a wide area—almost an entire building—can now be installed on a table top or on the lap top. The internet technology has brought a revolution in space saving and information technology.

21.2.6 Government and Economic Growth

Since Keynesian Revolution in the late 1930s, the economic role of the government has increased tremendously. The growth of the government's role has proved to be both a positive and a negative factor in the process of economic growth and development. Whether the government plays a positive or a negative role in economic development of a country has been a controversial issue. However, even the most ardent critics of the government's economic role agree that the government can play and, in fact, has played, a very significant role in the process of economic growth and development of a country.

The major areas in which the governments have contributed significantly in the process of growth and development can be classified under two broad categories. (a) building of social overhead capital, and (b) promotional roles.

Social overhead capital plays a significant role in economic growth of a country. In fact, it provides a foundation for economic growth. **Building social overhead capital** is one of the important areas in which the governments have made significant contributions to economic growth. The social overhead capital, also called as 'social infrastructure', can be defined as all man-made means of production which are used directly or indirectly in the process of production. Social overhead capital includes:

- means of transport (including roads and bridges, railways, airports, seaports, etc.),
- means of communication (including postal services and telecommunication network),
- educational institutions (including schools, colleges, universities, research institutions and training centers),

19. Quoted in Michael P. Todaro, *op. cit.*, p. 119.

- means of irrigation (e.g., dams and canals),
- electricity generation plants and distribution networks,
- health-care system (hospitals and primary health centres),
- supply of drinking water, and sewage and sanitation system.

The social overhead capital enhances the efficiency of individuals, firms and of the society. An efficient transport and communication system stimulates economic activities by making product and factor markets work more efficiently and by reducing cost of production. For example, according to Rostow,[20] railroad worked as 'the leading sector' in economic "take-off" of many developed countries including the United States, Canada, United Kingdom, France, Germany and Russia. The spread of rail-road network makes the distant areas of the market easily accessible for the producers. The expansion of road transport played an important role in economic development of developed countries. It increases mobility of labour and other factors of production and increases interaction between the demand side (the buyers) and the supply side (the producers) of the market.

The need for public investment in social overhead capital arises because private sector capital does not flow to this sector for the following reasons.

(i) It requires heavy investment which private sector can hardly afford;
(ii) Rate of return is low and slow;
(iii) It has a long gestation period; and
(iv) Social overhead capital is of public good nature which causes problems in pricing.

To sum up, government plays an important role in economic growth by way of building necessary and adequate social overhead capital, developing infrastructure, playing a complementary role where private venture is lacking, by developing and maintaining an efficient financial infrastructure and system, and by protecting the domestic industries against foreign competition in both domestic and international markets.

It may be finally added that whether a government helps or hinders economic growth of the country depends on the efficiency of the government, appropriateness of its economic policies, and honest and efficient administration. An inefficient, corrupt and dishonest bureaucracy can do more harm than good to the growth process, as is the case in India. According to a Survey conducted in 2009 by a Hong Kong based Political and Economic Risk Consultancy, India's bureaucracy is the 'least efficient' in 12 Asian economies—China ranked at 9th place. Singapore has been placed on the top of the bureaucracy efficiency ranking.

21.2.7 What Matters Most?

We have discussed above the factors that contribute to economic growth of a country. The question that one may ask here is: What factor or factors matter most in economic growth? All the factors noted above have an important role to play. But their relative importance varies from time to time. However, the economists have identified three most important factors of economic growth, viz., (i) labour, including both quantity and quality, (ii) capital formation, and (iii) human capital formation.

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20. Rostow, W.W., *The Stages of Economic Growth*: *A Non-Communist Manifests* (Cambridge University Press, London), 1960.

This has been proved by empirical facts. For example, there was unprecedented growth in a group of Asian countries, called Asian Tigers—Hong Kong, Singapore, South Korea and Taiwan—during the period from 1966 to 1990. Their per capita real income had grown at an annual average rate of 7 percent, converting the poorest countries into the richest ones. Research findings have shown that this growth was the result of the three factors mentioned above. So is the case with the Indian economy. The growth of capital formation, from 24 percent of *GDP* in the 1990s to 34% in 2007–08, and about 15% growth in human capital formation have pushed up India's *GDP* growth from about 4.5% to 9% during this period. One can find many such other examples. That is why, perhaps, most modern growth theories are based on these factors of growth, as we will see in the subsequent sections of this Chapter.

21.3 PRODUCTION FUNCTION AND GROWTH ACCOUNTING

Economic growth is measured by the rate of increase in national output, *GDP*. The output depends on inputs[21]—labour, capital, technology, etc. The theories of economic growth bring out how and to what extent each input or factor contributes to the growth process. For understanding growth theories, therefore, it is important to understand how the relative share or contribution of each factor to the growth of output is determined. The answer to this question is provided by the ***production function***. In fact, theories of economic growth use production function to explain the process of economic growth, some economists call it '***growth accounting***'. This section presents a brief discussion on *production function*, and illustrates how it helps in measuring the relative contribution of the growth factors, the inputs

The production function used widely in growth analysis is of the following form.

$$Y = f(L, K, T) \qquad \textbf{(21.1)}$$

where Y = total output, L = labour, K = capital and T = technology.

From the economic growth accounting point of view, Y refers to national output (*GDP*), L to aggregate employment of labour, K to the national stock capital, and technology (T) assumed to remain constant.

To begin the analysis of growth accounting, let us assume Cobb-Douglas type of *linear homogenous production function*. A linear homogenous production function, also called *homogenous production function of degree 1*, is one in which all the inputs (L and K) increase in the same proportion, and this proportion can be factored out. Given these conditions, the production function (21.1) can be expressed as

$$kY = f(kL, kK)$$

or

$$kY = k(L, K) \qquad \textbf{(21.2)}$$

21. In the context of economic growth, 'inputs' are same as the determinants of economic growth. However, while some growth factors are quantifiable and change over time, some factors are non-quantifiable, and some remain constant over time. The economists have developed their growth theories specifically in terms of quantifiable and variable factors. Therefore, the term 'inputs' refers here only to three basic inputs—labour, capital and technology—technology often assumed to be given.

In Eq. (21.2), 'k' is a constant showing a proportional increase in the variables—Y, L and K. It shows constant returns to scale.

A linear homogenous production function of degree 1, as given in Eq. (21.2), shows *constant returns to scale*, i.e., production increases at a constant rate equal to a certain proportionate increase in inputs—labour and capital. For example, if both L and K are doubled, then total production, Y, is also doubled. In that case, production function (21.2) can be written as

$$2Y = f(2L,\ 2K)$$

or

$$2Y = 2(L,\ K) \tag{21.3}$$

From the growth accounting point view, estimation of the relative share of labour and capital in output growth ($\Delta Y/Y$) is required.

In case labour and capital are increased at different rates, the relative share of L and K in income growth rate ($\Delta Y/Y$) can be estimated as follows.

$$\Delta Y/Y = \alpha \cdot \Delta L/L + (1 - \alpha)\ \Delta K/K \tag{21.4}$$

where α denotes the share of L and $1 - \alpha$ denotes the share of K in total input, and $\alpha + (1 - \alpha) = 1$.

Equation (21.4) gives the measure of the contribution of labour and capital, given their relative share in output growth ($\Delta Y/Y$). For a numerical example, suppose, labour growth ($\Delta L/L$) is 3 percent, capital growth rate ($\Delta K/K$) is 5 percent and $\alpha = 0.75$. Then Eq. (21.4) can be written as

$$\begin{aligned}\Delta Y/Y &= 0.75\,(3) + (1 - 0.75)\ 5\\ &= 2 \cdot 25 + 1.25 = 3.5\end{aligned}$$

Given the parameters, the *GDP* growth rate ($\Delta Y/Y$) turns out to 3.5 percent of which 2.25 percent is the share of labour and 1.25 percent is the share of capital.

In addition to the growth resulting from increase in L and K, there is another factor that adds to growth rate, i.e., the *total factor productivity*, measured as $\Delta T/T$. The ***total factor productivity*** is the increase in total production due to improvement in ***technology***, all other inputs remaining the same. We have so far assumed technology to be given. Let us now suppose that production technology is improved over time along with increase in L and K. It implies that technological improvement contributes to growth rate of output in addition to growth resulting from increase in L and K. With addition of change in technology ($\Delta T/T$), the Eq. (21.4) takes the following form.

$$\Delta Y/Y = \alpha \cdot \Delta L/L + (1 - \alpha)\ \Delta K/K + \Delta T/T \tag{21.5}$$

Suppose *technology productivity* is estimated to be 1.0 percent, i.e., $\Delta T/T = 1$. Then growth rate can be estimated by applying Eq. (21.5) as

$$\begin{aligned}\Delta Y/Y &= 0.75 \cdot 2 + (1 - 0.75)2 + 1.0\\ &= 4.5 \text{ percent}\end{aligned} \tag{21.6}$$

Thus, with addition of *total factor productivity*, *GDP* growth rate rises from 3.5 percent to 4.5 percent. This gives an idea of ***growth accounting***. The decade-wise growth accounting of the US economy for the second half of the 20^{th} century is given in the ***Appendix*** to this chapter.

21.4 THEORIES OF ECONOMIC GROWTH: AN OVERVIEW

Having described the meaning and use of growth accounting, we will now discuss the main theories of growth. Before we proceed to discuss the major theories of economic growth, let us have a glance at the emergence and growth of the theories of economic growth.

The origin of economic growth theories can be traced back to Adam Smith's *Wealth of Nations.*[22] In Simth's view, economic growth of a nation (strictly speaking, growth of national wealth) depends on the 'division of labour' and specialisation, and is limited by the limits of 'division of labour'. Smithian view was later succeeded by growth theories of Ricardo, Malthus and Mill. The growth theories suggested by these great economists are collectively known as the 'classical theory of economic growth'. In the later part of the 19th and the early 20th centuries, there appeared the Marxian theory of historical growth and Schumpeter's growth theory of 'technological innovations'. But, all these theories of growth were not of great significance. It was only after the Great Depression, i.e., during the 1930s and 1940s, that R.F. Harrod and E.D. Domar developed a path-breaking theory of economic growth, popularly known as Harrod-Domar growth theory. Since the mid-fifties, a number of other significant contributions[23] were made to the theory of economic growth. Called collectively as 'neo-classical theory of economic growth'. In late 1980s, however, Paul Romer and Robert Lucas developed a new theory of growth called *Endogenous Growth Theory*—a theory more relevant to modern conditions. Of all the theories of economic growth mentioned above, we will discuss here only three most important modern theories of economic growth, viz., Harrod-Domar theory, the neo-classical theory of economic growth and the endogenous theory of growth. The reason for omitting other theories[24] is that they have little relevance to the modern economic growth. Harrod-Domar and neo-classical growth theories, on the other hand, have a high analytical power to explain modern economic growth.

21.5 HARROD-DOMAR MODEL OF GROWTH

Harrod-Domar growth model is essentially an extension of Keynesian short-term analysis of full employment and income theory. The Harrod-Domar model provides 'a more comprehensive long period theory of output'. R.F. Harrod and E.D. Domar had, in their separate writings[25], identified the conditions and requirements of steady economic growth and developed their own models.

22. Adam Smith, *An Enquiry into the Nature and Causes of Wealth of Nations*, 1776, edited by Edwin Cannan (New York, Random House, 1937).

23. The most significant ones are R.M. Solow's, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics,* Feb. 1956; J.E. Mead's, "A Neo-classical Theory of Economic Growth" (Oxford University Press, 1961); E.S. Phelps', "The New View of Investment: A Neo-Classical Analysis," *Quarterly Journal of Economics*, November 1962, and H.G. Johnson's "The Neo-Classical One-Sector Model: A Geometrical Exposition and Extension to a Monetary Economy," *Economica,* August 1966.

24. A brief exposition of classical and other growth theories can be had from F.H. Hahn and R.C.O. Mathews, "The Theory of Economic Growth: A Survey," *Economic Journal,* December 1964. For detail, see Benjamin Higgins, *Economic Development* (Central Book Depot, Allahabad, 1961).

25. Roy F. Harrod, "An Essay in Dynamic Theory," *Economic Journal,* March 1939, and Evsey D. Domar, "Expansion and Employment", *Am, Eco. Rev.,* March 1947.

However, although their models differ in details, their approach and conclusions are substantially the same. Their models are therefore jointly known as Harrod-Domar growth model. The major aspects of their model are discussed below.

Capital Accumulation and Economic Growth Both Harrod and Domar consider capital accumulation as a key factor in the process of economic growth. They emphasise that capital accumulation (i.e., net investment) has a double role to play in economic growth. It generates income, on the one hand, increases production capacity of the economy, on the other. For example, establishment of a new factory generates income for those who supply labour, bricks, steel, cement, machinery and equipment, etc., and at the same time, it increases the total capital stock and, thereby, enhances the production capacity of the economy. The new income generated creates demand for goods and services. A necessary condition for economic growth is that the new demand (or spending) must be adequate enough to absorb the output generated by the increase in capital stock or else there will be excess or idle production capacity. This condition should be fulfilled year after year in order to maintain full employment and to achieve steady economic growth in the long-run. This is the central theme of Harrod-Domar growth model.

Let us now describe the Harrod-Domar model of economic growth in its formal form.

Harrod-Domar Growth Model The Harrod-Domar model assumes a simple production function with a constant capital-output co-efficient. In simple words, the model assumes that the national output is proportional to the total stock of capital and the proportion remains constant. The assumption may thus be expressed as

$$Y = kK \tag{21.7}$$

where Y = national output; K = total stock of capital and k = capital/output co-efficient.

Since output/capital ratio is assumed to be constant, any increase in national output (ΔY) must be equal to k-times ΔK, i.e.,

$$\Delta Y = k\ \Delta K \tag{21.8}$$

It follows from Eq. (21.8) that growth in national output (ΔY) per time unit depends on and is limited by the growth in the capital stock (ΔK). If economy is in equilibrium and the existing stock of capital is fully employed, Eq. (21.8) can be used to find how much additional capital (ΔK) will be required to produce a given quantity of additional output (ΔY).

Since increase in capital stock (ΔK) in any period equals the investment (I) of that period, Eq. (21.8) can also be rewritten as

$$\Delta Y = k\, I \tag{21.9}$$

Another important assumption of the Harrod-Domar model is that the national saving is a constant proportion (s) of the national income, (Y), i.e.,

$$S = sY \tag{21.10}$$

where S = national savings per unit of time, and s = marginal propensity to save ($\Delta S/\Delta Y$).

Finally, the Harrod-Domar model postulates that at equilibrium level of output, the desired savings (S) equal the desired investment (I), i.e.,

$$S = I = sY \tag{21.11}$$

Given these assumptions, the growth rate, defined as $\Delta Y/Y$,[26] may be obtained as follows. If the term sY is substituted for I in Eq. (21.9), the equation takes the form $\Delta Y = k \cdot sY$. By dividing both sides by Y, we get growth rate as

$$\frac{\Delta Y}{Y} = k \cdot s \tag{21.12}$$

As Eq. (21.12) shows, the rate of growth equals the output/capital ratio (k) times marginal propensity to save[27] (s). Since, growth rate $\Delta Y/Y$, pertains to the equilibrium condition that $I = S$, this may also be called equilibrium growth rate. The equilibrium growth rate implies capacity utilisation of capital stock. This growth rate fulfills the expectations of the entrepreneurs. Therefore, Harrod called this growth rate as **warranted growth rate** (*Gw*). Harrod defines *Gw* as "that rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount".

According to Harrod-Domar model, a target economic growth can be achieved either by increasing marginal propensity to save and increasing simultaneously the stock of capital, or by increasing the output/capital ratio. This proposition of Harrod-Domar model is based on the assumption that ***warranted growth rate (Gw)*** is equal to the actual ***or realised growth rate (Gr),*** i.e., expected growth rate is always realised. This is possible only under the following simplifying assumptions of the model.

(i) *MPC* remains constant;
(ii) Output/capital ratio remains constant;
(iii) The technology of production is given;
(iv) Economy is initially in equilibrium;
(v) There is no government expenditure and no foreign trade; and
(vi) There are no time lags in adjustments between demand and supply, and between saving and investment.

However, these assumptions are obviously unrealistic. The unrealistic assumptions make the model economy unrealistic. In real world economy, therefore, the warranted (or expected) growth rate may not always be equal to the actual (realised) growth rate. And, if warranted and actual growth rates are not equal, it will lead to economic instability.

Capital Accumulation and Labour Employment in Harrod-Domar Model We have so far discussed Harrod-Domar model confining to only one aspect of the model, i.e., accumulation of capital and growth. Let us now discuss another important aspect of the model, i.e., availability and employment of labour. Labour has been introduced to the Harrod-Domar model by making the following assumptions:

26. $\Delta Y/Y = (Y_t - Y_{t-1})/Y_{t-1}$ where Y_{t-1} = national output in period $t - 1$; and Y_t = National output in period t.

27. It is assumed that average and marginal propensities to save are equal.

(i) that labour and capital are perfect complements, instead of substitutes, for each other; and
(ii) that capital/labour ratio is constant.

Given these assumptions, economic growth can take place only so long as the potential labour force is not fully employed. Thus, the potential labour supply imposes a limit on economic growth at the full employment level. It implies:

(i) that growth will take place beyond the full employment level only if supply of labour increases; and
(ii) that actual growth rate would be equal to warranted growth rate only if growth rate of labour force equals its warranted growth rate.

However, if labour force increases at a lower rate, the only way to maintain the growth rate is to bring in the labour-saving technology.[28] This is what happens in the developed countries. Under this condition the long-term growth rate depends on (i) growth rate of labour force ($\Delta L/L$) and the rate of progress in labour-saving technology (i.e., the rate at which capital substitutes labour, m). Thus, the maximum growth rate that can be sustained in the long-run would be equal to $\Delta L/L$ *plus* m. Harrod calls this growth rate as **natural growth rate (*Gn*)**.

Criticism: Harrod-Domar Growth Model is a Razor-edge Model

The major defect for the Harrod-Domar model is that parameters used in this model, viz., capital/output ratio, marginal propensity to save, growth rate of labour force, progress rate of labour-saving technology, are all determined independently out of the model. The model therefore does not ensure the equilibrium growth rate in the long-run. Even the slightest change in the parameters will make the economy deviate from the path of equilibrium. That is why this model is sometimes called as 'razor-edge model'.

21.6 THE NEO-CLASSICAL THEORY OF GROWTH

The contributions made to the growth theory by Tobin, Solow, Swan, Meade, Phelps and Johnson have been given a joint name—'The Neo-classical Growth Theory'.[29] The approach adopted by these growth theorists in their own models is based on the assumptions usually made by the neo-classical economists, viz., Marshall, Wicksell and Pigou. The assumptions are:

(a) there is perfect competition in commodity and factor markets;
(b) factor payments equal their marginal revenue productivity;
(c) capital/output ratio is subject to variation; and
(d) there is full employment, etc.

28. It implies that the assumption regarding the constant output/capital ratio will have to be dropped.

29. The main contributors to the Neo-Classical Growth Theory are James Tobin, "A Dynamic Aggregate Model," *Journal of Political Economy,* 63, April 1955; Robert M . Solow, "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, 7 February 1956; T.W. Swan, "Economic Growth and Capital Accumulation," *Economic Record,* November 1956; J.E. Meade, *A Neo-classical Theory of Economic Growth*, (Oxford University Press, 1961); E.S. Phelps, "The New View of Investment: A Neo-classical Analysis," *Quarterly Journal of Economics*, November 1962; H.G. Johnson, "The Neo-Classical One-sector Model: A Geometrical Exposition and Extension to a Monetary Economy," *Economica*, August 1966.

Since growth theories of Tobin, Solow, *et. al.,* are based on neo-classical assumptions, their growth theories are jointly called 'neo-classical growth theories'. However, the growth model built by R.M, Solow is generally considered to be a more perfect presentation of the neo-classical theory of growth. Therefore, we present here the Solow model of growth as the neo-classical theory of growth.

21.6.1 The Solow Model of Growth

To explain the neo-classical growth model – the Solow model, in particular—let us begin by pointing out the differences between the assumptions of the Harrod-Domar and neo-classical growth models. This will give not only a comparative view of the Harrod-Domar model and the Solow model, but will also give the assumptions made by Solow in building his growth model.

First, while the implicit production function in the Harrod-Domar model contains only one factor, i.e., capital, the neo-classical model assumes a multifactor production function, including labour, capital and technology.

Secondly, in the Harrod-Domar model labour and capital are assumed to be perfect *complements* of each other whereas in the neo-classical model, capital and labour are assumed to be close *substitutes* for each other.

Thirdly, while Harrod-Domar model assumes a constant capital-output ratio, the neo-classical model assumes a variable capital-output co-efficient. Both the models, however, assume that capital and labour are subject to the law of diminishing marginal return to scale.

Finally, the neo-classical model assumes that factor market is perfectly competitive and that factor prices, i.e., price of labour (P_L) and price of capital (P_k), equal their marginal revenue productivity. That is,

$$P_L = MRP_L$$

and

$$P_k = MRP_k = i$$

According to the Solow model, rate of economic growth depends on the growth rate of (i) capital stock, K; (ii) labour supply, L; and (iii) technological progress (T), over time. The relationship between the national output and these variables is expressed in the from of a production function, given as

$$Y = f(K, L, T) \qquad \textbf{(21.13)}$$

where Y = National output (at constant price), K = stock of capital, L = labour supply, and T = the scale of technological progress.

Let us assume for the time being that technology remains constant. Then the growth rate depends on K and L. The production function then takes the following form.

$$Y = f(K, L) \qquad \textbf{(21.14)}$$

Solow model assumes a Cobb-Douglas type of production function of homogeneous degree one, which means constant returns to scale. Given the assumption of constant return to scale, the increase in national output (ΔY) due to increase in K and L can be obtained as follows.

$$\Delta Y = \Delta K \cdot MP_K + \Delta L \cdot MP_L \qquad \textbf{(21.15)}$$

where MP_K and MP_L denote marginal physical products of capital (K) and labour (L), respectively.

By dividing both sides of Eq. (21.15) by Y, we get the growth rate of the national product ($\Delta Y/Y$) and the relative share of capital (K) and labour (L) in the growth rate as follows.

$$\frac{\Delta Y}{Y} = \Delta K\left(\frac{MP_K}{Y}\right) + \Delta L\left(\frac{MP_L}{Y}\right) \tag{21.16}$$

If the first term of Eq. (21.16) is multiplied by K/K and the second term by L/L, it yields useful ratios for further development of the model, without altering the equation. Thus,

$$\frac{\Delta Y}{Y} = \Delta K\left(\frac{MP_K}{Y}\right)\frac{K}{K} + \Delta L\left(\frac{MP_L}{Y}\right)\frac{L}{L}$$

By rearrange the terms, we get

$$\frac{\Delta Y}{Y} = \frac{\Delta K}{K}\left(\frac{K \cdot MP_K}{Y}\right) + \frac{\Delta L}{L}\left(\frac{L \cdot MP_L}{Y}\right) \tag{21.17}$$

In Eq. (21.17), the terms in brackets yield two very useful values for finalizing the model: (i) the numerator $K \cdot MP_K$ denotes the share of capital (K) and $L \cdot MP_L$ denotes the share of labour (L), in the national output (Y), and (ii) $(K \cdot MP_K)/Y$ and $(L \cdot MP_L)/Y$ denote the relative share of K and L in ΔY. Under constant returns to scale, the relative shares of K and L in ΔY add up to 1. Thus,

$$\frac{MP_K \cdot K}{Y} + \frac{MP_L \cdot L}{Y} = 1 \tag{21.18}$$

Let $(MP_K \cdot K)/Y$ in Eq. (21.18) be denoted by b. Then $(MP_L \cdot L)/Y = 1 - b$.

By substituting these values in Eq. (21.17), growth rate, $\Delta Y/Y$, can be rewritten as

$$\frac{\Delta Y}{Y} = b\left(\frac{\Delta K}{K}\right) + (1 - b)\frac{\Delta L}{L} \tag{21.19}$$

Equation (21.19) reveals the basic idea of neo-classical growth theory. In this equation, b and $1 - b$ show the responsiveness of output to the changes in K and L, respectively. That is, b denotes the elasticity[30] of output with respect to change in capital stock, labour remaining constant, and $(1 - b)$ denotes the elasticity of output with respect to change in labour, stock of capital remaining constant. Thus, ***neo-classical model*** suggests that ***economic growth rate equals the elasticity of output with respect to increase in capital stock, plus elasticity of output with respect to increase in labour force, given the level of technology***.

When technological progress is introduced to the neo-classical model and the resulting growth rate of output is denoted by $\Delta T/T$, Eq. (21.19) can be written as

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30. The elasticity of output with respect to an input is the proportional change in output associated with 1 percent change in the (chosen) input, other inputs remaining constant. In other words,

$$\text{Elasticity of output} = \frac{\%\text{ change in } Y}{\%\text{ change in } K(\text{or } L)}$$

$$\frac{\Delta Y}{Y} = b\left(\frac{\Delta K}{K}\right) + (1 - b)\frac{\Delta L}{L} + \frac{\Delta T}{T} \quad \textbf{(21.20)}$$

After the introduction of technological progress in the model, the growth rate presented in Eq. (21.19) increases by the proportional increase in the output owing to the technological progress. Thus, the overall growth equals the elasticity of output (Y) with respect to capital expansion *plus* elasticity of output (Y) with respect to labour employment *plus* growth rate of output as a result to technological progress. For a numerical example, see section 21.3 (Eq. 21.4 onwards).

21.6.2 The Long-Run Steady-State Growth

We have explained above the basics of the Solow growth model. As shown in Eq. (21.20), the Solow growth model concludes that income growth rate ($\Delta Y/Y$) depends on (i) the rate of increase in capital ($\Delta K/K$), (ii) the rate of increase in labour ($\Delta L/L$), (iii) change in technology ($\Delta T/T$), and (iv) marginal productivity of *capital* and *labour,* given the technology. A question arises here: How does the economy attain the *long-run steady-state of growth*, or the 'stationary growth', i.e., the rate at which the economy continues to grow at a *constant rate*? According to the Solow growth model, the steady growth rate is determined (if determined) by the equilibrium level of balance between consumption and savings and between saving and investment, or, what is called, capital formation. This is often referred to as the ***golden rule of capital formation***. We show here how 'golden rule level of capital stock' is determined in a simplified version of the Solow model.

According to the Solow growth model, an economy is said to be in a steady state when per capita income and capital formation are constant. The steady long-run growth is characterized by zero growth in per capita income, i.e., $\Delta y = 0$, and zero per capita capital growth rate (less depreciation), i.e., $\Delta k = 0$. These conditions can be explained, as follows. Recall the production function:

$$Y = f(K, L, T) \quad \textbf{(21.21)}$$

Solow model assumes that T is determined exogenously and, therefore, T can be excluded from the production function. Then the production function (21.21) can be modified to

$$Y = f(K, L) \quad \textbf{(21.22)}$$

Given the production function by Eq. (21.22), let us now look at the change in L and K and their effect on growth rate. According to Solow growth model, the growth of labour in an economy is exogenously determined and labour increases at a constant rate. This implies that, with constant returns to scale, income growth equals the labour growth, i.e., $\Delta Y/Y = \Delta L/L$. It means that $(\Delta Y/Y)/(\Delta L/L) = 1$ and $\Delta y = 0$. Under this condition, the long-run growth of income, $\Delta Y/Y$, depends on the *capital accumulation,* ΔK.

We know that $\Delta K = I$ (net investment), and $I = sY$ (where s denotes *mps*). Thus,

$$\Delta K = I = sY \quad \textbf{(21.23)}$$

Equation (21.23) shows ΔK depends on sY. This implies that ΔK increases with increase in saving (sY). However, K is subject to *depreciation*. Assuming a constant rate of depreciation, d, the net increase in the stock of capital can be expressed as

$$\Delta K = I = sY - dK \qquad \textbf{(21.24)}$$

When an economy reaches a stage where $sY = dK$, $\Delta K = 0$. In that case, growth in per capita capital, $\Delta K/N = \Delta k = 0$, ($N$ = population). When $\Delta k = 0$, $\Delta y = 0$. This condition makes the steady state of growth.

How is the Steady-State Growth Determined? According to the Solow model, the steady-state growth rate is achieved when per capita income and per capita capital growth is constant. The per capita capital decreases with increase in population. Let the population growth rate, $\Delta N/N = n$, where N is population. For the sake of analytical convenience, population (N) is treated as labour (L). Now, given the population growth rate (n), if growth in capital ($\Delta K/K$) = n, then the growth in per capita capital stock is constant. The growth in per capita capital stock can be measured by dividing Eq. (21.24) by L and adjusted for population growth (n). Thus,

$$\Delta(K/L) = s(Y/L) - (d + n)\,(K/L) \qquad \textbf{(21.25)}$$

The steady state growth in per capita stock of capital, as defined in Eq. (21.25), gives the *steady-state growth rate*. The process of determination of the steady-state growth of the economy is illustrated in Fig. 21.1.

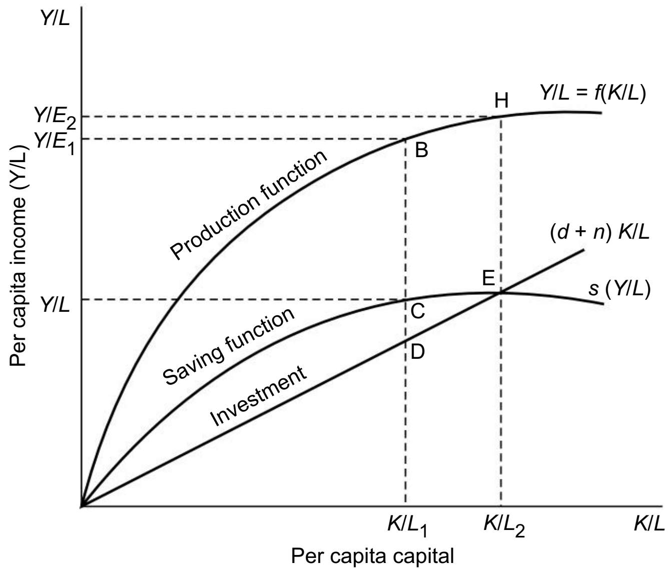

Fig. 21.1 Determination of Steady-State Output, Investment and Growth

In Fig. 21.1, the vertical axis measures the per capita income *(Y/L)* and horizontal axis measures the capital-labour ratio (K/L). The curve marked $Y/L = f(K/L)$ shows per labour production function. Note that with increase in population, per capita income grows at diminishing rate with increase in capital-labour ratio (K/L). The curve marked $s(Y/L)$ shows the trend in per capita savings with increase in income and the line marked $(d + n)$ (K/L) shows increase in investment with increase in saving. Note that the curve $s(Y/L)$ and the line $(d + n)$ (K/L) represent the two terms on the right-hand side of the Eq. (21.25).

As the figure shows, saving increases with increase in income. The vertical difference between the production function, $Y/L = f(K/L)$, and the saving function, $s(Y/L)$, shows the growth in consumption. For example, at K/L_1, per capita income is $B\text{-}K/L_1$. Out of this per capita income, BC is consumed and $C\text{-}K/L_1$ is saved. Investment, as shown by the straight line, marked $(d + n)K/L$, increases at a constant rate. The per capita saving and investment functions intersect at point E. *The point of intersection, E, determines the steady state of the economy*. The steady state of the economy is determined at capital-labour ratio of K/L_1, per capita income at $H\text{-}K/L_1$, saving and investment at $E\text{-}K/L_1$. So long as the economy is away from this steady state, there will be a tendency in the economy to move towards point E. For example, if the economy is at point B, savings exceed investment by CD. This will create conditions for investment to increase[31] until it equals savings at point E. Similarly, if investment exceeds savings, for some reason, cost of investment will cause investment to decline, until it equals savings at point E.

It may thus be inferred from the foregoing discussion that according to the neo-classical theory of growth, at steady state of the economy, both Y/L and K/L are constant; aggregate income increases at the growth rate of population; and saving and investment are equal.

The Golden Rule Level of Capital: An Extension of Solow Model It may be concluded from the foregoing analysis that higher the rate of saving, the higher the capital stock and the higher the rate of growth. It means that if 100 percent of income is saved, the growth rate will be maximum possible. But that is not the case. With consumption being zero, there will be no need for production, nor would there be the need for capital accumulation. So growth rate will turn to be zero. This implies that there is an optimum level of saving, capital stock and consumption that is required to be maintained for optimizing growth rate. In reality, however, the basic objective of an economy, and also of the government policies, is to maximize the per person economic welfare. The level of per capita economic welfare depends on the level of per capita consumption. Therefore, the policy makers have to choose a steady level of growth which maximizes the per capita consumption, saving and investment. This rule is called the ***Golden Rule Level of Capital*** denoted by k^*_{gold}, where k^* refers to per capita capital. This rule was formulated by Edmond Phelps[32] by using the Solow model of growth. The *Golden Rule of Capital* is discussed here briefly.

Recall that $Y = C + I$ and $C = Y - I$. The variables in equation $C = Y - I$ divided by L (population) gives the per capita income as $Y/L = y$, per capita consumption as $C/L = c$, per capita saving as $S/L = s$, and per capita investment as $I/L = i$. Thus, the per capita consumption can be expressed,

$$c = y - i$$

Following Mankiw, let steady-state level per capita consumption (c) be denoted by c^*, per capita production function $f(K/L)$ denoted by $f(k^*)$, and per capita investment (i) by dk^*. For a graphical illustration, in Fig. 21.1 let c^* be represented by the vertical difference between the curve $f(K/L)$ and the curve $s(Y/L)$, $f(k^*)$ by the curve $f(K/L)$, and dk^* by the line $(d + n)K/L$.

Given the above notations, the steady-state consumption can be expressed as

$$c^* = f(k^*) - dk^* \tag{21.26}$$

31. When saving exceeds investment, interest rate (i) tends to decrease. Since $I = f(i)$, fall in the interest rate increases investment.

32. Edmund Phelps, "The Golden Rule of Accumulation: A Fable of Growthmen", *American Economic Review*, 51 (September 1961).

It means that per capita consumption at steady state is just equal to per capita output less depreciation. As shown in Fig. 21.1, when per capita production function is graphed, it produced a curve with diminishing slope. The slope of the curve $f(k^*)$ gives the *marginal product of capital* (MPk). Since, investment is given by a straight line (see Fig. 21.1), its slope is constant and is given by d in Eq. (21.26). The difference between the curve $f(k^*)$ and the curve dk^* is maximum where the slope of $f(k^*)$ ($= MP_K$) equals the slope of $dk^* = d$ is maximum. It means that consumption (c) is maximum where

$$MP_K = d$$

This equation implies that *the golden rule level of capital is satisfied where marginal product of capital equals capital depreciation and investment is just equal to depreciation.*

Criticism of Solow Growth Model The neo-classical model of growth, especially the Solow model, has been strongly criticized by Joan Robinson and Nicolas Kaldor. Needless to mention that Solow model of growth, like the Harrod-Domar model, is based on certain assumptions. The assumptions, no doubt, add analytical simplicity and clarity to the model, but they also lead to a high degree of abstraction from the real problems of growth, and limit its applicability to general conditions, especially to small and less developed countries. The major criticisms against the neoclassical theory of growth are briefly mentioned here.

One of the most important criticisms against the neo-classical growth theory is the neo-classical assumption that factor prices are flexible enough to ensure full employment at all points of time. This implies that investment is always equal to equilibrium level of saving, or to the full employment level of saving. Critics find this assumption empirically untenable.

In addition, Prof. A. K. Sen[33] has pointed out some major problems of the growth theories in general which apply to the Solow model also.

"*First,* for steady state equilibrium, it is necessary to assume that technological progress is entirely labour augmenting". It means 'neutrality' of technological progress. There is, however, little empirical justification for this assumption.

Secondly, the adjustment mechanism envisaged by the neoclassical model rests on the flexibility of factor prices. But the adjustability of factor prices, e.g., interest rate, may be prevented by 'liquidity trap', at least at analytical level. The liquidity trap "may prevent the capital output ratio from being as high as may be necessary for growth equilibrium".

Thirdly, the neo-classical model does not include investment function, and hence fails to explain the expectations of entrepreneurial class and its role in capital accumulation. Therefore, if an independent investment function is introduced to the neo-classical model, instability problem will appear in the model.

Finally, neo-classical model, assumes homogeneity of capital assets which is unrealistic and misleading. It may, thus, be said at the end that the problem of economic growth model is not as simple as presented in the growth models.

33. A.K. Sen, *Growth Economics*, (Penguin Book, 1970), pp. 21–28.

21.7 ENDOGENOUS GROWTH THEORY

The endogenous growth theory is essentially an improvement of the neo-classical theory of growth. The neo-classical theory of growth, as presented by Solow model in 1956, dominated the thought on economic growth for three decades simply because of the mathematical elegance of the model. However, with further researches on growth issues, economists started realizing some major deficiencies in the Solow model of growth, on both theoretical and empirical grounds. Theoretically, Solow growth model shows that in case marginal productivity of labour and capital is subject to diminishing returns, growth in the long run has to come from *technological progress*. But Solow model does not answer a question: Where does technological progress take place? Solow assumed technological progress to be exogenous, determined outside the model, as a regular feature of growth process. At empirical level, while Solow model shows no relationship between growth and saving rates, empirical studies show that there is a positive and high correlation between them.

It was in the late 1980s that growth economists, especially Paul M Romer[34] and Robert E. Lucas[35] Jr. attempted initially to explain the technological progress. Their attempt was followed by a 'large and fascinating literature' on the subject. This lead to the emergence of a new theory of growth called ***endogenous growth theory***. The endogenous growth theory does not refute the Solow model. Instead, it is considered an extension of Solow model in an attempt to explain how technological progress and economic growth become *endogenous*—endogenous growth implies self-sustaining growth. In this section, we discuss briefly the *endogenous growth theory*.[36]

21.7.1 The Basic Model

Let us recall the production function used in the neo-classical growth model.

$$Y = f(K, L, T)$$

where Y = output, L = labour, and T = technology.

For the sake of analytical simplicity, let us suppose that per worker productivity remains constant, and T is determined exogenously. With these assumptions, L and T can be dropped from the production function without affecting it significantly. Therefore, one can use a simplified production function:

$$Y = aK \tag{21.27}$$

where 'a' denotes constant marginal productivity of capital, K, irrespective of its size.

Let us now see how stock of capital grows with the growth of output, Y. We know that stock of capital grows by new investment (I), i.e., $\Delta K = I$, and I depends on savings (S). Let us assume that a constant proportion (s) of income is saved which means $S = sY$. Given these assumptions, the growth of capital (ΔK), or what is also called capital accumulation, can be expressed as

$$\Delta K = I = sY \tag{21.28}$$

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34. Paul M. Romer, "Increasing Returns and Long-Run Growth ", *Journal of Political Economy,* 94, (October 1986).

35. Robert E. Lucas Jr., "On the Mechanics of Economic Development", *Journal of Monetary Economics,* 22 (July 1988).

36. For a detailed study of endogenous growth theory, see Alwyn Young, *Readings in Endogenous Growth* (Cambridge, MIT Press, 1993); Robert J. Barrow and Xavier Sala-i-Martin, *Economic Growth* (NY, McGraw-Hill, 1995); and Charles I. Jones, *Introduction to Economic Growth* (NY, Norton, 1998).

Since $Y = aK$, by substitution, Eq. (21.28) can be written as

$$\Delta K = I = s\,aK \tag{21.29}$$

The growth of capital can now be expressed as

$$\Delta K/K = sa \tag{21.30}$$

Equation (21.30) reveals that the growth of capital depends on the rate of savings. Since the marginal productivity of capital (a) is assumed to be constant, the higher the rate of saving(s), the higher the growth of capital measured as $\Delta K/K$. By combining[37] Eqs. (21.27) and (21.30), the income growth rate ($\Delta Y/Y$) can be expressed as

$$\frac{\Delta Y}{Y} = \frac{\Delta K}{K} = sa \tag{21.31}$$

Equation (21.31) reveals that, according to endogenous growth theory, income growth depends on the rate of saving – the higher the rate of saving, the higher the capital and income growth rate, given the marginal productivity of capital.

Treatment of Depreciation. Capital accumulation is subject also to depreciation which causes decline in the accumulated stock of capital. Capital depreciation causes decline in the stock of capital and, therefore, the decline in the growth rate of capital stock ($\Delta K/K$) is determined by the rate of depreciation (d). The decline in the growth rate of capital accumulation results in fall in the growth rate of income ($\Delta Y/Y$) by the depreciation rate. Thus, the growth rate given in Eq. (21.31) can be expressed as

$$\Delta K/K - d = \Delta Y/Y - d = sa - d$$

Thus, the ***depreciation adjusted growth rate*** can be written as

$$\Delta K/K = \Delta Y/Y = sa - d \tag{21.32}$$

where 'd' denotes the rate of depreciation.

How does technological progress take place? Recall that the main theme of the endogenous growth theory is to explain how technological progress takes place and how growth becomes endogenous – self-sustaining. Recall also that Solow model assumes diminishing marginal returns on capital. This assumption is palatable only when capital is defined as physical productive assets like machinery and equipments, but not if it is defined widely to include ***human capital*** including ***human knowledge*** and the resultant ***technology***. The human capital and technology not only add to the productivity of capital but also contribute to the returns on capital. This is self-evident from the empirical facts that 'human capital' has not only increased the productivity of physical capital but also resulted in *increasing returns to capital* defined widely. For example, Edward F. Denison worked out the relative contribution of different sources of economic growth in the US for 1929-1982. According to Denison, the US economy had grown at an annual average growth rate of 2.9 percent during the period from 1929 to 1982. The contribution of different sources of the US economic growth of 2.9 percent is reproduced in Table 21.1.

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37. That $\Delta K/K = \Delta Y/Y$ can be obtained as follows. Given the Eq. (21.27) as $Y = a\,K$, $K = Y/a$ and $\Delta K = \Delta Y/a$. By rearranging the values, we get $\Delta K/K = (\Delta Y/a)/(Y/a) = \Delta Y/Y$. Thus, $\Delta K/K = \Delta Y/Y$.

Table 21.1 Sources of Economic Growth in the US: 1929-82

Sources	*Percent Contribution*
Growth in labour input	32
Growth in labour productivity due to:	
1. Education per worker	14
2. Capital formation	19
3. Technological change	28
4. Economies of scale	9
5. Other factors	–2
Total (2.9%)	100

Source: Edward F. Denison, *Trends in American Economic Growth: 1929-82* (Washington, D.C., The Brookings Institution, 1985). Quoted from Froyen, R. T., *op. cit.,* p. 440).

As the table shows, technological change made the second largest contribution (28 percent) to annual average growth of 2.9 percent growth of the US economy, the first being the growth in labour input (32 percent). It is equally important point to note is that increase in the education of the workers made a significant contribution of 14 percent. These contributions are also regarded as the *external returns to capital*.

Like accumulation of physical assets, improvement of *knowledge* and *technology* required investment in research and development and acquisition of *human capital.* The growth of knowledge and technology is regarded as an automatic process of capital accumulation. As savings increase, total savings are not invested in accumulation of physical capital but a part of it goes to human capital formation. This is an automatic process. In fact, formation of physical capital and human capital are co-determined and co-existent. Therefore, growth becomes *endogenous*. This is what endogenous growth theory proves.

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QUESTIONS FOR REVIEW

1. What is meant by economic growth? Does increase in per capita income always indicate economic growth?
2. What are the sources of economic growth? What factors contribute most to economic growth of a country?
3. What is meant by growth accounting? Explain the process of growth accounting by using a linear production function.
4. Natural resources, human resources, capital formation and technology are four critical factors in economic growth of a country. Explain how these factors contribute to economic growth.
5. What are the assumptions of Harrod-Domar model of economic growth? How does this model distinguish between warranted, actual and natural rates of growth?
6. What is the central theme of the Harrod-Domar growth model? Outline Harrod-Domar model of growth and derive warranted rate of growth from the model.
7. Harrod-Domar model of economic growth tells that economic growth can be achieved either by increasing *mps* and stock of capital or by increasing capital-output ratio. Explain this proposition.
8. What are the conditions in Harrod-Damar growth model under which warranted growth rate equals the actual growth rate? Why is this model called a razor-edge model?
9. What are the assumptions of the neo-classical theory of growth? How do they differ from the assumptions of Harrod-Domar model of growth?
10. Explain neo-classical theory of economic growth. What are the drawbacks of this theory? How does this theory differ from Harrod-Domar growth model?
11. Suppose a linear production function is given as $Y = f(K, L)$. By using this production function, derive the equation measuring the income growth rate.
12. Explain the Solow model of economic growth. How does this model determine the long-term steady-state growth?
13. What is meant by long-term steady-state growth. Illustrate and explain how steady-state growth is determined.
14. What is golden rule level of capital? What are the conditions for determining the golden rule?
15. What is endogenous growth theory? How is the endogenous growth theory different from Solow's theory of growth? Explain how technological progress becomes endogenous in the process of increasing saving and investment?

APPENDIX TO CHAPTER 21

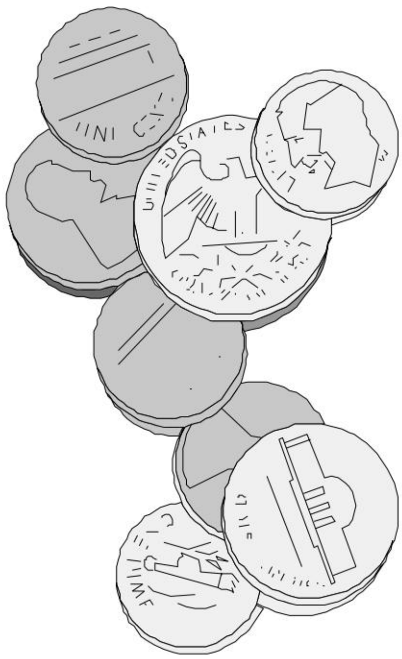
GDP Growth in the United States

Year	*GDP* Growth *Rate* ($\Delta Y/Y$)	*Sources of Growth*		
		Capital *Share* ($\Delta K/K$)	*Labour Share* ($\Delta L/L$)	*Total Factor Productivity* ($\Delta T/T$)
Growth over 1950-1999	3.6	1.2	1.3	1.1
1950-1960	3.3	1.0	1.0	1.3
1960-1970	4.4	1.4	1.2	1.8
1970-1980	3.6	1.4	1.2	1.0
1980-1990	3.4	1.2	1.6	0.6
1990-1999	3.7	1.2	1.6	0.9

Source: US Department of Commerce, US Department of Labour. Estimates made by N. Gregory Mankiw. Data reproduced (with some modifications and a correction of printing error) from N. Gregory Mankiw, *Macroeconomics* (New York, Worth Publishers, 2003), p. 233.

Chapter 22

Business Cycle Theories and Global Recession



INTRODUCTION

The economic history of the world economy is essentially the history of business cycles—economic ups and downs, booms and slumps, prosperity and depression. In fact, business cycles have characterised the free enterprise industrial world over the past one and a half centuries. However, since the Great Depression of 1930s had not repeated itself until 2008-09, i.e., over a period of 80 years—the longest period considered in the trade cycle classifications—the economists tempted to infer that 'business cycle is obsolete'. However, the global depression of 2008-09 has proved this point of view wrong. It means that there may be a long gap but business cycle is bound to repeat itself. It may be added here that even growth theories indicate that there is always a possibility of instability in the economy, if the critical balance between the various growth variables (viz., saving, investment, capital/output ratio, rate of increase in labour force, rate of money supply, etc.) could not be maintained.

Besides, if frequent and violent fluctuations are not taking place in the world economies, it is mainly because of government's stabilisation policy measures. Yet, the worldwide inflation of 1970s, on the one hand, depression-like conditions, on the other, are strong warnings against the complacency towards the dangers of economic crises. The economists have warned against the complacing towards the business cycles. To quote Burns, "…men who wish to serve democracy faithfully must recognise that the roots of business cycles go deep in our economic organization, that the ability of government to control depressions adequately is not yet assured, that our power of forecasting is limited, and that true foresight requires policies for coping with numerous contingencies"[1]. Burn's view on the predictability and controllability of business cycles has been proved to be an empirical fact. For example, the great global depression of 2008-09 could not be predicted even by the greatest of the great economists of the world, nor could the governments—even governments of the highly advanced countries, e.g., US, England, France Germany and Japan—could formulate economic policies to combat the downturn in their own economies. Whatever monetary or fiscal policy was adopted by the various governments to control the trade cycle proved to be ineffective. This means that the working system of the economy is such that business cycles are bound to occur time and again, though time gap may be different. For this reason, it is important for the individual households, firms and the government to understand the nature and causes of business cycles so that the adverse effects of recession could be minimized if not prevented.

This chapter presents a brief discussion on (i) what is a business cycle, (ii) different phases of business cycles and their features, (iii) theories of business cycles—what causes business cycles and how, and (iv) measures to control business cycles suggested by the economists and the effectiveness of the control measures with empirical proofs.

22.1 WHAT IS BUSINESS CYCLE?

The economists have defined business cycles in different ways and have tried to capture what happens at its different phases[2]. However, Samuelson and Nordhaus gives a fairly good definition: "A business cycle is a swing in total national output, income, and employment, usually lasting for a period of 2 to 10 years, marked by a widespread expansion or contraction in most sectors of the economy"[3]. Briefly speaking, business cycle refers to a period of high growth and prosperity in the economy followed by a period of sharp economic slowdown and depression. During the period of prosperity, there is a high growth rate of national output above the ***potential growth rate***[4], in per capita income, in investment and employment along with a reasonably high inflation rate. On the contrary, during the period of recession and depression, growth rate of national output and per capita income, investment and employment declines sharply. During the depressionary period, growth rate of national income turns to be negative; business activities decline sharply; not only the rate of employment declines, there is rise in unemployment; and price level goes down resulting in deflation. A regular periodic recurrence of growth and recession makes the business cycle.

1. Quoted from R.A. Gordon, *Business fluctuations*, (Harper and Brothers Publishers, New York, 1952), p. 4

2. For a detailed discussion on business cycles, see Maurice W. Lee, *Economic Fluctuations* (Richard D. Irwin Inc., Illinois, 1955), Ch. 3; D. Hamberg, *Business Cycles* (The Macmillan Company, New York, 1951), Ch. 1; and R. A. Gordon, *Business Fluctuation* (Harper and Brothers Publishers, NY, 1952), Ch. 8.

3. Paul A Samuelson and William D. Nordhaus, *Economics: International Edition* (McGraw-Hill, In., 1995), 551. Some other empirical proof put the period at 2 to 4 years.

4. *Potential growth rate* is the rate of growth which can be normally achieves from the full and efficient utilization of the available resources (labour, capital and technology) of the economy.

22.2 PHASES OF BUSINESS CYCLES

Business cycles, the periodic booms and slumps, in the economic activities, are generally compared to 'ebb and flow' in economic activities. As mentioned above, the ups and downs in an economy are reflected by the fluctuations in aggregate economic magnitudes, such as, production, investment, employment, prices, wages, bank credits, etc. The upward and downward movements in these magnitudes show different phases of a business cycle. Basically, there are only two phases in a cycle, viz., *prosperity* and *depression*. But considering the intermediate stages between prosperity and depression, the various phases of business cycle are listed below in order they appear in reality.

(i) Expansion
(ii) Peak
(iii) Recession
(iv) Trough
(v) Recovery and Expansion.

The five phases of a business cycle are presented in Fig. 22.1. The ***steady growth line*** shows the potential growth of the economy with increase in national resources and no economic fluctuations. The various phases of business cycles are shown by the *line of cycle* which moves up and own the ***steady growth line***. The line of cycle moving above the steady growth line marks the beginning of the period of 'expansion' or 'prosperity' in the economy. The phase of expansion is characterised by increase in output, employment, investment, aggregate demand, sales, profits, bank credits, wholesale and retail prices, per capita output and rise in standard of living. The growth rate eventually slows down and reaches the ***peak***. The *peak* phase is generally characterised by slackening in the expansion rate, the highest level of prosperity, and downward slide in the economic activities from the *peak*. The phase of ***recession*** begins when the downward slide in the growth

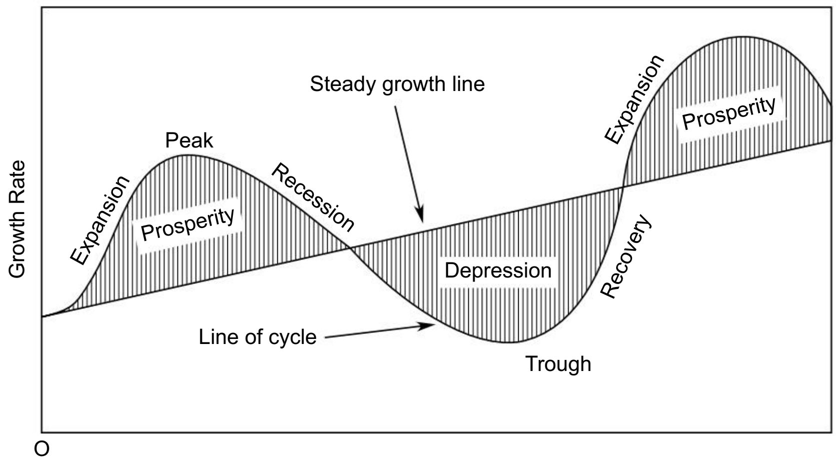


Fig. 22.1 Phases of business cycle

rate becomes rapid and steady. Output, employment, prices, etc., register a rapid decline, though the realised growth rate may still remain above the steady growth line. So long as the actual growth rate, exceeds or is equal to the expected steady growth rate, the economy enjoys the period of prosperity—high and low.

When the growth rate falls below the steady growth rate, it marks the beginning of ***depression*** in the economy. The span of depression spreads over the period growth rate stays below the steady growth rate. The growth rate may decline to zero or even to less than zero, as many *DC*s experienced a decline in their *GDP* during the global recession of 2008–09. ***Trough*** is a phase of depression during which the down-trend in the economy slows down and eventually stops, and the economic activities once again register an upward movement. ***Trough*** is the period of most severe strain on the economy.

When the economy register a continuous and rapid upward trend in output, employment, etc. it enters the phase of *recovery* though the growth rate may still remain below the steady growth rate. And, when the recovery continues and growth rate exceeds steady growth rate, the economy once again enters the phase of *expansion* and *prosperity*. What goes up must come down. The down turn marks the beginning of the recession. If economic fluctuations are not controlled by the government, the business cycle continues to recur over time.

22.3 THEORIES OF BUSINESS CYCLE

A number of theories have been developed by the economists to explain the business cycle. Most important contributions to the theory of business cycle were made in the first–half of the twentieth century, though business cycles took place throughout the nineteenth century. The classical economists—Adam Smith, Mill, Malthus and Ricardo—had devoted little attention to the causes of business cycles. This school of thought believed that the 'invisible hands' (i.e., market forces), if allowed to operate freely, would by themselves maintain stability in the economy.

Between 1890 and World War I, however, a number of important contributions were made to the trade cycle theory.[5] The important contributors were M. Tugan Baranowsky of Russia, Aurthor Spiethoff and J.A Schumpeter of Germany, Knut Wicksell of Sweden, D.H. Robertson and R.G. Hawtrey of England, Albert Aftalion and Jean Rescure of France, Thorstein Veblen and W.C. Mitchell of the United States.[6]

Although many important contributions were made to the theory of business cycle prior to the Great Depression, the study of business cycle still remained outside the General economic theory. It was Keynes,[7] who provided a general theoretical framework in which the theory of business cycle could be interwoven. In his *General Theory*, he provided a standard model for analysing the economic fluctuations, though he himself had said little about the causes of cyclical fluctuations. Hicks[8] has remarked that Keynesian economics has done all for our understanding of business

5. The only important contribution prior to this period was made by a non–economist, Clement Juglar in 1860.
6. R.A. Gordon, *op. cit.*, p. 306.
7. In his *The General Theory of Employment, Interest and Money*, 1936.
8. In his famous book *A Contribution to the Theory of Trade Cycle* (Oxford University Press, London, 1950), p. 1.

fluctuation but has left out the analysis of business cycle itself. In the post-Keynesian era, the main contributors[9] to the cycle theory include Metzlere, Harrod, Kalecki, Samuelson, Kaldor, Hicks, Goodwin and Duesenberry[10].

A detailed discussion on all the theories of trade cycle separately falls outside the purview of this book. Therefore, we will confine our discussion here only to some prominent theories of trade cycle listed below.

1. Pure Monetary Theory
2. Monetary Over-investment Theory
3. Schumpeter's Interaction Theory
4. Multiplier–Acceleration Interaction Theory
5. Hicksian Theory of Trade Cycle.

22.3.1 The Pure Monetary Theory of Business Cycle

The early business cycle theorists put major emphasis on the monetary factors and credit system in their analysis of business cycle. Their theory of business cycle is, therefore, known as *monetary theory* of business cycle. According to this theory, the main cause of business fluctuations is the instability of the monetary and credit system. The fluctuations in the supply of money and bank credit are the basic causal factors at work in the cyclical process. The main proponent of this theory, Hawtrey, maintained that business cycles are nothing but the successive phases of inflation and deflation. According to him, all changes in the levels of economic activities are caused by the changes in money flows. As the money supply expands, prices rise; profits increase; and total output increases. And, as money supply falls, prices decrease; profits decrease; production activities become sluggish; and production falls. Briefly speaking, Hawtrey relies implicitly on the *quantity theory of money* for explaining the price behaviour.

According to Hawtrey, the principal factor affecting the money supply is the credit mechanism. In modern economies, the principal source of money supply is the volume of credit created by the banking system. The upswing of the cycle begins with the expansion of bank credit and continues as long as the credit expansion continues. Banks expand credit when conditions are such that banks find it profitable to offer credit to the businessmen on easier terms. Availability of credit on easier terms (i.e., at a relatively lower interest rate) is the most effective inducement for the entrepreneurs to undertake productive activities. Consequently, bank credit flows into different types of capital

9. See also J.J. Clark and M. Cohen (eds.), *Business Fluctuations, Growth and Economic Stabilization* (Random House, 1963), Bibliography.

10. The trade cycle theories built during the post-Keynesian period are generally classified under the following categories:
(1) The Pure Monetary Theory, (2) The Monetary Overinvestment Theory, (3) The Non-monetary Overinvestment Theory, (4) Innovation Theory, (5) Acceleration Principle of Trade Cycle, (6) Psychological Theory, (7) Under-consumption Theories, (8) Exogenous Forces Theories, (9) Mitchell's Theory of Cycle, (10) Theories of Keynesian System, (11) Modern Theories of Trade Cycle Based on Interaction of the Multiplier and the Accelerator, and (12) Hicksian Theory of Trade Cycle.

formation activities including both widening and deepening of capital. Bank credits therefore continue to expand even if interest rates begin to rise—the reason being increased profitability. This process of credit expansion and investment leads to economic prosperity.

The process of prosperity brought about by the banking credit mechanism is reversed when banks find it difficult to expand the credit further at the prevailing interest rate. The problem of credit expansion arises because their excess reserves get depleted due to (i) increase in loans and advances; (ii) reduced inflow of deposits; and (iii) withdrawal of deposits for quick returns and more profitable uses. As credit expansion comes to an end, businessmen can no longer obtain easy and sufficient bank credit for increasing their business activities. Therefore, the process of expansion is slowed down. Due to non–availability of credit, businessmen find it difficult to meet their payment obligations and to maintain their inventories at the existing level. So they allow their inventories to deplete. Besides, they cancel their orders for the purchases of inputs. This marks the beginning of downswing and it continues till it hits the bottom line.

Evaluation of Pure Monetary Theory The pure monetary theory remained in vogue for quite some time and it still retains its relevance to the modern business fluctuations. However, this theory has been criticized on the following grounds.

First, although monetary factors are certainly major contributors to the business fluctuations, business cycles are not a purely monetary phenomenon. Economic activities have also fluctuated because of change in aggregate demand, demand for new investments, change in cost–structure and also due to miscalculations of businessmen.

Second, in spite of the fact that monetary factors play an important role in accelerating the process of expansion and contraction, they do not fully explain the turning points. At turning points, non–monetary factors have been found to have played a major role.

Third, monetary theorists' conviction that businessmen are highly sensitive to the changes in the interest rates is highly doubtful. More important factors which cause business fluctuations are changes in business prospects and marginal efficiency of capital.

In spite of these shortcomings the pure monetary theory of business cycles has been regarded as a sound reasoning and logical explanation of economic fluctuations. In fact, the root cause of recent global recession was the malfunctioning of the credit system in the US.

22.3.2 The Monetary Over-Investment Theory

The monetary overinvestment theory emphasises the role of imbalance between the *desired* and *actual* investments in economic fluctuations and the imbalance between the investment in capital and consumer goods industries—investment in the former exceeding that in the latter.

F.A. Hayek, the pioneer of this theory, stresses that to keep the economy in equilibrium, investment pattern must correspond to the pattern of consumption. *For the economy to remain in stable equilibrium, it is necessary that voluntary savings are equal to the actual investment*. So long as this equilibrium condition exists, the whole economy would remain stable.

The equilibrium and stability of the economy is upset by changes in the money supply and the saving-investment relations. The saving–investment relation may change due to increase in investment without a corresponding increase in voluntary savings. Investment may increase due to such reasons as increase in marginal efficiency of capital, fall in the rate of interest, over-optimism about the future prospect, etc. When new investments are financed through increased bank credit, this leads to over-investment, mainly in the capital goods industries. Thus, there is expansion of investment without contraction in consumption. New investments, along with sustained level of consumption, and increased employment together lead to increase in money supply. This leads eventually to a rise in the general price level. Increase in price results in loss of purchasing power. For this reason, the real demand does not increase at the rate of increases in investment. In fact the real investment is acquired at the cost of real consumption.

It follows from the above reasoning that the existing rate of interest cannot be maintained because it has gone out of balance with consumer demand falling behind the investment demand. Under this unbalanced situation, labour employment increases leading to rise in labour income. As a result, consumer demand increases rapidly because of increase in labour income. Consequently, rise in consumer-goods prices overtakes the rise in capital-goods prices. Therefore, profitability of consumer goods industries turns out to be higher than that of capital-goods industries. This causes a shift in investment from the capital-goods to consumer-goods industries. As a result, demand for bank credit increases in the consumer goods industries. But, due to banker's unwillingness and inability to meet the credit demand, there is shortage of credit—more so when there is a demand for funds also from capital goods industries. This causes a financial crisis. This leads to a sharp decline in the capital-goods production because of (i) fall in investment under the pressure of rising cost, and (ii) fall in marginal efficiency of capital. Therefore, employment declines in the capital-goods industries. Unemployment created in capital-goods sector is much too rapid to be absorbed in the consumer-goods sector. Consequently, large-scale unemployment results; income stream is broken; and a downswing begins in general business activities leading to a deep *depression*. However, the forces which had worked for depression start moving in the reverse direction after depression has hit its bottom.

Criticism When tested against the empirical facts, the over-investment theory was found to have the following weaknesses.

First, the over–investment theory presumes that when market rate of interest is lower than the natural or the normal rate of interest due to, say, excess supply funds, the new bank credit flows to the capital goods industries. This would be true only under the condition of full employment. But, business cycles have taken place even when resources were not fully employed.

Secondly, this theory emphasises on the change in the interest rate as the main determinant of investment. It ignores many other important factors such as businessmen's own expectations, cost of capital equipments, etc.

Finally, the monetary over-investment theory lays undue emphasis on the imbalance between investment in capital goods and consumer goods industries. In a modern economy, such imbalances are self-correcting and do not create serious depression.

22.3.3 Schumpeter's Innovation Theory of Trade Cycle

According to Joseph A. Schumpeter, 'business cycles are almost exclusively the result of *innovations* in the industrial and commercial organisation.' By *innovations* he means 'such changes of the combination of the factors of production as cannot be effected by infinitesimal steps or variations on the margin. [Innovations] consist primarily in changes in methods of production and transportation, or changes in industrial organisation, or in the production of a new article or opening of a new market or of new sources of material.' Innovations are not the same as *inventions*. Innovations are simply the commercial application of new techniques, new materials, new means of transportation, and new sources of energy. According to Schumpeterian theory, innovations are the originating cause of cyclical fluctuations.

In his formulation of the business cycle theory, Schumpeter has developed a model in two stages which he calls as the *first approximation* and the *second approximation*. The first approximation deals with the initial impact of the innovatory ideas, and the second approximation deals with the subsequent waves that are created by the application of innovation.

The **first approximation** of Schumpeter's model starts with the economic system in equilibrium: there is no involuntary unemployment; each firm has its $mc = mr$ and price = ac; and there is no incentive for additional investment or disincentive to reduce it. Under the condition of complete equilibrium in the economy, if an innovation in the form of an improved technique of production or a new product is introduced, it will have to be financed through bank credit. With additional funds available from the banking system, the innovating firms go on bidding higher prices for other inputs with a view to withdraw them from other uses. Due to increased spending in the economy, prices begin to rise. This process is further accelerated when other firms imitate the innovation and acquire additional funds from the banks. With the widespread adaptation of the innovation, output begins to flow into the market. The phase of expansion gets underway. But beyond a certain level, increased output causes a decrease in price and profitability. Since further innovations do not come by quickly, there would be no additional demand for funds. Rather, the firms which had earlier borrowed from the banks start paying back. This leads to contraction in money supply. Hence prices fall further. The process of recession begins and continues until equilibrium is once again restored. Thus, the *first approximation* has two phases: **first,** expansion due to innovation, and **second,** the recession until equilibrium position is reached.

The **second approximation** of Schumpeter's model analyses the secondary waves that are created by the waves of the first approximation. The main element in the **secondary wave is speculation**. When the primary wave of expansion begins, investors, particularly in capital goods industries, expect upswing to be permanent. With this expectation, existing firms borrow heavily. Even consumers anticipating higher price in future go into debt to acquire durable consumer goods. This leads to heavy indebtedness which causes problems when prices begin to fall. Debtors, both investors and consumers, find it extremely difficult to meet their obligations. This situation leads to a panic and then to depression. The lower turning point comes when the necessary liquidation has been completed, the debt structure has been brought to order and uneconomic firms are eliminated.

Criticism According to M.W. Lee,[11] "An objective evaluation of Schumpeter's theory of the cycle is not only difficult" but also unavailing because much of his arguments is based on 'sociological rather than economic factors'. Hence, this theory can hardly be put to test. Besides,

11. *Economic Fluctuation* (Illinois, Richard D. Irwin, Inc., 1955), pp. 317–18.

Schumpeter's theory is not basically different from investment theory: it differs only in respect of the cause of variation in the investment when the economy is in a state of equilibrium. Also, Schumpeter's theory, like many other theories, leaves out many other important factors causing business fluctuations. Innovation is only one, not the sole factor of economic fluctuation.

22.3.4 Multiplier-Accelerator Interaction Theory of Business Cycle: Samuelson's Model

While business cycle theorists of Keynesian tradition emphasised the ***multiplier*** process in economic fluctuations, J.M Clark, stressed the role of ***acceleration*** in business fluctuations. The post-Keynesian business cycle theorists,[12] however, contend that neither the theory of multiplier nor the principle of acceleration alone is an adequate tool for analyzing the business cycle. In their opinion these two tools integrated together offer a much more satisfactory explanation of business cycle. They have therefore developed their own models and have shown the role of interaction between *multiplier* and *accelerator* in business fluctuations. We discuss here two representative models of this tradition, viz., Samuelson's and Hicks' models. While Samuelson's model marks the first attempt to integrate the multiplier and acceleration principles, Hicks' model is considered as an improvement and integration of the earlier models.

In this section, we discuss Samuelson's model. Hick's model, or what is called 'Hicksian theory of trade cycle', will be discussed in the forthcoming section.

Samuelson's Model Samuelson's model is regarded as the first step in the direction of integrating theory of multiplier and the principal of acceleration in the attempts to explain business cycles. His model shows how *multiplier* and *acceleration* interact with one other to generate additional income, consumption and investment demands more than expected, and how economic fluctuations take place.

To understand Samuelson's model, let us recall the distinction between *autonomous* and *derived investment. Autonomous investment* is the investment made due to exogenous factors such as new inventions and innovations in the technique of production, production process, discovery of new markets, etc. *Derived investment* is the investment which is induced by or undertaken due to decrease in the interest rate and increase in consumer demand necessitating new investment.

To describe the interaction process briefly, when autonomous investment takes place in a society, income of the people rises and the process of *multiplier* begins. Increase in income leads to increase in demand for consumer goods depending on the marginal propensity to consume. If there is no excess production capacity, the existing stock of capital would prove inadequate to produce consumer goods to meet the rising demand. Due to demand exceeding supply, prices of consumer goods begin to rise. Rise in prices leads to rise in profits. Rise in profits induces new investments. Thus, increase in consumption creates demand for investment—the *derived* investment. This makes

12. Especially, R.F. Harrod, The *Trade Cycle Th*eory (Oxford, Clarendon Press, London, 1936); P.A. Samuelson, "Interaction between the Multiplier and the Principal of Acceleration," *Review of Economic Studies*, May 1939; A.H. Hansen, *Business Cycle and National Income* (W.W. Norton and Company Inc., 1951); Hicks, J.R., *A Contribution to the Theory of Trade Cycle* (Oxford University Press, London, 1950).

the beginning of acceleration process. When derived investment takes place, incomes rise further, in the same manner as it happens when autonomous investment takes place. With increase in income, demand for consumer goods rises. Here the process of multiplier joins the process of acceleration. This is how the multiplier and the accelerator interact with each other and make the incomes grow at a rate much faster than expected.

In his analysis of interaction between multiplier and accelerator, Samuelson assumes:

(i) no excess production capacity.
(ii) one-year lag in income and consumption;
(iii) one-year lag in investment and consumer demand; and
(iv) no government activity and foreign trade.

Samuelson's formal model and his conditions for economic fluctuations are presented below. Given the assumption (iv), the economy will be in equilibrium when

$$Y_t = C_t + I_t \tag{22.1}$$

where Y_t = national income, C_t = total consumption expenditure, and I_t = investment expenditure, all in period t.

Given the assumption (ii), the consumption function may be expressed as

$$C_t = a\ Y_{t-1} \tag{22.2}$$

where Y_{t-1} is income in period t–1, i.e., of the preceding year, and a is *mpc*.

Given the assumption (iii), investment function with a one-year lag with consumer demand is expressed as

$$I_t = b(C_t - C_{t-1}) \tag{22.3}$$

where b represents capital/output ratio (which determines accelerator).

By substituting Eq. (22.2) for C_t and Eq. (22.3) for I_t, the equilibrium condition of the economy Eq. (22.1) can be expressed as

$$Y_t = aY_{t-1} + b(C_t - C_{t-1}) \tag{22.4}$$

Since $C_t = aY_{t-1}$ and $C_{t-1} = aY_{t-2}$, by substitution Eq. (22.4) can be written as

$$Y_t = aY_{t-1} + b(aY_{t-1} - aY_{t-2}) \tag{22.5}$$

By solving Eq. (22.5), we get

$$Y_t = a(1 + b)\ Y_{t-1} + ab_{t-2} \tag{22.6}$$

Equation (22.6) forms the basis for deriving necessary information for analyzing the business cycles. The Eq. (22.6) reveals that if values for a and b, and incomes of two preceding years are known then income for any past or future year can be determined. Besides, the nature and the rate of variation in national output depends on the values of parameters a and b. Recall that a = *mpc* determines the multiplier and b = capital/output ratio determines the accelerator.

The combination of parameters *a* and *b* determines whether business cycle is explosive or dampening. Samuelson has also shown the various kinds of cycles that would be generated by different combinations of *a* and *b*. Through a graphical presentation of the combination of *a* and *b* as reproduced in Fig. 22.2, he has shown the various patterns of income variations and the types of cycles caused by the various combinations of *a* and *b*. The various combinations of *a* and *b* have been marked by areas shown by *A, B, C,* and *D*, each having a different pattern of trade cycles, shown in Fig. 22.3. The various combinations of *a* and *b* and the corresponding natures of cycles may be briefly described as follows.

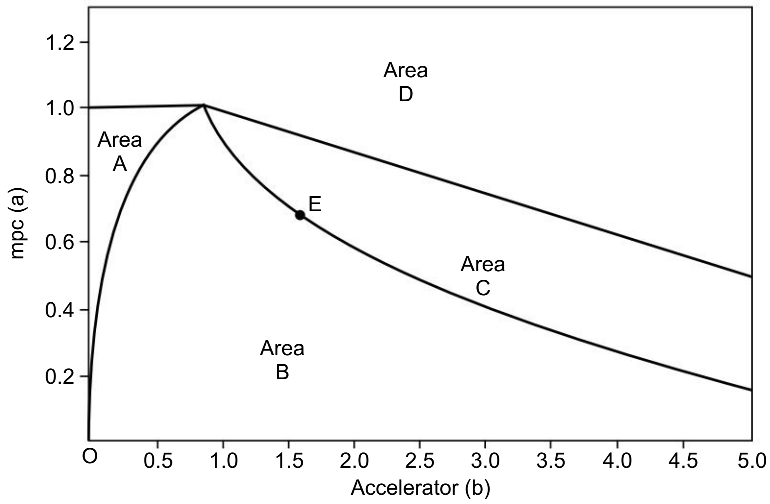


Fig. 22.2 Combinations of *mpc* (a) and accelerator (b) cycles

(i) Combinations of *a* and *b* in Area A produce ***Damped Non-oscillatory Cycles.*** If all the combinations of parameters *a* and *b* fall in Area *A* in Fig. 22.2, incomes move upward or downward, depending on whether autonomous investment increases or decreases, at decreasing rates, asymptotically reaching a new equilibrium as shown in Panel *A* of Fig. 22.3. If autonomous investment increases, the economy takes route R_1, otherwise route R_2.

(ii) Combinations of *a* and *b* in Area B produce ***Damped Oscillatory Cycles.*** If combinations of *a* and *b* fall in Area *B*, it produces cycles of amplitude growing smaller and smaller until the cycles disappear and the economy ultimately stabilises, as shown in Panel *B* of Fig. 22.3

(iii) Combinations of *a* and *b* in Area C produce ***Explosive Oscillatory Cycles.*** The combinations of *a* and *b* in Area *C* in Fig. 22.2 produce a series of trade cycles with larger and larger amplitude. This area is of explosive cycles. (See Panel *C* of Fig. 22.3)

(iv) Combinations of *a* and *b* in Area *D* produces ***Explosive Non–oscillatory Cycles.*** Combinations of *a* and *b* falling in Area *D* in Fig. 22.2, make the income increase (or decrease) at an exponential rate until the ceiling (or bottom) is hit (See Panel *D* of Fig. 22.3).

(v) A combination of *a* and *b* at point E produces a regular business cycle of equal amplitude. Point *E* shows a unique combination of *a* and *b* which produces cycles of equal amplitude that continue forever.

Criticism Samuelson's model is highly acclaimed as a pioneering attempt to integrate the Keynesian multiplier theory and Clark's acceleration principle to explain business cycle. However, his model is discredited for the following shortcomings.

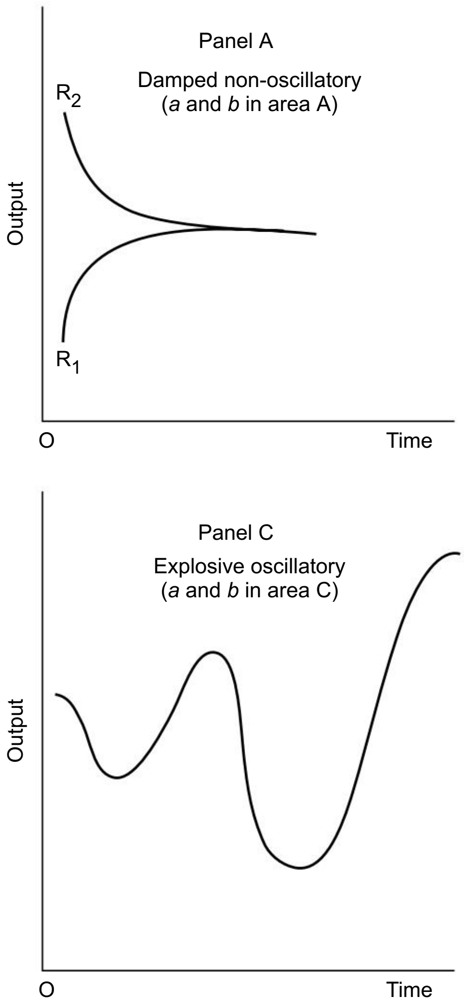


Fig. 22.3 Trade Cycle Patterns with Different Combinations of *mpc* (a) and accelerator (b)

First, Samuelson's model is regarded by its critics as far too simple to explain fully what actually happens during the period of economic fluctuations since it is developed on highly simplifying assumptions.

Second, this model emphasizes the role of multiplier and accelerator and their interaction between them in economic fluctuations. Like many earlier theories, Samuelson's model too leaves out or gives little consideration to many other important factors which might play an equally important role in business cycles, e.g., the role of producer's expectations, changing business psychology, changing consumer preferences, and such other exogenous factors.

Third, one of the major shortcomings of Samuelson's model is that it assumes constancy of capital-output ratio whereas there is a great likelihood of change in this ratio during the periods of upswings and downswings. If this assumption is dropped, cycles may have different shapes and amplitudes from those suggested by the model.

Finally, it is alleged that many cyclic patterns suggested by the model do not conform to the world experience in its economic history.

22.3.5 Hicksian Theory of Trade Cycle

Hicks has developed his theory of trade cycle[13] by combining interaction between multiplier and accelerator with Harrod-Domer growth model. In other words, Hicks combines Samuelson's multiplier-accelerator *interaction* model and Harrod–Domar growth model to expound his own theory of trade cycle. He combines multiplier–accelerator interaction with growth theory since, in his opinion, business cycles have historically taken place against the background of income growth, and therefore, the trade cycle theory should be linked with growth theory.

In his theory, Hicks uses (i) Keynesian concept of saving–investment relationship and the multiplier, (ii) Clark's acceleration principle, (iii) Samuelson's multiplier-accelerator interaction, and (iv) Harrod-Domar growth model. These are the main ingredients of Hicks' theory of trade cycle.

In his model, Hicks assumes an equilibrium rate of growth in the model economy. The equilibrium growth rate is defined as the rate at which *realised growth rate* (G_r) equals the *natural growth rate* (G_n). He assumes also that the autonomous investment increases at a constant rate which always equals the rate of increase in voluntary savings. The equilibrium growth rate is determined by the rate of autonomous investment and saving. This is the Keynesian part of his theory.

Besides, Hicks assumes a Samuelson–type of consumption function, $C_t = aY_{t-1}$ (with one-year lag between income and consumption). He gives two reasons for the lagged consumption function: (i) lag of consumption expenditure behind income; and (ii) lag in non–wage income behind the change in *GDP*. The saving function naturally becomes the function of the past-year's income. Given these assumptions, Hicks' multiplier become a mathematical truism. With the lagged relationship between income and saving–investment, the multiplier process has a dampening effect on the fluctuation. The lagged multiplier "acts as a depressant on upswing and a counterforce on the downswing."

Another important ingredient of Hicks' model is Clark's acceleration principle. In this regard, Hicks distinguishes between *autonomous* and *induced* investment functions. He assumes that *autonomous* investment is a function of current output and is undertaken to replace the wornout capital. The *induced investment*, in his model, is a function of change in output. The change in output generates *induced* investment which brings the accelerator in action. It may be noted here that this accelerator interacts with multiplier effect upon income and consumption.

Finally, unlike Samuelson's ever–widening, explosive cycles (case C in Fig. 22.3), Hicks imagines 'ceiling and bottom for the upswing and downswing'. The ceiling on upward expansion is imposed by the 'scarcity of employable resources'. In regard to the limit of the downswing, he says 'there

[13] In his book *A Contribution to the Theory of the Trade Cycle* (London: Oxford University Press, 1950).

is no such direct limit on contraction.' But an indirect limit is imposed by the mechanism of accelerator on the downswing. However, irrespective of what Hicks says, there is a natural limit to bottom level of growth. People do produce goods and services for their survival, come whatever may. So there is a limit to economic contraction.

Diagrammatic Presentation Hicks has outlined his theory of trade cycle in a diagram, reproduced in Fig. 22.4. The vertical axis measures the logarithms of output and employment and the horizontal axis measures *time* by its semilogarithmic scale. In Fig. 22.4, the line *AA* shows the course of autonomous investment, increasing at the constant rate in accordance with the first assumption. The line *EE* is equilibrium path of output growth in a dynamic economy. The output growth is a constant multiple of autonomous investment. The line *FF* is the full employment ceiling which is above the equilibrium path. The line *LL* shows the equilibrium path during the period of slump, assuming the output level will never go below this level.

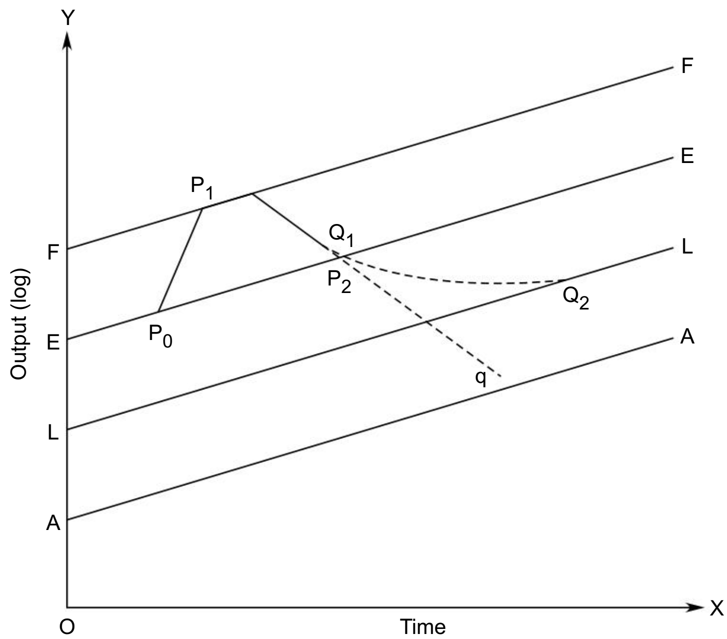


Fig. 22.4 Hicksian Trade Cycle

Let us suppose that the economy has been progressing on the dynamic equilibrium path, *EE*, and reaches point P_0 at some point of time. Suppose also that at this juncture autonomous investment takes place due to an invention. Consequently, investment and, therefore, output increases and the economy leaves the equilibrium path, *EE,* and begins to tred on path P_0P_1. After a certain time lag begins the multiplier process caused by the autonomous investment. As a result, output and employment increase. Increase in output leads to induced investment which in turn brings accelerator in action. This interaction between the multiplier and the accelerator causes expansion in the economy which then moves along the expansion or oscillation path P_0P_1 until point P_1 on full employment line *FF*, is reached. As Fig. 22.4 shows, the expansion beyond P_1 will not be possible because of full employment constraint. The most it can do is to creep along the ceiling line *FF*.

But the economy cannot move along the line FF for long. The reason is that the initial burst of autonomous investment was supposed to be shortlived; "thus on the upper part of the path P_0P_1 no more than the normal amount of autonomous investment is taking place." It implies that the expansion along P_0P_1 has been mainly on account of the induced investment during the preceding periods. But when the ceiling is hit, the expansion sustained by the induced investment along FF is bound to end and a downswing becomes inevitable.

The reason for downswing can be explained as follows. Once the ceiling line FF is hit the increase in output along FF is not high enough to induce investment and hence the induced investment ceases to take place. The downswing may be prolonged if output–investment (induced) relation has a 3 or 4-year lag. But the downfall in the output is inevitable because returns on the induced investments are much less than expected. This marks the beginning of the downswing. Once the downfall has started, there is nothing in the process to stop it at EE: the downfall will continue further. The rate of fall, however, should be lower since the disinvestment is limited to the rate of depreciation which goes on decreasing following the decrease in output and fall in the stock of capital. That is, the reverse accelerator does not work as fast as it does during the upswing. There is a marked lack of symmetry. Even though the process of decline in output may be slower, a situation characterised by slump does take place in due course. Here the autonomous investment is reduced a little below the normal level, while induced investment is zero.

The course of slump is shown by curve Q_1Q_2. The absolute magnitude of output decreases along Q_1Q_2 towards the slump equilibrium line LL. Another possible course of slump is shown by Q_1q, when the output plunges downward indefinitely. According to Hicks, however, this is a rare possibility. The normal course of slump is Q_1Q_2.

Turning to recovery, when the downswing hits the bottom it starts moving along the slump equilibrium line LL. After a time-lag, autonomous investment begins to take place and output begins to rise again. This increase in output brings the accelerator back into action. This marks the beginning of recovery once again. Once the autonomous investment starts coming in, the process of multiplier, and later, its interaction with accelerator, makes the economy grow on the path of expansion towards the equilibrium path line EE. This completes the cycle.

The Hicksian theory of trade cycle is regarded as the most modern and highly streamlined theory of trade cycle. As Lee remarks, "It incorporates all the best features of earlier models and scraps most of those which have not proved out in the past."[14] In addition, Hicks has pointed out that there is a difference between the role of accelerator at the upswing and its role at the downswing. On the downswing the accelerator is inoperative because of excess capacity. This kind of role of accelerator is regarded as a very important contribution by Hicks.

Criticism One general criticism of Hicksian theory is that, like other theories of this tradition, Hicksian theory too does not provide sufficient reasons for the linear consumption function and a constant multiplier. It is quite likely that during the phases of expansion and contraction, incomes are so redistributed that it affects the marginal propensity to consume at the aggregate level and hence the multiplier.

14. W.W. Lee, *Economic Fluctuations, op. cit.,* pp. 414–15.

Similarly, the assumption regarding the constancy of multiplier under the dynamic conditions is looked upon with skepticism. Without a sound empirical evidence, the whole discussion on acceleration principle assumes an abstract character and it retains only academic interest. The empirical studies have also not provided evidence to the assumption of constant accelerator.[15]

Lastly, like other theories, Hicksian theory is also regarded as a highly abstract formulation which seems incapable of explaining the phenomenon of economic fluctuations in real life.

However, in spite of these minor points of criticism, Hicksian theory of trade cycle is treated as the most important contribution to the area of trade cycle. His theory is theoretically most sound. Moreover, discussion in the Hicksian theory of trade cycle takes us to the end of our discussion on the theories of trade cycle.

22.4 WHAT THEORY OF TRADE CYCLE?

In the preceding sections of this chapter, we have discussed some major theories of business cycles and have also noted the theoretical deficiencies and lack of empirical validity of these theories, as pointed out by the economists. It may be recalled from the foregoing discussion that none of the business cycle theories is sound enough to explain fully the factors that cause business cycle. The growth of multiple business cycle theories itself creates a doubt about their theoretical validity and empirical relevance. A question that arises here is: *Which of the business cycle theories can be taken to be theoretically more sound and closer to the reality*? The simple answer to this question is: *None and each one.*

Let us look at why 'none'. If one examines the theoretical validity, the relevance and the applicability of various business cycle theories to the modern economic conditions and the working of the economic systems, one finds that none of the theories explains fully the origin and the cause of business cycles. This point is illustrated in the following section with the example of the *current global recession.*

Why is 'each one' of business cycle theories important? The reason is that the various factors that economists of different periods have identified as the leading factor causing business cycle were relevant then and are also relevant today either as the main factor or as a contributory one. For example, fluctuation in the ***money supply*** identified by Hawtrey as the main factor causing business cycle was relevant in his days—the last quarter of the 19th century—and is relevant today. So is the case with Hayek's theory of monetary over-investment, Samuelson's multiplier-acceleration interaction theory, and Hicksian theory of trade cycle which combines Harrod-Domar growth model with Samuelson's theory of business cycle. The 'excess money supply', the over-investment, the interaction between multiplier and accelerator and growth factors were all relevant in the past and are all relevant today. So one cannot reject any of these business cycle theories altogether.

A somewhat better understanding of the relevance of the business cycle theories can be had by looking at the origin and deepening of economic recession in the US causing global recession.

15. See, for example, J. Tinbergen, *Statistical Testing of Business Cycle Theories* (Geneva, League of Nations, 1939) and his 'Critical Remarks on Business Cycle Theories; *Economica*, April 1942; Simon Kuznets, "Relations between Capital Goods and Finished Products in Business Cycle," *Economic Essays in Honour of Wesley Clair Mitchell* (New York, Columbia University Press 1935).

22.5 THE GLOBAL RECESSION—THE BUSINESS CYCLE OF 2008-09

As mentioned earlier, since business cycles did not recur over a long period of time after the Great Depression, some economists held the view that business cycles were the things of past. However, the global recession of 2008-09 proved them wrong. The global recession has proved the point beyond any doubt that business cycles continue to remain a dormant threat to the individual as well as the world economy. In this section, we describe briefly the origin of the current global recession, its impact on the world economy, and the gradual revival of the recession-hit economies.

22.5.1 The Origin of the Global Recession

The global recession originated in the US—the richest and the strongest economy of the world—in the later half of 2008 and spread to almost all major economies of the world. Although the US economy had suffered a strong economic downturn during the 1980s, the economic recession of 2008-09 was the worst economic recession in the US after the Great Depression of 1930s. The US economic crisis caused ultimately a global economic recession, which continues to remain the biggest concern for the economies suffering from the global recession.

The economic recession in the US was caused by a *financial crisis,* widely known as ***sub-prime crisis***. The ***financial crisis*** in the US was caused by the burst of the housing boom. What had happened, in fact, was that the housing sector of the US had a booming growth during 1997-2002. The most important factor behind the housing boom was the excessive housing loans granted by the banks and their subsidiaries and also by the other financial companies to the *sub-prime borrowers*—the poor and young sections of the society with low creditworthiness and a poor track record of repaying loans. Although banks were generally reluctant to grant loans to the sub-prime borrowers, they made excessive loans to them during the period of housing boom because (i) banks and financial firms had excess liquidity due to simultaneous booming stock market, and (ii) the US government had encouraged banks to lend money to help the poor and young to have their own house. Besides, the banks had offered a newly invented facility, i.e., to pay only the interest portion of EMI in the first two years and the prime loan after two years. These factors had encouraged the sub-prime borrowers to borrow excessively by mortgaging their property. Besides, during the housing boom, the real estate prices had more than doubled. This had created a favourable condition for the sub-prime borrowers to borrow heavily by mortgaging their 'junk houses', often with manipulated inflated values. The total housing loans to sub-prime borrowers exceeded $ 1.4 trillion.

What led to the sub-prime crisis? The sub-prime crisis was caused by the burst of the housing boom. The housing boom had collapsed because of housing supply far exceeded the demand causing a sharp decline in housing prices. The housing boom had started petering out in 2007. Due to the sharp decline in housing prices, house-owners started selling their houses to minimize their loss and financing firms their collaterals to recover their loans as much as they could. The result of the number of house sellers far exceeded the number of buyers. This created a vicious circle of increasing supply with falling demand causing further fall in realty prices. As a result, housing prices had declined by over 50% in 2008 from their peak in 2006.

Due to the sharp decline in housing prices, the sub-prime borrowers suffered heavy losses and hence they defaulted in repaying their loans in a big way. The default in repayment of loans was aggravated also because the *interest rate* on sub-prime loans was 2% higher than that on the prime loans. The default in loan repayments by the sub-prime borrowers was unprecedented. Consequently, banks and financing companies failed to recover their loans from their collaterals because of collapse in housing prices. This resulted into massive financial losses to the banks and other financial companies. As a result, banks started failing in 2007 and most leading banks of the US failed[16] by 2008. The financial condition of the US had turned worst with the bankruptcy of Lehman Brothers in September 2008. The closure of the leading banks led to the financial crisis in the US, called ***sub-prime crisis*** or ***sub-prime mortgage crisis.*** The sub-prime crisis generated a ***financial crisis*** which marked the beginning of the downtrend in the US economy.

The Sub-prime Crisis Caused Economic Recession in the US Economy

The sub-prime crisis resulted in a deep economic recession in the US. Since major banks had turned bankrupt, availability of finance to manufacturing firms declined sharply causing a sharp decline in manufacturing output. According to a panel of American economists, the US manufacturing output had declined in November 2007 at the fastest pace in 26 years and the US faced recession first in December 2007. The recession in the world's largest economy deepened further in the 4th Qtr of 2008. Income and therefore consumer demand declined sharply. According to the estimates made by the Commerce Department of the US, *GDP* contracted by 0.2%—more than 0.1% fall in October and consumer spending contracted by 0.6% in November though less than a steeper fall by 1% in October 2008. The Commerce Department had estimated a 6.3% decline in the US economy in Q4 2008 on year-to-year basis. This was the most sever meltdown in the US economy since 1982.

With declining production, income and the overall demand, unemployment had increased heavily. The number of persons claiming unemployment benefits had jumped by 30,000 in the last week of November 2008, which was the highest in the past 26 years. According to the Labour Department, almost 2 million workers had lost jobs in 2008 driving the unemployment rate to 6.7%. Private sector wage and salary disbursements had fallen by $8.7 billion in November 2008 compared to $1.5 billion in October. Total loss of jobs in 2008 was 1,000,000.

16. For instance, two banks Freddie Mac and Fannie Mae, known for their prudent practice, had guaranteed more than half of approximately $ 12 trillion loan in housing mortgage. The two banks together suffered a loss of $14 billion in three quarters of 2008. By the end the year, the global banks and mortgage companies had to write off $ 512 billion as sub-prime losses. The largest hit was Citigroup ($ 55.2 billion) followed by Merrill Lynch ($52.2. million). At the aggregate level, a little more than half of these losses ($ 260 billion) were suffered by the US banks and investment firms; $ 227 billion by European firms; and a relatively modest loss ($ 24 billion) by the Asian firms. As a result, banks in the US started collapsing despite the bailout help by the Federal Reserves. Bear Stern, one of the largest investment banks and security trading firms, collapsed due to its losses; Lehman Brothers, the 4th largest investment bank in the US, turned bankrupt; Merrill Lynch was bought by Bank of America; and Freddie Mac and Fannie Mae were nationalized. So devastating was the effect of the financial crisis in the US that it led to a global crisis.

The situation continued to worsen in 2009. In January 2009—just in one month – 80,000 jobs were cut down in a single day. Over 400,000 jobs were lost in the 1st two months of 2009 – 5 jobs terminated every minute this year as a cost-cutting measure by the companies. The unemployment was expected to increase further as many manufacturing companies, including General Motors (GM), a large employer, suffered a heavy loss and turned bankrupt[17] in June 2009.

22.5.2 The US Economic Recession and the World Economy

The US recession had its impact on the global economy causing a global recession[18]. The impact of the US economic recession spread to the global economy because of heavy decline in (i) the international flows of goods and services—the foreign trade, (ii) the international flows of capital, and (iii) the international flow of labour. As regards the impact of the global recession on the world economy, since the US economic recession continued till mid-2009, it was premature to measure its overall impact on the global economy. However, the international organizations like IMF and World Bank (WB) and the UN bodies have given their estimates of impact of the US economic recession in terms of the *decline in global growth rate, loss of jobs,* and *decline in the world trade.*

Decline in Global Growth Rate. The WB predicted a decline in global economic growth to 0.9% in 2009 from 2.5% growth in 2008. According to the MD of the IMF, Dominique Straus-Kahn, the global economic growth could dip *below zero* for the first time in 2009, "the worst performance in our life time". The decline in the world *GDP* growth rate is mainly due to most advanced economies facing sever recession. The UN Department of Economic and Social Affairs (UN-DESA) has forecast the world economy to shrink by 2.6% in 2009, revising its earlier estimate of only 0.5% decline. The DESA attributed this global crisis to the global financial crisis, affecting poor countries more that the rich countries.

Decline in World Trade. The world trade was projected to decline by 2.1% due to fall in demand and non-availability of credit – for the first time since 1982. The trade growth in South East Asia

17. Initially, GM anticipating economic recession to continue, had planned to cut more and more jobs over a period of time for its survival. For example, GM had a plan to axe 31,500 more jobs in the US as it confronted a sever slump. In fact, it had planned to reduce its US employment from 96,537 employees to 65,000-75,000 by 2012. Also, it had planned to reduce number of plants from 47 to 38. The reason was that the largest decline in sales in 26 years. However, the company reached the stage of bankruptcy in early 2009.

The GM had filed for bankruptcy on June 1, 2009. This was the 4th largest bankruptcy case in US history and the largest for an industrial company. The company had fallen deeply in debt as its assets of $ 82.29 billion had fallen far short of their debts of $ 172.82 billion—a deficit of $ 90.53 billion. Incidentally, Lehman Brothers (with an asset of $ 691 billion) filing bankruptcy in September 2007 was the nation's largest ever, the second being the Washington Mutual with an asset of $327 billion and the third was the WorldCom with an asset of $ 107 billion.

18. However, the WB had a different opinion. In its Report, *Global Economic Prospects – 2009,* the WB observed that the global recession was caused by an unprecedented increase in commodity prices over a long period of 5 years – between 2003 and 2008. Oil prices had increased by 320% and food prices by 130%. According to WB, 130 to 150 million people were pushed into poverty by zooming prices of food items between 2005 and 2008. The global inflationary pressure might be a factor responsible for loss of purchasing power and fall in global demand. But inflation was not the main factor causing global recession. It is widely accepted that US economic recession was the main cause of the global recession.

declined from 8.4% in 2007 and 6.3% in 2008 to 5.4% in 2009 – the decline in export growth rate being the highest in India and Pakistan. In East Asia and Pacific region (including China), the trade growth was projected to decline from 8.5 in 2008 to 6.7% in 2009 and China's trade growth rate to drop from 9.4% in 2008 to 7.5% in 2009. In its revised report, WB predicted that the global economy and the world trade would shrink in 2009 for the first time since the World War-II. It added that the crisis that began with 'junk mortgages' in US was causing havoc in poor countries which have nothing to do with this problem. Most affected countries include those from Latin America, Africa, and East Asia.

The Global Loss of Jobs: According to the ILO, the global loss of jobs might reach 51 million in 2009 due to global recession. The ILO estimated that the global unemployment rate might reach 6.1% in 2009. More realistically, if financial turmoil persists, the loss of jobs would be 30 million in 2009, putting the global unemployment rate 7.1%. The earlier estimate of ILO for unemployment in 2009 was 20 million. The ILO estimates of the loss of jobs in different economic regions are as follows.

- Developing nations, mainly Sub-Saharan Africa and South Asia, would be biggest suffers of the job losses.
- North Africa and Middle East had the highest unemployment rate – 10.3% and 9.4%, respectively.
- Unemployment rate in 2008 in Central and South Eastern Europe and former Soviet States was 8.8%; Sub-Saharan Africa – 7.9%; and Latin America – 7.3%.

The ILO Director General, Juan Somavia, observed in the Global Wage Repot – 2008/09, "For the world's 1.5 billion wage earners, difficult times lie ahead. Slow or negative economic growth combined with highly volatile food and energy prices will erode the real wages of many workers". The Report noted that 'wage growth had lagged behind overall economic growth during upswing and slowed down more rapidly during economic downswing. Between 1995 and 2007, for each 1% decline in *GDP*, per capita wages fell by 1.55%'. "If this pattern were to be in the rapidly spreading global downturn, it will deepen the recession and delay the recovery". Mr. Somavia suggested that countries should adopt the minimum wage law to keep the consumer demand alive and the economy to revive. The ILO suggested job creation through construction and rehabilitation projects including roads, bridges, schools, hospitals, public buildings.

22.5.3 Countries Affected Most by the Global Recession

The impact of global recession on different economies has been different. Here, we give a summary view of the country-wise impact of the global recession. According to the IMF, advanced economies were projected to have a dip of 2% in their *GDP* growth; the US – the origin of the global crisis – would have a *negative* growth of 1.6%. The negative growth rates in other major counties are projected by the IMF for 2009 as UK 2.8%; Japan 2.6%; Germany 2.5%; and Euro Area 2%.

The case of **Japan,** the second largest economy of the world, was hit most by the global recession because it depends heavily on exports. The Japanese economy slid into recession in November 2008 for the first time since 2001. According to a Government Report issued in February 2009, due to the collapse in global export demand, Japan's economy shrank at its fastest in past 35 years since the oil shock in 1974 and there was no sign of recovery. The Japanese economy contracted at an annual rate of 12.7% in the 4th Qtr of 2009. Business investment declined by 1.7% in 2008 due mainly to a dramatic fall in foreign demand for consumer goods, especially Japanese autos[19] and electronic gadgets. Japan's *GDP* declined by 15.2% in January-March 2009 – the highest decline since 1955 due to decline in exports caused by global recession.

Global recession has spread also to the **Gulf Countries**. The recession in the gulf countries led the loss of jobs in Gulf nations due mainly to decline in construction and realty boom followed by the decline in crude oil price. Of the 5 million labour working abroad, 90% are working in Gulf countries and the South-East Asia. The Gulf countries were affected because **crude oil** price declined to $48 p/b, the lowest in three years in New York due to the recession in the US, the world's largest energy consumer. Oil prices had tumbled 68% in the fist week of December 2008 since reaching a record of $147.27 on July 11, 2008. The decline in oil prices was mainly due to simultaneous recession in the US, Europe and in Japan—the worst after the World War II.

22.5.4 The Two Least Affected Economies: China and India

The two economies which are deemed to be much less affected by the global recession are China and India – called as 'fast developing economies'. According to the IMF forecast on January 28, 2009, while the world economy is projected to grow at 0.5% in 2009, China and India – the only two sizable economies – are likely to record growth rate over 5% and will prevent the world from recording negative growth in 2009. According to a study jointly conducted by India's FICCI and American Ernst & Young, the growing economic links between the US and India has benefited the former during the economic downturn as thousands of Americans could save their jobs when Indian corporates made major acquisition of US companies. During the last two years, Indian companies[20] acquired 143 US firms across various sectors – 94 companies in 2007-08 and 50 companies in 2008. Indian companies could acquire US companies because of their high financial status and the liberal policies adopted by the GOI and the RBI.

These facts should not, however, lead to the conclusion that these economies are not affected at all by global recession. These countries too had suffered substantially mainly due to (i) financial crisis, and (ii) huge decline in their exports, during the period of global recession.

Looking at **India's** problems, India's financial markets – equity markets, money markets, forex markets and credit markets – had come under pressure due to (i) global liquidity squeeze, reversal of capital flows causing forex problem[21]. Besides, due to global slump in demand, *India's exports* had declined by 33.3% in March and by 33.2 in April 2009 compared to exports in the respective months in 2008. This was worst performance of India's export sector in the last 14 years. Imports had declined by 36.6% in April 2009 compared to exports in April 2008. According to the RBI projections, the economic slowdown in India might continue till 2010, in spite of intensive use of monetary policy measures, reason being the low business confidence, decline in consumer spending and rise in unemployment rate. However, the Indian economy showed its strong resilience against

19. The auto sales of Toyota, Japan's No.1 automobile company, plunged 21.8% in November 2008 – the biggest drop in 8 years. The company made the operating loss for the first time in 2008 in 70 years.

20. The main acquiring companies were Tata Chemicals, Wipro, Reliance Communications, and First Source Solutions.

21. D. Subbarao, "Impact of the Global Financial Crisis on India: Collateral Damage and Response", in RBI Bulletin, March 2009, p. 387.

the effects of global recession. According to an official estimate, Indian economy registered a growth of 6.7% in 2008-09, the year of the global recession, which was substantially higher than 5-6% projected by the individual economists and analysts.

China's exports had declined by 27.7% due global downturn, causing a sharp decline its growth rate from 9% in 2008 to 6.5% in 2009. According the official figure, the sharp decline in China's exports, as many as 2452 manufacturing companies in Guangdong province – the heart of the China's economic miracle – were shut down by January 2009. However, according to the industry sources, the situation was much grim as 20,000 out of over 70,000 companies in Guangdong had trimmed their operation to 30-40% and many of them were on the verge of closing down because of decline in exports. This created a grim situation of unemployment. According to an official survey, 20 million (2 crore) agricultural workers had lost their jobs due to global recession.

Nevertheless, the positive growth in China and India builds optimism for the revival of the global economy. Although growth rates in India and China have declined due to global recession, a much lower fall in their growth rates has created an optimistic outlook for the work economy. In its latest Report[22], the WB projected that the developing nations, including China and India, would grow at 1.2% in 2009. But, with these countries excluded, the developing nations would shrink at 1.6%. According to the WB, the continues positive high growth in China and India would make the developing countries grow at 4.4% in 2010 and at 5.7% in 2011 and global growth will rebound to 2% in 2010 and to 3.2% in 2011.

22.5.5 Revival of the Global Economy

Most developed and developing economies affected by the global recession have adopted economic stimulus schemes, including monetary and fiscal policy packages, with the objective of controlling further deterioration in the economy. The stimulus packages aimed at (i) preventing further failure of banks and companies and reviving the financial market, (ii) creating job opportunities for jobless, and (iii) to generate additional income, with the purpose of reviving plunging demand.

The **US** Federal Reserve Chairman, Ben Bernanke, announced a bailout scheme of $1.8 trillion with basic purpose of bailing out the banks and financial companies from the financial crisis. The US government went for buying shares of failing companies – it bought 70% shares in GM. This was in addition to reducing the key interest rate nearly to zero with the purpose of encouraging economic activities. The US economy had shown the sign of the revival – the retail sale in the US had fallen at a much lower rate of 0.1% in February compared to a 0.5 fall in January 2009. Other countries had also adopted similar economic stimulus package for reviving their economy.

China announced economic stimulus package of $ 587 billion for labour-intensive infrastructure projects. This was followed by other stimulus schemes aimed at creating new job opportunities by constructing houses for 12 million families and creating health facilities. In addition, China slashed bank rate by more than 1% on the 26th November 2008, in an attempt to revive the economy hit by global recession and the consequent joblessness in the industries. This was the highest interest cut by the People's Bank of China since the Asian financial crisis in 1999. China reduced also the reserve rate. The cuts aimed "at ensuring ample liquidity in the banking system and promoting stable credit growth to make the monetary policy play an active role in supporting economic growth".

22. Global Development Finance—2009: Charting a Global Recovery.

Japan, the second largest economy and the worst affected economy, announced a similar stimulus package to fights its 'unprecedented economic crisis'. Japan had announced an additional public spending of $122 billion in April 2009 with the objective of preventing the economic shrinking further, creating employment, and to create public facilities.

India also had adopted stimulatory monetary and fiscal policies. The monetary policy package included (i) a substantial reduction in the interest rates, (ii) liberalized financing of exports, (iii) rupee-dollar swap facility provided to banks. The fiscal package amounting 3% of *GDP* included such measures as additional public spending, grant of funds for infrastructure, cuts in indirect taxes, and financial support to exporters. With a liberal monetary policy, the industrial sector, specially the core sector industries, started picking up. The core infrastructure industries – crude oil, refinery products, electricity, coal and cement, having a combined weightage of 26% in Index of Industrial Production – registered a growth of 2.2% in February 2009. This is being taken as the sign of recovery. The sector-wise growth in February 2009 was coal 6%; cement 8.3%; electricity 0.3%; and steel 3.6%, though crude oil declined by 6.2% and petroleum refinery by 0.5%.

Most **other countries** affected severely by the global recession adopted economic stimulus packages to prevent the aggravation of the economic crisis. In addition, WB announced a $ 50 billion trade liquidity fund on March 31, 2009. These revival schemes created favourable conditions for the revival of the world economy. And, in fact, the world economy started reviving by mid-2009. A survey of economists' opinion by National Association of Business Economics revealed that 90% economists predicted that the recession would end by 2009 though it may be bumpy.

In mid-2009, most international bodies including UNO, WB, IMF, and also economic research organizations expressed hopes for revival of the global economy in 2009-10. The global recovery was projected in 2010 with global *GDP* growth of 3% – China 8%; India 6.5%; US 1.6% 5; Euro area, UK and Japan 0.6%. The Fed Res Chairman predicted US recession to end in 2009 and 2010 will be year of recovery.

22.5.6 What Business Cycle Theory Applies to Global Recession?

A question that arises now is: What business cycle theory applies to the global recession of 2008-09? A reasonable answer to this question can be found only by conducting an extensive and intensive research on the problem. However, the over-investment theory, on the face of it, appears to be closely applicable to the global recession. As the facts stand, the global recession was caused by the ***collapse of the housing boom*** in the US. The collapse of the hosing boom was caused by supply of houses in excess of demand. The excess supply of houses was the result of ***over-investment in the housing sector***. The supply of housing in excess of demand caused a 50% decline in the housing prices. This caused tremendous financial loss to the sub-prime house mortgagers. Therefore, they could not pay their debt to the banks and financers. This is what caused the sub-prime crisis. Due to the ***sub-prime crisis,*** the banks suffered unprecedented losses. As a result, banks turned bankrupt and pulled down their shutters. The result was a ***big financial crisis*** in the US, leading to fall in investment and downturn in the US economy. The US financial crisis affected the financial sector of all the related economies, on the one hand, and decline in consumer demand resulted in fall in imports, on the other, which affected exports of the exporting countries. This was the basic cause of the global recession. Thus, over-investment theory of business cycle appears to offer a reasonable explanation to the global crisis.

22.6 NEED FOR CONTROLLING BUSINESS CYCLES

We have so far discussed the prominent theories of business cycles and also the sources and effects of the current global recession. In this section, we discuss briefly the policy measures suggested by the economists to control business cycle and the measures which are generally adopted by the governments to revive the economy during the period of economic recession. Let us first see when and why it became a necessity to control business cycles, especially when the economy shows strong signs of economic downturn.

Business cycles create devastating conditions for the economy. A fast growth leads to overheating of the economy, which ultimately ends in a rapid downturn in the economy. If not controlled, it turns into economic depression causing unemployment and poverty and all sorts of economic misery, including national security. For instance, as mentioned above, the global recession of 2008-09 caused a sharp decline in growth rate and *GDP*, decline in consumer demand and high rise in unemployment, in almost all highly rich nations of the world. As a result, most countries announced fiscal packaged and monetary measures to control the further deterioration in the economy.

Although, as world's economic history shows, many countries had suffered from business cycles in the past, no sincere efforts were made by the governments to control business cycles whenever they took place. In fact, until the Great Depression of 1930s, there prevailed an orthodox economic belief – known the classical thought – that the working of economy should be left to the market forces and 'invisible hands' would automatically maintain the balance in the economy and would prevent the occurrence of business cycles. However, the Great Depression proved this thought to be baseless and inapplicable under the modern conditions. Besides, there emerged a new economic thought that if working of the economy is left to market forces, business cycles are bound to take place and a free economy is always open to risk of business cycles.

It was only after the Great Depression that John Maynard Keynes created a revolution in economic thoughts that emphasized the need for controlling and regulating the economy with the purpose of preventing business cycles and maintaining a stable growth in the economy. But the Keynesian thought did not gain prominence until the Second World War. After the War-II, however, a considerable attention was devoted by the economists to the analysis of business cycles and formulating economic policies to control the sever fluctuations in the economy. Thus, "… by an evolutionary process, economic thought has progressed from a strong conviction that the economy should be left to run on its own course to a general and non-partisan acceptance of the need for a stabilizing policy which would prevent excessive fluctuations in the private economy"[23]. It is now a widely accepted rule that when the economy shows the signs of overheating or of downturn, the authorities must use appropriate policy measures to stabilize the economy.

22.7 POLICY MEASURES TO CONTROL BUSINESS CYCLE

The basic objective of controlling business cycle is to eliminate the forces and the factors that cause economic fluctuations with the purpose of achieving economic stability without affecting the growth factors adversely. Before we proceed, let us look at the meaning and purpose of economic stabilization.

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23. W.W. Lee *op. cit.*, p. 422.

Economic Stabilization: Meaning and Objective Stabilization does not mean creating conditions for economic stagnation. Stabilization broadly means preventing the extremes of ups and downs or booms and depression in the economy without preventing the factors of economic growth to play their role. It also implies preventing over and under-employment. Stabilization does not mean rigidities: it should permit a reasonable degree of flexibility for 'self-adjusting forces of the economy'.

The major objective of stabilization policies of free-enterprise economies are:

(i) Preventing excessive economic fluctuations and, at the same time, making allowance for fluctuations necessary for a long-term, sustained economic growth;
(ii) Efficient utilization of labour and other productive resources as far as possible;
(iii) Encouraging competitive enterprise with minimum interference with the functioning of the market economy; and
(iv) Avoiding, as far as possible, the conflict between the internal and external factors.

The Policy Measures The two most important and widely used economic policies to control business cycle and to achieve economic stability are

(i) fiscal policy; and
(ii) monetary policy.

In case of dire economic necessity especially when fiscal and monetary measures prove to be inefficient or inadequate, the government may adopt *direct controls* to supplement fiscal and monetary measures to ensure economic stability. Fiscal and monetary policy measures[24] which are generally adopted by the government to control the business cycles are briefly described below.

22.7.1 Fiscal Policy Measures

What Is Fiscal Policy? The term 'fiscal policy' refers to the changes made in taxation and public expenditure by the government to achieve certain predetermined objectives. Taxation is a measure of transferring funds from the private purses to the public coffers. It amounts to withdrawal of funds from the private use. Public expenditure, on the other hand, is the flow of public funds into the private economy. Thus, taxation reduces private disposable income and thereby the private expenditure. Public expenditure, on the other hand, increases private incomes and thereby the private expenditure. Since tax revenue and public expenditure form the two sides of the government budget, the taxation and public expenditure policies are also jointly called as 'budgetary policy.'

Fiscal or budgetary policy is regarded as a powerful instrument of controlling business cycle with the objective of ensuring economic stabilization. The importance of fiscal policy as an instrument of economic stabilization rests on the fact that government plays a very important role in modern economies and government taxation and expenditure account for a considerable proportion of *GDP*, ranging from 10 to 25 percent. Therefore, the government may influence the private economic activities to the same extent through variations in taxation and public expenditure.

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[24] Monetary and fiscal policies, their broad objectives, their theoretical functioning and their limitations have been discussed ahead—Monetary Policy in Ch. 30 and Fiscal Policy in Ch. 31. Here, we give only a brief description of how these policies can be used to control business cycles.

A section of economists, called "fiscalists", consider fiscal policy to be more effective than monetary policy because the former directly affects the private decisions while the latter does so indirectly. If fiscal policy of the government is so formulated that it generates additional purchasing power during depression and contracts it during the period of expansion it is known as **counter–cyclical fiscal policy**.

Before we proceed to discuss what kinds of fiscal measures are used to control business cycle, let us have a glance at how the counter-cyclical fiscal policy is formulated. The counter-cyclical fiscal policy is formulated on the basis the nature of relationship of public expenditure and taxes to the national income, the *GDP*. The relationship between public expenditure and *GDP*, and between tax and *GDP* may be expressed in the form of the following propositions.

(a) ***Public Expenditure and GDP*** An increase in public expenditure raises the level of *GDP*. *The size of increase in the GDP as a result of additional public expenditure is determined by the rate of multiplier*. Public expenditure in the form of purchase of goods and services increases the income of the households in the form of wages, rent and business profit which, in turn, increases governments' tax revenue.[25] Marginal *propensity* to consume being greater than zero, *households* spend a part of additional income on consumption, and so do the people who earn any income due to additional consumption expenditure at the first instance. The process continues and *GDP* increases by the rate of multiplier.[26]

(b) ***Taxation and GDP*** All taxes are considered to have a deflationary impact on the economy to a large or small extent. *Increase in taxation, by way of increasing the rate of existing taxes and imposing new taxes, reduces disposable income, household spending and hence GDP. The size of decrease in GDP as a result of increase in* taxation depends on the tax multiplier. The multiplier works in reverse direction in case of taxation. For, taxation reduces disposable income and hence consumption expenditure cumulatively. It should be noted here that the tax–multiplier is 1 less than public expenditure multiplier even if *mpc* is the same in both the cases. The implication of this difference between the two multipliers is that public expenditure of a certain amount would more than neutralise the taxation effect of an equal amount. Therefore, an equal amount of taxation and public expenditure, i.e. a balanced budget policy, will have an expansionary effect on the economy equal to the amount of public expenditure.

(c) ***Counter-cyclical Fiscal Policy: Automatic and Discretionary Changes*** It may be inferred from the relationship between public expenditure and *GDP* and between taxation and *GDP*, that a counter–cyclical fiscal policy would require increase in public expenditure and reduction in taxation to fight depression, and reduction in public expenditure and increase in taxation to control inflation. In other words, fighting depression would require a *deficit budgeting* and controlling inflation requires surplus *budgeting*.

A counter-cyclical fiscal policy may be of two types: (i) relying on *automatic adjustment* process to control business cycle, and (ii) making discretionary changes in taxation and expenditure. Let us now see how the two kinds of fiscal policies work to stabilize the economy.

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25. Otto Ekstein, *Public Finance* (New Jersey, Prentice-Hall Inc., 1967) 2nd Edn., pp. 102–03.

26. For detailed description of multiplier process, *see* Chapter 33, pp. 510–13.

(i) ***Built–in–Flexibility and Automatic Stabilization*** Automatic budgetary adjustment takes place only when fiscal policy has *built–in–flexibility*. Under the built-in-flexibility approach, budgetary changes automatically, follow the change in *GDP*. Built-in-flexibility in the fiscal policy implies that as *GDP* falls, both income and consumption decline. Consequently, the revenue from both direct and indirect taxes declines. Government establishments and committed expenditure remaining the same public expenditure exceeds its revenue and the budget automatically runs into deficit. Deficit spending does automatically increase the level of *GDP*. This effect is more quick and powerful in the countries which provide unemployment allowances and other relief benefits. On the contrary, when *GDP* increases, tax base expands and tax revenue increases. Expenditure level remaining the same, the government budget runs into surplus. Surplus budget has a negative effect on the *GDP* and proves helpful in preventing unduly fast growth in the economy.

The deficit and surplus resulting from fluctuation in *GDP* work as automatic stabilizers of the economy. It is however generally believed that automatic stabilizers prove to be adequate and serve useful purpose only for short–term fluctuations in the economy. Automatic stabilizers prove inadequate generally to control the economic fluctuations of larger amplitude. Under such conditions, discretionary changes in taxation and public spending becomes a necessity.[27]

(ii) ***Discretionary Fiscal Policy and Stabilization*** The discretionary changes in the budgets refer to the change made in the tax structure and in the level and pattern of public expenditure by the government on its own discretion. Discretionary changes include changes in tax–rate structure, abolition of existing taxes, increasing or decreasing the public expenditure, etc. Discretionary changes are so designed as to arrest the inflationary and deflationary trends in the economy and to mitigate the destabilizing forces such as increase or decrease in aggregate demand. For example, the government of India had cut down excise duty and import duties on certain items to control inflation in the year 2008.

Formulating a counter-cyclical fiscal policy is not a straight forward affair. It involves certain *complications* which need to be taken into account while devising the new tax and expenditure policy to stabilize the economy. Some complications have been pointed out by Eckstein[28] as follows:

1. *All expenditures do not have the same multiplier effect*. For example, some kinds of transfer payments do not create a direct demand for goods and services provided by the government. Some public expenditures (e.g., free education and hospital facilities) only replace private expenditure.
2. *Not all changes have the same multiplier effect*. For example, taxes paid by the upper income groups have lower multiplier effect than those paid by lower income groups, because of differences in their *mpc*. The multiplier effects of indirect taxes are not clearly known and not precisely predictable.

27. See Richard A. Musgrave, *The Optimal Mix of Stabilization Policies* in W.D Grump and E.T. Weiler, (eds.) *Economic Policy: Readings in Political Economy* (Illinois Richard D. Irwin, Inc).

28. Otto Eckstein op. cit pp. 109–11.

3. *Deficit financing through public borrowing may reduce private investment* which reduces the multiplier effect due to crowding–out effect.
4. There are practical difficulties in assessing the time-lags and accuracy of forecasts.

22.7.2 Monetary Policy Measures

What Is Monetary Policy? Monetary police refers to the changes made by the central bank in the total supply of money and in demand for money to achieve certain predetermined objectives. One of the primary objectives of monetary policy is to control economic fluctuations and to achieve economic stability. The traditional instruments through which central banks carry out the monetary policies are: *open market operations*, *changes in bank rate and changes in the cash reserve ratio* (CRR). Briefly speaking, **open market operation** by the central bank is the sale and purchase of government bonds, treasury bills, securities, etc. to and from the public. **Bank rate** or the *repo rate* is the rate at which central bank discounts the commercial banks' bills of exchange or first class bill and lends money to banks. The cash reserve ratio is the *proportion* of commercial banks' time and demand deposits which they are required to deposit with the central bank or keep cash-in-vault. All these instruments when operated by the central bank reduce (or enhance) directly and indirectly the credit creation capacity of the commercial banks and thereby reduce (or increase) the flow of funds from the banks to the public. The working of the monetary instruments are explained here briefly assuming an inflationary situation and need for controlling inflation.

(a) ***Open Market Operations*** During the period of inflationary expansion, the central bank sells the government bonds and securities to the public. The sale of securities depresses their price, on the one hand, and results in transfer of money from the public to the government treasury, on the other. To the extent the government securities are purchased through the transfer of bank deposits to the central bank account, it reduces the credit creation capacity of the commercial banks. The open market operation result in monetary contraction if (a) government securities are popular; (b) people have a good deal of banking habit, and (c) banking system is fairly developed. During the period of depression the central bank buys the government securities. Its impact on money supply with the public is just reverse to the sale of securities.

(b) ***The Bank Rate or Repo Rate*** The central bank with the objective of controlling inflation, raises the bank rate. It increases the cost of borrowing from the central bank. Following the increase in bank rate, commercial banks raise their own discount rates for the public. The increase in cost of borrowing discourages the borrowings from the commercial banks. Thus the flow of money towards the private economy is restrained. But this method is effective only when commercial banks do not possess excess reserves. During depression the banks rate is lowered with a view to facilitating and encouraging private borrowing which leads to monetary expansion and work against the forces of depression.

(c) ***The Cash Reserve Ratio (CRR)*** When the central bank wants to reduce the credit creation capacity of the commercial banks, it increases the *CRR*, i.e., the ratio of their demand and time deposits to be held as reserve with the central bank, and *vice versa*. Therefore, the anti–inflationary monetary policy requires raising of variable reserve ratios, and anti-deflationary policy requires lowering the reserve ratio. When the central bank changes the reserve ratio, the deposits which form the basis of credit creation are affected and it affects the banks' capacity to create credit. To control inflation, the central bank increases cash reserve ratio and to control deflation, it decreases the cash reserve ratio.

Of the three instruments of monetary control, the **open market operation** is considered to be the **most effective** tool available to the central bank, especially in the less developed countries having underdeveloped money market. The open market operation is flexible and easily adjustable to the changing conditions. The other two instruments are effective only when (i) commercial banks do not possess excess cash reserves: and (ii) in case of bank rate, borrowers are not highly optimistic about future business prospects.

In addition to these instruments, central banks use various **selective credit control measures** and **moral suasion.** The selective credit controls are intended to control the credit flows to particular sectors without affecting the total credit and also to change the composition of credit from undesirable to desirable pattern. *Moral suasion* is a persuasive method to convince the commercial banks to behave in accordance with the demand of the time and in the interest of the nation.

The fiscal and monetary policies may be alternatively used to control business cycles in the economy, though monetary policy is considered to be more effective to control inflation than to control depression. It is however, always desirable to adopt a proper mix of fiscal and monetary policies to check the business cycles. It is also essential because both policies have their own limitations. Therefore, an appropriate mix of fiscal and monetary policies would always prove more effective than a single policy. A proper mix of the two policies is essential also because (i) it would avoid the possible conflict between them, and (ii) a proper fiscal policy depends on the current monetary policy. It is, therefore, always desirable to formulate a counter-cyclical policy with a proper coordination of fiscal and monetary policies.

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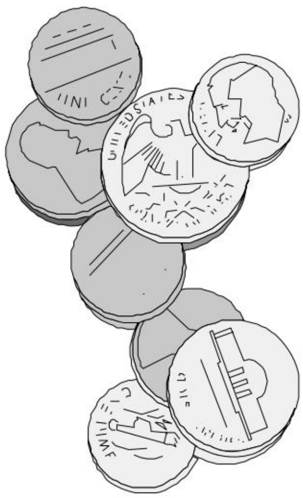
QUESTIONS FOR REVIEW

1. What is meant by business cycle? What factors create conditions for business cycle?
2. What are the different phases of business cycles? What are the economic features of different phases of business cycle?
3. In a free market economy, business cycle is self-adjusting. Explain the process of recession when prosperity reaches its peak and the forces of uptrend when depression reaches its bottom.
4. Explain the pure monetary theory of business cycle. How does monetary expansion lead to growth in output, employment and price level and how does it lead to recession? What are the shortcomings of the monetary theory of trade cycle?
5. Suppose desired and actual investment are not in equilibrium. How does the discrepancy between desired and actual investment lead to depression in an economy? How does monetary overinvestment theory explain this phenomenon?
6. "Business cycles are almost exclusively the result of innovations in the industrial and commercial organizations". Explain this statement with the help of Schumpeter's theory of trade cycles. Does this theory fully explain the business cycle?
7. Explain the concept of multiplier and acceleration? What is the source of principal of acceleration?
8. Explain how multiplier and acceleration interact. How does interaction between multiplier and accelerator lead to economic expansion and then to depression?
9. How does Samuelson's model of multiplier–accelerator interaction explain the phenomena of boom and depression? Suppose the value of multiplier is very high and that of accelerator very low. What kind of business cycle will it produce?
10. Explain the Hicksian theory of trade cycle. What are the factors, according to this theory, that set the upper and lower limits of oscillations? Examine critically the Hicksian theory of trady cycle.
11. What factor led to global recession in 2008-09? How did the global recession affect the growth and employment rate in different countries?
12. What is meant by the sub-prime crises? How did the sub-prime crisis lead to economic recession in the US? How did the US economic crisis turn into the global crisis?
13. What is meant by built–in flexibility? How does it help in stabilizing the economy?
14. What is meant by counter-cyclical fiscal policy? Suppose an economy is faced with the problem of inflation with economic expansion. What kind of counter-cyclical fiscal policy will you recommend and why?
15. What is meant by monetary policy? What monetary measures are used to control business cycle of depressionary nature? Which measure is more effective in a developing economy?
16. Is monetary or fiscal policy more effective in controlling inflation in a developing economy? Why is it desirable to combine both the policies for controlling inflation?

Part 7

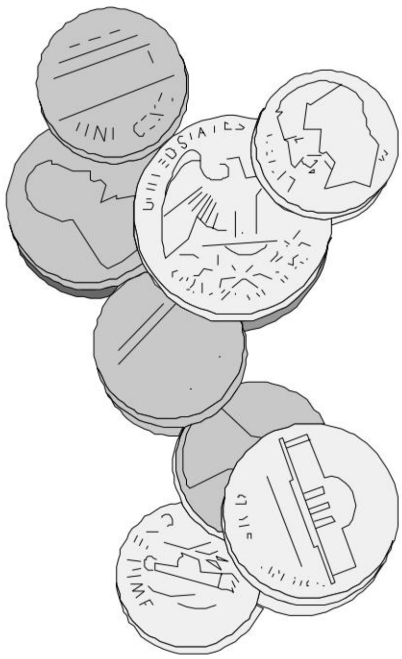
Inflation and Unemployment



This part of the book deals with two most important problems confronting most of the economies on and off: the problems of inflation and unemployment. It is important to note here that these are two separate problems and economists have developed theories of inflation and employment separately. It has however been found that the problems of *inflation* and unemployment are closely related. The economists have inconclusively debated the issue. As the problem of inflation and related issues have gained great significance in the current world economic scenario, it needs a detailed discussion. This is the objective of this part of the Book. While Chapters 23 and 24 deal with the meaning and measurement of inflation, theories of inflation, and causes and cure of inflation, Chapter 25 presents a brief account of causes and kinds of unemployment and its relationship with inflation, as traced by A.W. Phillips, and takes a view of contributions made to the issue by the later economists.

Chapter 23

Inflation: Meaning, Measure and Effects



INTRODUCTION

The problem of inflation is as old as market system. But, a persistent, continuous and high rate of inflation—generally, 5% or more—has emerged during the post-War II period as the most intractable economic problem for both theoreticians and policy-makers all over the world. The problem of inflation has received a more serious attention since the early 1970s. A continuous rise in the general price level over a long period of time has been the most common feature of both developed and developing economies (for details, see Tables A23.1 and A23.2 in the Appendix to this Chapter). For example, the US is currently facing the problem of rate of inflation (around 5 percent) even though the US economy is facing recession. India, a fast developing nation—growing at the rate of 9% per annum was facing a high rate of inflation—over 12% in the 2nd half of 2008 which had created economic, social and also political problems of the country. Persistent inflation is perhaps the second most serious macroeconomic problem confronting the world economy today—second only to hunger and poverty in the 'third world.' Some authors consider inflation as the 'dominant economic problem' in modern times. The persistent inflation and the problems associated with inflation have claimed more attention of the economists, policy makers and politicians than any other macroeconomic problem. This has led to abounding increase in the literature on inflation. In this introductory Chapter, we discuss three main aspects of inflation—meaning, measurement and effects of inflation. The theories of inflation and the relationship between inflation and unemployment are discussed in two subsequent chapters.

23.1 WHAT IS INFLATION?

In a broad sense of the term, inflation means a considerable and persistent rise in the general price level over a period of time. However, there is no universally acceptable definition of inflation. The definition of inflation has been, in fact, a matter of opinion on price rise and its causes. Let us look at some widely quoted *early definitions* of inflation and their implications.

According to Pigou,[1] "Inflation exists when money income is expanding more than in proportion to increase in earning activity." To Coulborn, inflation is a situation of "too much money chasing too few goods." According to Kemmerer, "Inflation is ... too much currency in relation to physical volume of business." Crowther defined inflation as, "a state in which the value of money is falling, that is, prices are rising."[2] The general drawback of these definitions is that they tell the cause of inflation rather than telling what inflation is. The definitions of this orientation do not capture the full implications of the inflationary situation. Besides, despite being theoretically unsound, these definitions are alleged to be of little use in the formulation of anti-inflation policies, especially under modern economic conditions characterized by complexity of factors causing inflation.

Consider *some recent* and more appropriate definitions of inflation. According to Ackley, "Inflation is a persistent and appreciable rise in the general level or average of prices."[3] Harry G. Johnson defines inflation as "a sustained rise in prices."[4] According to Samuelson, "Inflation denotes a rise in the general level of prices".[5] Bronfenbrenner and Holzman[6] have suggested a number of alternative definitions of inflation which are mostly modified versions of the earlier definitions. Their alternative definitions make things more fuzzy rather than adding clarity to the concept of inflation.

The modern economists, however, seem to agree that *inflation means a 'persistent' and 'appreciable' increase in the general level of prices*. Nevertheless, the terms 'persistent' and 'appreciable' and other terms like "sustained," "considerable," "continuing," and "prolonged" used in other definitions of inflation are not precisely defined. In practice, however, the term *'persistent'* implies that the price level continues to rise and does not respond to anti-inflationary policies. The term *'appreciable'* is more ambiguous because it does not specify as to what rate of increase in the price level is to be considered as 'appreciable' or 'considerable'—5%, 10%, 30% per month or per annum or what? There is no specific answer to this question, nor can there be any because economic conditions, desirability of inflation, ability of the economy to absorb or tolerate inflation and effects of inflation vary from country to country and from time to time.

23.1.1 What Rate of Price Rise is Inflation?

If one goes by the definition of inflation given by some modern economists, *any rise* in the general price level is *not* inflation. In their opinion, only a 'persistent', 'prolonged' and 'sustained' and a

1. A. C. Pigou, "Types of War Inflation," *EJ.,* December 1947, p. 409 and in his *The Veil of Money,* p.34.
2. M. Crowther, *An Outline of Money,* p.106.
3. Ackley, Gardner, *Macroeconomic Theory, op. cit.,* p.421.
4. Harry G. Johnson, "A Survey of Theory of Inflation", *Ind. Eco. Rev.,* Vol. 6, No. 4, August, 1963, reprinted in his *Essays in Monetary Economics* (George Allen & Unwin Ltd., London, 1966), p.104.
5. Samuelson, P. A. and Nordhaus, W. D., *Economics,* (15th International Edn, 1995), p.574.
6. Martin Bronfenbrenner and Franklin D. Holzman, "A Survey of Inflation Theory," *Am. Eco. Rev.,* September 1963.

'considerable' and 'appreciable' rise in the general price level can be called 'inflation'. Though the terms 'persistent', 'prolonged' and 'sustained' are not defined precisely, it implies that if price rise is not 'persistent', prolonged or sustained, it is not inflation whatever the rate of rise in the general price level. Nor do the economists specify what rate of price rise is 'considerable' or' appreciable' – 1%, 5%, 10%, 20% or what? They do not provide a specific answer to this question too. It may thus be concluded that modern economists do not provide a definite answer to the question as to 'what rate of increase in price rise is inflation'.

However, if one goes by Samuelson-Nordhaus definition of inflation, 'a rise in the general level of prices' is inflation. It means that *any* rise in the general price level over and above the base-year level is inflation. This is the concept of inflation which is generally used in the analysis of price behaviour. For instance, the rate of price rise in India during April-May 2009 was below 1% and had gone down to 0.13% in the last week of May 2009 – the lowest in 30 years. This almost zero rate of rise in the general price was called inflation in public report. This is the practice, in fact, in all other countries and adopted also by the international organizations like World Bank and IMF.

This should not mean, however, modern economists' perception of inflation is meaningless and impracticable. If one looks at their approach carefully, one finds that their approach is policy oriented and they have an important and useful point of view. As we will discuss in detail later, inflation upto a certain level is advantageous and desirable as it is conducive to economic growth and employment. But beyond this level, inflation is harmful and often proves disastrous to the economy. Besides, it creates many social and political problems. Therefore, when inflation rate crosses its desirable limit, it has to be controlled. But, an anti-inflationary policy and inflation control measures have to be devised very carefully or else it may do more harm than good to the economy. For this purpose, the policy-makers have to ensure (i) that inflation rate is high enough to prove harmful to the economy and the society, and (ii) that inflation persists over a long period of time and it is not an intermittent rise-and-fall affair of a seasonal affair or 'supply-shock' kind of inflation, e.g., oil supply shock of 1970s causing global inflation. Since economic conditions of different countries and their ability to absorb inflation vary from country to country and, within a country, from time to time, it is not justifiable to specify a rate of price rise to be called inflation. Each country has to find for itself the *desirable rate of inflation* at different points of time and to formulate policy measures accordingly to control inflation.

Now a question arises here: What is the desirable rate of inflation? The economists' point of view on this question is discussed below.

23.1.2 What is Desirable Rate of Inflation?

The question as to what is a desirable rate of inflation can be answered by linking it to the economic and social needs of the country. In general, a ***moderate rate of inflation is considered to be desirable and acceptable*** for at least three reasons.

(i) A moderate rate of inflation keeps the economic outlook optimistic, promotes economic activity and prevents economic stagnation.

(ii) It is helpful in the mobilization of resources[7] by increasing the overall rate of savings and investment—inflationary financing has, in fact, been widely used to finance economic growth of the underdeveloped countries.

(iii) It is historically evident that, despite intermittent deflation, the general price level has exhibited a rising trend, and some increase in the general price level is inevitable in a dynamic and progressive economy.

A rate of inflation higher than the *desirable* rate of inflation is considered to be 'considerable'.

Now the question arises: ***What is the Moderate Rate of Inflation*?** This question cannot be answered in specific percentage terms because desirability of inflation depends on the need and the absorption capacity of a country which are subject to variation from time to time. The capacity of a country to absorb inflation may be defined in terms of the limit of the price rise beyond which the economy gets overheated and macro variables like savings, investment, growth of output, *BOP* position, and employment get adversely affected. The absorption capacity, so defined, varies from country to country and from time to time depending on their growth potentials. Therefore, the desirable limit or the moderate limit of inflation has to be determined for each country and for different periods of time. There is no definite rule in this regard. However, based on the past experience, it is some times suggested that 1-2 percent inflation in developed countries and 4-6 percent inflation in less developed countries is the appropriate and desirable limit of moderate inflation.[8]

As regards the desirable rate of inflation for India, the Chakravarty Committee (1985), a Committee set up by the RBI to review the monetary system of the country, considered a 4-percent rate of inflation in India socially desirable and conducive to economic growth. Some economists consider a lower rate of inflation to be desirable. "Some people who regard inflation as an economic evil believe that a price level rising at a rate of around 1.5 percent ... assists in achieving and maintaining full employment and a satisfactory rate of growth."[9] However, if one goes by the recent record of inflation. (see Appendix Tables A23.1 and A23.2), inflation rate of 1.5 percent appears to be too low to maintain "full employment and a satisfactory growth rate."

To conclude, **a price rise of 2-3 percent per annum in the developed and 4-5 percent per annum in the developing economies is generally considered as the desirable rate of inflation.** Therefore, a price rise in excess of 2–3 percent in developed countries and 4–5 percent in developing countries can be regarded as 'considerable' and undesirable. This definition may not be theoretically defendable but it is empirically defendable. Also, it has an important policy implication, i.e., so long as (i) the general level of price rises at an annual average rate of a 2-3 percent in developed countries and 4-5 percent in less developed countries, and (ii) macrovariables are not adversely affected by the price rise, an anti-inflationary policy is not advisable as it may distort the price system and affect adversely the employment and growth process.

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7. This aspect of inflation will be discussed in detail in a subsequent section of this chapter.

8. Harry G. Johnson, "Is Inflation the Inevitable Price of Rapid Development or Retarding Factor in Economic Growth?", *Malayan Economic Review,* Vol. 11, No. 1, April 1966. Partly reproduced in *Leading Issues in Economic Development,* (ed) by Gerald M Meier (Oxford University Press, Delhi), Sixth Edition—quoted from p.179.

9. Edward Shapiro, *Macroeconomic Analysis,* (Galgotia Publishers, New Delhi, 1994), p.468.

23.1.3 Every Price Rise in Excess of Moderate Rate is not Inflation

As noted above, from the view point of the desirability of moderate inflation, any price rise in excess of 2-3 percent in the developed and 4-5 percent in the developing economies may be considered as undesirable inflation. This will be however an erroneous conclusion because **a price rise on account of the following factors cannot be taken to be inflationary**.

(i) price rise due to change in the composition of *GDP* in which high-price industrial goods replace the low-price farm products;
(ii) price rise due to qualitative change in the products accross the board;
(iii) price rise due to change in price indexing system, and
(iv) recovery in price after recession.

Therefore, while deciding on whether a price rise in excess of the moderate rate of inflation is genuinely inflationary, one must take these factors into account and adjust the price rise accordingly, especially when the purpose is to formulate anti-inflationary policies.

23.2 METHODS OF MEASURING INFLATION

There are two common methods of measuring inflation: (i) percentage change in Price Index Numbers (PIN), and (ii) change in *GNP* Deflator. The two methods of measuring inflation are discussed below.

23.2.1 Measuring Inflation by PIN

The following formula is used for measuring the rate of inflation through the change in the PIN.

$$\text{Rate of Inflation} = \frac{\text{PIN}_t - \text{PIN}_{t-1}}{\text{PIN}_{t-1}} \times 100$$

where PIN_t in the price index number in the year selected for measuring inflation and PIN_{t-1} is the price index number in the preceding year.

The two widely used PINs are Wholesale Price Index (*WPI*), also called Producer Price Index (*PPI*), and Consumer Price Index (*CPI*). *WPI* is used to measure the general rate of inflation and *CPI* is used to measure the change in the *cost of living*.

In order to illustrate the measurement of inflation, let us use price index numbers in India in the early 1990s. The *WPI* (1999–2000 = 100) for 'all commodities' increased from 134.6 in 2005–06 to 141.9 in 2006–07. The rate of inflation between 2005–06 and 2006–07 can be obtained by using the above formula as follows.

$$\text{Rate of Inflation} = \frac{141.9 - 134.6}{134.6} \times 100$$
$$= 5.4 \text{ percent}$$

The annual average rate of inflation over a period of time (say 5, 10 or 20 years) is computed by taking average of the annual rates of inflation. For example, consider the annual average rate of inflation in India during the period from 2001-02 to 2005-06 as given in Table 23.1. As the table shows, 5-year annual average rate of inflation in India during 2001–06 was 4.7 percent.

Table 23.1 The Annual Average Rate of Inflation in India: 2001-02 to 2005-06

Year	*Annual Inflation Rate (%)*
2001-02	3.6
2002-03	3.4
2003-04	5.5
2004-05	6.5
2005-06	4.4
Annual average	4.7

23.2.2 Measuring Inflation by *GNP* Deflator

The *GNP* deflator is the ratio of nominal *GNP* to the real *GNP* of the same year, i.e.,

$$GNP \text{ deflator} = \frac{\text{Nominal } GNP}{\text{Real } GNP}$$

where *Nominal* GNP *is GNP at current prices* and *Real GNP* is *GNP at constant prices*.

The *GNP* deflator for any year can be obtained by using this formula. Suppose we want to calculate India's *GNP* deflator for the year 2005-06. India's nominal *GNP* (i.e., *GNP* at current prices) in 2005-06 was Rs 32,76,000 crore and her real *GNP* (i.e., *GNP* at constant prices of 1999-2000) was Rs 26,13,000 crore. Now, India'*s GNP* deflator for 2005-06 can be obtained as follows.

$$GNP \text{ deflator (2005-06)} = \frac{32{,}76{,}000}{26{,}13{,}000}$$

$$= 1.2537$$

In terms of percentage, *GNP* deflator equals $1.2537 \times 100 = 125.37$ percent. It means that India's nominal *GNP* in 2005-06 was 125.37 percent of her real *GNP*, or the *nominal GNP* was 12.54 percent higher than her *real GNP* in 2005-06. For example, Table 23.2 presents India's *GNP* deflator for the period from 1990-91 to 1994-95.

Table 23.2 India's *GNP* Deflator and Inflation: 1990-91 to 1994-95

(GNP in Rs crore)

Year	*Nominal GNP*	*Real GNP*	*GNP Deflator (percent)*	*Rate of Inflation* (percent)*
1990-91	470269	208481	225.569	——
1991-92	542691	209621	258.892	14.77
1992-93	618969	220489	280.725	8.43
1993-94	719548	233805	307.755	9.63
1994-95	843294	249903	337.448	9.65

* It equals percentage change in *GNP* deflator.

Source: *Economic Survey*, 1996-97, Government of India, Ministry of Finance, Statistical Appendix, Table 1.1.

The percentage change *in GNP* deflator between any two years gives a measure of inflation. For example, the rate of inflation between 1990-91 and 1991-92 can be obtained as follows.

$$\text{Rate of inflation} = \frac{258.892 - 225.569}{225.569}\ 100$$

$$= 14.77\%$$

The inflation rates based o*n G*NP deflator for the period between 1990-91 and 1994-95 are given in the last column of Table 23.2.

Which of the two methods is better?

As discussed above, inflation rate can be measured by using *WPI* or *GNP* deflator, called also as *national income deflator*. A question arises here: which of the two methods is a better method? In the opinion of the economists[10], *GNP* deflator gives a more appropriate measure of inflation. The reason is that *GNP* takes into account all the goods and services and, therefore, *GNP deflat*or takes into account prices of all the goods, wherea*s WPI* is based on only wholesale prices which exclude value added at retail stage. Therefore, *WPI* gives only a partial measure of inflation. That is why economists conside*r GNP* deflator as a better measure of inflation than *WPI*. In general however, *WPI* is more commonly used to measure the inflation in India.

23.3 TYPES OF INFLATION

Inflation is generally classified on the basis of its rate and causes. While rate-based classification of inflation refers to the severity of inflation or how high or low is the rate of inflation, cause-based classification of inflation refers to the factors that cause inflation. In this section, we discuss the types of inflation classified on the basis of its rate. The types of inflation classified on the basis of its cause will be discussed in the next Chapter under the causes of inflation. On rate basis, inflation is classified as: (i) Moderate inflation, (ii) Galloping inflation, and (iii) Hyper inflation. There main feature are described below.

(i) Moderate Inflation

When the general level of price rises at a moderate rate over a long period of time, it is called moderate inflation or creeping inflation. The 'moderate rate' of inflation may vary from country to country. However, 'a single digit' rate of annual inflation is called 'moderate inflation' or 'creeping inflation.' An important feature of moderate inflation is that it is 'predictable.' During the period of moderate inflation, the people continue to have faith in the monetary system and confidence in 'money as a store of value.' Money continues to work as a medium of exchange and people continue to hold money as asset.

(ii) Galloping Inflation

The economists have different views on galloping inflation. For example, according to Baumol and Blinder,[11] "Galloping inflation refers to an inflation that proceeds at an exceptionally high rate." They

10. Dornbusch, R. and Fischer, S., *Macroeconomics* (McGraw-Hill, NY, 1994), p. 36; Baumol, W. J, and Blinder, A. Q., *Economics : Principles and Pol*icy (Harcourt Brace Jovanovich, London, 1988), pp, 114; Froyen, Richard T., *Macroeconomics : Theories and Policies* (Macmillan), 1990, p. 35. See also H.G. Johnson, *op. cit.,* pp. 104-6.

11. W.J. Baumol and A.S. Blinder, *Economics : Principles and Policy, op. cit.,* p.109.

do not specify what rate of inflation is 'exceptionally high.' Samuelson and Nordhaus[12] define 'galloping inflation' more precisely. According to them, "Inflation in the double- or triple-digit range of 20, 100 or 200 percent a year is labeled galloping inflation." This definition is not less imprecise because double and triple-digit inflation ranges between 10 and 999 percent and economic effects of inflation in this range will be immensely different. A country with a 900 percent annual inflation will have devastating effects whereas a country with 20-30 percent inflation can manage without pressing the alarm bell.

However, the post-War I inflation in Germany is often cited as a classic example of galloping inflation though some would call it *hyper inflation*. The wholesale prices in Germany increased 140 percent in 1921 and a colossal 4100 percent in 1922. In 1923, prices increased in Germany at an average rate of 500 percent per month.[13] In recent times, Argentina, Brazil, Mexico, Peru and Yugoslavia (former) had galloping inflation during the 1970s and 1980s. The annual average rate of inflation[14] in these countries during 1980-91 was exceptionally high: Argentina—416.9 percent; Brazil—327.6 percent; Peru—287.3 percent; former Yugoslavia—123.0 percent; and Mexico—66.5 percent. Incidentally, these cases are also cited as the examples of hyper inflation.

(iii) Hyper Inflation

In general, a price rise at more than three-digit rate per annum is called 'hyper inflation'. According to some economists, however, "Hyperinflation is often defined as inflation that exceeds 50 percent per month ..... An inflation rate of 50 percent per month implies a more than 100-fold increase in the price level over a year"[15] During the period of hyper inflation, paper currency becomes worthless and demand for money decreases drastically. Germany suffered from hyper inflation in 1922 and 1923 when wholesale price index shot up by "100 million percent between December 1922 and November 1923."[16] November 1923 was the worst period of hyper inflation in Germany—"from January 1922 to November 1923, the price index rose from 1 to 10,000,000,000."[17] Hungarian inflation of 1945-46 is the worst case of hyper inflation ever recorded: the "rate of inflation averaged about 20,000 percent per month for a year and in the last month prices skyrocketed 42 quadrillion[18] percent."[19]

The price rise in zillion and quadrillion percentage makes the meaning of hyper inflation obscure. It goes beyond the mental vision of the number. The following anecdotes about German hyper inflation would reveal what happens during the period of hyper inflation.

— People carried basket-load of money to the market and brought goods in pocket.

12. P.A. Samudson and W.D. Nordhaus, *Economics,* 15th Edn, p.579.
13. Mankiw, N. Gregory, *Macroeconomics*, 4th Edn., (Macmillan Worth Publishers, NY, 2000), p.154.
14. Mankiw, N. Gregory, *Macroeconomics*, op. cit., p.180.
15. CMIE, *World Economy and India's Place In It,* October 1993, Table 11.6.
16. Baumol, W.J., and Blinder, A. S., *op. cit*., p.109.
17. Samuelson, P.A. and Nordhaus, W. D., *Economics, op. cit.* , p.579.
18. In US and France, 1 quadrillion = 1,000,000,000,000,000, and in UK and Germany, 1 quadrillion = 1,000,000,000,000,000,000,000,000 (i.e., 24 zeros placed after 1) or 1 quadrillion = 1,000,000,000 zillion or 1 quadrillion = 1, 000,000 septillion.
19. Baumol, W. J. and Blinder, A. S., *op. cit.,* p.109.

— It was cheaper to burn currency notes to make tea rather than buying it in the tea-shop.
— Price of a house in pre-inflation period was just sufficient to pay a day's rent in post-inflation period.
— At the time of entering the cafe, the price of a cup of coffee was 4,000 marks, which rose to 8000 marks before one could finish his coffee.

In the recent past, Argentina, Brazil, and Peru had hyper inflation in 1989 and 1991. The rates of inflation in these countries in 1989 and 1990 are listed in Table 23.3.

Table 23.3 Rate of Inflation in Argentina, Brazil and Peru–1989 and 1990

Country	*1989*	*1990*
Argentina	3079.8 percent	2314.0 percent
Brazil	1287.0 percent	2937.8 percent
Peru	3398.6 percent	7481.7 percent

(*Source*: CMIE, *World Economy & India's Place In It*, October 1993, Table 11.6)

More recently, according to prediction made by some economists, the inflation rate in Yugoslavia was to reach 2,50,000 percent in December 1993 (*TOI*, 27/12/1993). The Yugoslav treasury had issued the biggest currency notes with denomination of 500 billion dinars to facilitate transactions.

(iv) Open and Suppressed Inflation

In the contemporary writings on the subject, one often comes across the terms 'open inflation' and 'suppressed inflation.' When there is no control on the rising prices and prices are free to find their own level, the inflation under this condition is called ***open inflation***. In the post-War II period, control and regulation of prices by direct and indirect measures has become a common feature of economic policy of most developed and developing economies. In addition to indirect measures including monetory and fiscal control measures, direct price control measure in the form of statutory fixation of the price or fixation of a price ceiling; rationing the consumption of scarce goods, controlled distribution of goods through public distribution system; subsidization of commodities with inflation potentials, etc. are used to control the price rise. In spite of these control measures, prices do rise and inflation does take place but at a rate lower than the potential rate in the open system. This kind of inflation is called ***suppressed inflation***.

In the modern world economy *open inflation* is a rare phenomenon. Countries facing inflation have suppressed inflation. For example, the 7-8 percent inflation in India in 2008 was virtually a suppressed inflation.

23.4 INFLATION, DISINFLATION AND DEFLATION

Before we proceed to discuss further aspects of inflation, let us understand the difference between *inflation* and *disinflation* and between *inflation* and *deflation*. ***Inflation*** refers to a persistent increase in the general price level. ***Disinflation*** means decline in the rate of inflation. ***Deflation*** means fall in the general price level below the base-year level. The conceptual difference between these terms is illustrated below with hypothertical price data.

Measuring Inflation, Disinflation and Deflation

(Base year=2000-01)

Year	*Price Index Number (PIN)*	*% Change in Price (Year-to-Year)*	*Nature of Price Change*
2000-01	100	—	—
2001-02	110	10	Inflation (10%)
2002-03	105	4.5	Disinflation (5.5%)
2003-04	100	(-) 5.0	Disinflation (5.0%)
2004-05	100	0.0	Zero Rate of Inflation
2004-05	95	- 5.0	Deflation

As can be seen from the above table, when PIN rises from 100 in base-year 2000-01 to 110 in year 2001-02, it means there 10% ***inflation***. When PIN decreases from 110 in year 2001-02 to 105 in year 2002-03, ***inflation*** rate on year-to-year basis has declined from 10% to 4.5% but still remains above the base-year level. This is the situation of ***disinflation***—the fall in the rate of inflation. When PIN declines below the base-year PIN=100, this means ***deflation***. Thus, ***deflation*** means that the general price level has gone down below the *base-year price level.*

Inflation, Disinflation and Deflation in India

Looking at the Indian data, the weekly rate of inflation (based on WPI) had shot up to 13.1% in the 2nd week of August 2008 – the highest rate of inflation during the past 16 years – and the *annual* inflation rate had gone up to 12.81% in 2008. This was a matter of great concern for both the MOF and the RBI. Thereafter, however, inflation rate started declining setting a *disinflationary trend.* In the 2nd week of September 2008 inflation rate declined to 12.14%. Over the following period of three months, inflation rate had sharply declined to 6.61% in the 2nd week of December 2008 due mainly to the recession in the economy caused by the impact of global recession. This decline in the inflation rate was, in fact, ***disinflation.*** The disinflationary trend continued and inflation rate declined to 0.13% in the last week of May 2009, i.e., inflation rate had fallen to a near-zero level. The price level continued to decline and fell to – 1.61% in the first week of June 2009 and –1.31% in the last week of June. This marked a situation of ***deflation*** in India.

23.5 INFLATION IN INDIA: A LONG-TERM VIEW

The historical record of inflation in India is given in Table 23.4. As the table shows, India has had inflation almost continuously over a period of six decades, though the rate of inflation has been changing – sometimes low, sometimes high – and in some years there was deflation. The inflation rate during the First Plan period (1951-56) was very low (1.5%), rather insignificant. But, the price rise picked up during the Second Plan period (1955-56 to 1960-61) when prices had increased at the rate of 6.3 percent per annum. As can be seen in Table 23.4, the five-year average rate of inflation in India remained limited to one digit during most of the period of the past five decades, except, of course, in 1970s. It was only during the first half of 1970s and the first half of 1990s that the rate of inflation had crossed one-digit rate.

Table 23.4 Annual Average Rate of Inflation in India: 1960-2001

(Base: 1993–94 = 100)

Period	*52-week annual average*	*Point to Point (March end)*
1950-51 to 1955-56*	1.5	---
1956-56 to 1960-61	6.3	5.2
1961-62 to 1965-66	5.8	5.9
1966-67 to 1970-71	6.7	5.7
1971-72 to 1975-76	12.0	10.8
1976-77 to 1980-81	8.5	11.0
1981-82 to 1985-86	6.5	5.5
1986-87 to 1990-91	7.8	8.5
1991-92 to 1995-96	10.6	9.3
1096-97 to 2000-01	5.0	5.3

* Figures taken from CMIE, *Basic Statistics Relating to the Indian Economy*, 1994, Table 21.2

Source: Economic Survey—2001–2002, Ministry of Finance, Government of India, p.111.

Table 23.5 presents the inflation rates in India for the period 2000-01 to 2008-09.

Table 23.5 Annual Inflation Rate: 2000-01–2008-09

(Year-on-year: 1999-2000 = 100)

Year	*Inflation Rate*
2000-01	7.2
2001-02	3.6
2002-03	3.4
2003-04	5.5
2004-05	6.5
2005-06	4.4
2006-07	5.4
2007-08	4.7
2008-09	8.4

Source: Economic Survey-2008-09, MOF, GOI, Table 4.1, p.64

Conclusion From the data presented in Tables 23.4 and 23.5, it can be concluded that the Indian economy has been prone to inflation. However, in view of the fact that it is a fast growing economy, inflation rate has been within the range of moderate inflation. Besides, a comparison of inflation rates in pre-economic reform period (pre-1990 period) and post-reform period shows that the inflation rate tended to decline in the post-reform period. It may be the result of faster growth rate of the economy, i.e., 5% plus. Inflation in India will be analysed in a greater detail in the next chapter, in the light of the theories of inflation.

23.6 ECONOMIC EFFECTS OF INFLATION

The economic effects of inflation are all pervasive. It affects all those who depend on the market for their livelihood. The effects of inflation may be favourable or unfavourable, and low or high depending on the rate of inflation. For example, a galloping and hyper inflation have devastating effect on the economy and have serious social and political implications too. In this section, however, we will discuss only economic effects of inflation on certain major aspects of the economy, viz., (i) distribution of income, (ii) distribution of wealth[20], (iii) different sections of the society, (iv) output and economic growth, and (v) employment of labour.

1. Effect of Inflation on Distribution of Income

The effect of inflation on income distribution depends on how it affects the price received and price paid by different sections of the society, especially the consumers and the producers. *Prices received are the same as incomes* defined crudely. For example, households receive their incomes in the form of factor prices–wages and salaries, rents and royalties, dividend, interest, profits and income from self-employment. Similarly, *actual prices paid represent the expenditures on consumer goods and production inputs*. *Inflation changes the income-distribution-pattern only when it creates a divergence between total price received and total prices paid by different sections of the society*. For example, let us consider only two major forms of incomes–wage incomes and profits. When price rise is so evenly distributed that wages increase proportionately to the rise in profit incomes, the income distribution remains generally unaffected. When output prices increase faster than input prices, profits rise faster than wage incomes, which is generally the case, incomes get redistributed in favour of the profit earners—the employers. However, if inflation is predictable and consumers are able to adjust consumption pattern and wage earners can move from low-wage jobs to high-wage jobs, then the impact of inflation on income distribution is considerably mitigated.

What happens in general, however, is that product prices increase first and at a faster rate, and input prices (especially wages) increase later and at a lower rate. It is so because, there is always a time-lag between the rise in output prices and input prices. For example, prices of goods and services increase first, in general, and wages of labour after a time gap—we know that when prices of consumer goods increase, dearness allowance is paid after a time gap. This is the general case.

20. Generally, the effect of inflation on income and wealth distribution are discussed together. However, since income is a flow concept and wealth a stock concept, we will discuss them separately.

As a result, wage incomes flow to producers of wage-goods first and at a faster rate than the reverse flow. Consequently, inflation cause redistribution of income in favour of the producers. Consequently, rich (firms) get richer and poor (labour) get poorer.

2. Effect of Inflation on Distribution of Wealth

From the view point of analysis here, let us look at wealth as accumulated assets. Assets can be classified as: (i) price variable assets, and (ii) fixed value assets. *Price-variable asset*s are those whose prices change with change in the general price level. The money value of price-variable assets increases, during the period of inflation. Price-variable assets can be further classified as: (a) *physical assets* including land, building, automobiles, gold, jewellery, etc., and (b) *financial assets* including shares and stocks. The *fixed-value assets*, on the other hand, are those assets whose money value remains constant even if the general price level changes. *Fixed-value assets* include bonds, term deposits with banks and companies, loans and advances, etc. Like assets, there are liabilities also. *Liabilities* are mostly of fixed claim nature like house loans, car loans, bank loans, and mortgage of property. Let us assume, for the sake of simplicity in the analysis, that fixed value assets and fixed value liabilities cancel out.

In that case, the effect of inflation on the distribution of wealth depends on how inflation affects th*e net wealth* (= assets – liabilities) of the different classes of wealth holders. The effect of inflation on the net wealth depends on how inflation affects the money value of the price-variable assets. If prices of all price-variable assets increase at the rate of inflation, then there will be no change in asset portfolio and no change in wealth distribution.

However, if price of price-variable assets increases at a rate higher than the rate of inflation, inflation changes the distribution of wealth. Inflation changes wealth distribution by changing the wealth accumulation ability of the different groups of wealth holders. Suppose there are only two categories of wealth holders – the high wealth and the low wealth holders. In general, high wealth holders belong to high income groups. The ability to acquire wealth depend on the ability to save and ability to save depends on the income. As a matter of the general rule, the high income groups have a higher ability io save and therefore a higher ability to acquire wealth. During the period of inflation, income of the high-income groups increases at a higher rate than that of the low-income groups. As noted above, during the period of inflation, income of the businessmen increases at a higher rate than that of the employees, and income of the business executives increases faster than that of the low-grade employees. Therefore, the higher income groups are able to save more and accumulate more wealth than the lower income groups. As a result, the wealthy people are able to acquire more and more wealth than the low wealth holders. It may thus he concluded that inflation changes wealth distribution in favour of the wealthy class of the society.

Empirical Evidence. It has been argued above that inflation can, at least theoretically, affect the distribution of income and wealth under certain conditions. Let us now turn to the question whether inflation really affects income and wealth distribution. The economists have devoted a considerable effort and attention to examine the effect of inflation on the distribution of wealth.

A voluminous literature[21] is available on the subject. Empirical studies do not produce conclusive evidence on the effect of inflation on the distribution of income and wealth. To quote Samuelson and Nordhaus, "The summary wisdom of these studies indicates that the overall impact is highly unpredictable."[22]

3. Effects of Inflation on Different Sections of Society

As noted above, the overall impact of inflation is unpredictable. However, inflation has certain definite and predictable effect on the income of certain sections of society. These are briefly discussed below.

Wage Earners. It is a common belief that wage earners are hurt by inflation. Some authors consider this belief as a myth.[23] In fact, whether wage earners lose or gain by inflation is again a matter of labour-market conditions. In developed countries labour is, by and large, organized and labour market is competitive. According to Baumol and Blinder[24] "the average wage typically rises more or less in step with prices." This contradicts the 'popular myth' that wage earners are, in general, losers during the period of inflation. They have used US data to show that real wage "is not systematically eroded by inflation." They add, "The fact is that in the long-run, wages tend to outstrip prices as new capital equipment and innovation increase output per worker."

The Baumol-Blinder conclusion holds not only in the US but also in India, at least, for the organized sector of the country. In the organized sector, labour is unionized. The organized labour uses its union power to get compensatory increase in their wages. The labour in the organized sector is, therefore, often adequately compensated for the loss of purchasing power due to inflation. According to the official data, the public sector employees, that is, a part of the organized sector, are more than doubly compensated. The per capita annual emoluments have increased by 1326.17 percent between 1971-72 and 1994-95, whereas the consumer price index (1960 = 100) has gone up by only 630.21 percent during this period.[25] The annual emoluments in the private organized sector has increased at a faster rate. It may thus be concluded that the wage earners in the organized sector have gained during the period of inflation.

21. Some widely quoted works are listed here: G. L. Bach and A. Ando, "The Redistributional Effect of Inflation," *Rev. of Eco. & Stat.*, February 1957. pp. 1-13; S. E. Harris, *The Incidence of Inflation: Or Who gets Hurt?*, Study Paper No. 7, i*n Study of Employment, Growth, and Price Level*s, Joint Economic Committee, US Congress 1959; A. Brimmer, "Inflation and Income Distribution in the United States," *Rev. of Eco. & Stat.*, February 1971. pp. 37-48; E. C. Budds and D. F. Seiders, "The Impact of Inflation on the Distribution of Income and Wealth*," Am. Eco. Re*v, May 1971, pp. 128-38; W. D. Nordhaus, "The Effect of Inflation on the Distribution of Economic Welfare*," Jl. of Credit, Money and Bankin*g, February 1973, Part 2, pp. 465-96; G. L. Bach and J. B. Stephenson, "Inflation and the Distribution of Wealth*," Rev. of Eco. & Stat.*, February 1974. pp. 1-13; A. M. Maslove and J. L. Rawley, "Inflation and Redistribution*," Canadian JL. of Eco*., August 1975, pp. 399-409; J. Foster, "The Redistributive Effects of Inflation : Questions and Answers*," Scottish Jl. of Pol. Eco.*, February 1956, pp, 73-98; H. Niida, "The Distributional Effects of the Inflationary Process in Japan*," Rev. of Income and Wealth*, June 1978, pp. 195-219; J.J. Minarik, "The Size Distribution of Income During Inflation*," Rev. of Income and Wealth*, December 1979, pp, 377-92.

22. P.A. Samuelson and W.D. Northaus*, Economics, op. cit.*, p.581.

23. See, for example, W. J. Baumol and Alan S. Blinder*, Economics: Principles and Polic*y*, op. cit.*, p.100.

24. W. J, Baumol and A. S. Blinder*, Economics: Principles and Policy*, op. cit., p.101.

25. See *Economic Survey,* 1996-97, Government of India, Ministry of Finance, p. S-54.

However, the economists' finding that inflation benefits labour can hardly be accepted as a universal phenomenon. For, labour market conditions and price variations vary from country to country and from time to time. The labour markets in the less developed countries, mostly in the countries facing a large scale open and disguised unemployment, are generally divided between *organized* and *unorganized* labour markets. In India, for example, the employment share of unorganized sector is much larger—nearly five times bigger—than that of the organized sector.[26] The wage in the unorganized labour market have not increased in proportion to the rate of inflation. Therefore, the labour in the unorganized sector is a net loser during the period of inflation. However, things have been found different in the organized sector. According to a study conducted by Times Bureau (*ET*, May 2009), the rise in the wage rate was 5-6 percentage point higher than the labour productivity in the manufacturing sector in 2007. This might be both the cause and the effect of inflation. Thus, it may be concluded that inflation harms the labour in the unorganised sector but it benefits the labour in the organised sector.

Producers. Whether producers gain or lose due to inflation depends, at least theoretically, on the rates of increase in prices they receive (the sale price) and the prices they pay (input prices or the cost of production). In general, product prices rise first and faster than the cost of production. Therefore, profit margin increases and producers gain. Let us elaborate on this point.

The product prices rise first due to demand-pull factors such as rise in money supply, rise in income (as was the case in India in 2007 and 2008), or supply bottlenecks. The input prices remaining the same, profit margin increases. This creates additional demand for inputs pushing the input prices up, though at different rates and with different time lags. As mentioned above, wages and salaries increase in the long run in step with the rate of inflation. However, it must be borne in mind that wages and salaries do not increase automatically and simultaneously during the period of inflation. There is always a time-lag between the rise in product price and wages. Wages and salaries are not increased until labour unions create pressure for wage-hike. So there is a time lag. Therefore, producers gain during inflation due to wage-lag. Besides, other input prices increase at a lower rate. Therefore, producers are the net gainers.

However, firms have to bear some additional cost, called ***menu cost***. During the period of inflation, especially when inflation rate keeps increasing, firms are required to revise their prices, print new price lists and publicize their new prices. The cost incurred for this purpose is called *menu cost*. In spite of the *menu cost*, the firms stand to gain from inflation.

Fixed income class. The people of the fixed-income category are the net losers during the period of inflation. The reason is that their income remains constant even during the period of inflation, but the prices of goods and services they consume increase. As a result, the purchasing power of their income gets eroded in proportion to the rate of inflation. For example, suppose that a person earns a fixed annual income of Rs 100,000 and that the rate inflation is 10 percent. It means that if he spends his total income, he can buy goods and services worth only Rs 90,000 at the prices in the current year. If prices continue to increase at the rate of 10 percent per annum, his

26. According to Planning Commission estimates (published in *Economic Survey*, 1996-97, p. S-54), the total employment in India stood at 320.5 million persons in 1994-95, of which nearly 183 million (based on 1981 ratio) were self-employed. It means, 137.5 million fell in the category of employees. Of this, only 27.4 million, i.e., about one-fifth, were employed in the organized sector including private industrial and public sector. Thus, unorganized labour market comes to nearly 5 times of the organised labour market.

purchasing power will be reduced to goods and services worth Rs. 81,000 in the second year and to worth Rs 72,900 in the third year, and so on.

Borrowers and lenders. In general, borrowers gain and lenders lose during the period of inflation. For example, suppose a person borrows Rs 5 million at 12 percent simple rate of interest for a period of five years to buy a house. Suppose also that escalation in property prices is such that property prices double every 5 years. After 5 years, the borrower would pay a total sum of Rs 8 million whereas the price of house rises to Rs 10 million. The borrower gains by Rs 2 million. The lender loses by the same amount in the sense that had he bought the house himself, his asset value would have risen to Rs 10 million.

The government. The government is a net gainer during the period of inflation. In order to analyze the government's gain from inflation, let us consider the *government as a taxing and spending unit and as a net borrower*. As regards the effects of inflation on tax revenue, inflation increases revenue yields from both, the direct and indirect taxes. Consider first the direct taxes, *viz*., personal and corporate income taxes.

Inflation increases tax yields from ***personal income tax*** in at least three ways. *One*, inflation redistributes income generally in favour of higher income groups. This kind of income transfers enlarge the tax base for the personal income tax. As a result, the yield from the personal income tax increases. *Two*, inflation increases the nominal income at the rate of inflation, real income remaining the same. As a consequence, an income which was non-taxable prior to inflation becomes taxable after inflation. This also enhances the tax base and, therefore, the tax revenue. *Third*, with the increase in the nominal income due to inflation, incomes taxable at lower rates becomes taxable at a higher rates. This increases the yields from personal income tax.

As regards the ***corporate income tax***, tax-yield increases during the period of inflation on account of two factors. ***One,*** during the period of inflation, output prices increase generally faster than the input prices. Therefore, the total profit increases. Consequently, the yield from the corporate income tax increases. Even if output and input prices increase at the same rate, the volume of nominal profit increases. This increases the tax yield. ***Two,*** the yield from the corporate income tax increases also due to tax laws in respect of depreciation allowance. Firm's tax liability is determined after deducting the allowable depreciation of the plant and equipment. In determining the tax liability, depreciation is allowed on firm's book-cost of plant and equipment, not on their (inflated) market value. The taxable profit is overstated to this extent. This enhances the government's revenue from the corporate income tax.

As regards the revenue from **indirect taxes**, it depends on whether indirect taxes (customs, excise and sales tax) are imposed at fixed rate per unit of output or at *ad valorem* rate. If taxes are imposed at fixed rate, the rise in price does not affect the revenue. However, indirect taxes are generally imposed at *ad valorem* rates. The *ad valorem* rates enhance the revenue from the indirect taxes in direct proportion to the rate of inflation. In India, a major part (about three-fourths) of the central government tax revenue was contributed by indirect taxes (customs and excise) prior to the tax reforms of 1991-92: these taxes still contribute nearly half of the total tax revenue, for example, 47.0 percent in 2006-07. The high rate of inflation during the 1970s and 1980s had contributed a great deal to the yields from the indirect taxes. The additional revenue accruing to the government due to inflation, tax rate remaining constant, can be called **inflation tax**.

4. Effect of Inflation on Economic Growth

The effect of inflation on economic growth can be examined at both theoretical and empirical levels. Let us first examine the issue of inflation and economic growth at theoretical level. *Theoretically*, the rate of economic growth depends primarily on the rate of capital formation which depends on the rate of saving and investment. Therefore, whether inflation affects economic growth positively or negatively depends on whether it affects savings and investment positively or negatively. Most economists hold the view that there is a positive relationship between inflation and saving and investment and, therefore, *inflation is conducive to economic growth*. Two arguments are put forward in favour of this proposition.

First, during the period of inflation, there is a time-lag between the rise in output prices and rise in input prices, particularly the wage rate.[27] This time-lag between the rise in output prices and the wage rate is called wage-lag. When the wage-lag persists over a long period of time, it enhances the profit margin. The enhanced profits provide both incentive for a larger investment and also the investible funds to the firms. Firms plaugh back their profits for higher profits. This results in an increase in investment, production capacity and a higher level of output.[28]

Second, inflation tends to redistribute incomes in favour of higher income-groups whose incomes consist mostly of profits and non-wage incomes. This kind of inflation-induced redistribution of incomes increases total savings because upper-income groups have a *higher propensity to save*. The increase in savings increases the supply of investible funds and lowers the rate of interest. Since investment is the function of interest rate, other factor given, a lower rate of interest increases investment. With increase in investment, production capacity of the economy increases. This causes an increase in the total output, which means economic growth.

Going by these arguments, the developing countries unable to mobilize adequate development finance through taxation and borrowings have been recommended inflationary financing of their growth. For example, according to Harry G. Johnson, " ... some degree of inflation—but a moderate degree only—is the logical concomitant of efficient economic mobilization."[29] Apart from helping growth through redistribution of income, he argues, a moderate rate of inflation breaks the characteristic "rigidities and immobilities" of the underdeveloped economies and can "draw labour and resources out of traditional or subsistence sectors into the developing sectors of the economy" and can help efficient reallocation of resources.[30]

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27. For the evidence of wage-lag, see Alchian, A. A. and Kessel, R. A., "The Meaning and the Validity of Inflation Induced Lag of Wages Behind Prices," *Am. Eco. Rev.,* March 1960, pp. 43-66; T. F. Cargil, "An Empirical Investigation of Wage-Lag Hypothesis," *Am. Eco. Rev.,* December 1969, pp. 806-16.

28. For the effect of wage-lag on profits, investment and economic growth, see D. Felix, Profit Inflation and Industrial Growth", *Qly. Jl. i.e Eco.,* August 1956, pp. 441-63, and E. J. Hamilton, "Prices as Factor in Business Growth," *Jl. of Eco. Hist*., December 1952.

29. Harry G. Johnson, "Is Inflation the Inevitable Price of Rapid Development or a Retarding Factor in Economic Growth ?", *Malayan Economic Review*, Vol. 11, No. 1, April 1966. Reproduced in Gerald M. Meier (ed.) *Leading Issues in Economic Development,* (Oxford University Press, Delhi, 1995), pp. 179-82 (quoted from p.179).

30. Harry G. Johnson, *op. cit.,* p.179.

As regards the **empirical evidence** of relationship between inflation and economic growth, there is no clear evidence of whether inflation helps or hinders growth. The historical records and empirical researches do not seem to have produced a clear evidence of positive relationship between inflation and economic growth, at least in the long run. "Looking back to the record of the eighteenth and the nineteenth centuries, some economists find a positive relationship between inflation and economic growth in various countries."[31] Samuelson and Nordhaus recount the US experience: "Until the 1970s, high inflation usually went hand in hand with high employment and output. Rising inflation occurred when investment was brisk and jobs were plentiful. ... But a more careful examination of the historical record has revealed an interesting fact: The positive association between output and inflation appears to be only a temporary relationship. Over the longer run, there seems to be no sustained relation between a country's inflation rate and its level or growth of output or employment."[32] Different kinds of relations between inflation and growth have been observed during the post-War II period: (i) low rate of inflation and high rate of growth (West Germany); (ii) high rate of inflation and high rate of growth (Japan); (iii) high rate of inflation and low rate of growth (United Kingdom);[33] and (iv) low rate of inflation and low rate of growth (India).[34]

Conclusion. Most economists generally agree that *a moderate rate of inflation is conducive to economic growth and that, in the short run, there is positive relationship between moderate rate of inflation and economic growth.* In the words of Samuelson and Nordhaus, *"While economists may disagree on the exact target for inflation, most agree that a predictable and stable or gently rising price level provides the best climate for healthy economic growth."*[35] In the long run, economic growth of a country is affected by many factors and, therefore, the relation between inflation and growth loses its distinctiveness. Furthermore, a very high rate of inflation—galloping and hyper types of inflation—causes erosion in real savings and investment and therefore the actual savings and investment. For example, Five year Plan expenditure in India has doubled in each successive Plan but the real value of investment has declined due particularly to 8-9 percent annual rate of inflation during the 1970s and 1980s. A high rate of inflation, especially when it is unanticipated, throws investment and production plans out of gear. When price rise is unpredictable, people find it very difficult to determine the course of their response to the price changes. This upsets the price system which causes inefficient allocation of resources and, thereby, a lower output. For example, Jerret and Selody[36] have found that the output growth in Canada declined by 0.3 percent for each 1 percent increase in the inflation rate. In their opinion, "... there is no doubt that high inflation is bad for growth."[37]

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31. Edward Shapiro, *Macroeconomic Analysis*, 5th Ed. (Galgotia Publication Ltd., New Delhi), p.489.
32. P.A. Samuelson and William D. Nordhaus, *Economics,* 15th Edn., pp. 582-81.
33. Edward Shapiro, *op. cit.,* p. 489.
34. The annual average rate of inflation in India during 1950-51 to 1993-94 was 6.5 per cent which is close to the desirable limits of inflation (5-6% p.a.) for developing economies. This is therefore a low rate of inflation accompanied by a low rate of economic growth (3.5%) during this period.
35. P.A. Samnelson and W.D. Nordhaus, *Economics, op. cit.,* p.583.
36. Quoted in Dornbusch and Fischer, op. cit., (6th Edn), p. 521. Evidence reviewed in Jack Selody, "The Goal of Price Stability," Bank of Canada Technical Report No. 534, May 1960.
37. Rudiger Dornbusch and Stanley Fischer, *Macroeconomics*, 6th Ed., *op. cit.* p.521.

5. Effect of Inflation on Employment

Economic growth and employment go hand in hand. It may thus be construed that inflation has promotional effect on employment. It is a widely accepted view that a moderate rate of inflation helps economic growth which creates additional employment opportunities. Since inflation affects growth variables—savings, investment and profits—favourably, it affects employment favourably too. The economists have found that the greater the rate of investment, the greater the rate of employment till the economy reaches the full employment level.

However, a very strong conflict arises between growth and employment at a high rate of inflation. While a high rate of inflation increases employment, it affects growth adversely. Besides, inflation as a means to growth and employment involves severe economic and social costs in terms of distortions in relative prices, malallocation of resources, and social and political unrest. Therefore, it cannot be allowed to go uncontrolled. If it is controlled, it will limit the employment and cause unemployment. The policy-makers are therefore often faced with a situation of dilemma. If inflation is allowed to go on a high rate, it will affect growth adversely, and if it is controlled, it will affect employment adversely and there may be a high rate of unemployment. The policy-makers are therefore required to find *a trade-off between inflation and unemployment*. This issue has received a great deal of attention in recent times. This issue will therefore be discussed in detail through the Philips Curve in Chapter 25.

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QUESTIONS FOR REVIEW

1. Define inflation. Can any price rise be called inflation? What is the acceptable or desirable limit of inflation?
2. How is inflation measured? Explain the methods of measuring inflation with examples.
3. What is meant by national income deflator? How is national income deflator used to measure inflation?
4. Why is a moderate rate of inflation considered to be desirable for the economy? What are the limits of desirable rate of inflation for the developed and developing nations?
5. What are the types of inflation? How do they differ from one another?

6. Explain and distinguish between walking, galloping and hyper inflation. What are the general features of these kinds of inflation?
7. 'A moderate degree of inflation is the logical concomitant of efficient economic mobilization.' Explain and justify the statement.
8. What is meant by suppressed inflation? Is the current rate of inflation in India suppressed or open inflation? Justify your answer with facts.
9. What are the effects of inflation on wage-earners, fixed-income people, debtors and creditors, producers and the government? Give the reasons for the effects of inflation on different sections of the society.
10. What is meant by inflation tax? Under what conditions is inflation tax used as a source of financing growth?
11. How does inflation affect economic growth? How can inflation be used to make the economy grow?
12. Explain the relationship between inflation and employment. Is achieving a high rate of employment by means of inflation always desirable?

APPENDIX TO CHAPTER 23

Table A 23.1 Annual Average Rate of Inflation in Industrial and Some Other Developed Countries

Industrial Countries	*1949-69*	*1970-73*	*Other Developed Countries*	*1949-69*	*1970-73*
Austria	5.85	5.70	Australia	4.89	6.40
Belgium	2.00	5.05	Finland	4.69	6.60
Canada	2.50	4.65	Greece	4.71	6.41
Denmark	4.46	7.10	Iceland	8.71	12.50
France	5.74	5.90	Ireland	3.78	9.30
Germany	1.80	5.40	New Zealand	3.98	8.31
Italy	3.09	6.55	Portugal	2.42	10.50
Japan	5.24	7.37	South Africa	3.15	6.41
Netherlands	4.12	6.70	Spain	6.06	8.40
Norway	4.07	7.90	Turkey	7.41	12.10
Sweden	3.93	6.72			
Switzerland	1.85	5.79			
UK	3.83	8.05			
USA	2.07	4.90			
Group average	**3.61**	**6.27**	**Group average**	**4.88**	**8.69**

Source: Joseph O. Adekunle, *Rates of Inflation in Industrial, Other Developed and Less Developed Countries—1949-65,* IMF, *Staff Papers*, November 1968, updated by Geoffry Maynard and W. Von Ryckeghem, in *A World of Inflation* (B. T. Batesford Ltd, London, 1976), pp. 1-3.

Table A 23.2 Annual Average Rate of Inflation in Less Developed Countries

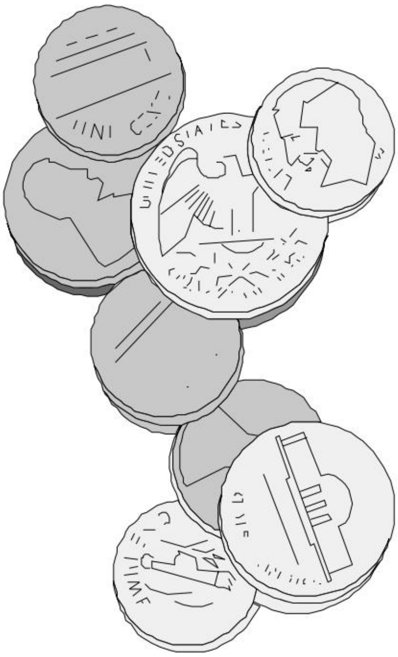
Countries	*1949-69*	*1970-73*	*Countries*	*1949-69*	*1970-73*
Argentina	26.95	33.20	Israel	8.35	8.10
Bolivia	36.89	3.90	Korea	45.67	10.00
Brazil	31.45	11.80	Mexico	5.17	9.40
Ceylon	1.17	6.30	Morocco	4.92**	3.40
Chile	30.96	75.70	Nicaragua	4.58	6.20
Colombia	9.73	12.60	Pakistan	2.71	5.50
Costa Rica	2.69	3.70	Panama	0.20	4.30
Dominican Republic	0.91	6.20	Peru	9.35	6.90
Ecuador	2.63	8.10	Philippines	2.48	10.40
El Salvador	2.90	1.20	Thailand	3.30	4.10
Ghana	6.13*	9.40**	Tunisia	4.69	3.40
Guatemala	1.40	3.50	United Arab Republic	1.95*	3.40
Honduras	2.50	3.10	Uruguay	30.25	43.40
India	3.99	6.40	Venezuela	1.62	3.10
Iran	3.88	5.20			
Iraq	0.17	4.60	**Group Average**	**9.69**	**10.80**

* 1949-68; ** 1970-72.

Source: Joseph O. Adekunle, *Rates of Inflation in Industrial, Other Developed and Less Developed Countries—1949-65,* IMF, *Staff Papers*, November 1968, updated by Geoffry Maynard and W. Von Ryckeghem, in *A World of Inflation* (B. T. Batesford Ltd, London, 1976), pp. 1-3.

Chapter 24

Theories of Inflation and Control Measures



INTRODUCTION

In the previous chapter, we have discussed the meaning, measurement and effects of inflation. In this chapter, we move on to discuss the theories of inflation. Theories of inflation seek to explain the causes and sources of inflation. In addition, we will also discuss the various measures suggested by the economists to cure inflation. It may be noted at the outset that the perception and sources of inflation have been a matter of controversy between the classicalists and the Keynesians, between the Keynesians and the monetarists. Besides, there is a difference of opinion between all these school of economists and the group of economists called "structuralists," especially in their approach to dealing with inflation in less developed or developing countries. The divergent views on the causes of inflation have led to the emergence of various theories of inflation. We discuss here the theories of inflation in their chronological order just to show the order of the development of the inflation theories over time.

24.1 THE CLASSICAL AND NEO-CLASSICAL THEORIES OF INFLATION

24.1.1 The Classical Theory of Inflation

The views of classical economists, (*viz*, Jean Bodin, Richard Cantillon, John Locke, David Hume, Adam Smith and William Petty) on the continuous rise in the general price level are called collectively as the 'classical theory of inflation'. None of these economists had, however, developed a systematic theory of inflation. Their thoughts on inflation were rudimentary. It was Irving Fisher—a highly reputed classical economists—who was the first to formulate a systematic theory of inflation, knows as the 'classical theory of inflation'.

Let us now look at the classical theory of inflation in detail. As noted above, the first and the comprehensive version of the classical theory of inflation was propounded by Irving Fisher[1] in 1911. According to his theory, inflation occurs in direct proportion to increase in money supply, given the level of output. The classical theory of inflation is derived directly from the *Fisher's quantity theory of money*. According to Fisher's quantity theory,

$$MV = PT$$

and therefore, in any year

$$P = MV/T \tag{24.1}$$

Given the Eq. (24.1), the rate of inflation can be worked out as follows.

$$\text{Rate of inflation (\%)} = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100 \tag{24.2}$$

where t denotes a chosen year, and $t - 1$ is the previous year.

There is another method[2] of working out the rate of inflation by using the quantity theory Eq. (24.1). The method is to calculate the percentage change in M, V, P and T (=Y) over a period of any two years, and find the percentage change in the price level. The calculation method is given below in Eq. (24.3).

$$m + v = p + y$$

$$p = m + v - y \tag{24.3}$$

where p = rate of inflation, m = % change in money supply (M), v = % change in velocity of money (V), generally assumed to remain constant, and y = % change in real output (Y).

Going by the classical assumptions, the velocity of money (V) and real output (T) are given in the short run. The supply of money (M) is subject to variation depending on the monetary policy of the central bank of the country. Therefore, according to the classical theory, prices rise in direct proportion to the rise in money supply. For example, if there is full employment and money supply (M) increases by 5 percent, V and Y *remaining constant*, i.e., $v = 0 = y$. In that case, the rate of increase in the general price level will be 5 percent.

Criticism The ***greatest shortcoming*** of the classical quantity theory of money, as pointed out by the economists, is that it does not explain the process by which an increase in money supply causes the rise in the price level. Wicksell, a classical economist, however, explained the process as follows. Additional money supply flows into the economy in the form of loans and advances made by the banks to the businessmen to finance the new investment. The increase in investment demand increases the aggregate demand, especially labour. The economy being in the state of full

[1] Irving Fisher, *The Purchasing Power of Money,* 1926, p.24.

[2] See also Dornbusch R., and Fischer, S., *Macroeconomics, op. cit*. 6th Edn, p.535.

employment, additional labour is not available at the prevailing wage rate. The additional labour are therefore acquired by bidding higher prices (wages). This marks the beginning of the rise in the price level. The rise in the input prices (especially wages) leads to increase in money incomes. This leads to rise in the demand for consumer goods. Under the condition of full employment, the supply of consumer goods does not increase in response to increase in demand. Therefore, demand for goods exceeds their supply. As a result, prices increase till the entire increase in aggregate demand is absorbed by the rise in prices. This is how increase in money supply causes inflation.

It may be added here that despite the weakness of the classical quantity theory of money, as mentioned above, it forms the foundation of the monetarists' theory of inflation. This theory is discussed ahead.

24.1.2 The Neo-Classical Theory of Inflation

Another version of the classical theory of inflation, known as neo-classical theory of inflation, was later developed by the Cambridge economists[3], also known as neo-classical economists. There is, however, a difference between the two versions of inflation theory. While classical school considered increase in the *supply of money* as the cause of inflation, the Cambridge School postulated increase in *demand for money* as the cause of inflation. Recall the Cambridge version of quantity theory of money:

$$M_D = kPQ$$

(where M_D = demand for money; Q = real output; P = general price level; and k = the constant proportion of total income people want to hold in the form of money).

The Cambridge equation yields the price level equation as

$$P = M_D/kQ$$

This equation implies that the general price level increases in proportion to the increase in demand for money, given k and Q. In case k and Q are variable too, the rate of inflation depends on the difference in the rate of increase in demand for money and the sum of the rates of change in k and Q. Given the value of k, the rate of inflation can be obtained as follows.

$$p = m/r$$

where p = rate of price rise, m = rate of increase in money demand (M_D) and r is the rate of rise in real income (Q).

Criticism: The neo-classical theory of inflation has its own drawback. The greatest drawback of the neo-classical theory, as pointed out by the economists, is that it does not offer a plausible theory of inflation as it does not explain how M_D rises, especially with k and Q remaining constant. In fact, M_D depends on Q. If Q remains constant, there is no plausible reason for the rise in M_D, and in price level.

[3] A. C. Pigou, "The Value of Money", *Qly. Jl. of Eco,,* Vol., 32, November 1917; Alfred Marshall , *Money, Credit and Commerce* (Macmillan, London, 1923); J. M. Keynes, *A Tract on Monetary Reforms* (Macmillan, London, 1923); and D. H. Robertson, *Money* (Cambridge University Press, 1937).

24.2 THE KEYNESIAN THEORY OF INFLATION

Keynes' theory of inflation is considered as 'only a little more than an extension and generalization' of Wicksell's view.[4] Keynes has, however, made an important departure from the classical view. While classical economists considered an increase in money supply as the only cause of an increase in the aggregate demand and the only cause of inflation, Keynes too postulated that inflation is caused by increase in the aggregate demand. But, according to Keynes, the aggregate demand might increase due to increase in real factors like increase in consumer demand due to increase in *mpc,* increase in investment demands due to upward shift in marginal efficiency of investment (*MEI*) and increase in the government expenditure. Such changes may take place even when supply of money remains constant. Increase in aggregate demand, aggregate supply remaining constant, creates a demand-supply gap which he called as "inflationary gap". According to Keynes, the *inflationary gap* is the cause of inflation.

Keynes had expressed his view on inflation in his book, *How to Pay for the War* (1940*),* wherein he gave the concept of *inflationary gap*. ***Inflationary gap is defined as the gap between the planned expenditure and the real output available at full employment.*** Following Keynes, the British Chancellor of Exchequer defined the inflationary gap in his budget speech of 1941 as "the amount of the government's expenditure against which there is no corresponding release of real resources of manpower or material by some other members of the community."[5] The 'inflationary gap' is so called because it causes inflation, without increasing the level of output.

It is *important* to note here that Keynes linked inflationary gap and the consequent inflation to full-employment output. In his opinion, if the economy is at less-than-full-employment level, a price rise is not inflation. It implies that ***the expenditure creating demand in excess of output supply at less-than-full-employment level is not inflationary*** even if prices increase. For, such increase in price generates additional employment and output. The additional output supply absorbs the excess demand with a time lag. According to Keynes, price rise during the time lag is not inflation.

According to the Keynesian theory of inflation, a price rise due to excess demand only at full employment level is inflationary, i.e., inflation takes place only at full employment level. The concept of inflationary gap and its impact on the price level is exemplified by using the **'Keynesian cross'** in Fig. 24.1. Suppose that the economy is in full-employment equilibrium at point E_1 where aggregate demand $(C + I + G) = AD_1$ schedule intersects the aggregate supply (AS) schedule. At point E_1, resources are fully employed. At the full employment level of output, the aggregate income equals the aggregate expenditure, that is, $OY_1 = E_1Y_1$.

Given the full-employment status of the economy, let us suppose that the government increases its spending by $E_1E_2 = \Delta G$. Consequently, the aggregate demand schedule shifts upward to $AD_2 = C + I + G + \Delta G$ and equilibrium point shifts from point E_1 to point E_3. But, since there is full employment, additional resources (capital and labour) would not be forthcoming in response to the additional demand. Therefore, higher factor prices would be offered to draw the factor inputs from their existing employment. This creates an inflationary pressure in the economy. This inflationary pressure has arisen due to $\Delta G = E_1E_2$. Therefore, E_1E_2 *is inflationary gap. The inflationary gap generates only money income without creating matching real output because the economy is in full employment equilibrium*. The rise in money income would create multiplier effect depending on the

[4] Gardner Ackley, *Macroeconomics: Theory and Policy,* 1978, p.427.

[5] Quoted in Lawrence Klien, *The Keyneqian Revolution,* p.155.

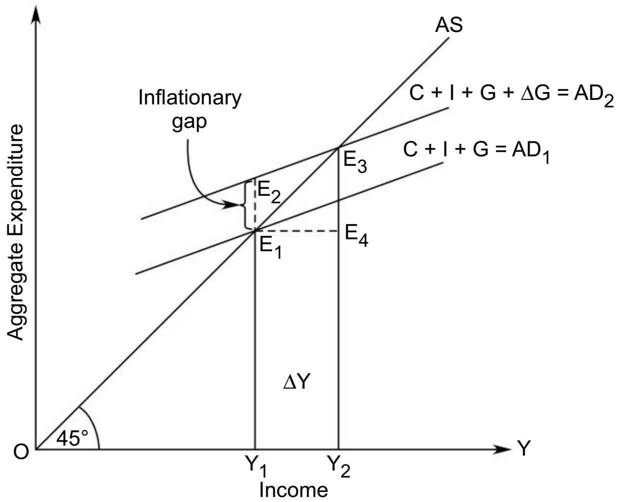


Fig. 24.1 The Inflationary Gap and Inflation

mpc. Since the economy is in the state of full employment and additional goods and services would not be forthcoming, the multiplier would work only on the money income generating more and more demand. The prices would therefore rise till the entire extra money income and excess demand are absorbed by the rise in the general price level. According to Keynes, this price rise is inflation—not the price rise prior to full employment level.

What is the rate of inflation? According to the Keynesian theory of inflation, the rate of inflation equals the *percentage* of additional money income (ΔY) generated by ΔG to the pre-ΔG money income. Since pre-ΔG money income equals OY_1,

$$\text{Inflation rate (\%)} = \frac{\Delta Y}{OY_1} \times 100$$

As Fig. 24.1 shows, $\Delta Y = OY_2 - OY_1 = Y_1Y_2$. By substituting Y_1Y_2 for ΔY, we get

$$\text{Inflation rate (\%)} = \frac{Y_1Y_2}{OY_1} \times 100.$$

This sums up the Keynesian approach to inflation.

24.3 THE MONETARIST VIEW ON INFLATION

The modern monetarist view on inflation is an improved version of the classical theory of inflation, especially the one based on Fisher's quantity theory of money. The modern monetarism is therefore sometimes called 'modern Fisherianism'. Like classical economists, the modern monetarists,[6] hold

[6] In addition to Milton Friedman, the founder of monetarism, other "Leading monetarists include the late Karl Brunner of the University of Rochester, Allan Meltzer of Cannegie-Mellon University, William Poole of Brown University, Anna Schwartz of the National Bureau of Economic Research and Hunter College, and Robert Barro of Harvard University." Quoted from Rudiger Dornbusch and Stanley Fischer, *Macroeconomics,* 6th Ed., (McGraw-Hill, Inc., NY, 1994), p.209.

the view that the general level of price rises only and only due to the increase in money supply. Milton Friedman, the leader of the monetarist school, crystalized the monetarist thought on inflation. According to Milton Friedman, "Inflation is always and everywhere a monetary phenomenon. ... and can be produced only by a more rapid increase in the quantity of money than in output."[7] To this extent, monetarists subscribe to the classical quantity theory of money. However, the modern monetarists make certain important deviations from and make certain modifications to the classical quantity theory of money.

(i) The modern monetarist disagree with the classical view that there is always a proportional relationship between the stock of money and the price level. In Friedman's own words, "In its most rigid and unqualified form the quantity theory asserts strict proportionality between the quantity of what is regarded as money and the level of prices. Hardly anyone has held the theory in that form."[8] It implies that price rise may be more than or less than proportional to the change in money supply.

(ii) They do not agree with classical proposition that change in money supply changes the price level directly and straight away. "Monetarists such as Friedman argue that a reduction in the money stock does in practice *first* reduce the level of output, and only later have an effect on prices."[9]

(iii) Unlike the classical economists, modern monetarists distinguish between the short-run and long-run effects of change in the stock of money. They argue that, in the short run, changes in the stock of money 'can and do have important' effect on the real output. But in the long run, change in money stock remains *neutral* to the real output. "They argue that in the long run money is more or less neutral. Changes in the money stock, after they have worked their way through the economy, have no real effects and only change prices ..."[10]

24.4 MODERN THEORIES OF INFLATION

The *modern approach to inflation* follows the *theory of price determination*. The price theory tells that, in a competitive market, price of a commmodity is determined by the market demand for and the market supply of the commmodity and that the variation in the price of the commodity, if any, is caused by the variation in the demand and supply factors. Likewise, according to the modern theories of inflation, *the general price level is determined by the aggregate demand and aggregate supply*, and variation in the aggregate price level is caused by the variations in the aggregate demand and aggregate supply.

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7. Milton Friedman, *The Counter-Revolution in Monetary Theory,* Occasional Paper No. 33 (Institute of Economic Affairs, London, 1970), p.24.

8. Milton Friedman, "Money: The Quantity Theory" in *The International Encyclopedia of Social Sciences,* Vol. 10 (London, Crowell Collier and Macmillan, Inc, 1968), pp. 432-447. Quoted in Rudiger Dornbusch and Stanley Fisher, *op. cit.,* p.209.

9. Rudiger Dornbusch and Stanley Fischer, *op. cit.,* p.209.

10. Rudiger Dornbusch and Stanley Fischer, *op. cit.,* p.210.

The modern theory of inflation is, in fact, a synthesis of classical and Keynesian theories of inflation. The modern analysis of inflation shows that inflation is caused by both *demand-side* and *supply-side* factors. The demand-side factors are called *demand-pull factors*, and supply-side factors are called *cost-push factors*. Accordingly, there are two kinds of inflation, *viz*,

(i) demand-pull inflation, and
(ii) cost-push inflation.

However, many economists hold the view that demand-pull and cost-push factors do not affect the price level independently in isolation of one another. Rather, *demand-pull and cost push factors interact* to cause inflation, whatever factor may be the cause of initial inflation. We will, therefore, discuss the process of interaction between cost-push and demand-full factors to cause sustained inflation. Let us begin our discussion with demand-pull inflation.

24.4.1 Demand-Pull Inflation

The analytical framework[11] developed in Chapter 19 will be used here to explain the demand-pull theory of inflation. The demand-pull inflation refers to the rise in the general price level when aggregate demand increases much more rapidly than the aggregate supply. As shown earlier in Chapter 19 (see Fig. 19.14), the demand-pull inflation occurs, given the aggregate supply (*AS*), when the aggregate demand (*AD*) curve shifts upward to the right. The rightward shift in the *AD* curve may be caused by (a) monetary factors, i.e., increase in money supply, and/or (b) real factors, i.e., increase in demand for real output. The demand-pull inflation caused by monetary and real factors are discussed here separately in the *IS-LM* framework.

(a) Demand-Pull Inflation Caused by Monetary Factors. Given the money supply and the level of output, there exists a general level of price. Suppose, this price level is a reasonable one—neither inflationary nor deflationary. Under these conditions, the reason for demand-pull inflation is increase in money supply in excess of increase in potential output. Whether increase in money supply in excess of output is the cause of inflation has been a controversial issue. In reality, however, monetary expansion in excess of increase in real output is one of the most important factors causing demand-pull inflation. The logic of demand-pull inflation caused by one-time increase in money supply is illustrated in the *IS-LM* framework in Fig. 24.2.

Let us suppose that, at a point of time, the *IS* and *LM* curves for an economy are given as *IS* and LM_1, respectively, in panel (a) of Fig. 24.2. The *IS* and LM_1 curves intersect at point E_1 where the level of income is determined at Y_1 and interest at i_2. At point E_1, therefore, the economy is in general equilibrium and there is full employment. When the economy is in the general equilibrium, there prevails a general price level. The general price level associated with the general equilibrium is determined by the aggregate demand and aggregate supply as shown by the price level P_1 in panel (b). At the general price level P_1, the aggregate demand (AD_1) equals the aggregate supply (*AS*) at point E_1 in panel (b). Note that the equilibrium point E_1 in panel (a) coincides with equilibrium point E_1 in panel (b). The equilibrium point E_1 is therefore the point of full employment.

[11] The readers are advised to make a quick review of Chapter 19.

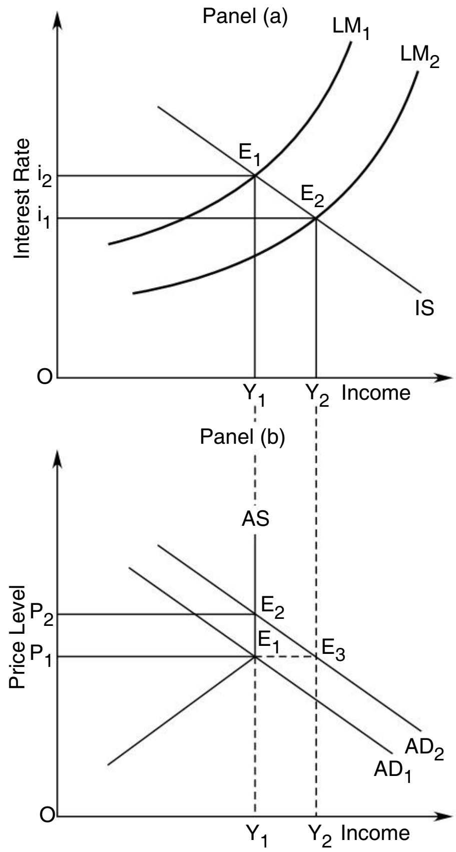

Fig. 24.2 The Demand-Pull Inflation due to Monetary Expansion

Now let the money supply increase due to a discretionary change in monetary policy. As a result, the *LM* curve shifts from LM_1 to LM_2. The curve LM_2 intersects the *IS* curve at point E_2. Therefore, the interest rate decreases from i_2 to i_1. The decrease in the interest rate causes an increase in investment (ΔI) and, thereby an increase in the level of income from Y_1 to Y_2. Increase in income causes a rise in consumption expenditure (ΔC). The rise in the aggregate expenditures ($\Delta C + \Delta I$) makes the *AD* curve shift from AD_1 to AD_2 in panel (b). The shift in the *AD* curve is exactly proportional to the rise in the money supply.

Let us now see what happens to the price level. Recall that the economy is in full-employment equilibrium at point E_1. Therefore, the aggregate supply is not expected to increase beyond Y_1. Under these conditions, the rise in the aggregate demand forces a rise in the general price level to the extent that can eliminate the excess aggregate demand (Y_1 Y_2). The measure of increase in the price level is given by the shift in equilibrium point from point E_1 to point E_2, the point of intersection between the *AS* curve and the curve AD_2. The shift in the equilibrium point from E_1 to E_2 shows the increase in the general price level from P_1 to P_2. The rise in the general price level causes a decline in the real value of money holding. This causes a decline in the demand for money. As a result, the *LM* curve shifts backward from LM_2 to LM_1. As a result, money and product markets return back to the original equilibrium point E_1. Note that, since aggregate supply is inelastic, the economy adjusts to a higher letel of price and interest rate.

As regards the empirical evidence of this kind of inflation, German inflation of 1922-23 is often cited as an example of demand-pull inflation caused by the increase in money supply. During 1922-23, the German government had fallen under heavy post-war debts and reparation payment obligations. The government, left with no option, asked its central bank to print currency notes and pass them on to it, so that the government could meet its payment obligations. When the German central bank printed and circulated billions and billions of paper currency, the general price level rose a billion-fold. In recent times, the excess supply of money caused demand-pull inflation in Russia in 1990s 'when the Russian government financed its budget deficit by printing roubles.' Due to rapid increase in money supply, the general level of prices had risen in Russia during the early 1990s at an average rate of '25 percent per month [or $100 \times (1.25^{12} - 1) = 1355$ percent per year].'[12]

Furthermore, in India, money supply (M_3) had increased at an annual average rate of 18 percent during the period 1990-91 to 2006-07 and the annual average rate of inflation during this period was 7 percent. The inflation rate was lower than proportionate rise in money supply because the real output had increased during this period at an annual average rate of about 7 percent. Also, if one compares the year-to-year rise in money supply and inflation rate, one finds that the higher the rise in money supply, the higher the rate of inflation. From this empirical data, it appears that there is a strong link between the money supply and inflation rate.

(b) Demand-Pull Inflation Caused by Real Factors. The real factors or the non-monetary factors that cause demand-pull inflation are those that cause upward shifts in the *IS* curve. The factors that cause upward shift in the *IS* curve are:

(i) increase in government spending given the tax revenue;
(ii) cut in tax rates without change in the government expenditure;
(iii) increase in autonomous investment causing upward shift in the investment function;
(iv) downward shift in the saving function;
(v) upward shift in export function; and
(vi) downward shift in the import function.

The demand-pull inflation caused by the real factors is illustrated in Fig. 24.3 by using the *IS-LM* model. Let us suppose that the monetary and real factors are in equilibrium at point E_1 in panel (a) where equilibrium income level is determined at Y_1 and interest rate at i_1. The equilibrium of the money and product markets implies that aggregate demand (*AD*) and aggregate supply (*AS*) are in equilibrium and a general price level is determined. The determination of the general price level is depicted in panel (b) at point E_1, the point of intersection between AD_1 and *AS* schedules. The *AD* and *AS* curves are in balance at income level Y_1 and price level is determined at P_1.

Given the equilibrium conditions in panels (a) and (b), let the schedule IS_1 shift to IS_2 due to a real demand-pull factor, say, due to increase in government spending. When the *IS* schedule shifts to IS_2, the point of equilibrium between the money and the product markets shifts from point E_1

12. Samuelson, P. A. and Nordhaus, W. D., *Economics, op. cit.,* p. 584-85.

to E_2. As a result, the level of income increases from Y_1 to Y_2 and the interest rate rises from i_1 to i_2. Since the interest rate has risen due to an upward shift in the *IS* schedule, it will stay there without affecting investment demand adversely[13]. Since the economy is in full-employment equilibrium at Y_1, the aggregate supply is inelastic beyond this level of income, as shown by the vertical portion of the *AS* curve in panel (b). As a result, prices will increase to absorb the increase in demand. The price rise of this nature is shown in panel (b) by the rise in price from P_1 to P_2. This is demand-pull inflation caused by the upward shift in the *IS* curve.

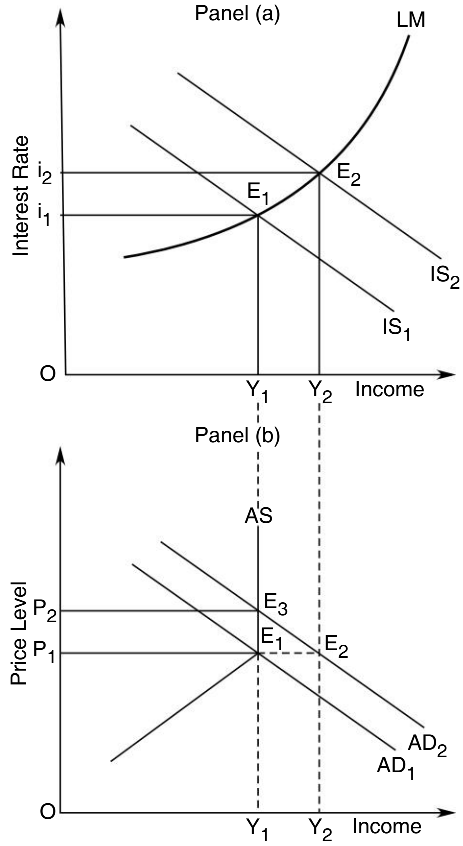

Fig. 24.3 The Demand-Pull Inflation Caused by Real Factors

Important: The demand-pull theory of inflation discussed above in abstract theoretical model leads to the conclusion that the price rise only at the state of full employment is inflation. This conclusion conforms to the Keynesian view that, if the economy is below the full employment level, price rise is not inflation. In reality, however, economies hardly ever attain the state of full employment. But

13. Investment remains unaffected despite increase in the interest rate because rise in income from Y_1 to Y_2 provides the matching savings at the higher interest rate.

demand-pull factors do cause a substantial rise in the general price level which is practically taken as inflation. This is the case, in reality, in all the countries. This has been the case in India too.

24.4.2 Cost-Push Inflation

Inflation is not caused by the demand-side factors alone. There are numerous instances of inflationary rise in prices which could not be fully explained by the demand-side factors. The 1958-recession in western countries is a famous instance. During this period of recession, aggregate demand had declined. Therefore, the general price level should have decreased but it did not. In recent times, it is a common experience that prices generally do not decrease during the period of recession. Furthermore, even when there is stagnation in the economy and there is no inflationary pressure, the general price level generally continues to increase, with a high rate of unemployment. The search for explanation to this kind of phenomenon, particularly for the 1958-puzzle, has lead to the emergence of *supply-side theories of inflation*, popularly known as *cost-push theory* and *supply-shock* theory of inflation.

The **cost-push inflation** is caused by the monopoly power exercised by some monopoly groups of the society, like labour unions and firms in monopolistic and oligopolistic market setting. It has been observed that strong labour unions often succeed in forcing money wages to go up causing prices to go up. This kind of rise in price level is called ***wage-push inflation.*** Not only labour unions, the firms enjoying monopoly power have also been found causing rise in the general price level. The monopolistic and oligopolistic firms push their profit margin up causing a rise in the general price level. This kind of inflation is called ***profit-push inflation.*** Yet another kind of cost-push inflation is said to be caused by **supply shocks**. Thus, the cost-push inflation may be classified on the basis of supply-side factors as follows.

(a) Wage-push Inflation
(b) Profit-push Inflation, and
(c) Supply-shock Inflation

To these may be added some other kinds of supply-side factors, *viz., minimum-wage legislation*, and *administered prices.* The minimum-wage legislation is an intervention with the labour market. This prevents the downward adjustment in wages during the period of recession. Administered prices, for instance, fixing a minimum price for some sections of producers (e.g., oil price and minimum procurement price of food grains in India) prevent downward adjustment in prices during the period of good harvest and keep the prices artificially high for socio-political reasons. In this section, we will discuss briefly these kinds of cost-push inflation in theoretical mode.

(a) Wage-Push Inflation

Wages constitute a part of the price. Therefore, a rise in wages causes a rise in prices. A wage rise may not necessarily cause inflation. A wage rise higher than the rise in labour productivity causes an undue rise in price. This is called wage-push inflation.

Wage-push inflation is caused by the exercise of monopoly power by labour unions to get the money wages enhanced above the competitive labour market wage rate. The logic of wage-push inflation is simple. Labour unions exercise their monopoly power and force firms, the employers, to increase their money wages above the competitive level without a matching increase in labour productivity. Increase in money wages causes an equal increase in the cost of production. The increase in cost of production causes the aggregate supply curve shift backward. A backward shift in the aggregate supply causes increase in the price level. This is called wage-push inflation.

The mechanism of wage-push inflation is illustrated in Fig. 24.4. Let us suppose that the initial aggregate demand and supply curves are given as AD and AS_1, respectively, in quadrant (d) of the figure and the economy is initially in equilibrium at point E_1. At point E_1 the equilibrium level of national output is determined at Y_2 and the general level of price at P_1.

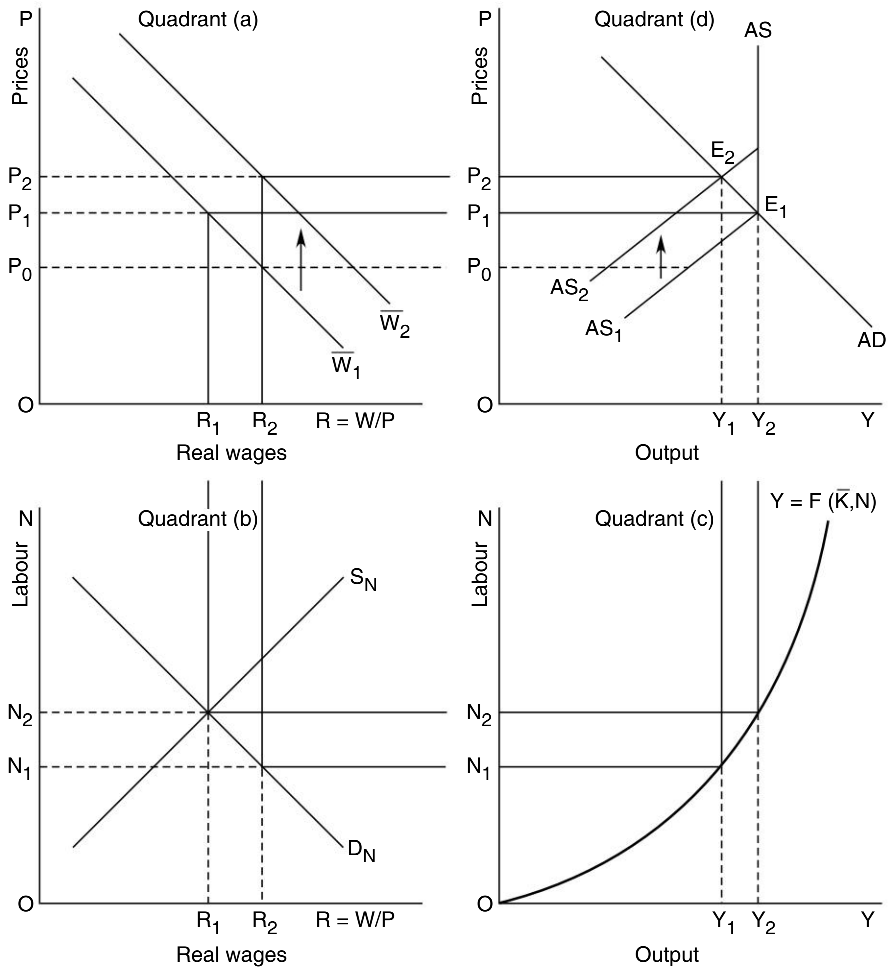

Fig. 24.4 The Wage-Push Inflation

Now let us find the equilibrium level of employment at the equilibrium level of income. Given the national output at Y_2 and production function, $Y = f(\overline{K}, N)$, as shown in quadrent (c), the equilibrium level of employment can be obtained by linking the output Y_2 to the production function. As shown in quandrant (c), the national output Y_2 generates a total labour employment of ON_2. At employment ON_2, demand for labour equals supply of labour so that the labour market is in equilibrium. The equilibrium of the labour market is determined at the intersection of the labour demand curve (D_N) and labour supply curve (S_N) as shown in quadrant (b). Labour market being in equilibrium, the equilibrium rate of real wage (R), i.e., money wage (M) divided by price (P), is determined at R_1. The real wage rate R_1 multiplied by price P_1 gives the money wage rate $W = R_1 \times P_1$. This is indicated by money wage rate curve $\overline{W}_1$ in quadrant (a).

Let us now suppose that labour unions demand and get a raise in their money wage. The rise in money wage makes the money wage curve shift upward from $\overline{W}_1$ to $\overline{W}_2$ in quadrant (a). The rise in the money wage rate causes a rise in the real wages from R_1 to R_2. The rise in the real wages causes a decline in employment from N_2 to N_1 as shown in quadrant (b). The decrease in employment causes a decline in the output by Y_1 Y_2 in quadrant (c). Decline in the output makes the aggregate supply curve shift from AS_1 to AS_2 in quadrant (d). At price P_1, the aggregate demand (Y_2) exceeds the reduced aggregate supply (Y_1) by Y_1Y_2. This discrepancy between AD and AS causes prices to move upward. Prices move upward till a new equilibrium point is reached. As quadrant (d) shows, the curve AS_2 intersects with the aggregate demand curve AD (assumed to be given), at point E_2. Thus, the equilibrium shifts from point E_1 to E_2. This shift in equilibrium shows that the aggregate output *decreases* from Y_2 to Y_1 and price level increases from P_1 to P_2. This price rise has been caused by a rise in money wages. In the final analysis, a rise in the money wages causes (i) a rise in the price level, (ii) a decrease in the aggregate output, and (iii) a fall in employment.

Is Every Rise in Money-wage Inflationary? The foregoing analysis of relationship between the money wage rate and inflation may lead to a misleading conclusion that the rise in the money wages is always inflationary. This is however not the case always. The rise in money wages is not said to be inflationary under the following conditions.

(i) ***Productivity linked wage-rise.*** When money wages rise following an equal rise in labour productivity, wage rise is not inflationary. Rise in money wages in excess of the rise in labour productivity also may not necessarily be inflationary, for a part of rise in money wages may have been caused by an excess of demand for labour.

(ii) ***Wage rise caused by inflation.*** When rise in money wages is caused by the rise in the general price level due to upward shift in the aggregate demand curve, it is not wage-push inflation. This can be explained as follows. When the general level of price rises, it increases profits. Increasing profits create demand for additional labour. If labour demand exceeds the labour supply, producers acquire labour by bidding higher wage rates. As a result, wages go up without an increase in labour productivity. This kind of rise in money wages is the result of inflation, not the cause of inflation. This is the case of competitive labour market. But this argument applies also to the unionized labour market. If labour unions demand higher wages because of inflationary rises in product prices and they are granted a compensatory rise in wages, this wage hike is not the cause of inflation. This is the general case in India and in other countries.

(iii) ***When proportion of unionized labour is small.*** It is also argued that only a small proportion of total labour force—about one-fifth—is unionized. Therefore, even if labour unions succeed in getting their money wages raised up in relation to the wages of nonunion labour, it does not push up the level of the entire wage-structure. The work by H. G. Lewis on wages and inflation shows even a depressing effect of union-caused high wages on the non-union wages.[14] It is therefore concluded that wage rise caused by labour unions does not always affect the general price level materially.

However, it is also argued that where there are strong trade unions in important sectors of the economy, the unions succeed in getting their wages hiked. The wage-hike in the unionized sector works as a pace setter for the wages in the non-union sectors. Wages in the non-union sector rise following the wage rise in the unionized sector generally for such reasons as (i) employers' desire to prevent unionization of their labour force, (ii) to prevent labour discontent and give them wage incentive to improve their productivity, (iii) to retain efficient and disciplined workers, and (iv) the pressure of the market environment. However, empirical evidence on wage-push inflation of this kind is not conclusive either way.

(iv) ***Money-wage rise under competitive conditions.*** Where wages are determined by the market forces under perfectly competitive conditions, rise in money-wage is not said to be inflationary. In a perfectly competitive market, wages increase or decrease depending on relative changes in demand for and supply of labour. In a competitive market, increase in demand may be caused by upward shift in the *MRP* curve. The rise in money-wage under this condition is not considered to be inflationary.

24.4.3 The Case of Wage-push Inflation in Less Developed Countries

The wage-push type of inflation discussed above is based on the experience of and theoretical possibilities in the developed countries. The scenario in the less developed countries is substantially different. The labour unions do exist in the less developed countries in both private and public sector undertakings, as is the case in India. But the powers of the labour unions and their bargaining power are seriously limited by the following factors:

(i) large scale open and disguised employment which prevents trade unions to force wage-hike;
(ii) huge unorganized and ununionized sector in relation to a small unionized labour proportion;
(iii) division of labour unions in political groups resulting in in-fights and weakening the union;
(iv) weak sustaining power of labour and weak financial position of labour unions and their members;
(v) poverty, illiteracy and ignorance of workers causing low membership of unions.

Under these conditions, labour unions can hardly make a strong impact on the wage rate in the organized and unionized sector. The trade unions are not able even to force a reasonable compensation for the rise in the cost of living. Wages in less developed countries lag for this reason far behind the rate of inflation caused by other factors. In India, however, employees in central government enterprises are more than adequately compensated[15] against inflation based on CPI. But this does not apply to labour in unorganised private sector.

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14. H.G. Lewis, *Unionism and Relative Wages in the United States* (Chicago University Press, 1963). He has estimated that, during the 1950s, the unions had raised the unionized wages by 7-11 percent and reduced nonunion wages by 3-4 per cent.

15. For details, see *Economic Survey* 2007-08, GOI, MOF, Statistical Appendix, Table 3.2.

(b) The Profit-push Inflation

Another supply-side factor that causes inflation is the use of monopoly power by the monopolistic and oligopolistic firms to raise their price to enhance their profit margin. This has reactionary effect on other prices which lead to inflation. Note that the existence of monopolistic and oligopolistic firms and the use of their monopoly power to increase their prices is a necessary condition for profit-push inflation. Market situation all over the world is characterized by imperfect market conditions. Monopoly, monopolistic competition and oligopoly dominate almost all manufacturing industries. Therefore, a profit-push type of inflation has a great theoretical relevance.

It is argued that in imperfect markets, prices are largely 'administered prices' determined by the management, not by the market. The administered prices are adjusted upward in a greater proportion than the rate of increase in input prices or even without increase in input prices. When monopolistic and oligopoly firms increase the 'administered price' with a view to increasing their profit margin, it leads to rise in prices which takes the form of profit-push inflation.

The mechanism of profit-push inflation and its effects on output and employment are illustrated in Fig. 24.5. To begin with let us suppose that there is perfect competition in both product and

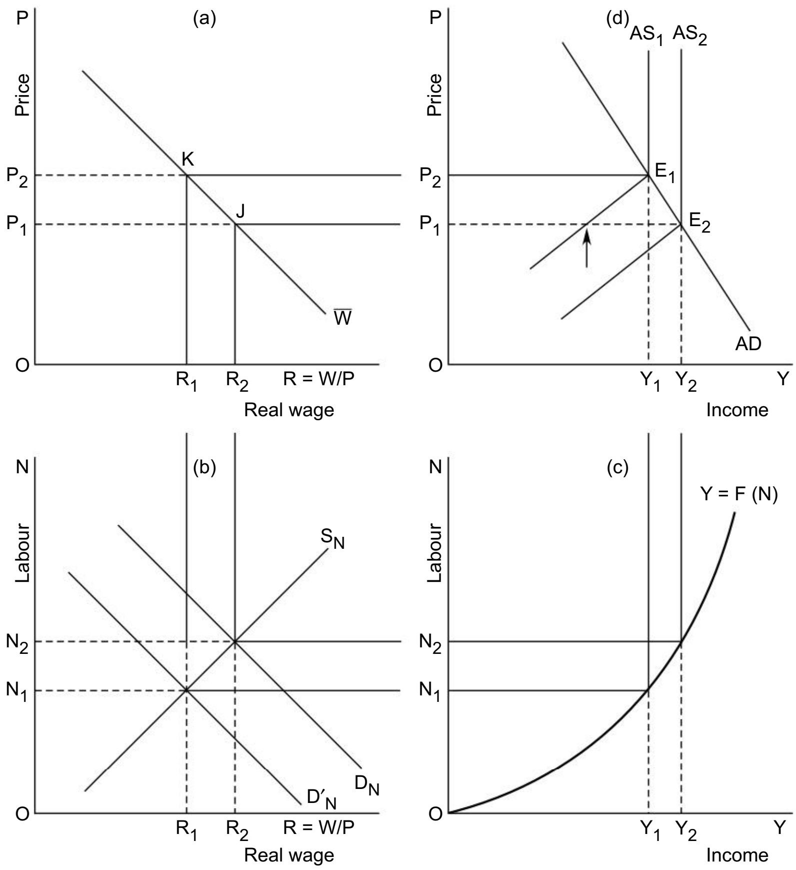

Fig. 24.5 The Profit-push Inflation

labour markets and that the economy is in equilibrium at point E_2 in quadrant (d), where AS_2 intersects AD. At point E_2, the equilibrium, level of income is OY_2 and the general price level is OP_1. At OY_2 level of income, the labour market is in equilibrium at total employment of ON_2 in quadrant (c) at real wages OR_2. Under perfect competition, firms are earning only normal profit.

Let us now suppose that the firms merge together in their attempt to enhance their profits and the product market becomes oligopolistic. We know that oligopoly prices are higher and output lower than the competitive prices and output. A lower output implies a lower demand for labour. This is indicated by a downward shift in the labour demand curve from D_N to D'_N in quadrant (b). As a result, employment decreases from ON_2 to ON_1. With the decrease in employment from ON_2 to ON_1, real output (Y) decreases from OY_2 to OY_1 given the production function $Y = F(N)$ in quadrant (c). Consequently, the aggregate supply curve shifts leftward from AS_2 to AS_1 in quadrant (d). The aggregate demand curve (AD), assumed to remain constant, is intersected by AS_1 at point E_1. The point E_1 is a new equilibrium point which marks a rise in price from OP_1 to OP_2 and decrease in income from OY_2 to OY_1. The rise in price is the result of firms' strategy to enhance their profit. This kind of inflation is, therefore, called ***profit-push inflation***.

(c) Supply-Shock Inflation

Another variant of cost-push inflation is the supply-shock inflation. Supply shock is a sudden and unexpected decrease in the supply of some major commodities or key industrial inputs. The supply-shock inflation occurs generally due to sudden rise in the prices of high-weightage items in the price index number, for instance, food prices due to a crop failure (as it happened in India in 2009) and prices of some key industrial inputs like, coal, steel, cement, oil and basic chemicals. The rise in the price may be caused by supply bottlenecks in the domestic economy or international events (generally wars) causing bottlenecks in the movement of internationally-traded goods and causing, thereby, shortage of supply and rise in the prices of imported industrial inputs. The sudden rise in the OPEC oil prices during 1970s due to Arab-Israel war is the famous example of the supply shock. During the mid and late 1970s, the problem of inflation had become a global phenomenon because the OPEC had more than quadrupled the oil prices between 1972 and 1974. The oil price (Arabian Lights/Dubai) had increased from \$1.90 per barrel in 1972 to \$10.41 per barrel in 1974.[16] Mainly due to rise in the oil prices, the rate of inflation in India was as high as 20.1 percent in 1973-74, 25.2 percent in 1974-75; 17.1 percent in 1979-80, and 18.2 percent in 1980-81 compared to the annual average of 6.1 percent inflation during the preceding decade and about 8 percent inflation during the succeeding decade. The other factors which had contributed to the high price-rise in India in the 1970s were (i) failure of crops in 1972-73, (ii) the aftermaths of 1971 war, (iii) influx of Bangladeshi refugees. For these reasons, prices had risen by 32 percent in September 1974. This kind of inflation falls in the category of supply-shock inflation.[17]

The mechanism of supply-shock inflation is the same as in case of wage-push and profit-push inflation. The supply-shock inflation can be explained through Figs. 24.4 and 24.5, beginning with quadrant (d).

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16. *World Economy and India's place In It*, Center for Monitoring Indian Economy (CMIE), Economic Intelligence Service, October 1993, Table 11.11.

17. For more examples of supply-shock inflation, see T. F. Dernburg, *Macroeconomics: Concepts, Theories and Policies* (McGraw-Hill, NY, 1985), 7th Edn. Section "12.2. Food and Energy Shocks," pp. 278-82.

24.5 INTERACTION BETWEEN DEMAND-PULL AND COST-PUSH INFLATION

Many economists hold the view that demand-pull or cost-push factors alone cannot cause inflation. To quote Machlup, "There is a group of economists contending that there cannot be a thing as cost-push inflation because, without an increase in purchasing power and demand, cost increases will lead to unemployment and depression, not to inflation."[18] There is another group of economists who assume that "demand-pull is no cause of inflation, it takes a cost-push to produce it." The gist of these arguments is that neither cost-push nor demand-pull factors alone can cause a sustained inflation. In reality, cost-push and demand-pull factors interact to sustain the inflation over a period of time, whichever may be the cause of initial inflation.

Whether Demand-pull or Cost-push Inflation: Identification Problem. In the process of their interaction, cost-push and demand-pull factors get so intermixed that it is often very difficult to identify whether it is a demand-pull or a cost-push inflation. Some economists even contend that "the distinction between demand-pull and cost-push inflation is unworkable, irrelevant or even meaningless."[19] It may be argued that demand-pull and cost-push inflation may be distinguished on the basis of which of the two factors caused rise in the price in the first instance. But the question arises: *First* since what time? If prices and wages have risen in turn, especially in a cause-and-effect manner, in successive years, 'the choice of a base period is quite arbitrary and a conclusion assigning the leading role to one factor or the other would be equally arbitrary.' This means that even to distinguish between demand-pull or cost-push inflation on the basis of which of the two factors caused the *first rise* in price is a difficult and often a controversial proposition. Nevertheless, *demand-pull factor is regarded as the leading factor*.

The Indian economists and the policy makers faced the problem of deciding whether the inflationary situation in 2008 was caused by the demand-side or the supply side factors. The inflation rate in India had shot up from about 6 percent in April 2008 to about 8 percent in May, 2008 and to 13.10 percent in mid August 2008. This is the highest rate of inflation in 16 years. This had created more political problems than the economic ones—Parliament elections being due shortly. The policy makers were in dilemma on whether it is demand-pull or cost-push type of inflation. This issue was very important from policy point of view as policy-makers had to decide what measures to adopt for controlling inflation. The problem was serious because any inflation control measure could prove counter-productive. However, the inflation rate started declining sharply after one month due to the impact of the global recession on the economy. So the problem was resolved automatically by the global recession.

However, understanding the dichotomy between demand-pull and cost-push inflation is considered to be useful for at least three reasons: (i) it helps identifying the prime cause of inflation; (ii) it contributes to a fuller understanding the phenomenon of inflation; and (iii) it helps in formulating an appropriate policy to control inflation.

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18. Fritz Machlup, "Another View of Cost-Push and Demand-Pull Inflation," in *Rev. of Eco. & Stat.*, Vol. 42, 1960, reproduced in R. Ball and Peter Doyle (eds), *Inflation: Selected Readings* (Penguin Books, 1969). (All page references from Ball and Doyle).

19. Fritz Machlup, *op. cit.* p.153.

How Demand-pull and Cost-push Factors Interact. Let us now look at the process of interaction between the demand-pull and the cost-push factors. The interaction between demand-pull and cost-push factors is illustrated in Fig. 24.6. To begin the analysis, let us assume that the economy is in equilibrium at point *E,* the point of intersection between aggregate demand curve, AD_1, and aggregate supply curve, AS_1, and the general price level is determined at P_1. Let us now suppose that, given the *AS* schedule, AD_1 shifts upward to AD_2 due to an autonomous demand-pull factor, while no cost-push factor is at work. As a result, the equilibrium point *E* shifts to point *F* and general price level rises from P_1 to P_4. This first phase of inflation is called **expansion phase**. During the expansion phase, the rise in the price-level causes a rise in money wage rate with a time-lag in two ways.

(i) The rise in the price level increases profit rates. Therefore, demand for labour increases, which causes a rise in the money wage rates at full employment level.
(ii) The rise in the price level reduces the real wage rates. This initiates labour union activities which force money wage rates to go up, after a time-lag, of course.

Whatever the course of rise in money wages, the fact is that wages rise in either case. This rise in the money wages reduces the demand for labour and hence the employment of labour. As a result, the aggregate supply curve shifts leftward to AS_2 which intersects with AD_2 at point *F*, the point of new equilibrium. Here, money wages conform to the price level. Therefore, prices and wages tend to stabilize at point *F*. This is called ***stabilization phase***.

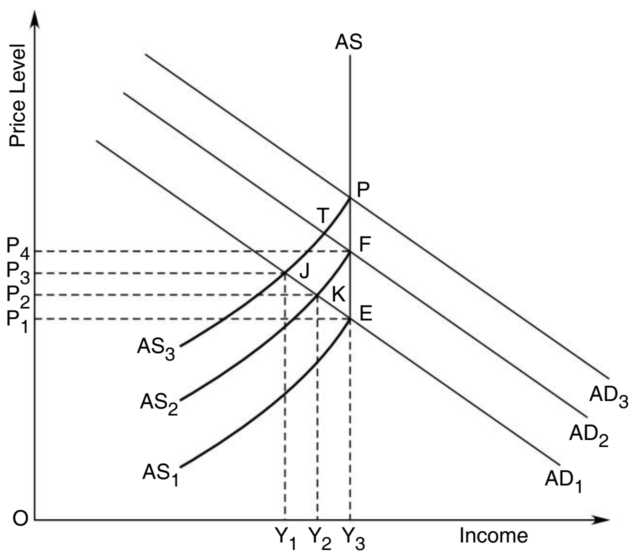

Fig. 24.6 Interaction between Cost-Push and Demand-Pull Inflation

Whether prices stabilize or move further up depends on how producers react to the rise in wage rates. If they respond to the rise in wages by enhancing their 'administered prices,' it will start a process of **wage-price spiral**, leading to a continuous inflation. If producers respond to wage-rise by cutting the demand for labour, the *AS* curve will shift to AS_3 which intersects AD_2 at point *T.*

Point T implies a less-than-full-employment level of production. Whether the economy stabilizes at point T depends on the government policy towards unemployment. If the government increases its spending with a view to increasing employment, the AD curve will shift from AD_2 to AD_3 fueling the process of inflation.

Similarly, it is quite likely that cost-push factors generate inflation in the absence of demand-push factors whatsoever. But, an once-for-all increase in wages will not cause a sustained increase in price. A sustained increase in price requires intermittent increase in wages. If it happens, it will bring in the demand-pull factor in force. The interaction between the demand-pull and cost-push factors lead to a sustained increase in prices. For instance, suppose again that the economy is in equilibrium at point E in Fig. 24.6 and unions force money wages up without increase in labour productivity. Due to the rise in money wages, demand for labour decreases so that the curve AS_1 shifts leftward to AS_2, aggregate demand curve remaining the same (AD_1). As a result, the equilibrium shifts point from E to K. At point K, the equilibrium level of income decreases to Y_2, price level rises to P_2 and unemployment takes place. Whether prices stabilize at a higher level (P_2) or move further up, depends on the government policy towards unemployment. If the government increases its spending with a view to increasing employment, the AD curve will shift from AD_1 to AD_2. Consequently, equilibrium point shifts from K to F and price level rises to P_4.

It may thus be concluded that whether inflation is initially caused by the demand-pull factor or by the cost-push factor, it is later joined by the other factor through a process of interaction. Both the factors interact to keep the prices moving upwards.

24.6 INFLATION IN LESS DEVELOPED COUNTRIES (*LDCs*)

24.6.1 Do Orthodox Inflation Theories Apply to LDCs?

A question that economists have attempted to answer is: Can Orthodox Theories of Inflation be Applied to LDCs? The simple answer is 'NO'. The reason is that the orthodox theories of inflation are based on the characteristics and experience of the western developed countries. The studies on the inflation problem faced by the less developed economies show that inflation theories developed with reference to the institutional setting and assumptions relevant to western industrialized nations have little relevance to the conditions of the developing countries. In simple words, inflation theories based of the economic characteristics of the developed countries can hardly be applied to explain the inflation in the developing countries. Therefore, the orthodox theories of inflation are of little consequence as far as formulations of anti-inflationary policy in *LDCs* is concerned. The reason is that orthodox theories assume: (i) a balanced and integrated structure of the economy; (ii) smooth intersectoral flows of resources in response to market signals, (iii) quick adjustments between consumption, production and investment, and (iv) a smooth and free play of market forces. These characteristics of developed countries do not exist in the *LDCs*.

Besides, in the framework of the orthodox theories, inflation takes place only when the economy is in the state of full employment with 'natural rate of unemployment,' if any. The rise in the general price-level prior to the state of full employment in the economy is not considered to be inflationary because that price level was lower than what was necessary to bring about full employment in the economy. In contrast, *in the less developed economies, inflation and large-scale unemployment exit together*. This has been the experience of most developing economies using plans, programmes and policies to achieve a higher growth rate through the public sector investments.

As regards the institutional factors, the less developed economies are characterized by highly fragmented markets, market imperfections, immobility of factors, wage rigidities, disguised unemployment and underemployment, 'low equilibrium trap' and sectoral imbalances with surplus in some sector and scarcity in others.

For these reasons, the inflation theories built on the facts and in the framework of the developed countries have little relevance to the developing economies. Some economists, for instance, Myrdal and Streeten, even argue against straightaway application of such theories to the *LDCs*.

24.6.2 Structuralists' Approach to Inflation in *LDCs*

The search for an appropriate explanation to inflation in the *LDCs* has led to the emergence of a new school of economists called '*structuralists*' and a new class of inflation theories known as *structuralist theories of inflation*. Some significant contributors of this school of thought are Myrdal,[20] Streeten,[21] and several Latin American economists.[22] The structuralist view on inflation is briefly explained in this section.

According to the structuralist view, inflation is inevitable in the less developed countries embarking on ambitious development programmes and is caused mainly by the characteristic structural imbalances in such economies. Major structural imbalances include: (a) food scarcity: (b) resource imbalance—excess of labour and shortage of capital, (c) foreign exchange bottlenecks, (d) infrastructural bottlenecks, and (e) social and political constraints.

The origin of these structural bottlenecks and their implications on the growth of output and price levels are examined here in the context of a developing economy, especially India.

(a) Food Scarcity. Most developing economies have had imbalance in demand for and supply of food due to uncertain, erratic and inelastic food supply position, leading often to rise in food prices. The reasons for low food supply are defective system of land ownership (non-cultivators being the landowners and cultivators being the landless), inequitable distribution of land, low rate of saving and investment, technological backwardness, food production depending largely on weather conditions, and low level of agricultural infrastructure. These factors hold the food supply at low level against rising demand for food due to increase in population and urbanization. There is, therefore, a widening gap between the demand for and supply of food. As a result, food prices increase at a high rate. Rise in food price is accentuated further by speculative food-hoarding. Food scarcity often results in huge import of food grains. Food import claims a considerable proportion of meager foreign exchange earnings of the *LDCs*. In fact, rise in food grain prices lies in the center of the entire price structure in India and a major cause of inflation in the country[23]. For instance,

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20. Myrdal, G., *Asian Drama: An Inquiry into the Poverty of Nations* (Hormondsworth, Penguin, 1968).

21. Streeten, P., *The Frontiers of Development Studies* (Macmillan, London, 1972).

22. For details, see Kirkpatrick, C. H. and Nixon, F. I., "The Origins of Inflation in Less Developed Countries : A Selected Review," in Parkin, M. and Zis, G. (eds), *Inflation in Open Economies* (Manchester University Press, 1976).

23. Pandit, V. N., "An Analysis of Inflation in India : 1950-1975", *Ind. Eco. Rev.,* October 1978, pp. 89-115.

the WPI based inflation rate in India was negative (–1.16%) in June 2009 whereas food prices had increased 8–9% in the month. By the end of 2009, prices of food items—wheat, rice, sugar, vegetables and fruits had shot up by 50–100 percent.

(b) Resource Imbalance. Most *LDCs* are characterized by resource imbalances, especially the imbalance between demand for and supply of industrial inputs. A typical resource imbalance lies in their resource endowments. Most *LDCs* have excess supply of labour and stork deficiency of capital and other complementary resources. Capital deficiency is caused by low levels of income, savings and investment. For example, the First Five Year Plan (1950-55) had assumed only a 5-percent saving and investment in the country. However, according to the recent estimates,[24] the rate of saving and investment have gone up to 34.8 percent and 36.0 percent of *GDP*, respectively. Besides, the *LDCs* have experienced a perennial gap between their financial needs for their development and availability of resources. Therefore, governments are often required to initiate the development plans. For this, they need to mobilize resources. But, due to low levels of income, the prospects for taxation and domestic borrowings are very low. External borrowings, grants and aids are insufficient. The *LDCs* rely, therefore, heavily on deficit financing. This results in an increase in money supply. But output does not increase in the same proportion because (i) a major part of public investment goes to long-gestation infrastructural projects, (ii) productivity of public investment is low, and (iii) all pervasive corruption prevents the allocations from reaching the target projects. Therefore, the gap between demand and supply goes on widening that builds inflationary pressure.

(c) Foreign Exchange Bottlenecks. The *LDCs* face an almost perpetual imbalance between exports and imports, and balance of payment deficits. The reason is that they depend heavily on imports for their development needs for capital goods, industrial raw materials, and other essential goods. For this they need foreign exchange. But their foreign exchange earnings are very low because of the their comparatively low exports. Their exports are low due to their low exportable surplus, high cost of production, inferior product quality, low competitiveness of their goods in foreign markets and restrictive world trade practices. The result is severe scarcity of foreign exchange. The periodic increase in the prices of the essential imports, like oil, compound their foreign exchange problem. They are therefore forced to adopt a restrictive import policy which restricts imports, reduces domestic supply and leads inevitably to rise in prices. Fortunately, India has at present a very comfortable foreign exchange reserves. The fosex reserve in 2008 was over $160 billion in mid 2009.

(d) Infrastructural Bottlenecks. The *LDCs* have in general a deficient and an inefficient growth infrastructure—generation and distribution of electricity, means of transport and communication and social overheads. Creation of infrastructure facilities is generally the responsibility of the public sector which is corrupt and inefficient. On the contrary, investment in the infrastructure generates additional income and therefore additional demand for goods and services. The inadequate and inefficient industrial infrastructure limits the growth of industrial output against the rising demand. On the other hand, growth imperatives force further public investment in the infrastructural facilities, which create demand pressure and cause inflation.

24. *Economic Survey: 2007-08*, GOI, MOF, Table 1.6, p. A-10

(e) Social and Political Constraints. *LDCs* face social and political constraints in their efforts to promote economic growth. Social constraints include problems arising out of social customs, traditions, beliefs, property rights and division of society by religion, caste, language, and so on. Political constraints include problems arising out of political system and ideology[25] (capitalism and socialism), trade unions, economic policy and role of the government, structure of administrative laws, and so on. Social and political constraints limit to a great deal of the economic growth of a country. For example, religion and caste-based division of society in India is at present the biggest cause of social tension and an unhealthy economic environment in the country; tax laws of the country have generated huge black money and prevented its investment in productive activities; corrupt administrative machinery breeds all-round inefficiency. In this system, businessmen find it easier to make large profits through hoarding and hiking prices rather than through increased production. Such factors hold the production rate, whereas demand continues to increase due to an increase in population, unproductive expenditure by both private and the public sectors. This widens the gap between demand and supply leading to a rapid increase in the price level.

In India, inflation has been caused by an admixture of factors including 'the latent factors' built up in the early years of planning, increase in money supply, trade unions and bureaucratic hold on the economy, 'dislocation of infrastructural facilities such as power, transport and port facilities,' continued deficit financing, 'accretion of foreign exchange reserves,' droughts and floods, causing poor performance of the agricultural sector, heavy indirect taxation, and so on.

24.7 MEASURES TO CONTROL INFLATION

Economists agree that inflation beyond a moderate rate is undesirable as it can often prove disastrous, and therefore, it must be kept under control. Economists agree also that an appropriate mix of fiscal and monetary policies can be helpful in controlling inflation. However, there is divergence of opinion on the effectiveness and primacy of fiscal and monetary policies in the policy mix. While monetarists argue that monetary measures should be given prime role in the anti-inflationary policy-mix, fiscalists argue, on the contrary, that fiscal policy is more effective in controlling inflation. Besides, even the very issue of controlling inflation poses a dilemma because controlling inflation involves the risk of accentuating the problem of unemployment[26]. Several other measures to control inflation have been devised and suggested in addition to fiscal and monetary policies. In nutshell, measures to control inflation remain a controversial issue. Nevertheless, we will discuss here, the various measures which have been suggested by the economists and are used by the governments of different countries from time to time.

The various anti-inflation measures are generally classified as follows.

(i) Monetary measures
(ii) Fiscal measures
(iii) Price and wage control, and
(iv) Indexation.

These measures, their effectiveness and their shortcomings are discussed below.

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[25] For example, communist parties opposed and forestalled the proposal for disinvestment in PSUs by the UPA government. Incidentally, communist parties—CPM and CPI–were the partner of the UPA government in 2004–08, parliament led by the congress Party.

[26] This issue will be discussed elaborately in the next chapter.

24.7.1 Monetary Measures[27]

As already mentioned, the 'monetarists' argue that inflation is anytime and anywhere a monetary phenomenon and it originates in the monetary sector due to increase in money supply in excess of its optimum level. Therefore, they hold the view that control of money supply through an appropriate monetary policy is greatly effective in controlling demand-pull inflation. Monetary measures to control inflation range from demonetization to credit rationing. The monetary measures which are widely used to control inflation can be classified as (a) traditional measures, and (b) nontraditional measures. The traditional methods of controlling inflation are discussed here in a general terms. The non-traditional measures will be discussed with specific reference to the Indian economy.

A: Traditional Monetary Measures. The traditional monetary measures used to control inflation include:

(a) Bank rate policy,
(b) Variable reserve ratio or cash reserve ratio (CRR), and
(c) Open market operation.

Let us now look at the meaning, purpose, role and effectiveness of these measures in controlling inflation.

(a) Bank Rate Policy. Bank rate or, more appropriately, 'central bank rediscount rate,'[28] is the rate at which central bank buys or rediscounts the eligible bills of exchange and other approved commercial papers presented by the commercial banks. The central bank performs this function as the 'lender of the last resort.' In India, where bill market is underdeveloped, the Reserve Bank of India (RBI) advances money to the commercial banks in two forms: (i) in the form of advances mostly against the government securities, and (ii) rediscounting facility for eligible usance bills and 'other approved securities.' The bank rate policy is used during the period of inflation as a central instrument of monetary control. The bank rate forms the basis of lending rate charged by the banks. When the central bank raises the bank rate, it is said to have adopted a 'dear money policy' and when it reduces the bank rate, it 'cheap money policy'. The bank rate as a measure of monetary control works in two ways.

One, where objective is to control inflation, the central bank raises the bank rate. This increases the cost of borrowing and, therefore, reduces banks' borrowing from the central bank. The lower borrowing by the banks reduces their ability to create credit. As a result, flow of money from the commercial banks to the public reduces. Therefore, price rise is halted to the extent it is caused by the credit money. The **effectiveness** of this method of monetary control is, however, severely reduced if (i) commercial banks have excess liquidity, (ii) they have alternative sources of creating reserves, (iii) they are free to reduce their lending rates even if the central bank increases the bank rate, (iv) demand for commercial bank credit is low, and (v) future expectations regarding the

27. Monetary policy, its working and effectiveness are discussed in detail in Chapter 30 with a wider macroeconomic perspective. Here, we confine our discussion to the use of monetary measures to control inflation.

28. The RBI uses a new term for this measures, i.e., 'Repurchase operation rate', commonly used as 'Repo rate'.

market prospects is optimistic. In India, this method has not been very effective mostly because the RBI does not allow a big difference between the bank rate and the lending rate of the bank—only 0.5 percentage point at a time. Nevertheless, the RBI has used the bank rate (the rapo rate) quite frequently when inflation rate in India had crossed 10 percent in 2008.

Two, in a developed and fully integrated money market, the bank or discount rate sets the trend for the *general market rate of interest*, particularly in the short-term money market. Therefore, when the bank rate is changed, other rates of interest move in the same direction. For example, if bank rate is increased with a view to controlling money supply and, thereby, inflation, banks increase their lending rates and other market rates follow the suite. In general, the cost of borrowing goes up. This slows down the monetary flows from banks to the public. This is theoretically supposed to slow down the pace of general economic activities and also the price rise.

In *India*, the RBI is constrained to make full use of the bank rate as an instrument of monetary control for the fear (i) it might raise the interest rate in the gilt-edged market and thereby increase government's cost of borrowing, and (ii) it might result in capital loss to the bond-holders, i.e., the financial institutions. In controlling the 2008 inflation (inflation rate rose to 7.8 percent in May 2008), the RBI adopted a very cautious approach. It has so far used only its repo rate and Cash Reserve Ratio (CRR) by 0.25 basis point. The RBI has adopted a cautious approach or gradualism in controlling inflation as any drastic action might affect the growth rate adversely. Even otherwise, "the role of the bank rate as an instrument of monetary policy has been very limited in India, because of a number of factors like the administered structure of interest rates, sector specific refinance facilities for commercial banks and underdeveloped bill market"[29].

(b) Variable Reserve Ratio. Commercial banks are required to maintain a certain proportion of their total demand and time deposits in the form of *cash reserves*. A part of this reserve is maintained as 'cash in hand' for meeting their day-to-day payment requirements and a part is maintained with the central bank as 'statutory reserves.' The statutory reserve requirement called 'cash reserve ratio' (*CRR*) is determined and imposed by the central bank. The *CRR* has been changing in India. The central bank uses the *CRR* as a weapon to control money supply. With an objective to controlling inflation, the central bank raises the *CRR*. Increasing *CRR* is virtually withdrawal of money from the circulation. In effect, when central bank raises the *CRR*, it reduces the lending capacity of the commercial banks. As a result, flow of money from commercial banks to the public decreases. This halts the rise in prices to the extent it is caused by the bank credits. This method of controlling inflation has the same limitations as the bank rate policy. The RBI adopted the same approach when inflation rate turned to be *negative* in mid-2009. It cut down the repo rate by 0.5 percentage point.

(c) Open Market Operations. Open market operation refers to sale and purchase of the government securities and debts by the central bank to and from the public. This function is performed by the central bank as government's banker. Where objective is to control inflation through monetary policy, the central bank sells the government securities to the public through the authorized commercial banks. By selling the government securities in the open market, the central bank make money to flow from the public to the central bank. When people use their bank deposits to buy

29. *Economic Survey,* 1994-95, Ministry of Finance, Government of India, p. 43

government bonds, it reduces the deposits available to the banks for lending. This causes a reduction in the credit creation capacity of the commercial banks and in the flow of credit to the public. The reduction in the credit flow equals the credit-multiplier times the sales proceeds of the treasury bills.

Open market operation is regarded an efficient instrument of monetary control in the developed countries like the USA and the UK. This method is more effective than other methods of monetary control. An additional advantage of this system is that it is flexible: it can be used any time, in any amount and can be easily reversed. In developing countries like India, open market operation has not proved very successful because (i) the treasury bill market is not adequately developed and well organized, (ii) the central bank does not have adequate resources for buying back securities, and (iii) the unintended indirect effects of open market operations, e.g., disturbing the interest rate structure, are much greater than the objective of monetary control. In India, the treasury bill market is not well developed. It is largely a 'captive-market' in the sense that it is confined to the financial institutions such as public sector banks, scheduled commercial banks, insurance companies, and the government financial corporations. These institutions are required by law to invest a certain proportion of their total liabilities in the government bonds and securities.

B: Non-traditional Measures. The non-traditional methods of monetary control used by the RBI are following:

(i) Statutory liquidity ratio,
(ii) Selective credit controls,
(iii) Moral suasion, and
(iv) Credit authorization scheme.

These weapons of monetary control are discussed here briefly.

(i) Statutory Liquidity Ratio (SLR)[30]. The statutory liquidity ratio (*SLR*) is one of the non-traditional methods of monetary control used by the RBI in addition to the cash reserve ratio. The objective of *SLR* is to allocate the total bank credit between the government and the business sector. The *SLR* is a double-edged weapon. On the one hand, it controls the central government borrowings from the RBI, and on the other, it restricts the freedom of the banks to sell the government securities or to borrow against them from the RBI. Under this method of monetary control, banks are required by the statute to maintain a certain minimum proportion of their daily demand and time liabilities (*DTL*) in the form of certain *designated liquid assets*. The designated liquid assets include (a) excess reserves (*ER*)—defined as total reserves *less* cash in hand and balances with RBI, (b) investment in unencumbered government (*IGS*) and other approved securities, and (c) current account balances with other banks (*CAOB*). Thus,

$$SLR = \frac{ER + IGS + CAOB}{DTL}$$

30. This section follows S. B. Gupta, *Monetary Economics: Institutions, Theory and Policy,* 1983 (S. Chand & Co., New Delhi).

In fact, the main objective of the *SLR* is to ensure the availability of a certain minimum of bank credit to the government. The RBI has been changing the *SLR* from time to time. It has raised *SLR* from 20 percent in 1949 to 35 percent in 1981, to 38.5 percent in 1990-91 and reduced to 25 percent in 1994-95 which remains constant till date.

(ii) Moral Suasion. The central banks use moral suasion technique of persuasion and pressure in general and on the errant banks—banks not strictly following the rules implemented by the central bank—in particular to adopt a lending policy in line with the objectives of the general monetary policy. The central banks use this technique through discussions, letters, and speeches made by the concerned authorities, especially when traditional methods of monetary control do not work satisfactorily for any reason. This method is used for controlling both quantity and quality of credits. The quality of credit refers generally to the sectoral distribution of credit. The RBI uses moral suasion to urge the commercial banks to keep a large proportion of their assets in the form of government securities, to help the RBI in developing a broad-based security market, and to cooperate in controlling inflation. The RBI has frequently used moral suasion for implementing its monetary policy.

In its attempts to control the 2008 inflation, the RBI was using the advisory method. It advised banks to use their loanable funds in the manner that helps in controlling inflation without affecting growth adversely.

(iii) Selective Credit Controls (SCCs). The methods that RBI uses to regulate the distribution of bank credit between the various sectors and the industries on selective basis is called *selective credit controls*. The RBI has generally used the *SCCs* to prevent the banks from advancing money for the purpose of speculative hoarding of essential commodities like food grains, oil seeds and agricultural raw materials. The objective is to prevent the rise in the prices of essential commodities. What the RBI does is to reduce the lending margin against the stock of essential goods. This discourages the traders to hoard the essential commodities in short supply and prevents the speculative rise in the prices.

The effectiveness of *SCCs* is reduced by (i) availability of non-banking finance, (ii) availability of other collaterals against which traders can borrow from the banks, and (iii) the degree of scarcity of the commodities in question. The last point needs a clarification. When a commodity is greatly in short supply, then their price is high, and the speculative tendency is high causing a further rise in their prices. A timely action by the RBI can prevent hoarding and further increase in the price of an essential commodity.

(iv) Credit Authorization Scheme (CAS). The credit authorization scheme (*CAS*), introduced in 1965, is used by the RBI to allow banks to give credit to large public and private sector borrowers. Under the scheme, the commercial banks are required to seek prior authorization of the RBI and to report later to the RBI with regard to large credit facilities given to large private and public sector undertakings. The credit facility subject to prior authorization include credit facility regarding (a) working capital, (b) term loans for capital accumulation, and (c) letter of credit and deferred payment guarantees. For other kinds of credit facilities, prior authorization is not necessary but has to be reported to the RBI. The *CAS* facility includes export credit, credit for fertilizer distribution, and defense related credit.

24.7.2 Fiscal Measures

A section of economists popularly known as 'Keynesians' or 'fiscalists' argue that demand-pull inflation originates in the real (product) sector due to increase in aggregate demand in excess of aggregate supply. The excess demand may result from the increase in expenditure by the households, firms and the government. They emphasize that the excess demand arises mainly due to excessive government expenditure. Therefore, fiscal policy or the budgetary measures are a more powerful and effective weapon to control demand-pull inflation.

The choice of fiscal measures for controlling inflation depends on the cause(s) of excess demand resulting in demand-pull inflation. Where excess demand is caused by the *government expenditure*, the most effective measure is to cut down the public expenditure. A cut in public expenditure reduces not only the government demand for goods and services but also the private consumption expenditure through a process of reverse multiplier. Therefore, the excess demand decreases more than a given cut in public expenditure.

Where excess demand is caused by increase in private expenditure, that is, the expenditure by the households and firms, as was happening in 2008 in India, *taxation of incomes* is a more appropriate measure to control inflation. Taxation of incomes reduces the disposable income. Since consumer demand is a function of disposable income, consumer demand decreases due to taxation. Thus, a well designed taxation policy reduces the aggregate demand, and thereby, it brings the demand-pull inflation under control. However, the government of India has resisted from increasing tax rates because of its adverse effect on the growth process. It has rather reduced excise duty and import duties on some commodities to facilitate increase in supply.

Is Fiscal or Monetary Policy More Effective? Economists are not unanimous on the effectiveness of fiscal and monetary policies in controlling demand-pull inflation or any kind of inflation for that matter. Fiscalists argue that fiscal policy is more effective in controlling inflation, whereas monetarists argue that monetary policy is more effective. The other groups of economists, called 'rationalists' and 'supply-side' economists hold a different view from those of the monetarists and fiscalists on the measures to control inflation.

The empirical evidences on the relative effectiveness of monetary and fiscal policies are also not conclusive. Some economists, e.g., Andersen and Jordan, find that monetary policy is relatively more effective than the fiscal policy in controlling inflation and promoting employment. Some other economists, (*viz*., Leeuw and Kalchbrenner) find that fiscal policy is more effective than the monetary policy. Findings of Gary Fomm and R Klien support the view that fiscal policy is more effective. Most researches on this issue find that fiscal policy is more effective, but they do not prove conclusively that monetary policy is not effective. The debate remains inconclusive on empirical facts because causes of inflation vary from country to country and from time to time.

However, it may be concluded from this controversy that demand-pull inflation may originate in monetary sector or in the real sector. If inflation originates in the monetary sector due to excess money supply, then monetary policy would be more effective. And, if inflation originates in the real or the product sector due to a rise in the aggregate private demand and public expenditure, then fiscal policy would be more effective. *In fact, an appropriate combination of fiscal and monetary policy is more effective in controlling inflation than any one of these policies*.

24.7.3 Price and Wage Control

In case monetary and fiscal measures prove ineffective in controlling inflation the governments resort to direct measures to control inflation. Direct measures consist mainly of *price and wage controls*. The price and wage controls go together because price-push and cost-push inflation go hand in hand, whatever may be the cause of initial inflation. We discuss here the price control and wage control as practical measures of combating inflation.

Price control as a measure to control inflation is generally adopted during the war period when inflation tends to gallop. This method is adopted even during the peace period, when inflation threatens to cause serious damage to the economy in general and to the vulnerable sections of the society in particular. When the government resorts to price control, a maximum retail price of goods and services is fixed. Price control may be general, applicable to all goods and services or it may be partial, confined to only scarce and essential goods and services. The primary objective of price control is to prevent the price rise of scarce goods and to ration the use of the commodity. In order to ensure a fair distribution of the scarce commodities, rationing system is adopted. Under the price control system, selling a commodity at a price higher than the price fixed by the authorities is declared a cognizable offence.

Whether the system works effectively and efficiently is a controversial matter. It is general experience that price controls lead to black-marketing of goods and unfair distribution of scarce goods and services, especially where administrative machinery is corrupt and inefficient. It is a common experience of both developed and developing economies, that price control is an ineffective and costly affair.

Wage control is used to combat inflation when wages tend to rise much faster than the productivity or the 'cost-of-living index' or when, in simple words, wage-push is found to have caused and sustained inflation. Under this method, the government controls the wage-rise directly by imposing a ceiling on the wage incomes in both private and public sectors. Often a direct and strong method, that is, a 'wage-freeze' is applied to contain inflation. In a democratic country with strong trade unions, 'wage-freeze' is more often than not a politically sensitive issue. Under an otherwise condition, wage-freeze is expected to affect productivity. Then the government uses a weaker method called *'jawboning'* or *'moral suasion'*. This method is essentially forcing moral responsibility on the trade unions for the consequences of cost-push inflation and restraining labour unions from demanding higher wages. Jaw-boning and moral suasion work only for a short period, if at all, because it is one-sided in a situation of wage-price spiral.

A more sensible and effective method of containing wage-push inflation is known as *'wage guideposts'* generally used in developed countries. The 'wage guideposts' mean a plan of action against inflation. The plan of action is prepared by common consent and mutual agreement among the representatives of the government, trade unions and the businessmen, for a disciplined and controlled upward movement in the wages and prices. Under this scheme, wage and price rise are monitored by a board of the representatives of the different groups of the society. However, simply due to its democratic nature, the plan does not work for long, especially when prices continue to rise. Friedman comments, "Guideposts and pleas for voluntary compliance are a halfway [measure] whose only merit is that they can more readily be abandoned than legally imposed controls. They are not an alternative to other effective measures to stem inflation, but at most a smoke-screen to conceal lack of action."[31]

In reality, the wage-price control system does not work efficiently. For, if wage-hike is not allowed, skilled workers move to the industries and companies where wage structure is relatively higher. Excessive job-changing is not only inefficient but also tends to breakdown wage controls.[32] Also, restriction on job-changing affects productivity and a fall in productivity enhances the cost of production. This makes the system to break down.

24.7.4 Indexation

It may be concluded from the foregoing discussion that inflation is an intractable problem. Besides, controlling inflation is also fraught with the danger of aggravating unemployment problem. However, an uncontrolled inflation affects different sections of the society in different ways. While some categories of people gain from inflation, some sections lose heavily. Inflation also causes inequitable distribution of incomes. Economists argue that if inflation cannot be or should not be controlled, its adverse effects on different groups of the society should be minimized. They suggest indexation of prices, wages and contractual obligations with a view to compensating those who lose their real incomes due to inflation. According to Samuelson and Nordhaus, "*Indexing* is a mechanism by which wages, prices, and contracts are partially or wholly compensated for changes in the general price level."[33] Briefly speaking, under this method, a separate index is constructed for the prices of different category of goods, wages, and other contractual payments (e.g. house rent, etc.). The indices are compared to find out who loses and who gains from the inflation. Those who lose are compensated.

Thus, indexation is not a method of controlling inflation. It is a method of adjusting monetary incomes so as to minimize the undue gains and losses in real incomes of the different sections of the society due to inflation. It helps contain social dissension and discontent and, therefore, makes inflation easier to live with.

In spite of strong recommendation by the economists to index wages, debts, taxes, and all other long-term contractual payments, the governments have doubted the *feasibility* and *effectiveness* of indexation for three reasons.[34] ***One***, adjustment in indexation is very difficult in case of recurrent supply shocks of great amplitude. ***Two***, the economy is an extremely complex system with interlinked and inter-related prices. Therefore, a reasonable indexing of all prices to the satisfaction of all concerned is an extremely difficult task. ***Three***, the governments find it politically impracticable because it does not control inflation: rather it creates a base for its perpetuation.

31. Milton Friedman, "What Price Guidepost ?", in Arthur M. Okun (ed), *op. cit.,* p. 211

32. William Poole, "The Cost of Wage-Price Control", in Arthur M. Okun (ed), *The Battle Against Unemployment,* 1972, p.14.

33. Samuelson, P. A. and Nordhaus, W. D., *Economics*, 15th Edn., p. 596

34. Rudigar Dornbusch and Stanley Fischer, *op, cit.,* p. 525.

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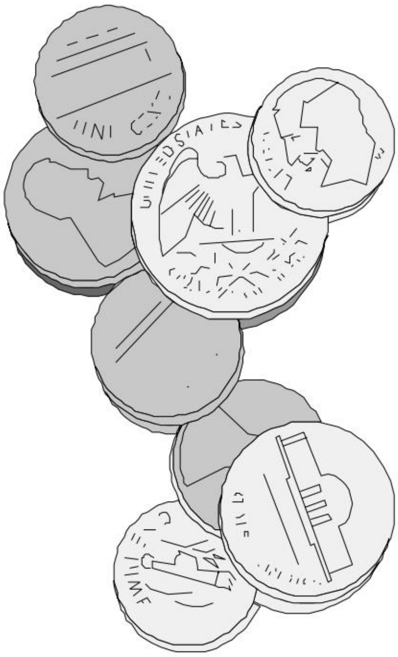
QUESTIONS FOR REVIEW

1. Describe the classical theory of inflation. How is neo-classical theory of inflation different from the classical theory? Do these theories explain fully the phenomenon of inflation?
2. What is monetarists' approach to the phenomenon of inflation? Is inflation always and everywhere a monetary affair?
3. What is meant by 'inflationary gap'? How does the concept of inflationary gap explain a continuous and persistent increase in the general price level?
4. "Inflation is always and everywhere a monetary phenomenon ... and can be produced only by a more rapid increase in the quantity of money than in output." Who said it? Do you agree with this statement? Give reasons for your answer.
5. What are factors behind the demand-pull inflation? Explain with the help of appropriate diagrams. What are the major weaknesses of the demand-pull theory of inflation?
6. What is cost-push inflation? What factors contribute to the cost-push inflation?
7. Distinguish between demand-pull and cost-push inflation. Can the two types of inflation go hand-in-hand ? Explain in this regard the 'wage price spiral'.
8. In the opinion of an economist, "the distinction between demand-pull and cost-push inflation is unworkable, irrelevant or even meaningless." Who is the economist? Do you agree with this statement? Give reasons for your opinion.
9. Demand-pull and cost-push factors interact to cause inflation to persist and accelerate. Do you agree with this statement? Give reasons for your answer.
10. Some economists (Myrdal and Streeten) argue against straightaway application of inflation theories developed in the background of developed countries to the less developed countries. Do you agree with this proposition? If not, why?

11. Can demand-pull and cost-push theories of inflation be straightaway applied to explain the phenomenon of inflation in the less developed countries? Give reasons for your answer.
12. What is the 'structuralist view' on inflation? Explain the structural bottlenecks that are supposed to cause inflation in the developing countries.
13. Combating inflation has been one of the most intractable economic problem faced by the developed and underdeveloped countries. Comment.
14. What are the traditional monetary measures to control inflation? Explain how these measures work to control inflation.
15. Explain the working of the monetary weapons of monetary control. Which of these weapons is more effective under what conditions?
16. What are the fiscal measures of controlling inflation. Are the fiscal or monetary measures more effective in controlling inflation?
17. Describe and evaluate the RBI approach to control inflation in India in 2008.

Chapter 25

Inflation and Unemployment



INTRODUCTION

In the preceding chapter, we have discussed the methods of controlling inflation assuming that inflation should be controlled if it exceeds the desirable limit. However, by controlling inflation successfully in the first half of the 1980s, most western countries, particularly the US, the UK, West Germany and Italy, experienced a severe recession and growth of unemployment. For example, the unemployment rate in the US had gone up to 10 percent which was the highest since the Great Depression[1]. This was exactly the dilemma being faced by India in 2008. The inflation rate had gone up to about 8 percent which was socially and politically unacceptable. But controlling inflation drastically might affect the economic growth adversely and might lower down the 9-percent-growth rate in the year. Fall in growth rate might aggravate the unemployment problem of the country. This kind of situation creates a dilemma for the policy-makers as to whether or not to control inflation. The dilemma arises because economists have found that controlling or ignoring inflation, both have the following kinds of undesirable effects on the economy.

(i) Controlling inflation causes unemployment,
(ii) Reducing inflation below a certain limit might reduce the growth of *GDP*, and
(iii) Uncontrolled inflation might lead to stagflation.

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1. William J. Baumol and Alan S. Blinder, *Economics: Principles and Policies, op. cit.*, p. 344.

Therefore, the question 'whether inflation should be controlled, and if yes, then to what extent', has been the foremost concern of the macro-economists and the policy-makers alike, over the past three decades, especially in the industrially advanced countries.

Turning to the problem of inflation and unemployment, because of its policy implications, the relationship between the rate of inflation and the rate of unemployment has received more 'attention in contemporary macroeconomics' than any other economic issue. The reason is that most of the industrialised and developing economies have been plagued, paradoxically though, with the problem of co-existence of unemployment and inflation, though the magnitude of the problem has been different in different countries.

We are concerned in this chapter mainly with the relationship between inflation and unemployment. However, we have said so far little about the nature and types of unemployment, which would figure often in the following discussion. Let us, therefore, have first a glance at the meaning, measure, types and the concept of various kinds of unemployment.

25.1 THE MEANING, MEASUREMENT AND THE KINDS OF UNEMPLOYMENT

25.1.1 What is Unemployment?

In general sense of the term, unemployment means lack of jobs even for those who are able and willing to work at the prevailing wage. This definition is however ambiguous from the policy point of view as it does not specify the persons who should be and who should not be included in the category of job-seekers. This problem arises because of undesirability of including persons of certain category and age-group among the job seekers. For example, should children below 15 years of age, and the persons above 65 or 70 years—even if they are looking for a job—be included among the job-seekers or be considered as part of the labour force? According to the ILO, only those belonging to the age group of 15 to 65 years should be included in the labour force of country. In the US, persons belonging to the age group of 16 years and above are included among the employment seekers.

From the measurement point of view, the unemployment may also be defined as the gap between the potential 'full employment' and the number of employed persons. **What is full employment?** The concept of full employment has been variously defined. However, the UN definition of full employment is more sound and acceptable. According to UN experts on the *National and International Measures of Full Employment*, full employment is "a situation in which employment cannot be increased by an increase in effective demand and unemployment does not exceed the minimum allowance that must be made for effects of frictional and seasonal factors." Going by the UN definition of full employment, unemployment exists only if there is unemployment in excess of frictional and seasonal unemployment.

From employment policy point of view, therefore, unemployment is measured more specifically as follows.

$$\text{Unemployment} = \text{Labour force} - (\text{number of employed} + \text{frictionally unemployed})$$

Definitionally, *labour force* of a country consists of persons belonging to the age group of 15 to 65 years (or so) who are employed and those who are unemployed but are looking for a job. Labour force does not include full-time students, full-time house-wives and retired persons.

25.1.2 Measuring Unemployment Rate

The rate of unemployment in a country is measured by the following formula.

$$\text{Unemployment rate} = \frac{\text{Labour force} - \text{Employed labour}}{\text{Labour force}} \times 100$$

or
$$\text{Unemployment rate} = \frac{\text{Number of unemployed}}{\text{Labour force}} \times 100$$

This measurement of unemployment can hardly be applied strictly to the Indian conditions because there is a large scale of underemployment. In India, therefore, the National Sample Survey Organization (NSSO), the organization entrusted with the task of measuring employment and unemployment in the country, uses three concepts of unemployment.

(i) Usual status of unemployment,
(ii) Current weekly status of unemployment, and
(iii) Current daily status of unemployment.

The *usual status of unemployment* or chronic unemployment is measured in terms of number of persons who are unemployed for major part of the year. The *weekly status unemployment* is measured in terms of number of persons who did not find job even for one day during the entire survey week. The *daily status unemployment* includes those who do not find job even for an hour on a day of the survey week. The unemployment rate is measured in terms of (a) unemployment, and (ii) underemployment. The NSSO estimates of unemployment rate (on Current Daily Status Basis) in the country for the recent years are given below.

Year	*Unemployment Rate (%)*
1983	9.22
1993-94	6.06
1990-00	7.31
2004-05	8.28

Obviously, the unemployment rate in India is very high—over 8 percent.

25.1.3 Kinds of Unemployment

The unemployment may be classified as follows.

(i) Frictional unemployment,
(ii) Structural unemployment,
(iii) Natural unemployment, and
(iv) Cyclical unemployment.

The nature and the reasons for these kinds of unemployment are described here briefly.

1. Frictional Unemployment. The concept of *frictional unemployment* can be better understood with reference to the classical postulate that there is always full employment. *There is* *therefore no unemployment.* If there is any unemployment at any time, it is of temporary nature. This kind of unemployment is called *frictional unemployment*. The temporary unemployment is caused by some extraneous disturbance in the economy and friction in the labour market throwing some workers out of job. Besides, the labour market in a free economy is 'always in a state of flux'. While new job-seekers enter the labour market, some quit the market as retirees or take up some business. While new firms enter the market creating new job opportunities, some firms close down reducing demand for labour. For these reasons, the labour supply mismatches with labour demand for a short period. These kinds of changes in the labour market often cause an abnormal gap between demand for and supply of labour. The excess of labour supply takes the form of frictional unemployment. According to classical postulates, frictional unemployment is quickly wiped out through an automatic process of market mechanism and adjustments.

The neoclassical economists, on the other hand, focused on the imperfections in the labour and product markets in the real world and on the frequent emergence and continuation of frictional unemployment. They have argued that, in real world, imperfections in the labour market arise due to lack of information about vacancies, cost of information, cost of training, slow occupational mobility, and cost of transportation and displacement in case of spatial movement of labour, monopoly powers of labour unions and business corporations. In an imperfect market setting, *the upward adjustment in the wages in response to price-rise is quick but the downward adjustment is slow and rigid.* Therefore, labour market remains uncleared even if there is change in wages, i.e., some persons willing to work at the prevailing wage rate remain out of job. Therefore, under imperfect labour market conditions, some *unemployment of frictional nature* becomes a regular affair, especially where technological changes are regular in the economy. According to the neo-classical view, ***frictional unemployment can be defined as the number of unemployed persons under the condition that the number of job-vacancies equals the number of job-seekers who somehow fail to get the job.*** In other words, ***frictional unemployment is said to exist when job-vacancies equal the job-seekers and yet some persons are unemployed.***

Furthermore, the neo-classical economists postulated that, notwithstanding the existence of frictional unemployment, the economy is deemed to be in the state of full employment. For example, "for the American economy, the frictional rate of unemployment is thought by many economists to be about 4 percent, and therefore full employment is said to occur when the rate of employment is approximately 96 percent."[2] In simple words, with 4 percent frictional unemployment and 96 percent employment, the American economy was considered to be in state of full employment in the 1970s. So the policy requirement of a country was confined to removing frictional employment by correcting market imperfections, reducing monopoly powers of labour unions and business corporations, and by providing market information and job training.

2. Structural Unemployment. The structural unemployment arises due to structural change in a dynamic economy making some workers go out of job. Structural changes include change in structure or sectoral composition of the economy and change in technology. Change in sectoral composition means gradual decline of some kinds of industries and emergence of new industries. The downfall or decay of some kinds of industries throws people of specific skill out of job. They remain unemployed till they find new jobs. Technological changes alter the demand pattern of different kinds of skills. Some skills become obsolete and some less efficient. In a dynamic society,

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2. Fred R. Glahe, *Macroeconomics: Theory and Policy* (Harcourt Brace Jovanovich, Inc., NY, 1973), p. 231.

structural change is a continuous process. In this process, some persons find it difficult to get a new job requiring a new kind of job skill. The important thing in the structural unemployment is that there are vacancies and there are job-seekers and yet there is unemployment because of mismatch between the demand and supply pattern of the labour market.

In spite of a great deal of similarity, the structural unemployment is different from the frictional unemployment. Under frictional unemployment, an unemployed person gets a job after a short period of unemployment, whereas under structural unemployment, a person either goes out of job or remains unemployed for a prolonged period of time till he acquires new skills. In simple words, *frictional unemployment appears to disappear, whereas structural unemployment appears to stay,* even if they arise for the same reasons.

3. The Natural Rate of Unemployment. The term 'natural rate of unemployment' was coined and used by Milton Friedman. Friedman has defined the natural rate of unemployment as the rate of unemployment "which has the property that it is consistent with equilibrium in the structure of *real* wage rate"[3]. Friedman's concept of natural rate of unemployment is similar to the concept of *structural unemployment.* Structural unemployment, as mentioned above, becomes a regular feature in a dynamic society. As a result, a certain rate of unemployment is always there even when market is cleared and the economy is in the state of full employment equilibrium. At this rate of unemployment, the forces of demand-pull and cost-push inflation are in balance and the rate of inflation is stable. Friedman calls this rate of unemployment as '*the natural rate of unemployment.*' In Friedman's opinion, the natural rate of unemployment is an unavoidable feature of the economy. Therefore, at the natural rate of unemployment, the economy is said to be at full employment. The theory of the natural rate of unemployment will be discussed in a forthcoming section.

4. Cyclical Unemployment: Okun's Law. Arthur Okun,[4] Chief economist of President Kennedy's Council of Economic Advisors in the United States, was the first to bring out the relationship between output and unemployment. Okun used output and employment data of 1950s and early 1960s to study the relationship between output and employment. His study revealed that ***every one percentage point increase in unemployment rate results in a 2.5 percent[5] reduction in real GNP below the natural output.*** This relationship between unemployment and output is known as Okun's law. The number 2.5 is called ***Okun coefficient***. It implies that a one percentage point decline in real *GDP* causes a 0.4 percentage point in the unemployment rate.

Different versions of Okun's law are available in the literature on the subject. One of the widely quoted versions is expressed as

3. Milton Friedman, "The Role of Monetary Policy," *Am. Eco. Rev.*, 58 (March 1968), p. 8. The theory of natural rate of unemployment was later developed also by Edmund Phelps in his (ed.) *Employment and Inflation* (NY: Norton, 1970).

4. Arthur M. Okun, "Potential GNP: Its Measurement and Significance" in his *The Political Economy of Prosperity* (Brookings Institution, Washington, D, C., 1970), pp. 132-45.

5. Different authors quote different percentage figures for decline in output due to 1% fall in unemployment. For example, Samuelson [*Economics,* 15th Ed., p. 559] quotes 2%; Robert J. Gordon [*Macroeconomics,* 3rd ed., p. 351] quotes 2.5%; N. Gregory Mankiw [*Macroeconomics*, 5th ed., 2003, p. 37] and Geoffrey Woglom [*Modern Macroeconomics,* 1988, p. 285] quote 3%. We quote here Gordon's 2.5% which is the average of the three rates.

$$100\,(Y^N - Y)/Y^N = LC\,(u - u^N)$$

where Y = real actual GNP; Y^N = natural output; LC = Okun's law coefficient; u = unemployment and u^N = natural unemployment.

The Okun's law does not stand the empirical test in exact quantitative terms. But inverse of this law does indicate an irrefutable fact that recession causes fall in output and fall in output causes unemployment.

Let us now turn to our main concern in this chapter, that is, the relationship between the rate of inflation and the rate of unemployment.

25.2 INFLATION AND THE RATE OF UNEMPLOYMENT

The relationship between inflation and employment has been a contentious issue. Although the issue was first raised by Irving Fisher in 1920, it was A. W. Phillips, a British economist and a Professor at London School of Economics, brought out an empirical and theoretically sound study[6] in 1958 on the relationship between unemployment and the change in money wage rates in the British economy during the period from 1862 to 1957. Phillips found an *inverse relationship between the rate of changes in the money wage rate and the rate of unemployment*. According to his findings, when money wage rate increases, unemployment rate decreases. The rise in money wage rate may be the *cause* or effect of inflation. In any case, inflation and unemployment (or employment) are interrelated. It is possibly for this reason that Phillips curve logic was extended to construct the theory of relationship between inflation and unemployment. In fact, Phillips' findings created a flutter and generated a long debate on the relationship between inflation and unemployment and its policy implications. In the course of the debate, many economists expressed their opinion on and contributed to the analysis of relation between the rate of inflation and the rate of employment (or unemployment).

However, to begin with, we will discuss first the Phillips curve and its theoretical findings.

25.2.1 The Phillips Curve

As mentioned above, Phillips had found in his study that there exists an inverse relationship between the rate of change in the money wage rate and the rate of unemployment. He presented this inverse relationship between the change in money wage rate and the rate of unemployment in the form of a curve, called Phillips curve.[7] What Phillips did was that he established through an empirical study

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6. A.W. Phillips, "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom—1862-1957," *Economica.* Vol. XXV, November 1958, reprinted in M. G. Mueller (ed.), *Readings in Macroeconomics,* 2nd Indian Edn. (Surjeet Publications, Delhi, 1988). All quotations are from the reprint).

7. Although the Phillips curve is named after A.W. Phillips, some authors contend that the inverse relationship between inflation and unemployment was focused on much earlier by Irving Fisher. For example, R. Gordon and Gardner Ackley point out, in their separate books, that the inverse relationship between the unemployment rate and inflation rate was first brought out much earlier by Irving Fisher in his article "A Statistical Relation between Unemployment and Price Changes," *International Labour Review,* June 1926, reprinted in *Journal of Political Economy,* March/April 1973, pp. 596-602. Gordon even argues that 'The curve should actually be called "Fisher curve". For further details, see R. J. Gordon, *Macroeconomics, op. cit.,* 3rd Edn p. 237 *fn*., and Gardner Ackley, *Macroeconomics: Theory and Policy, op. cit,* 1978, p. 439 *fn.*

that there exists an ***inverse relationship*** *between the rate of unemployment and the rate of increase in money wages.* The general conclusion that is drawn from Phillips' empirical finding is that a rise in money wage rate reduces the rate of unemployment and a fall in money wages increases the rate of unemployment. Besides, from policy point of view, Phillips curve reveals that there exists a trade-off between the rate of unemployment and the rate of change in money wage rates, that is, a lower rate of unemployment can be achieved only by allowing money wage rate to increase upto a certain level. This implies that inflation reduces unemployment.

The Phillips curve is presented in Fig. 25.1. The dots in the figure show the combination of rise in wage rate and decline in unemployment rate in different years over a period of 52 years. A curve drawn through the cluster of dots produces the *Phillips curve*. This curve shows the inverse relationship between the rate of change in money wage rate and the rate of unemployment. This result is based on the study by Phillips covering a period of 52 years, i.e., from 1861 to 1913.

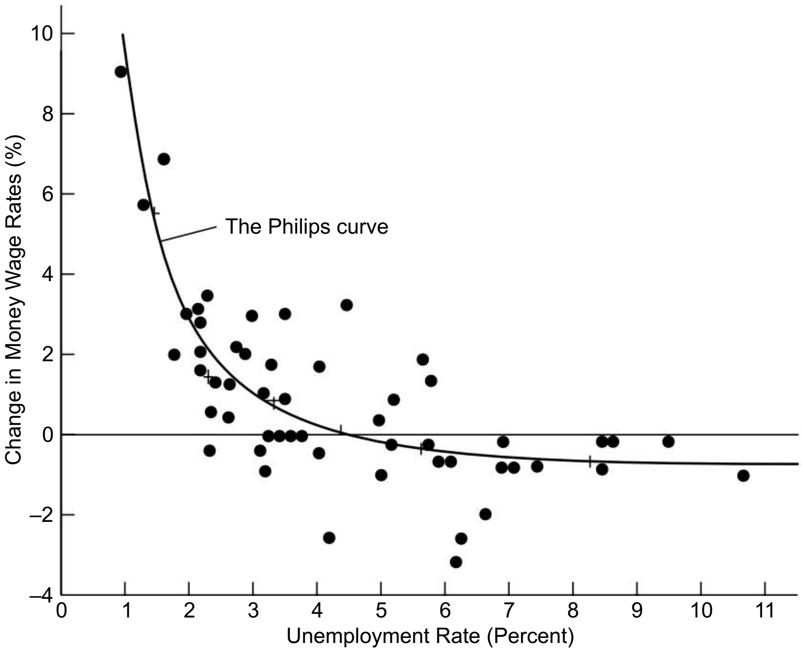

Fig. 25.1 The Phillips Curve: Inflation and Unemployment

The Phillips curve shown in Fig. 25.1 is drawn on the basis of an equation fitted to the actual data. The fitted equation is given as

$$y + a = bx^c$$

where y is the rate of change of wage rates and x is the percentage unemployment, and the constants b and c are constants estimated by applying the least square method using the values of x and y, and constant a was obtained through "trial and error."

The estimated equation that yielded the Phillips curve is given below.

$$y + 0.900 = 9.638\ x^{-1.394}$$

or

$$\log\ (y + 0.900) = 0.984 - 1.394\ \log\ x$$

The validity of the Phillips curve was later examined by other economists also. For instance, Richard Lipsey applied the 'standard statistical technique' to data collected and used by Phillips to verify the relationship between the rates of change in money wage rates and unemployment rates. Lipsey's finding[8] was similar to Phillips' results though Lipsey's equation is somewhat different.

The Extension of the Phillips Curve Although Phillips had traced the relation between the rate of change in money wages and the rate of unemployment, his analysis was later extended to examine the relationship between the rate of inflation and the rate of employment. A plausible reason for this might be the fact that movements in wages and prices are interlinked and they move in the same direction. Under this interpretation of the curve, some economists have used the US data to verify the Phillips curve in the short run phases of different periods. For example, Dernburg[9] used US data for the period 1951-61, Dornbusch and Fischer[10] for 1961-69, Ackley[11] for 1955-69, and Glahe[12] for 1961-70. They all find Phillips curve relationship to be consistent with the US data in the short run. Their Phillips curve shows a ***positive relation*** between the rate of inflation and the rate of employment.

Why Phillips-Curve Relationship? As mentioned above, the economists have found an inverse relationship between the rate of inflation and the rate of unemployment, i.e., inflation reduces unemployment. A question arises here: Why is there an inverse relationship between the rate of inflation and the rate of unemployment? Or, how does inflation reduce the rate of unemployment or how does it promote employment? The inverse relationship between the inflation rate and the unemployment rate can be explained by both the demand-pull and the wage-push factors.

Demand-pull Factor. Considering the demand-pull factor first, Phillips postulated that during demand-pull inflation, demand for labour increases as increase in prices gives firms incentive to increase production. He argues, "When the demand for labour is very high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rates to attract the most suitable labour from other firms and industries" (Mueller, *op. cit.,* fn. 6, p. 245). As the labour

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8. R. G. Lipsey, "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862-1957 : A Further Analysis", *Economica,* XXVII (February 1960), reprinted in R. A. Gordon and L.R. Clien, eds, *Readings in Business Cycles, (Richard D. Irwin, 1965)*. Lipsey arrived at a similar conclusion though his equation is somewhat different as given below.

$$W = -0.44 + 0.023\ (1/U) + 12.52\ (1/U^2)$$

9. Thomas F. Dernburg, *Macroeconomics: Concepts, Theories and Policies,* (McGraw-Hill,), 7th Edn, pp. 295-96.

10. R. Dornbusch and S. Fischer, *Macroeconomics, op. cit*., pp. 216-17.

11. Gardner Ackley, *Macroeconomics: Theory and Policy, op. cit.,* pp. 441-43.

12. Fred R. Glahe, *Macroeconomics: Theory and Practice, op. cit.,* 1973, p. 233.

moves from one firm to another and from one industry to another, it creates job vacancies. As a result, the unemployed labour is drawn into employment. Thus, with the increase in the money wage rates following the rise in inflation rate, the rate of unemployment decreases. More importantly, it has been observed that with the upward movement in the wage rate following the rise in prices, the demand for labour is quick and rapid. On the contrary, during the period of recession or deflation, 'workers are reluctant to offer their services at less than the prevailing [wage] rates when the demand for labour is low and unemployment is high.' It means that downward adjustment of the wage rates is slow and that unemployment increases with decrease in the wage rates.

Two conclusions can be drawn from this description: (i) unemployment rate and wage rate are inversely related, and (ii) upward movement in wage rates is rapid and quick during inflation, and downward adjustment in wages is gradual, rather sticky, during the period of deflation. These trends make the Phillips curve a non-linear curve with a negative slope.

Wage-push Factor. As explained in Chapter 24, wage-push inflation is caused by an autonomous demand by the labour unions for increase in wages in excess of increase in labour productivity. The extent to which labour unions can push wages up depends, among other things, on the rate of unemployment. The lower the rate of unemployment, the greater the union's power to push the wages up and *vice versa*. Also, the period of low unemployment is generally the sign of 'buoyant' product market and high profits. Therefore, employers are willing and able to pay higher wages. There is, therefore, a fast upward movement in wages and decrease in unemployment. On the contrary, when unemployment rate is high and profits are low, labour unions are constrained to demand high wage rates and employers, on their part, resist paying higher wages. Thus, with high rate of unemployment, wages tend to decline. These relationships produce a Phillips curve.

Phillips Curve, Inflation-Unemployment Trade-off and Policy Implications The trade-off means that a certain rate of inflation can be traded for some rate of unemployment. In other words, a lower rate of unemployment can be achieved only at a higher rate of inflation. The Phillips curve provides a large number of such trade-off points. This is called the '**menu for choice between inflation and unemployment**.' The trade-off between inflation and unemployment has a very important policy implication. Given the inflation and unemployment rate combinations, policy makers get a number of trade-off points between inflation and unemployment to choose from.

A widely used *theoretical* or *hypothetical Phillips curve* is given in Fig. 25.2. The vertical axis on the left measures the annual rate of inflation and the horizontal axis meaures the rate of unemployment. Note that the vertical axis on the right measures the annual percent rise in the wage rate. The inflation rate on the left vertical axis reads inflation rate adjusted for an assumed 2 percent increase in the productivity of labour in relation to rise in the wage rate. In other words, *inflation rate equals rate of increase in wages less annual rate of increase in labour productivity.* For example, if wages rise by 5 percent and labour productivity increases by 2 percent, then the rate of (wage-push) inflation is only 3 percent.

Given the Phillips curve as in Fig. 25.2, the *trade-off* between the unemployment and the inflation rate can be easily found. For example, as shown in the figure, a 2.5 percent (= 6.5 percent – 4 percent) unemployment can be traded (accepted) for a 2 percent (= 5 percent – 3 percent) inflation. It means, from policy point of view, that if unemployment rate is intended to be reduced from 6.5

percent to 4 percent, a rise in inflation rate from 3 percent to 5 percent will have to be tolerated. If an inflation rate of 3 percent is the target, an unemployment rate of 6.5 percent will have to be accepted. A similar conclusion can be drawn by linking unemployment rate to wage-inflation rate given on the vertical axis on the right hand side.

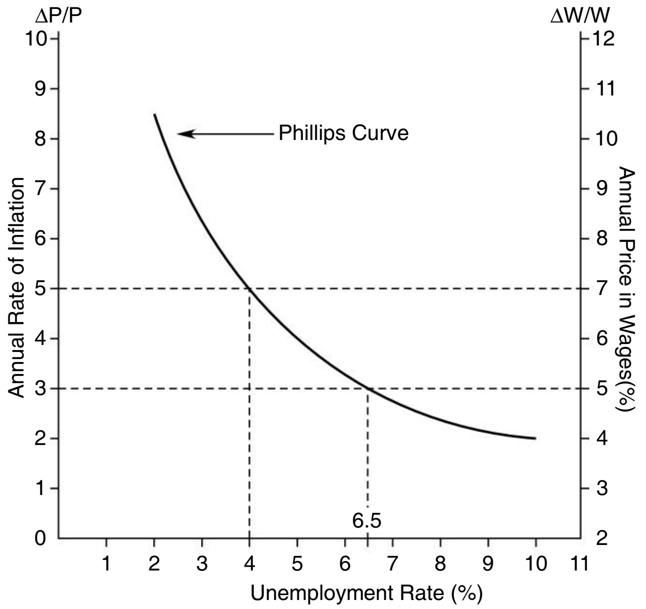

Fig. 25.2 The Theoretical Phillips Curve: Inflation and Unemployment

25.3 MODIFICATIONS IN PHILLIPS CURVE

The Phillips Curve is a Short-Run Phenomenon. Phillips had traced an inverse relationship between unemployment rate and wage rate that existed during a period from 1861 to 1913. A period of 52 years is by no measure a short run. However, recent evidence shows that the *Phillips curve relationship holds only in the short run*. In the long run, Phillips curve keeps shifting up on down. For instance, the studies which were carried out on the basis of the US data for the 1960s, 1970s and 1980s confirm the existence of the Phillips curve only in the short run. The Phillips curve is found to be relevant only for 1961-69, for the 1970s, and for the late 1980s, though at different rates of inflation and unemployment. But, when the entire unemployment and wage data for 1961-93 is plotted together, it produces a Phillips curve which keeps shifting up and down in the long run[13] in a spiraling way. It is therefore concluded that *there exists either no or a weak relationship between inflation and unemployment in the long run.*

13. *Economic Report of the President (US), 1994.* Quoted in Samuelson and Nordhaus, *Economics,* op. cit., p. 588. See also R. Dornbusch and S. Fischer, *Macroeconomics, (6th Edn)* p. 217.

However, economists continued to ask themselves: Why does Phillips curve keep shifting up and down in the long run? This question was answered by Edmund Phelps[14] and Milton Friedman.[15] Since Friedman's contribution in this regard is much more widely cited, we will confine our discussion here to his modification of the Phillips curve and his theory of *the natural rate of unemployment*.

25.3.1 The Long-Run Phillips Curve: Friedman's Theory of Natural Rate of Unemployment

Milton Friedman integrated the logic of the short-run Phillips curve into the macroeconomic theory and explained the spiralling Phillips curve. In the process, he constructed a long-run Phillips curve. Friedman began by showing graphically that Phillips curve holds only in the short-run. In the long run, he argues, there is always a rate of unemployment whatever the rate of inflation. This rate of unemployment he calls the ***"natural rate of unemployment"***. The natural rate of unemployment was subsequently termed as the **"non-accelerating-inflation rate of unemployment" (NAIRU)**. A significant feature of the NAIRU is that *it exists even when labour market is cleared and is consistent with the potential level of output.* Friedman argues that NAIRU cannot be eliminated permanently by means of expansionary monetary and fiscal policies of the government. The expansionary policies may only accelerate the rate of inflation and cause an upward shift in the Phillips curve showing a higher level of unemployment and inflation rate. In the ultimate analysis, the Phillips curve becomes a *vertical line*. This is the gist of Friedman's *theory of the natural rate of unemployment*.

Friedman's theory of the natural rate of unemployment and his derivation of the long-run Phillips curve are illustrated in Fig. 25.3. The curves SPC_1, SPC_2 and SPC_3 are the short-run Phillips curves at different levels of unemployment and inflation rates. Now, suppose that at some point of time the economy is at point *A* with unemployment rate of U_n and inflation rate of *R* and that these rates are consistent with the potential level of output. Suppose also that the policy-makers consider U_n to be a high rate of unemployment and plan to reduce it by means of expansionary policies. Since the economy is at the potential level of output, any expansionary policy will only push up the price level. When the price level rises, the real wages go down. As long as the workers are confused by the situation or do not realize the decline in the real wages or have money illusion, real wages continue to decline. Under these conditions money wages lag behind the price rise and real wage decreases. As a result of fall in the real wages, employers increase their demand for labour, employment increases and unemployment decreases. With rising prices and decreasing unemployment, the trade-off point *A* moves towards point *B* along the short-run Phillips curve SPC_1. This shows a decline in the unemployment rate from U_n to *U*.

It is important to note here that the decrease in the unemployment rate below its natural rate could be possible only if real wage declines and there is a *time lag* for the money wage to catch up with the price rise. This time lag might be due to employer-labour contract time, workers' inability to anticipate correctly the rise in prices or gradualness of price rise so that the pinch of inflation is felt after a lapse of time.

14. Edmund S. Phelps, "Money-Wage Dynamics and Labour Market Equilibrium," *Jl. of Pol. Eco.,* July-August 1968, Part II, pp. 678-711, and *Inflation Policy and Unemployment Theory* (W.W. Norton, NY, 1972), Ch. 2.

15. Milton Friedman, "The Role of Monetary Policy," *Am. Eco. Rev.,* Vol. 58, 1968.

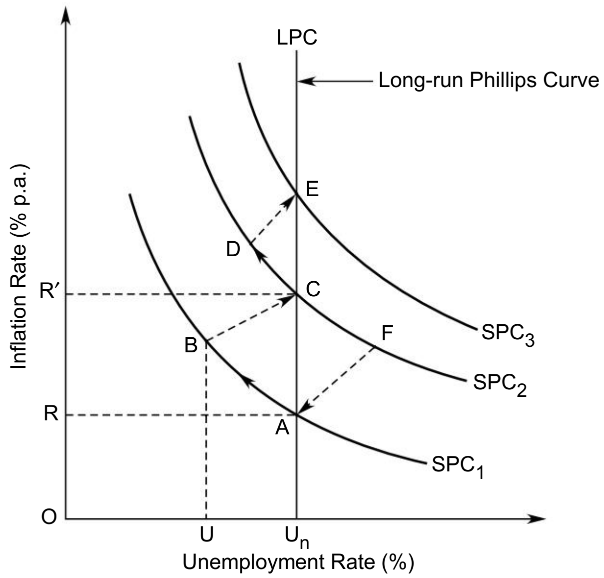

Fig. 25.3 Friedman's Long-Run Phillips Curve (LPC)

However, the inflation-unemployment combination at point *B* is not sustainable. The reason is, workers do eventually feel the pinch of decline in their real wages and begin to anticipate a further fall in their real income. Therefore, they begin to incorporate their 'expectations' into their demand for higher money wages matching with the expected price rise. They negotiate for a higher money wage rate at the time of the renewal of the labour contract. As a result, real wages begin to rise. The rise in the real wage rate causes a decline in the demand for labour. Consequently, the labour market begins to move towards a higher equilibrium point as shown by the path of movement from point *B* towards point *C*. Note that the movement from point *B* to *C* indicates an increase in the rates of both inflation and unemployment. This marks a shift in the Phillips curve from SPC_1 to SPC_2. As a result, the rate of unemployment rises back to its natural level, U_n, the rate of inflation rises from *R* to *R′*. This is virtually a situation of ***stagflation*** when both prices and unemployment increase simultaneously. ***Stagflation is, in fact, a situation in which prices increase without increase in employment and output.***

What Happens at Point C? What happens at point *C* depends on how policy-makers react to the rate of natural unemployment. It they reconcile with the natural rate of unemployment the system will stagnate at point *C*. If they decide to reduce the unemployment rate to a lower target level, they will have to adopt an expansionary policy, say, increase the money supply. If they do so, the consequences will be similar to the previous expansionary policy. The expansion of money supply will make the system move from point *C* towards point *D* and then from *D* to point *E* after a lapse of time. Note that the attempt to reduce the natural rate of unemployment through the expansionary policies results only into an upward shift in the Phillips curve without reducing the natural rate of unemployment permanently.

When we take a **long-run view** of the Phillips curve and its upward shift, we find the equilibrium point shifting upward from point *A* to *C* and then from *C* to *E*, all conforming to the short-run Phillips curves. By joining the equilibrium points *A, C* and *E*, we get *a straight vertical line* which is *Friedmanian long-run Phillips curve (FLPC).* **The long-run Phillips curve means that there is no trade-off between the unemployment and inflation rates in the long run, and that the natural rate of unemployment can be compatible with any rate of inflation.**

What Happens when the Government Attempts to Reduce Inflation? Let us now suppose that the economy is at point *C* with inflation rate at *R′* and authorities find *R′* rate of inflation too high to be tolerated and plan to reduce the rate of inflation. To this end, they adopt an anti-inflationary policy and reduce the money supply. Decrease in money supply reduces the prices and increases the real wages. As a result, employers cut down the demand for labour. Consequently, unemployment increases following the decline in the price level. This situation is depicted by the movement from the equilibrium point *C* to point *F* along the SPC_2. This is a situation of recession with deceleration in inflation rate. This situation was observed in the US economy in 1971 and 1982.[16]

Eckstein-Brinner's Phillips Curve Friedman's long-run Phillips curve is not the end of the debate on the relationship between the rate of unemployment and the rate of inflation. During the early 1970s, Otto Eckstein and Roger Brinner, and James Tobin made further modifications in the long-run Phillips curve. The Phillips curves drawn by Eckstein and Brinner and by Tobin are similar in nature. We present here Eckstein-Brinner's long-run Phillips curve. While Friedman's long-run Phillips curve means that 'there is no trade-off between unemployment and inflation in the long run' these economists argue that *there does exist a trade-off between the unemployment rate and the inflation rate though it exits below a certain rate of inflation and beyond the 'critical rate of unemployment.'*

Eckstein and Brinner[17] advanced a new theory of the long-run Phillips curve by combining the main features of Friedman's long-run Phillips curve and the traditional short-run Phillips curve. They agree with Friedman's proposition that there is no trade-off between unemployment rate and inflation rate below 'critical rate of unemployment' (which is the same as Friedman's natural rate of unemployment). However, they contend that beyond the critical rate of unemployment and below a certain rate of inflation, there does exist a trade-off between unemployment and inflation. Their theory is presented in Fig. 25.4. In the figure, U_C marks Eckstein-Brinner's 'critical rate of unemployment' which is the same as Friedman's 'natural rate of unemployment.' The line *LPC* is Friedman's long run Phillips curve. Eckstein-Brinner agree that, at the critical rate of unemployment U_C and beyond a certain rate of inflation, say *R*, there is no trade-off between the rate of unemployment and the rate of inflation. However, according to them, there does exist a trade-off between the rate of unemployment beyond U_C and the rate of inflation below *R*. The Eckstein-Brinner range of trade-off between inflation rate and unemployment lies in the range between points *R* and B.

16. Thomas F. Dernburg, *Macroeconomics: Concepts, Theories and Policies,* 1985, *op. cit*., p.300.

17. Otto Ekcstein and Roger Brinner, *The Inflation Process In the United States,* Joint Economic Committee, Congress of the United States, (US Printing Office, Washington, 1972).

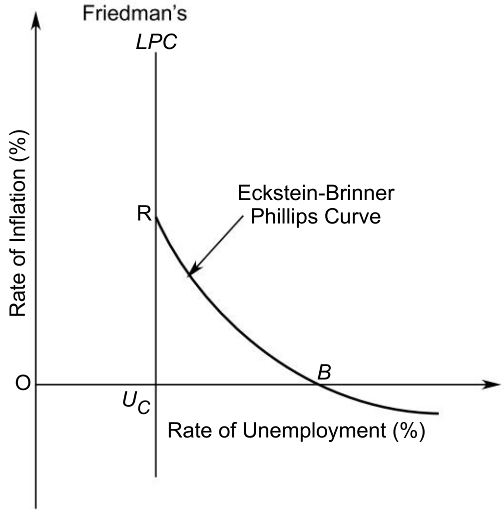

Fig. 25.4 Eckstein–Brinner Long-Run Phillips curve

Policy Implications of the Long-Run Phillips Curve Let us now return to the Friedman's famous long-run Phillips curve and look into the policy implications of the natural rate of unemployment. The theory of the natural rate of unemployment has two important policy implications.

One, there is a minimum level of unemployment which an economy will have to tolerate in the long run. This unemployment rate cannot be reduced in the long run through policy measures. It can be reduced for a short while only at the cost of inflation.

Two, as can be noticed in Fig. 25.3, the efforts to contain unemployment below its natural rate and inflation rate below one associated with the natural rate of unemployment have a great chance of proving unproductive. Such efforts, instead, first make the economy go through a phase of low rates of unemployment and high rates of inflation and then a high rates of unemployment and high rates of inflation. This situation can be visualized by looking at the path which can be formed by joining points *A, B* and *C* in Fig. 25.3.

25.4 WHAT RATE OF UNEMPLOYMENT IS THE NATURAL RATE OF UNEMPLOYMENT?

We have discussed above, the concept and the theory of the natural rate of unemployment. However, an *empirical* question that remains to be answered is: What rate of unemployment should be treated as the natural rate of unemployment? The answer to this question is 'elusive'—it is illusive because the very concept of the natural rate of unemployment is elusive. The empirical studies on the issue reveal that the natural rate of unemployment varies from country to country, from time to time in the same country and from condition to condition at the same point of time in the same country. The first attempt to answer this question was made for the US economy during the President John F. Kennedy regime and a 4 percent unemployment rate was considered to be the tolerable natural rate of unemployment. It meant that with a 4 percent unemployment, the economy was to be taken to be at full employment. During the late 1970s, however, the US economists debated again on the question 'how much unemployment is full employment.' According to Robert J. Gordon, an expert on the subject, the natural rate of unemployment was about 6 percent during the 1980s. In fact, 'by the early 1980s many economists came to believe that full employment meant an unemployment rate close to 6 percent.' However, the available evidence shows that the natural rate of unemployment has been increasing in the US—from 4 percent in the early 1960s to 5 percent in the early 1970s and then to 6 percent during the 1980s.[18] The rise in the natural rate of unemployment in the US is attributed to three factors: (i) change in the demographic structure of the labour force due to a larger participation of teen-agers and women; (ii) unemployment insurance (for 23 weeks) which discouraged temporarily unemployed persons to find job and to accept a low-paid job; and (iii) an increase in the structural unemployment due to ups and down in the industrial sector.

As regards the natural rate of unemployment in other countries, it was found to be between 1 percent and 2 percent in France, Germany and the UK during the early 1960s. In later years, however, the natural rate of unemployment in these countries rose to a range between 6 percent and 12 percent. The variability of the natural rate of unemployment makes many economists doubt even the validity of the concept. The concept of the natural rate of unemployment continues to remain a controversial issue.

Nevertheless, the fact remains that some unemployment is always there in all the countries for the reasons cited by Friedman and other economists. The rate of this unemployment is called the natural rate of unemployment.

25.5 POLICY DILEMMA: WHAT IS DESIRABLE—INFLATION OR UNEMPLOYMENT?

Notwithstanding the controversy on the shape of the Phillips curve, the economists generally agree that there is a *trade-off* between unemployment and inflation in the *short run.* It means that inflation and unemployment cannot be controlled simultaneously. If inflation is controlled, it may lead to an increase in unemployment and if unemployment is controlled, it may cause inflation. This situation creates a dilemma for the policy-makers as to what to choose between the two great economic evils—inflation and unemployment. In the words of Samuelson and Nordhaus, "The search for a way to resolve the cruel dilemma of needing high unemployment to contain inflation continues to be one of the most pressing concerns of modern macroeconomics."[19] Here, we will discuss briefly the social and economic costs of unemployment and the need for controlling unemployment.

25.5.1 Cost of Unemployment

Loss of Output. Labour has productivity, high or low, depending on its skill and availability of capital per labour. Therefore, unemployment means loss of output expected from the employment of unemployed labour force. The loss of output equals per labour output multiplied by the number of unemployed persons. According to Okun's law, **in a developed economy, a recession that raises the unemployment rate by one percentage point above the natural rate of unemployment rate, causes a 2.5 percent fall in actual real GNP below the potential output at full employment.**[20]

18. P. A. Samuelson and W. D. Nordhaus, *Economics, op.cit.,* p.592.

19. P. A. Samuelson and W. D. Nordhaus, *Economics, op. cit,* p.597.

20. See also Robert J. Gordon, *Macroeconomics* (Little, Brown and Co., Boston, 1984), p.351.

Human Cost of Unemployment. Human misery and tragedy is the most obvious cost of unemployment. According to NSSO estimate in its 61st round, the unemployment rate (the percentage of unemployed to labour force) was 7.3 percent in 1990–2000. The rate of underemployment, according to an estimate was 13.3 percent.[21] An expert group constituted by the Planning Commission estimated the incidence of poverty at 39.3 percent in 1987-88 and 27.5 percent[22] for the year 2004-05. This can be taken as a measure of unemployment and underemployment in India. Majority of poor people live in abject poverty and deprivation. Most of them are ill-fed, malnourished, scantily clothed and ill-sheltered. They live a sub-human life. They die early due to starvation, malnutrition and diseases caused by unhygienic living conditions. Thousands of farmers are reported to have committed suicide in the past two years (along with their family members) in India. In *LDCs*, prolonged joblessness or underemployment has become a way of life for one-quarter to one-third of the population.

In developed countries, however, people having lived a high standard of life and having enjoyed comfortable and luxurious life could hardly withstand the economic misery caused by prolonged unemployment. A considerable number of them commit suicide and homicide, become victim of psychiatric disorder and fatal diseases for lack of medical care, and a large number of persons take to crime. Barry Bluestone and Bennet Harrison[23] have estimated human deaths and tragedy in the United States during 1981-82 recession for every one percent increase in unemployment rate, as follows: 920 more people committed suicide; 650 committed homicide; 500 died of heart attack and cirrhosis of the liver; 4000 were admitted to state mental hospitals; and 3300 were sent to state prisons. In total, for every one percent increase in unemployment, there were 37,000 more deaths, including 20,000 heart attacks.

In a similar study, M. Harvey Brenner[24] estimated the following loss of human lives and human tragedy in the United States caused by every one percentage point increase in unemployment rate—38,886 more deaths; 22,240 more cardiovascular failures; 494 more cases of cirrhosis of the liver; 920 more suicides, 648 more homicides; 3,340 more admissions to state prisons; and 4,227 more admissions to mental hospitals. So tragic was the situation even when duration of unemployment was as short as 4 months on an average. These estimates may not be accurate, but they do reveal the magnitude of human tragedy and social cost of unemployment.

So high is the human cost of unemployment in terms of loss of human life and misery! It is evident from the above data that unemployment calls for all possible efforts to contain it at the minimum possible level. Since unemployment and underemployment problems are more sever and acute in *LDCs* compared to those in developed countries, the *LDCs* have to find a solution to these problems.

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21. *Economic and Political Weekly*, Vol. XXXIX, No. 48, December 2004.

22. *Economic Survey:* 2008-09, Government of India, MoF, pp. 259–60.

23. Barry Bluestone and Bennet Harrison, *The Deindustrialization of America* (NY, Basic Books, 1982, Ch3), cited in Robert J. Gordon, *Macroeconomics, op. cit.,* p. 353, quoted here with tragic cases arranged vertically.

24. Cited by Louis Ferman in “Some Health Aspects of Unemployment” in the House of Representatives, Committee on the Budget, *Hearings on the Related Social Effects of Unemployment*, March 10, 1983, and in Geoffrey Woglom, *Modern Macroeconomics* (Scott, Foreman and Co., 1988), p.286.

25.5.2 Cost of Disinflation

One way of reducing unemployment is to allow inflation to accelerate. Inflation is however another economic evil, although a lesser one, which needs to be controlled. But, controlling inflation or *disinflation* has its own costs in terms of loss of employment and output. Let us see how disinflation affects employment and output.

Disinflation and Unemployment. So far as the cost of disinflation in terms of unemployment is concerned, it depends on the nature and slope of the Phillips curve. The slope of the Phillips curve depends on the time perspective, that is, whether time frame is a short run or a long run. Let us consider the short run first.

As noted above, ***the short-run Phillips curve*** has a negative slope and provides a trade-off between the rates of unemployment and inflation. The negative slope implies that disinflation will increase unemployment. By how much? It depends on the slope of the short-run Phillips curve. If slope of the short-run Phillips curve is high, a disinflation of a certain percentage point causes a lower percentage point of unemployment and *vice versa*. However, the slope of a usual Phillips curve is not uniform all along the curve (see the Phillips curve in Fig. 25.2). It is generally flatter towards the lower half in the range of higher rates of unemployment. It implies that if unemployment rate is high, a disinflation of certain percentage point will increase unemployment at a much higher rate. And, the Phillips curve is steeper in the lower range of unemployment. It implies that a high rate of disinflation causes a smaller percentage decrease in unemployment. As regards the **empirical evidence**, as noted above, according to recent studies, "to reduce inflation by one full percentage point, unemployment must be held two percentage points above the natural unemployment rate for 1 year".[25]

As regards ***the long-run Phillips curve***, it is vertical at the natural rate of unemployment. Therefore, a disinflation is not supposed to affect unemployment rate in the long run. However, this conclusion is relevant only for the developed economies which are in a position to achieve and have often achieved full or near full employment.

Conclusion. The foregoing discussion makes it amply clear that the policy-makers in developed country are faced with a 'cruel dilemma' in their effort to find an acceptable combination of inflation and unemployment. The logical conclusion that follows is that attempt should be to keep the unemployment rate close to its natural rate. But the concept of 'the natural rate of unemployment' itself is a fuzzy concept. To many economists, the term 'natural rate of unemployment' is 'misleading' and the 'natural rate of unemployment is in no way natural'. It keeps changing following the demographic changes in the labour force, the historical level of unemployment, the nature of labour market, the government policy towards social welfare, and so on. Some economists suggest to keep the unemployment rate close to its 'optimum level,' supposed to be lower than the natural rate of unemployment. The concept of the 'optimum level of unemployment' is an equally fuzzy concept. Some economists suggest that, instead of getting bogged down with the policy predicament, it is advisable to learn to live with inflation, a lesser evil.

25. Samuelson and Nordhaus, *Economics, op. cit.,* p.594.

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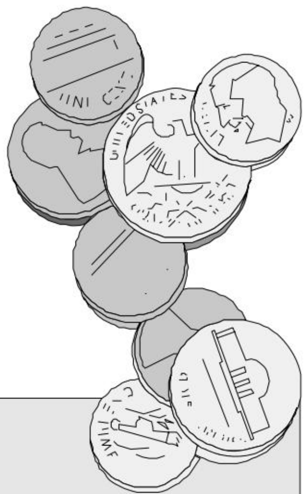
QUESTIONS FOR REVIEW

1. What is meant by unemployment? How is unemployment measured?
2. What are the different types of unemployment? How are they different from one another?
3. What is the nature of relationship between inflation and unemployment? Does inflation always promote employment? If not, why not?
4. What is Phillips curve? Discuss the reasoning behind the negative slope of the Phillips curve.
5. What is meant by trade-off between the rate of inflation and the rate of unemployment? What is its policy implications?
6. Does Phillips curve hold in the long run? Discuss the dynamics of unemployment and inflation and the long-run Phillips curve.
7. How is the natural rate of unemployment defined? Does it remain constant over time? How does it differ from frictional unemployment?
8. Is the concept of the natural rate of unemployment a meaningful and useful concept from the policy point of view? If not, what do you think is a reasonable approach to the employment policy?
9. What is the theory of the natural rate of unemployment? What are the policy implications of the natural rate of unemployment? Can the rate of unemployment be reduced below its natural rate? If not, why?

10. Given the Phillips curve relations, what kind of policy dilemma is faced by the policy makers? How will you react to the option of making a choice between a high rate of unemployment and a high rate of inflation? Give reasons for your choice.
11. What modifications were made to the Phillips curve by Eckstein and Brinner? How is their modification different from Friedman's modification?
12. Explain the Friedmanian theory of natural rate of unemployment. How is Friedmanian approach different from Phillips curve?
13. Suppose an economy has a high rate of unemployment and a high rate of inflation. What kind of policy dilemma does this situation create for the country? What kind of policy would you suggest to fight inflation and increase employment?
14. Discuss elaborately the economic and human costs of unemployment and inflation. Why is a low rate of unemployment associated with a high rate of inflation preferable to a low rate of inflation associated with a high rate of unemployment?

Part 8

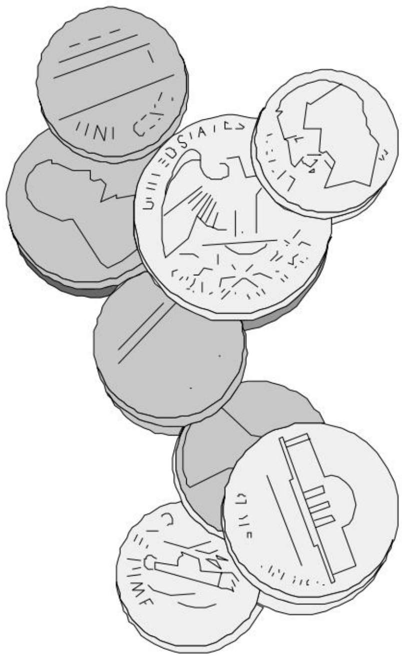
International Aspects of Macroeconomics



We have so far discussed macroeconomics with only a contextual reference to the international aspects including export and import in four-sector income determination model in Ch. 8 and to balance of payments (*BOP*) in four-sector *IS-LM* model in Chapter 18. In reality, however, international aspects of macroeconomics are of wide spectrum as almost all economies of the world are economically interlinked and interdependent to a great extent. Therefore, the effects of economic changes in one country get transmitted to other countries through foreign trade, change in exchange rate, inflows and outflows of foreign capital and labour, as the world experienced during the recent global recession. The international economic changes have a wide range of macroeconomic effects on *GDP*, employment and price level of a country. However, given the scope of this book, we extend our discussion in this Part of the book to two major aspects of the external economy, viz., the *exchange rate* determination and *balance of payments* (*BOP*). These aspects have serious macroeconomic implications from both theoretical and policy points of view. Although *BOP* related issues are much more important, exchange rate is not only one of the important determinant of the *BOP* position of a country, but also a means to correct adverse *BOP*. Therefore, we begin our discussion on the international aspect of macroeconomics with a brief discussion on the *exchange rate*.

Chapter 26

International Monetary Aspect: The Foreign Exchange Rate



INTRODUCTION

The international monetary aspect refers to the monetary transactions between the nations and to how the price of currency of a country is determined in terms of another currency in the international financial market. The rate at which the currency of one country is exchanged for the currency of another country is called the *exchange rate*. By definition, the exchange rate is the rate at which currency of one country is bought and sold in terms of currency of another country. People buy a foreign currency because currency of one country is not acceptable as a medium of exchange in another country. For this reason, people making transactions with people abroad need to acquire foreign currency. For example, when an Indian citizen visits the US, he/she needs US dollars to pay to the hotels and to buy other goods and services. The Indian has, therefore, to buy US dollar from the banks or other kinds of foreign money dealers. Similarly, when an American visits India he needs Indian currency to make payments for the purchases he/she makes in India. Therefore, the American has to buy Indian currency from the authorized dealers. The sale and purchase of foreign currency creates 'foreign exchange market'. The exchange rate is determined in the foreign exchange market on the basis of demand for and supply of foreign currencies. However, determination of exchange rate is a complex process. Our main objective in this Chapter is to discuss the market mechanism of exchange rate determination in the foreign exchange market. However, prior to discussing the theories and practices of exchange rate determination, let us have a quick look at the organs and working of the foreign exchange market as it would help us in understanding the market mechanism of exchange rate determination.

26.1 THE FOREIGN EXCHANGE MARKET

The foreign exchange market refers to the organizational setup under which foreign currencies are bought and sold by the buyers and sellers. The buyers and sellers include central banks, commercial banks, foreign exchange brokers, business firms, exporters, importers and individuals. Like any other market, foreign exchange market is a system, not a particular place. The market system works through the roles played and facilities provided by the ***key players*** of the market, *viz*., foreign exchange brokers, commercial banks and central banks. The other players of the market include exporters, importers investors, tourists and immigrants. The relative place and importance of the foreign exchange market players in the foreign exchange market are shown in Fig. 26.1.

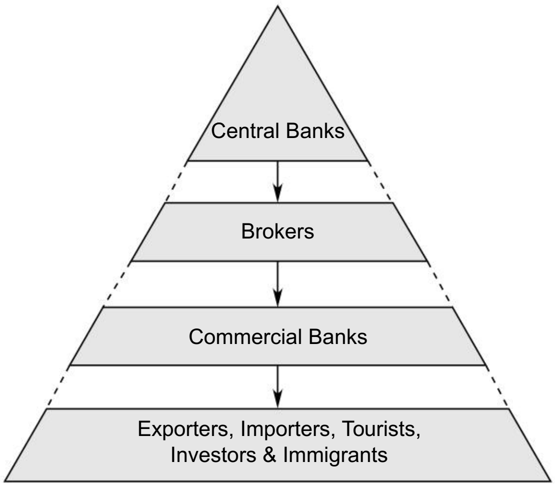


Fig. 26.1 Structure of the Foreign Exchange Market

As the figure shows, ***central banks*** hold the top position in the foreign exchange market. They work as 'custodian of foreign exchange of the country' and 'lender of the last resort.' They have the power to control and regulate the domestic foreign exchange market to ensure that it works in an orderly manner. One of their main functions is to prevent by direct intervention, if necessary, the violent fluctuations in the exchange rate. The main form of intervention is buying and selling a foreign currency—selling a foreign currency when it is overvalued in terms of domestic currency and buying it back when it tends to be undervalued against domestic currency.

Foreign exchange brokers hold the second most important place in the foreign exchange market. Brokers work as a link between the central bank and the commercial banks and between the banks. They are the major source of market information. Their main function is to liason the foreign exchange transactions between the actual buyers and the banks, the sellers. They themselves do not buy or sell the foreign currency; they only strike the deal between the buyers and sellers, on commission basis.

Commercial banks make the third important organ of the foreign exchange market. Banks dealing in foreign exchange play the role of 'market makers' in the sense that they quote the daily exchange rates for buying and selling a foreign currency. They work also as the '*clearing house*.' They clear the market by buying the foreign currency in demand from the brokers and selling it to the buyers.

At the bottom of the foreign exchange market are the actual buyers and sellers of the foreign currencies—***exporters, importers, tourists, investors and immigrants***. They are the actual users of the foreign exchange. Those who need a foreign currency approach the commercials banks to buy the currency. Those who want to sell their foreign currency sell it to the banks or other foreign exchange dealers.

Foreign exchange market is the biggest market in the world economy today, daily transactions exceeding $100 billion. Most major countries have foreign exchange market centers. London, New York, Paris, Tokyo, Zurich, Frankfurt, and Singapore are some prominant foreign exchange market centers for the US dollar. Unlike other markets, the foreign exchange market centers work 24 hours a day and seven days a week. The major **functions** of the foreign exchange market include: (i) transferring foreign currency from one country to another where it is needed in the settlement of payments; (ii) providing short-term credit to the importers, and, thereby, facilitating smooth flow of goods and services between the countries; and (iii) stabilizing the foreign exchange rate by *spot* and *forward* sale and purchase of foreign currencies.

The Kinds of Foreign Exchange Market

The foreign exchange market is classified on the basis of whether foreign exchange transactions are *spot* or *forward*. Accordingly, there are two kinds of foreign exchange markets: *spot market* and *forward market*. The nature of transactions in the spot and forward markets are described here briefly.

(i) Spot Market. The spot market refers to that segment of the foreign exchange market in which sale and purchase of foreign currency are settled within **two days** of the deal. The spot sale and purchase of foreign exchange make the spot market. The rate at which foreign currency is bought and sold in the spot market is called *spot exchange rate*. For all practical purposes, *spot rate* is treated as the current exchange rate.

(ii) Forward Market. The forward exchange market refers to the deals for sale and purchase of a foreign currency at some future date at a presettled exchange rate. When buyers and sellers enter an agreement to buy and sell a foreign currency after 90 days of the deal, it is called *forward transaction*. The forward transactions in foreign exchange make the *forward market*. The exchange rate settled between the buyers and seller for forward sale and purchase of currency is called *forward exchange rate.*

The Nature of Foreign Exchange Transactions

The nature and purpose of foreign exchange transations are such that the exchange rate fluctuates day by day, some times even hour by hour. Therefore, the foreign exchange transactions involve risk and hence an opportunity to make profits. On the basis of their riskiness and profitability, foreign exchange transactions can be classified as (i) hedging, (ii) arbitrage, and (iii) speculation.

Hedging. Hedging is an important feature of the forward exchange market. When exporters and importers enter an agreement to sell and buy goods at some future date at current prices and exchange rate, it is called *hedging*. The purpose of hedging is to avoid losses that might arise due to exchange rate variations in future. The forward exchange market provides an opportunity to cover the risk arising out of exchange rate fluctuation and to avoid the resulting loss in foreign trade.

Hedging, i.e., the forward foreign exchange transaction, takes place through the banks. The banks dealing in forward purchase and sale of foreign exchange provide the hedging facility to the exporters and importers. They provide the guarantee for payment to the exporters and supply foreign exchange to the importers at the rate of exchange agreed upon between the banks and the exporters.

Arbitrage. Arbitrage is an act of simultaneous purchase and sale of different foreign currencies in different exchange markets. The objective of arbitraging is to make profit by taking the advantage of different exchange rates in different exchange markets. The arbitraging serves as an equalizer and stabilizer of exchange rates in major exchange markets as it transfers currency from the market where it is low to the market where it is high. However, arbitrage works successfully only when foreign exchange market is free from controls or when controls, if any, are not of great significance.

Speculation. Speculative transactions in foreign exchange are opposite of hedging. In hedging, the buyers and sellers try to avoid *risk,* if any, due to fluctuation in the exchange rate, whereas *speculation* in foreign exchange is a deliberate attempt under the condition of risk to make profits from the fluctuations in the exchange rate. The speculative sale and purchase of foreign currency is based, as in all other speculative business, on the speculators' expectations about the future exchange rates. The ***bears of the market*** expect the exchange rate between any two currencies to decline in the foreseeable future. On the other hand, ***bulls* of the market** expect the exchange rate to increase. Since bears expect foreign exchange to decrease in future, they sell their currency holding to avoid loss. The bulls, on the other hand, expect exchange rate to increase, and hence they buy the foreign currency with a view to selling it when exchange rate increases in future. Whether bulls and bears gain or lose depends on how correct they are in their expectations.

26.2 DETERMINATION OF EXCHANGE RATE IN FREE EXCHANGE MARKET

The exchange rate is the price of a currency in terms of another currency. More precisely, exchange rate is the rate at which currency of a country is bought and sold against the currency of another country in the foreign exchange market. For example, SBI (Chennai) quoted the selling price of one unit of some foreign currencies in terms of Indian rupee on the 10th July 2009 as US dollar–Rs 48.96; pound sterling–Rs 79.39; Euro–Rs 68.15; Swiss Frank–Rs 44.92; Japanes Yen (100 units)–Rs. 52.91; Singapore dollar–Rs 33.49; Hong Kong dollars–Rs 6.32 and Chinese Yuan–Rs. 7.16. These rates imply that foreign exchange dealers like SBI would sell these currencies at these quoted rates. Buying rates are lower than the selling rates by the amount of dealer's margin.

How is the Foreign Exchange Rate Determined?

There is no simple answer to this question. It depends on whether foreign exchange market is free or controlled, and whether the government adopts fixed or flexible exchange rate policy. The economists have attempted to explain the exchange rate determination resulting in different kinds of theories—the market theory, the purchasing power parity theory, the monetary theory, and the portfolio-balance theory. In this section, we will discuss only the first two theories which are used in general practice. Let us discuss first the *market theory of exchange rate determination* and then *the purchasing power parity theory*.

26.2.1 The Market Theory of Exchange Rate

The market theory of exchange rate determination, also called 'demand-and supply theory', applies to the conditions of a free market. A *free foreign exchange market* is one in which there is no government intervention and no restriction on holding and transacting foreign currency. In a free foreign exchange market, the rate of foreign exchange is determined, like the price of a commodity, by the demand for and supply of foreign exchange—the foreign currencies. The exchange rate determination in free foreign exchange market is illustrated in Fig. 26.2. The foreign exchange demand curves, as shown by DD_1 and DD_2 and supply curve as shown by SS_1 are the usual demand and supply curves. However, some explanation of demand and supply curves is in order.

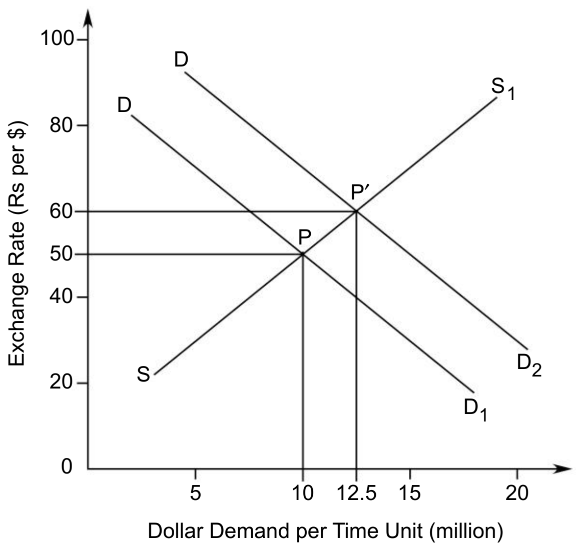


Fig. 26.2 Determination of Exchange Rate in Free Market

The demand for foreign exchange is a derived demand. It is derived from the demand for foreign goods, services and securities. The other components of demand for foreign exchange come from speculators and monetary authorities wanting to build foreign exchange reserves. Thus, the demand for foreign exchange is a composite demand. There is an inverse relationship between the demand for foreign exchange and the exchange rate, as shown by the demand curve DD_1. The reason is that a higher exchange rate implies higher price of foreign goods and *vice versa*. Higher prices reduce the demand for foreign goods and reduce imports. Lower import means lower demand for foreign exchange. Conversely, when exchange rate decreases, foreign goods become cheaper and therefore imports increase. Increase in imports lead to a greater demand for foreign exchange. That is why foreign exchange demand curves show an inverse relationship between the exchange rate and the demand for foreign exchange.

Likewise, the **supply curve** of foreign exchange is derived from a composite supply of foreign exchange by the speculators, foreign exchange dealers, and the monetary authorities providing foreign exchange for foreign payments or trying to get rid of their excess foreign exchange reserves. There is another way of looking at the supply curve of foreign exchange. The supply schedule of a country's currency is, in fact, an inverted image of its demand for foreign exchange. For, when a country demands foreign currency, it offers its own currency in payment and, in the process, it supplies its own currency. The supply curve has a positive slope.[1]

Returning to the question of exchange rate determination, as Fig. 26.2 illustrates the determination of rupee-dollar exchange rate under hypothetical conditions. The curves DD_1 and DD_2 and SS_1 indicate the demand for and supply of US dollar, respectively, at different exchange rates. As the Fig. 26.2 shows, the foreign exchange demand curve DD_1 and supply schedule SS_1 intersect at point P determining the exchange rate at Rs 50 per dollar. At this exchange rate, the total demand for dollar equals the total supply of dollar at \$10 million. It means that the dollar-rupee exchange market is cleared. Therefore, the exchange rate (\$1 = Rs 50) is the equilibrium exchange rate in the free foreign exchange market. In case demand for dollar increases for some reasons, say, due to the increase in demand for the US goods, the demand curve will shift to DD_2 and a new equilibrium exchange rate will be determined at \$1 = Rs 60 and market will be cleared at \$12.5 million.

Change in Equilibrium Exchange Rate

Figure 26.2 illustrates the exchange rate determination under the static conditions. The foreign exchange market conditions are however not static. They are subject to change due to changing domestic and external economic conditions. Therefore, market determined exchange rate is subject to frequent variations due to the following factors.

(i) Change in Domestic Prices. A change in domestic prices, foreign prices remaining constant, changes the demand and supply conditions of foreign exchange. For example, a rise in domestic prices in India, all other things remaining the same, reduces foreign demand for Indian goods and increases India's demand for foreign goods. Consequently, India's imports increase causing an increase in demand for foreign exchange and an upward shift in the India's demand curve. For the same reason, India's exports decrease causing a leftward shift in her foreign exchange supply curve. Both these changes cause a change the exchange rate.

(ii) Change in the Real Income. A change in real income of a country, other factors remaining the same, increases its demand for both domestic and foreign goods. Demand for foreign goods

[1] The foreign exchange supply curve can also be backward bending if demand for foreign goods is inelastic. For details, see A. P. Lerner, *The Economics of Control* (Macmillan, New York, 1944); Joan Robinson, "The Foreign Exchange," reprinted in H.L. Ellis and L. A. Metlzer (eds), *Readings in the Theory of International Trade* (McGraw-Hill, New York, 1950).

increases because, in general, imports are income elastic. Increase in imports increases demand for foreign exchange and, therefore, the exchange rate. For example, if real income of India increases, *ceteris paribus*, her imports increase because they are income-elastic. Increase in imports increases India's demand for foreign exchange. This makes the demand curve shift upward causing a rise in the exchange rate. Similarly, when real income of foreign countries increases, *ceteris paribus,* it results in appreciation of Indian currency.

(iii) Change in the Rate of Interest. Change in the interest rate in different countries affects the capital flows between the nations and the demand and supply conditions. Capital tends to flow from low-interest-rate countries to the high-interest-rate countries. The change in the pattern of capital flow leads to a change in demand and supply conditions for foreign exchange which changes the exchange rate. For instance, India had experienced a similar change in rupee–dollar exchange rate in 2008. Due to rapid inflow of Financial Institutional Investment (FII) demand for Indian currency had increaced and, therefore, the dollar price had declined from about Rs. 50 per dollar to about Rs. 40.

(iv) Structural Change. The structural change in an economy, for example, change in the composition of GNP and technological and industrial innovations, change the cost structure of a country which in its turn changes the relative price structure. Such changes cause a change in the demand and supply conditions and hence a change in the exchange rate.

(v) Speculative Demand and Supply. The speculative demand for and supply of foreign exchange too change the position of the demand and supply curves and therefore the exchange rate.

The factors noted above keep exchange rate floating. Such an exchange rate is called *floating exchange rate*. However, it is argued that if foreign exchange market is perfectly competitive, there will always be an order in the foreign exchange market and a stable exchange rate. Whether exchange rate remains stable over a period of time depends on the market conditions.

26.2.2 The Purchasing Power Parity Theory

A Swedish Economist, Gustav Cassel, developed the concept of equilibrium rate of exchange,[2] popularly known as the *purchasing power parity theory*, (PPP) after the First World War. "This theory asserts that the relative value of different currencies correspond to the relation between the real purchasing power of each currency in its own country."[3] The purchasing power parity theory can be stated in the form of the following two statements.

(i) Under inconvertible paper standard, the absolute rate of exchange between any two currencies is determined on the basis of their purchasing power in their respective countries.

(ii) The relative change in exchange rate between any two currencies is proportional to the change in the relative prices.

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2. Haberler, G. has, however quoted Prof. Angell in his book, *The Theory of International Trade,* (William Hodge, London, p.32n), that the purchasing parity theory was earlier formulated by Wheatley in 1802 and William Blake in 1810.

3. Haberler, G. *op. cit.,* p.32.

The *absolute rate of exchange* is determined in terms of absolute prices. For example, suppose a basket of goods and services can be bought in India for Rs 100 and in the US for \$2, both currencies being inconvertible paper currencies. Then the exchange rate between the two currencies will be determined as given bellow.

$$\$2 = \text{Rs } 100$$
$$\$1 = \text{Rs } 50$$

The determination of the absolute rate of exchange is based on the assumption that there is no cost of transportation, no tariffs, and no subsidies. It is therefore argued that since this assumption is unrealistic, the absolute version of the *PPP* theory is unrealistic. However, the absolute exchange rate can be worked out without this assumption by adjusting the commodity price for transportation cost, tariffs and subsidies.

The statement (ii) of the *PPP* theory sets the rule for working out the change in the exchange rate over time with the change in purchasing power of the currencies. For example, suppose (i) P_0^A and P_0^B are the price levels in countries *A* and *B,* respectively, in base year *O*, (ii) R_0 is the exchange rate between the two currencies in year *O*, and (iii) prices in the two countries change in year 1 to P_1^A and P_1^B, respectively. Then the exchange rate (R_1) in year 1 between the two currencies can be worked out as follows:

$$R_1 = R_0 \frac{P_1^A / P_0^A}{P_1^B / P_0^B}$$

This formula serves a useful purpose of determining the exchange rate between any two currencies with changing prices.

Drawbacks of the PPP Theory. The purchasing parity theory has been criticized on the following grounds.

First, the wholesale price index number (*WPI*) used in *PPP* theory does not give an accurate and relevant measure of purchasing power of a currency in the context of foreign trade. For determining the purchasing power of a currency, prices of only internationally traded goods are relevant, not the domestic price of all goods and services. Therefore, it does not give a realistic exchange rate.

Secondly, apart from goods, many service items, for instance, banking, insurance and consultancy, etc. enter the international transactions. Besides, a large amount of capital transfers take place between the nations. Such transactions do affect purchasing power of a currency. But, *WPI* does not take these transactions into account.

Thirdly, as Haberler has pointed out, tariffs, subsidy and embargo cause significant deviations in the purchasing power of a currency. But such items are not taken care of in the *PPP* theory.

Fourthly, the change in the exchange rate depends, by and large, on the elasticities of reciprocal demand for imports and exports. But, *PPP* theory does not take this factor into account.

Finally, the *PPP* theory assumes that relative price is the sole determinant of the international transactions. This is not true. Changes in the exchange rate take place also due to disequilibrium caused by capital transfers, service payments and changes in the real income.

In spite of these shortcomings, however, *PPP* theory is widely used as the first approximation of an equilibrium rate of exchange for periods of serious and frequent price changes. For a more accurate measure of the exchange rate, othep factors like capital transfers, changes in productiol technique and in real incomes need to be accounted for.

26.3 THE FIXED EXCHANGE RATE AND ITS DETERMINATION

Market determined exchange rate is called ***floating*** or ***flexible*** exchange rate. The flexible exchange rate system has certain serious ***disadvantages***. The most sepious disadvantage of flexible exahange rate is that it causes instability in trade, foreign investmelt, balalce of payments and employment, A sectiol of economiqts have, therefore, argued for fixed exchange rate system. The IMF has implemented a system of fixed exchange rate for its member nations with a ppotision of flexibility within a limited range. The fixed exchange rate is a rule today pather thal an exception, In this seatiol, we discuss briefly, the determination of the fixed exchange rate.

The Fixed Exchange Rate

When the monetary authority of a country fixes the exchange rate between the domestic currency and a foreign currency with a provision of fluctuation of the rate within a small upper and lower margin, it is called ***fixed exchange rate***. The fixed exchange rate has a long history. During the entire period of gold standard, the exchanged rate was fixed and all currencies of industrial nations were pegged to gold. However, gold standard broke down during the World War I and remained out of practice until the end of the end of World War II and so did the fixed exchange rate system. After the Second World War, the International Monetary Fund was established in 1945 and fixed exchange rate system was revived. Under the IMF system, the member nations were required to fix the official value of their currency in terms of a *reserve currency* (the US dollar) or a basket of ‘key currencies’. The exchange rate so determined was known as the currency’s ‘pegged exchange rate’ or *par value*. Under this system, the member nations could devalue or revalue their currency by 1 percent with approval of the IMF, especially under the condition of ‘fundamental disequilibrium’ in *BOP*.

However, the IMF system collapsed in 1973 due to speculative sale and purchase of gold by the central banks of the US and Germany and also by the private traders during the 1960s and the early 1970s. Price of gold fluctuated high and low depending on the gold market conditions. So the member nation of the IMF felt forced to abandon the system. As a result, the IMF system of fixed exchange rate broke down and the exchange rate started fluctuating. The fluctuating exchange rate created many serious international economic problems. Consequently, a number of different systems of fixing the exchange rate and its management were evolved by different groups of the nation[4]. The different systems of exchange rate adopted by different group of countries are listed below.

[4] For details, see International Monetary Fund, *International Financial Statistics*, 2001. A summary view can be had from Paul R. Krugman and Maurice Obstfeld, *International Economics: Theory and Policy* (Pearson Education), pp. 483-85.

1. **Independent floating:** A group of 35 countries including USA, UK, Japan, South Korea and Brazil, follow the system of independent floating of their currency. The countries of this group are explicitly committed to exchange domestic currency for a specified currency at a fixed exchange rate but they are free to float their currency.
2. **Managed floating:** A group of 49 nations including India, Indonesia, Russia and Nigeria, have adopted the managed floating system. Under this system, the nations of this group change their exchange rate, i.e., they can devalue or revalue their currency as and when required.
3. **Conventional fixed peg arrangement:** 41 nations including China, Saudi Arabia and Venezuela, follow the conventional fixed exchange rate system. They peg their currency to at a fixed exchange rate to another currency or to a basket of currencies. The exchange rate is allowed to fluctuate within marrow margins.
4. **Currency board arrangements:** A group of 7 nations (led by Estonia) form a currency board which fixes the exchange rate for exchanging domestic currency for a specified foreign currency.
5. **Crawling bands:** A small group of 5 nations (led by Israel) follow the system of fixing the exchange rate and the rate is allowed to fluctuate within a wide margin, of course, which they adjust periodically.
6. **Crawling peg:** 5 nations (led by Bolivia) follow the crawling peg system. Under this system, the exchange rate is fixed but allowed to fluctuate within a *small range*, under the condition of high inflation and large imbalance in trade with partners.
7. **Pegged exchange rate within horizontal band peg:** A group of only 4 nations (led by Denmark) follow the system of fixing the exchange rate with the provision of permitting exchange rate with is a limit. The upper and lower limits of fluctuation rage are also fixed horizontally.
8. **No separate legal tender:** 41 nations (including Euro nations, El Salvador, Mali, Chad, etc.) have formed a group of nations within which the currency of another country circulates as legal tender. So there is no need for fixing the exchange rate.

It may be added here that the basic purpose of adopting fixed exchange rate system is to ensure stability in foreign trade and capital movements. Under fixed exchange rate system, the government assumes the responsibility of ensuring stability of exchange rate. To this end, the government undertakes to buy and sell the foreign currency—buy when it becomes weaker and sell when it gets stronger. Any change in the official exchange rate is made by the monetary authority of the country in consultation with the IMF. In practice, however, most countries adopt a *dual system*: a fixed exchange rate for all official transactions and a market rate for private transactions.

Management of the Fixed Exchange Rate

The determination and regulation of the fixed exchange rate is illustrated in Fig. 26.3. Suppose that India's demand curve for foreign exchange (say, US dollar) is given by the demand curve D_2 and dollar supply by the curve S. In the absence of the fixed exchange rate system, the exchange rate will be determined at R_2 by the intersection of foreign exchange demand carve (D_2) and supply curve S at point E. This exchange rate may fluctuate up and down to any level which is not desirable. Therefore, the Indian government adopts the fixed exchange rate system and fixes the exchange rate between R_1 and R_3, that is, exchange rate variation is allowed between R_1 and R_3. This implies that demand for dollar can fluctuate within the lower and upper limits of *OM* and *OQ*, respectively, and exchange rate can move up and down between R_1 and R_3. So long as demand variation is limited between *OM* and *OQ* and exchange rate between R_1 and R_3, the monetary authority, need not intervene. But, if dollar demand and exchange rate variations cross these limits for such reasons as seasonal variation in demand, increase in imports, increase in short-term foreign investments, and so on, then the authorities will be required to intervene to control the demand variation and limit the exchange rate variation within permissible limits, R_1 and R_3. For example, suppose demand for dollar increases and demand curve D_2 shifts to D_3 and dollar demand exceeds the upper limit by *QR*, then the authorities will sell *QR* dollars from its reserves to vent the demand pressure on the exchange rate. Similarly, if for some reason, demand for dollar decreases and demand curve D_2 shifts leftward to D_1, then the authorities will buy dollars to the extent of *MN* to retain the exchange rate between R_1 and R_3. This is how the fixed exchange rate system works.

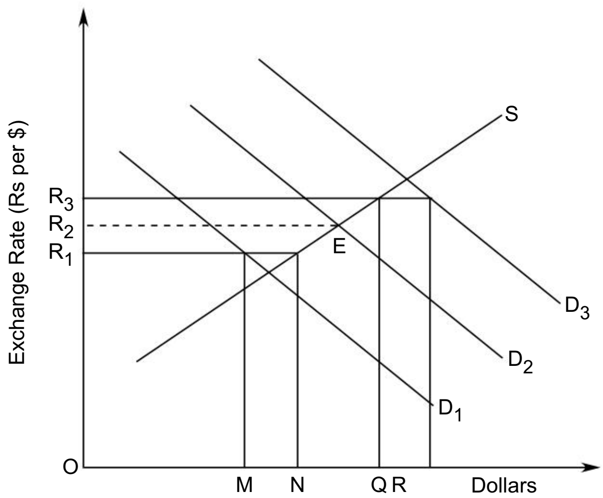

Fig. 26.3 Determination of Fixed Exchange Rate

Pegging of the Currency. When the value of domestic currency is tied to the value of another currency, it is called 'pegging.' Under the fixed exchange rate system, a currency is pegged to *a reserve currency* or to a *basket of 'key' currencies*. Besides, currencies are pegged also to the *Special Drawing Rights* (*SDRs*), an instrument created by the IMF. The currencies of about one-third of the developing nations are pegged to a single currency, that is, either to the US dollar or to French franc. The value of a pegged currency is allowed to vary within a certain lower and upper limit.

Pegging of a currency to a basket of currencies is called *composite currency pegging*. This system is adopted to avoid frequent adjustment problem caused by the variation in the reserve currency. Under this system, many countries have pegged their currency to more than one currency, mainly to the currencies of their major trading partners. This ensures a greater degree of stability in the fixed exchange rate. In this system, the rate of exchange is fixed on the basis of a weighted average value of the selected currencies. The currency basket is determined on the basis of the regional distribution of trade partners and the volume of trade and foreign investment. The European monetary system or the Euro currency system is the best example of this system. India has pegged her currency to the US dollars, SDRs and the pound sterling.

26.4 THE CONTROVERSY ON FIXED *VS.* FLEXIBLE EXCHANGE RATE

As noted above, the IMF system of fixed exchange rate adopted under Bretten Woods Agrement in 1945 worked effectively till 1973. Thereafter, however, the IMF failed to provide an adequate solution to three major problems:

(i) providing sufficient reserves to the member nation's to mitigate the short-run fluctuations in their balance of payments (*BOP*) and to maintain the fixed exchange rate system;
(ii) the problem of long-term adjustment in the *BOP;* and
(iii) managing the crises generated by speculative transactions.

Consequently, the currencies of many countries, especially the reserve currencies, were devalued frequently in the early 1970s, causing instability in the exchange rate. This raised doubts about the sustainability of the Bretten Woods system and viability of the fixed exchange rate system, and the Bretten Woods system broke down. The breakdown of the system generated a debate on whether fixed exchange rate is desirable and whether it is sustainable. The arguments were put forward in favour of and against both fixed and flexible exchange rate systems. The argument in favour of one system is essentially the argument against the other system. We will therefore confine to the arguments in favour of each system.

The Arguments for Fixed Exchange Rate

The ***first*** and most powerful argument in favour of fixed exchange rate is that it provides stability in the foreign exchange market; certainty about the future course of exchange rate; and it eliminates the risk caused by uncertainty. On the contrary, a flexible exchange rate causes uncertainty and often violent fluctuations in the international trade and *BOP* disequilibrium.

Secondly, fixed exchange rate system creates conditions for a smooth flow of foreign capital between the nations as it ensures a given return on the foreign investment. On the contrary, a flexible or floating exchange rate causes uncertainty about the rate of returns and hence it constrains the international capital flows.

Thirdly, the fixed exchange rate eliminates the possibility of speculative transactions in foreign exchange, whereas flexible exchange rate encourages speculative transactions which is by nature destabilizing.

Fourthly, fixed exchange rate system reduces the possibility of competitive exchange depreciation or devaluation of currencies. In case of need, assistance and guidance are provided by the IMF.

Finally, a case for fixed exchange rate is also made on the basis of the existence of the currency unions and areas. Flexible exchange rate is unsuitable for nations of the currency areas as it leads to a chaotic exchange rate and, hence, hampers trade between them.

The Arguments for Flexible Exchange Rate

The advocates of flexible exchange rate have put forward equally convincing arguments in its favour. They have challenged all the arguments against the flexible exchange rate. It is often argued that flexible exchange rate causes destabilization, uncertainty, risk and speculation. The proponents of the flexible exchange rate have not only rebutted these charges but also have put forward strong arguments in favour of flexible exchange rate.

First, flexible exchange rate provides a good deal of autonomy in respect of domestic policies as it does not require any obligatory constraints arising out of international market conditions. This advantage is of great significance in the formulation of domestic economic policies.

Second, flexible exchange rate is self-adjusting and therefore it does not devolve on the government to maintain an adequate foreign exchange reserves to stabilize the exchange rate.

***Third*,** since flexible exchange rate is based on a theory, it has a great advantage of predictability and has the merit of automatic adjustment.

Fourth, flexible exchange rate serves as a barometer of actual purchasing power of a currency in the foreign exchange market. This indication helps in formulating foreign trade policy.

***Finally*,** some economists argue that the most serious charge against the flexible exchange rate, that is, *uncertainty,* is not tenable because speculative tendency under this system itself creates conditions for certainty and stability. They argue that the degree of uncertainty under flexible exchange rate system, if any, is not greater than one under the fixed exchange rate.

The Debate Remains Inconclusive

The debate on fixed vs flexible exchange rate remains inconclusive. The reason is that both the systems have their own merits and demerits. Empirical evidence on either side is not conclusive. The fixed exchange rate under Bretten Woods system, as already mentioned, had come under great pressure during the early 1970s. The destabilizing effects have been experienced under both the systems. There is ample evidence to show that fixed exchange rate is subject to 'periodic bouts of very heavy speculation.' On the other hand, the experiments with flexible exchange rate in the 1950s and in 1969, by Britain and Germany in 1971 have not produced any evidence of serious fluctuation in the exchange rate.

The counter-arguments keep flowing from the advocates of the fixed and flexible exchange rates. However, the majority of central banks and policy-makers favour a fixed exchange rate with a margin for its fluctuation. And, economic theoreticians and analysts favour mostly the flexible exchange rate system, perhaps because of their faith in the efficiency of the market mechanism. In practice, however, as noted above, most countries have adopted a system of fixed exchange rate with a provision of its fluctuation within a upper and lower limit.

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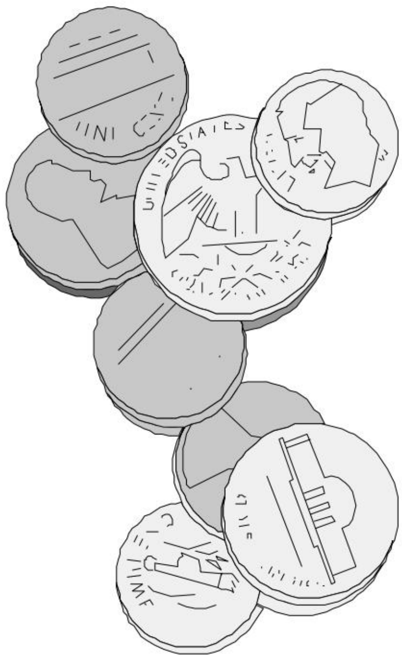
QUESTIONS FOR REVIEW

1. Define foreign exchange market and explain its organizational structure and working system.
2. Distinguish between spot market and forward market. Explain their place and working in the foreign exchange market.
3. Explain the different kinds of sale-purchase transactions in the foreign exchange market. Distinguish between arbitrage and speculation.
4. What is the nature of speculative transactions in the foreign exchange market? Does speculation stabilize or destabilize the exchange rate?
5. What is interest arbitrage? Explain how covered interest arbitrage prevent the risk arising out of fluctuation in the exchange rate.
6. What is meant by exchange rate? Explain the market theory of exchange rate determination. Does this theory explain fully the determination of the exchange rate? What are the factors that cause variation in the exchange rate?
7. Explain the purchasing power parity theory of exchange rate determination. What are the shortcomings of this theory?
8. Examine critically the purchasing power parity theory. Does this theory serve any useful purpose?
9. What is meant by the fixed exchange rate? Describe the features of the fixed exchange rate system.
10. How is the fixed exchange rate fixed or pegged? How does a government manage to prevent the fluctuation in the fixed exchange rate?
11. Is the fixed or flexible exchange rate more advantageous for an economy? Discuss the advantages and disadvantages of the flexible exchange rate.
12. What are the arguments against the fixed exchange rate? Why does the IMF want the member nations to adopt a fixed exchange rate policy despite its disadvantages?

Chapter 27

Balance of Payments: Meaning and Assessment



INTRODUCTION

In Chapter 26, we have discussed the foreign exchange market and the exchange rate determination. The exchange rate determines the exports and imports of a country to a great extent and inflows and outflows capital and manpower. Another international aspect of macroeconomics that we are concern with in this book is the *balance of payments* (*BOP*). The balance of payments of a country reveals the final outcome of its economic transactions with the rest of the world over a specific period of time. The *BOP* is the single most important aspect of the international economics that matters most in macroeconomic analysis. In this Chapter, we discuss the following aspects of the *BOP*.

(i) The meaning and purpose of *BOP*,
(ii) The accounting methods of *BOP*,
(iii) India's *BOP* position in recent years,
(iv) The method of assessing the *BOP* position, and
(v) The causes and kinds disequilibrium in *BOP*.

We begin our discussion on the subject matter of this Chapter with the meaning of *BOP* and purpose of preparing *BOP* accounts.

27.1 THE BALANCE OF PAYMENTS: MEANING AND PURPOSE

Meaning. As mentioned above, the balance of payments is a periodic accounting of international economic transactions. Each country having regular economic transactions with other countries prepares periodically the final accounts of their foreign receipts and payments and of their financial inflows and outflow arising out of its international transactions. This account is called *balance of payments* (*BOP*). Thus, the *BOP* is statement of economic transactions of a country with the rest of the world over a period of time. Specifically, the *BOP* can be defined as a statement of all economic transactions *between the residents of a nation and the rest of the world during a period of time, usually one year*. In practice, however, *BOP* accounts are prepared on quarterly basis also.

A brief explanation of some of the terms used in the definition of *BOP* is in order.

The term **'systematic accounting'** does not refer to any particular system. However, the system which is generally adopted is *double entry book-keeping system.* In this accounting system, both sides of a transaction 'debit' and 'credit' are recorded.

'Economic transactions' include all the transactions that involve the transfer of title or ownership of goods, services, money and assets between the residents of a country and the rest of the world. While some transactions involve physical transfer of goods, money and assets along the transfer of the title, in some transactions, physical transfer is not necessary. For example, even if profits of a subsidiary of a foreign company is not transferred abroad or reinvested within the country it is located, it is deemed to be paid to the parent company abroad. What is important is the transfer of the title, not the physical transfer of what is transacted.

The term **'residents'** means the nationals of the reporting country. Diplomatic staff, foreign military personnel, tourists, migratory workers and branches of the foreign companies are not treated as the 'residents' even though they works and operate in the reporting country.

Purpose The purpose of *BOP* accounting is to take the stock of country's foreign receipts and payment obligations and of assets and liabilities arising out of international economic transactions with a view to taking stock of gains and losses of foreign transactions and to correcting unhealthy trends. Some other important uses of the *BOP* accounts are following.

First, *BOP* accounting serves a very useful purpose in so far as it yields necessary information on the strength and weakness of the country in international economic status.

Second, by analysing the *BOP* accounts of past years, one can find the overall gains and losses from the international economic transactions. It can be ascertained whether composition and direction of international trade and capital movements have improved or caused deterioration in the economic condition of the country.

Third, *BOP* statements give warning signals for future policy formulation. For, even if the *BOP* position in recent past has not been a matter of concern, there may be unhealthy developments which might create problem in future. For example, building foreign exchange reserves on borrowed funds increases international indebtedness which might lead to financial bankruptcy.

27.2 THE BALANCE OF PAYMENTS ACCOUNTS

For preparing the *BOP* accounts, economic transactions between a country and the rest of the world are grouped under two broad categories, *viz.*

(i) current transactions, and
(ii) capital transactions.

Current transactions include export and import of goods and services, i.e., visible and invisible trade, unrequited (non-repayable) receipts and payments in the current year. ***Capital transactions*** include inflows and outflows of capital including foreign investments, gold transfers, and foreign exchange reserves.

The distinctive features of the two kinds of transactions are:

(i) current transactions change (increase or decrease) the current level of consumption of the country or change the current level of its nominal income, whereas capital transactions change the capital stock of the country, and
(ii) while current transactions are of flow nature, capital transactions are mostly of stock nature.

In accordance with the two kinds of transactions, *BOP* accounting is divided into two accounts:

(i) current accounts, and
(ii) capital account.

We give here a brief description of the transactions recorded in these accounts.

27.2.1 Current Account

Current account items of international transactions are listed in Table 27.1 as suggested by the IMF and currently followed in India. All the transactions included in the current account have their 'credit' and 'debit' counterparts. The credit column shows the 'receivables' and debit column shows the 'payables.' The balance of each item is shown under the 'net balance' column. The sum total of 'net balance' gives the current account balance.

Table 27.1 Balance of Payments: Current Account

Transactions	*Credit*	*Debit*	*Net Balance* (+) *or* (–)
1. Merchandise Trade	Exports	Imports	---
2. Foreign Travel	Earnings	Payments	---
3. Transportation (Shipping*)	Earnings	Payments	---
4. Insurance Premium	Receipts	Payments	---
5. Banking	Receipts	Payment	---
6. Investment Income	Receipts	Payment	---
7. Government (Purchase and Sale of Goods and Service)	Receipts	Payment	---
8. Miscellaneous**	Receipts	Payments	---
Current Account Balance : Surplus/Deficit			---

* Added to the IMF list.
** Includes motion picture royalties, telephone and telegraph services, fees for copyrights and consultancy, etc.

For a more detailed analysis, the items of current account are also classified as (i) visible items, and (ii) invisible items. *Visible items* include export and import of goods, called 'merchandise trade.' All other items (items 2-8) fall under the category of *invisible items.* Sometimes, a separate category is created as 'unrequited transfers' or unrequited items, to give a separate treatments to the unilateral transfers like, foreign gifts, donations, military aid, technical assistance, and so on.

Balance of Trade (BOT) The 'net balance' of the visible trade, that is, the difference between exports (X) and imports (M) of goods is called ***trade balance***. If $X > M,$ it shows ***trade surplus***, and if $M > X$, it means ***trade deficit***. The sum of the 'visible net' and 'invisible net' gives the balance on the current account. In general usage it is called **'current account balance.'** If sum of the entries in the 'credit' column is greater than that of the 'debit' column, it shows a ***current account surplus,*** and if sum of 'credit' items is less than that of the 'debit' items, it shows a ***current account deficit.*** The current account balance (surplus or deficit) is transferred to the capital account.

27.2.2 Capital Account

The broad items of the capital account are following.

(a) Short-term capital movements;
(b) Long-term capital movements;
(c) Inflow and outflow of gold and foreign exchange reserves.

The ***short-term capital movements*** include (i) purchase of short-term foreign securities, for example, treasury bills, commercial bills and acceptance bills, (ii) speculative purchase of foreign currency, and (iii) cash balance held by foreigners for security against uncertainty arising due to wars and political uncertainty, etc.

The ***long-term capital movements*** include (i) direct investment in shares, bonds, real estate or physical assets like plant, building and equipment, on which the investor holds a controlling power; (ii) portfolio investment, including all other stocks and bonds, e.g., government securities, securities of firms which do not entitle the holder with a controlling power; and (iii) amortization of capital, i.e., repurchase and resale of securities sold to the foreigners. Direct import or export of capital goods fall under the category of foreign direct investment (*FDI*) and foreign investment in shares and securities is called foreign institutional investment (*FII*). *It is important to note here that export of capital is a debit item because it causes outflow of foreign exchange, and import of capital is a credit item as it results in inflow of foreign exchange.*

The third item in the capital account, i.e., *gold and foreign exchange reserves*, are maintained as a safeguard against large and prolonged current account deficits and to stabilize the exchange rate of the home currency and also to make payments in case there is payment deficits on current accounts. The foreign exchange reserves increase or decrease depending on the net balances of other transactions.

27.3 INDIA'S BALANCE OF PAYMENTS

India's balance of payments and the accounting procedure followed in India are presented in Table 27.2 along with actual data. In Table 27.2 current account reveals two balances: (i) trade balance, and (ii) current account balance.

Table 27.2 India's Balance of Payments

Items of Transaction	*1990-91 (Million US dollars)*	*1995-96*	*2000-01*	*2007-08 (PR)*
A. Current Account				
1. Imports (c.i.f.)	27,915	43,670	59,264	257,789
2. Exports (f.o.b.)	18,477	32,311	44,894	166,163
3. Trade Balance	– 9,438	– 11,359	– 14,370	– 91,626
4. Invisibles				
(a) Receipts	7,464	17,676	34,786	148,604
(b) Payments*	7,706	12,216	24,006	74,012
(c) Net Receipts	– 242	5,460	10,780	74,592
5. Current Account Balance [3+4(c)]	– 9,680	– 5,899	– 3590	– 17,034
B. Capital Account				
(i) Foreign investment (net)	103	4,604	5862	44,957
(ii) Loans				
(a) External assistance (net)	2,204	867	410	2,114
(b) Commercial borrowings (net)	3,329	1,334	3842	39,816
(iii) Banking (net of receipts and payments)	682	762	811	11,757
(iv) Rupee debt service	– 1,193	– 952	– 617	– 121
(v) Other capital transactions (net)	1,931	– 2,537	– 290	9,470
(vi) Errors and omissions	132	600	– 588	1,205
6. Total Capital Account [i to vi]	7,188	4,678	10,018	109,198
7. Overall Balance (5 + 6)	– 2,492	– 1,221	5856	92,164
8. Monetary Transactions				
(a) IMF Transactions (net = purchase – repurchase)	1,214	– 1,715	– 26	—
(b) SDR Allocations	–	–	–	—
(c) Increase (+)/ decrease (–) on reserves	1,278	2,936	– 5830	– 92,164
9. Total (a + b + c)	2,492	1,221	– 5856	– 92,164

* Including 'interest and service payments on loans and credit; PR = Partially revised.

Source: Economic Surveys,—2000–01 and 2003–2004, 2008–09, Ministry of Finance, Government of India.

Trade balance = Exports – Imports

Current account balance = Trade balance ± Net Invisibles

The *capital account balance* (item no. 6) gives the net of (i) foreign investments, (ii) external assistance and commercial borrowings, (iii) banking receipts and payments (transfers), (iv) rupee debt services, (v) other capital receipts and payments, and (vi) errors and omissions.

The *overall balance* (item no. 7) shows India's overall balance of payments position in 1990-91, 1995-96, 2000-01, 2007–08. The overall balance is obtained as follows.

Overall balance = Current account balance – Capital account total

The *overall balance* of the nation needs to be cleared by the end of the accounting year. It can be seen from Table 27.2 (item 7) that India's *BOP* shows deficits in some years and surplus in some years. Incidentally, India's *BOP*, i.e., the *Overall Balance*, has been of deficit nature in most years. As regards the current account balance, it has been in deficit in most years. What is a matter of great concern is the fact that India's current account deficit in 2008–09 had risen to \$ 17.0 billion from \$ 9.5 billion in 2006–07. If *BOP* deficits (or even surplus) are of large magnitude and increase over years, then, the *BOP* is said to be in disequilibrium. The *BOP* disequilibrium, especially one of deficit nature has been a matter of great concern for both the policy makers and the economists, especially where it has not been a matter of policy. In case, maintaining *BOP* deficit is not a matter of policy, the policy makers will have to find ways and means to eliminate the deficit. We now turn to discuss the meaning, causes and kinds of balance of payments disequilibrium and adjustments mechanism of *BOP* disequilibrium.

27.4 ASSESSMENT OF BALANCE OF PAYMENTS

Since *BOP* accounting is based on the *double entry book-keeping system,* the two sides of the *BOP* accounts are always in balance. Therefore, the *BOP* statements prepared on the principles of this accounting system show *BOP* to be always in balance. Furthermore, a close look at the *BOP* accounts reveals that a deficit in the current account is offset either by a surplus on the capital account or by running down the gold and foreign exchange reserves. And, a surplus in the current account is offset by a matching decrease on the capital account resulting in loans or depletion of gold and foreign exchange reserves. This accounting system shows the *BOP* to be always in balance. This does not mean that *BOP* is always in balance, i.e., there is no surplus or no deficit in *BOP*. There is often a deficit or a surplus in *BOP*. In economic terminology, this is called disequilibrium in *BOP*. The *BOP* disequilibrium is assessed on the basis of the difference between the *autonomous* and *induced* transactions. The method of assessing whether *BOP* is in equilibrium or in disequilibrium is explained below. Let us first look at the nature and effects of *autonomous* and *induced* transactions.

27.4.1 Autonomous and Induced Transactions

For the purpose of assessing the *actual BOP* position, international transactions are grouped under two broad categories: (i) autonomous transactions, and (ii) induced transactions or accommodating capital flows. ***Autonomous transactions*** are those that are carried out with business motives or to meet the goods and the financial need of the country. The autonomous transactions take place on both current and capital accounts. On the **current account**, merchandise exports and imports of goods are autonomous transactions. If merchandise exports and imports are equal in value terms, there will be no other transactions and *BOP* will be in equilibrium, But that is not always the case. Most often $X \neq M$. If $X \lesseqgtr M$, it requires some balancing transactions. Balancing transactions are in the form of international borrowing or lending that lead to short-term capital inflows or outflows. This kind of international borrowing and lending are not made for their own sake, but for making payments for deficits in the balance of trade. Such transactions are called ***induced*** or ***accommodating transactions***. The unrequited items like gifts, donations and aid are voluntary and are treated as autonomous transactions.

On the **capital account**, international investments or exports and imports of long-term capital are autonomous transactions. Also, the short-term flows motivated by a desire to invest abroad are autonomous transactions. On the other hand, short-term capital movements, for instance, gold and accommodating capital flows on account of the autonomous transactions are induced transactions. Such induced transactions result in either rise or fall in gold and foreign exchange reserves of the country.

27.4.2 Assessment of *BOP* Disequilibrium

In the assessment *of BOP*, only autonomous transactions are taken into account. If total receipts from and payments for autonomous transactions are *equal,* it means *BOP* is in **equilibrium**. If total receipts from and payments for autonomous transactions are substantially *unequal*, it means *BOP* **disequilibrium**. If autonomous receipts are much greater than autonomous payments, it gives *BOP* disequilibrium of *surplus* nature and if foreign payment requirements exceed foreign receipts to a considerable extent, it gives *BOP* disequilibrium of *deficit* nature[1]. A *BOP* disequilibrium of surplus nature results in increase in capital account surplus and reflects ultimately in the form of increase in foreign exchange reserves. On the other hand, a *BOP* disequilibrium of deficit nature leads to sale of foreign assets, if any, or borrowing abroad which results in foreign indebtedness. The *BOP* disequilibrium of surplus nature is not a matter of great concern for the nation. But the *BOP* disequilibrium of deficit nature is often a matter of concern for the policy makers, especially when the magnitude of deficit is very high. The reason is that it begins to affect the macro balance of the economy. Therefore, *BOP* needs to be carefully assessed.

In order to assess the *BOP* position what is required is to look at the process of balancing the current and capital accounts. In case there is current account deficit, it has to be financed either by sale of foreign assets or by net borrowing, i.e., net capital inflow. Thus,

$$\text{Current account deficit} = \text{Net capital inflow}$$

Note that the current account deficit is the result of autonomous transactions and the net capital inflow is induced transaction. As noted above, current account deficit (or surplus) has to be adjusted in the capital account. From an adjustment point of view, it is useful to divide capital account transactions under two categories: (i) autonomous transactions, i.e., capital transactions carried out by the private sector, and (ii) official transactions, i.e., transactions by the central bank. As shown above, a current account deficit can be financed by borrowing abroad. However, if foreign loans are not available, the central bank has to sell foreign currency to the private sector for making payment abroad. This runs down the foreign exchange reserves held by the central bank. The decrease in official foreign exchange reserves gives the measure of *BOP deficit*. Thus,

1. For details, see "Towards a General Theory of Balance of Payments" by Harry G. Johnson, in *Readings in the Theory of International Trade and Commercial Policy* edited by D.T. Lakdawala, J. Bhagwati and R. Bhardwaj (Lalwani Publishing House, Bombay, 1973).

BOP deficit = decrease in official foreign exchange reserves
= current account deficit + net capital inflow

The method of assessing *BOP* position can be illustrated by using India's *BOP* data given in Table 27.2. As can be seen in the table, India had a current account deficit of US $ 17,034 million and a capital account surplus of US$ 109,198 million in 2007–08. Given these figures and 'monetary transactions', the assessment of India's *BOP* position in 2007–08 can be shown as follows.

Current account balance	US $ – 17,034 million
Capital account balance	US $ + 109,198 million
Overall balance	US $ + 92,164 million
Less Monetary transactions	
(a) IMF account	US $ – 92,164 million
(b) Decrease in forex reserves	US $ – 92,164 million
BOP accounting balance	----- nil -------

The decrease in India's foreign exchange reserves by US$ 92,164 million shows *BOP* disequilibrium of deficit nature. However, if one goes by the overall *BOP* balance of US$ 92,164 million, India's *BOP* was in surplus in 2007–08.

27.5 CAUSES AND KINDS OF *BOP* DISEQUILIBRIUM

The causes and kinds of *BOP* disequilibrium go together. We will therefore discuss them together and with reference to only *BOP* deficits.

1. Inflation and Fundamental Disequilibrium. Inflation is one of the most important causes of *BOP* disequilibrium and, in modern times, the most important one. Inflation causes deficit in *BOP*. Inflation makes imports relatively cheaper and exports relatively costlier. As a result, imports increase and exports decrease. If inflation persists, these trends in exports and imports persist, especially if imports and exports are price-elastic. Going by the Marshall-Lerner condition, if the sum of the price elasticities of imports and exports are not equal to zero, the gap between imports and exports increases. Given the Marshall-Lerner condition, a persistent inflation leads to a persistent deficit in *BOP*. This kind of disequilibrium becomes 'obdurate' and is called 'fundamental disequilibrium'.

2. Business Cycle and Cyclical Disequilibrium. Business cycle has been another major cause of *BOP* disequilibrium. Business cycle may be confined to a country or to a group of countries or it may be global as was during the Great Depression and during the global recession of 2008–09. If business cycle is of global nature, most countries face inflation and depression almost simultaneously. But, since countries differ in their economic size, their imports and exports are affected in varying degrees and forms. While some countries accumulate trade surplus, others have trade deficit of a large magnitude. For instance, during the short period of global recession of 2008–09, while India and China had trade surplus despite decline in their foreign trade, the US, UK, Euro nations and Japan had large trade deficits. Countries with high marginal propensity to import accumulate large trade deficits during the inflationary phase of the business cycle, and a moderate deficit or even a surplus during the depression. This kind of disequilibrium in *BOP* is called *cyclical disequilibrium*. The cyclical disequilibrium is however considered only a theoretical possibility under free trade system. In modern time free trade does not exist and countries adopt several measures to prevent a serious kind of *BOP* disequilibrium.

3. Structural Changes and Structural Disequilibrium. The third major cause of disequilibrium in *BOP* is the structural change within or outside the economy. The structural change may be caused by depletion of some widely used natural resources, change in technology, change in industrial structure, and change in consumer taste and preferences. Such changes affect significantly a country's capacity to export and propensity to import. The countries lagging behind in technological and industrial development find it difficult to face the international competition due mainly to their high cost of production. For example, gradual exhaustion of coal seams in Great Britain resulted in an increase in cost of coal production in spite of technological improvements in coal mining. This, coupled with labour problem, converted Great Britain from a net coal-exporting nation to a net coal-importing one.[2] The introduction and widespread use of nylon in the US textile industry affected Japanese silk exports. If magnitude of exports is very large, then the *BOP* of a country is affected in a significant way, causing *BOP* disequilibrium. This kind of *BOP* disequilibrium is called ***structural disequilibrium***.

4. Short-term Disequilibrium Factors. There are other factors which may cause temporal or short-run disequilibrium in *BOP*. In this category are included such factors as: (i) seasonal deficits caused by crop failures, as was the case with India before the mid-1970s, (ii) rapid growth of population in food-deficient countries causing import of large quantity of food, (iii) ambitious development plans necessitating heavy imports of technological know-how, machinery and equipment, and (iv) demonstration effect of the advanced countries on developing nations increasing imports in the latter. The temporal disequilibrium in *BOP* is only a matter of temporal concern.

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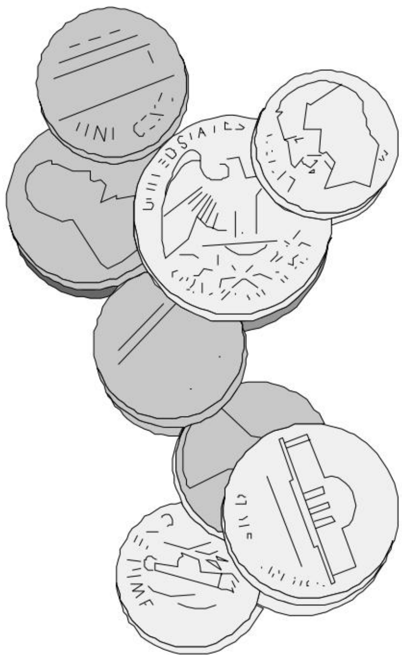
QUESTIONS FOR REVIEW

1. What is meant by the balance of payment? What purpose does it serve?
2. Explain the current account and capital account transactions and their implications on the balance of payments of a country.
3. What is meant by the balance of payment disequilibrium? How can you know whether balance of payments of a country is in equilibrium or disequilibrium?
4. What is meant by the disequilibrium in *BOP*? Explain the automatic adjustment mechanism under flexible exchange rate system.
5. What are the major causes of disequilibrium in the balance of payments of a country? What kind of balance-of-payment disequilibrium can hardly be cured through policy measures?

Chapter 28

Balance of Payments: Disequilibrium and Adjustments



INTRODUCTION

In the preceding Chapter, we have explained the meaning and the method of assessing the balance of payments, i.e., how a country can find whether its overall international balance is in surplus or in deficit. We have also discussed there the causes of disequilibrium in the *BOP*—a large magnitude of deficit or surplus in the balance of payments. In this Chapter, we discuss in detail the various approaches and policy measures suggested by the economists to correct the disequilibrium in the balance of payments. This is called *BOP* adjustment.

The *BOP* adjustment has been a theoretically complex and practically complicated issue for both the economists and the policy makers. The economists have suggested a variety of approaches and measures to correct the *BOP* disequilibrium. The various approaches and measures suggested by the economists can be classified under the following two broad categories.

(i) The ***classical approach* –** the free market approach – known also as the ***automatic adjustment approach*,** and

(ii) The ***interventionist approach,*** i.e., correcting *BOP disequilibrium* by adopting corrective policy measures.

We have discussed here the logic behind, and the need for, the two approaches and their working mechanisms in the framework of the *IS–LM* model. We have also discussed the effectiveness of and problems associated with the two approaches. Let us begin with the *classical approach* to the correction of *BOP* disequilibrium.

28.1 THE CLASSICAL APPROACH: THE AUTOMATIC ADJUSTMENT METHOD

The classical economists were of the view that the working of the economy – be it domestic or international – should be left to the free market system. According to the classical view, under free market conditions, the market mechanism would automatically solve the problems of the economy including the disequilibrium in *BOP*. This approach is, therefore, also known as 'automatic approach'. Under the classical system, the exchange rate is supposed to be determined by the market and, therefore, it remains flexible. Under the modern system, however, the exchange rate is determined by the monetary authorities of the member nations of the IMF. The exchange rate is allowed to fluctuate within a predetermined upper and a lower limit. The permission to allow the exchange rate to fluctuate within a range takes the system close to the classical system. Therefore, we will discuss here the working of the classical approach, i.e., the automatic approach, under both the *fixed* and the *flexible* exchange rate system for the sake of having a comparative view of the two systems.

28.1.1 Automatic *BOP* Adjustment Under Fixed Exchange Rate

As mentioned above, under the fixed exchange rate system the government of a member nation is obliged by the IMF to maintain the exchange rate for its currency within a band of range. Under this system, when the *BOP* of a country shows a surplus or a deficit causing a rise or a fall in the exchange rate, then the government is supposed to take necessary steps to prevent the rise or fall in the exchange rate beyond the permissible limits. The automatic adjustment under fixed exchange implies that the government maintains the fixed exchange rate and allows other market conditions to operate freely. This section illustrates the process of *BOP* adjustment in the *IS-LM* framework under the fixed exchange rate system. [It is advisable here to make a quick review of the derivation of the *BOP function* in Chapter 18, Section 18.6].

The *BOP* adjustment mechanism under fixed exchange rate is illustrated in Fig. 28.1. Suppose that the initial *IS* and *LM* curves are given by IS_0 and LM_0 curves, respectively, and the *BOP* function by the schedule marked *BOP*. Note that IS_0 and LM_0 curves intersect at point *F* determining equilibrium level of income at Y_0 and interest rate at i_3. Note also that the *BOP* function intersects the IS_0 schedule at point *E*. Since point *F* is placed above and to the left of point *E*, it shows *BOP surplus*[1]. As mentioned earlier (Ch. 27), *BOP* surplus (or deficit) means disequilibrium in the *BOP*.

Let us now see how market mechanism adjusts the economy to eliminate the *BOP* surplus and drives to the general equilibrium under the condition fixed exchange rate. A surplus in the *BOP* means a rise in foreign exchange reserves. It implies that the supply of foreign exchange in the domestic market exceeds the demand for it. As a result, foreign currency will depreciate in the domestic market and domestic currency will appreciate. For instance, foreign exchange reserves in India have been increasing almost continuously since 1991–92. It has increased from $9.2 billion

1. Recall here from Chapter 18, Section 18.6, and Fig. 18.3, that a point placed above and to the left of the *BOP* schedule implies a surplus in the *BOP*, and a point below and to the right of the *BOP* schedule implies a deficit in the *BOP*.

in 1991-92 to \$310 billion in 2007-08[2]. About two-thirds of it consisted of foreign currency. The rapid rise in the foreign currency reserves has been the main reason for appreciation of Indian rupee and depreciation of US dollar by 12-13 percent in June 2008.

To explain the process of *BOP* adjustment, let us suppose that the currency of a country depreciates. The appreciation of the currency may upset the export-import balance of the country by making its exports costlier and imports cheaper. In order to prevent this situation, the government would either increase the money supply to match the surplus foreign exchange or sell the surplus foreign currency in the international market. In both the cases, money supply increases. An increase in money supply will shift LM_0 schedule rightward to the position of LM_1. Note that the LM_1, IS_0 and *BOP* schedules all intersect at point *E.* At point *E,* therefore, both the internal and external sectors are simultaneously in equilibrium at a higher income level, Y_1 and at a lower interest, i_2. Point *E* is therefore the point of general equilibrium with *BOP* surplus eliminated.

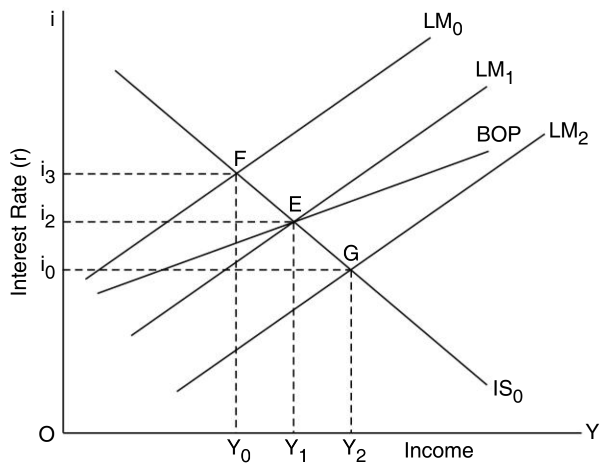


Fig. 28.1 *BOP* Adjustment under Fixed Exchange Rate

The same reasoning can be used to explain how a *BOP* deficit is eliminated under the fixed exchange rate system. Suppose that the initial *LM* curve is LM_2 intersecting IS_0 at point *G*. Since point *G* is below the *BOP* function, it shows *BOP* deficit. A deficit in the *BOP* means a shortage of foreign exchange, that is, demand for foreign exchange is greater than what is required to keep the exchange rate constant. The *BOP* deficit may therefore result in depreciation of the home currency and appreciation of the foreign currency in the domestic market. In order to prevent the depreciation of the home currency, the central bank will have to buy foreign exchange in the international market. This will reduce the money supply. As a result, the *LM* curve will shift leftward to the position of LM_1. Note that IS_0 and LM_1 curves and *BOP* function intersect with one another again at point *E*. At this point, both internal and external sectors are simultaneously in equilibrium with *BOP* deficit eliminated.

2. *Economic Survey—2008–09*, MOF, GOI, Statistical Appendix, Table 6.1(B).

28.1.2 Automatic Adjustment of BOP Under Flexible Exchange Rate

Under flexible exchange rate system, the exchange rate of a currency is determined in the foreign exchange market by the market forces of demand and supply, not by the central bank of the country. The currency of a country is free to find its value in the foreign exchange market. Under this system, the disequilibrium in the *BOP* (surplus or deficit) is automatically eliminated. The *BOP* disequilibrium itself creates the condition for the economy to attain *BOP* equilibrium. The process of automatic elimination of the *BOP surplus* and *BOP deficit* are discussed below.

Adjustment of BOP Surplus The automatic adjustment of *BOP* surplus is illustrated in Fig. 28.2. Suppose the initial *IS* and *LM* curves and the *BOP* function are given as IS_1, *LM* and BOP_1, respectively. In the pre-adjustment scenario, IS_1 is shown to intersect the *LM* curve at point *F*. Since point *F* is above and to the right of *BOP* function (BOP_1), it shows a *BOP* surplus. A *BOP* surplus means accumulation of foreign exchange in excess of what is required to keep the exchange rate stable. The *BOP* surplus causes, therefore, a rise in the exchange rate. That is, home currency gets appreciated in terms of foreign currency. Consequently, exports become costlier and imports cheaper. As a result, exports decrease and imports increase causing trade deficits. Trade deficits cause decrease in the national income. Therefore, these changes in exports and imports together make the *IS* curve shift leftward from IS_1 to IS_2 and *BOP* function from BOP_1 to BOP_2. The IS_2 and BOP_2 curves intersect at point *E* on the *LM* curve. Point *E* gives the point of general equilibrium because at this point both internal and external sectors are simultaneously in equilibrium and *BOP* surplus is eliminated. In this process of *BOP* adjustment, income level decreases from Y_2 to Y_1 and the interest rate falls from i_2 to i_1.

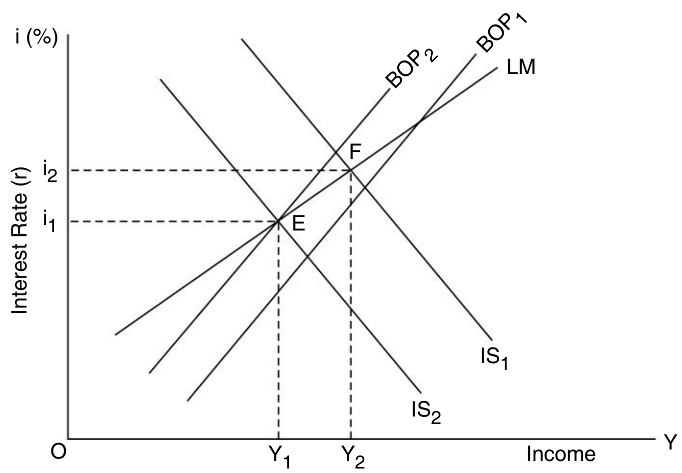


Fig. 28.2 *BOP* Disequilibrium (Surplus) and Automatic Adjustment under Flexible Exchange Rate

Adjustment of BOP Deficit The automatic adjustment of the *BOP* disequilibrium of deficit nature is illustrated in Fig. 28.3. Suppose that the initial *IS* and *LM* curves and *BOP* function are given as IS_1, *LM* and BOP_1, respectively. The curves IS_1 and *LM* intersect at point *F*. Since point *F* is below the *BOP* function, it implies a *BOP* deficit. A deficit in *BOP* means that the foreign exchange reserves are lower than what is required to keep the exchange rate stable at equilibrium. As a result, the home currency will depreciate. Depreciation of the home currency will make exports relatively cheaper and imports relatively costlier. As a result, exports will increase and imports will decrease causing *BOP* surplus over time. These changes in exports and imports will make the *IS* curve and *BOP* function shift rightward. The curve IS_1 shifts to IS_2 and function BOP_1 to BOP_2. The curve IS_2 and BOP_2, intersect at point *E* on the *LM* curve. Point *E* is, therefore, the point of general equilibrium. At point *E,* both internal and external sectors are simultaneously in equilibrium and *BOP* deficit is wiped out. Note that in the process of *BOP* adjustment, income level increases from Y_1 to Y_2 and the interest rate increases from i_1 to i_2.

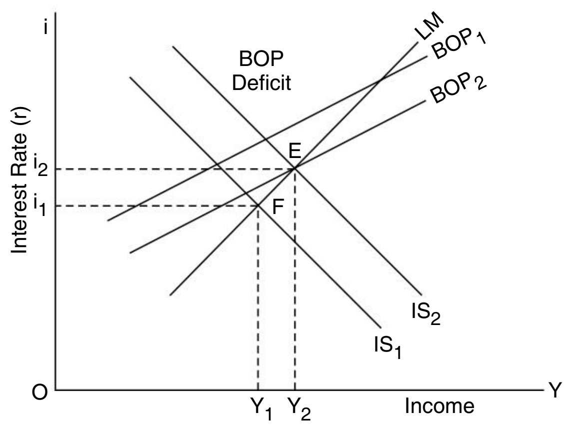


Fig. 28.3 *BOP* Disequilibrium (Deficit) and Automatic Adjustment under Flexible Exchange Rate

28.2 *BOP* ADJUSTMENT BY POLICY MEASURES: MUNDELL-FLEMING MODEL

In the preceding section, we have discussed how *BOP* disequilibrium gets *automatically* adjusted to equilibrium under both fixed and flexible exchange rate system assuming free market conditions in commodity, capital and foreign exchange markets. The solution offered by the market mechanism is basically theoretical. In reality, however, neither market conditions are free nor do the countries facing *BOP* disequilibrium, especially *BOP* deficits, rely on market mechanism to restore equilibrium in *BOP*. The main reason for government intervention is that market mechanism does not ensure a desirable solution to *BOP* disequilibrium on time. Therefore, countries facing *BOP* deficits do invariably adopt some suitable fiscal and monetary policy measures to correct their adverse *BOP*.

In this section, we discuss the policy measures generally adopted by the governments to correct the *BOP* disequilibrium, and how these policy measures help in eliminating undesirable surplus or deficit in *BOP*. Let us first look at why policy measures are inevitably required to correct the *BOP* disequilibrium.

28.2.1 Reasons for *BOP* Adjustment by Policy Measures

The main reasons for using policy measures for *BOP* adjustment are following.

First, the efficient working of the automatic adjustment mechanism requires perfectly competitive market conditions, including perfectly competitive international commodity and capital markets, no government intervention with free flow of goods and capital, international competitiveness of countries facing balance of payment deficits, and a fairly high price-elasticity and income-elasticity of demand for imports. In reality, however, such market conditions do not exist. Therefore, as most countries have experienced, market system does not ensure restoration of *BOP* equilibrium. For this reason most countries facing *BOP* deficit or surplus are often forced to opt for policy measures to correct the *BOP* disequilibrium.

Second, even if market system works efficiently, the economic cost of automatic adjustment is very high. The economic cost arises due to uncertainty associated with automatic adjustment mechanism. It is immensely difficult to predict the course of market mechanism. Besides, the automatic adjustment process may involve high economic cost in terms of inflation and unemployment. Most countries have neither the resources nor do they find it affordable and desirable to bear the cost of adjustment.

Third**,** the automatic adjustment mechanism requires that the *BOP* surplus countries tolerate rise in domestic prices and outflow of capital. But, the surplus countries are generally unwilling to allow the painful process of adjustment and to bear the cost of adjustment. Therefore, the market system does not work efficiently.

For these reasons, most countries adopt appropriate policy measures to correct their *BOP* disequilibrium.

28.2.2 The Policy Measures

The macroeconomic policy measures that are generally used to correct the *BOP* disequilibrium can be gropued under the following heads.

(i) Expenditure changing policies:
   (a) Monetary policy, and
   (b) Fiscal policy

(ii) Expenditure switching policy:
   (a) Devaluation, and
   (b) Revaluation

(iii) Monetary approach to manage forex reserves.

Obviously, a number of alternative policy measures are available to the policy makers to correct the adverse balance of payments. However, none of these policy measures has been found to be effective enough to solve the problem of *BOP* disequilibrium. Therefore, policy-makers need to find an appropriate policy-mix to solve the problem. However, policy-makers find it extremely difficult to devise an appropriate policy mix in the context of an open economy. Robert Mundell[3], a Nobel Laureate Professor in Columbia University, and late Marcus Fleming[4], a researcher in the IMF, developed in the early 1960s their own models that generally form the basis (with later refinements, of course) of finding an appropriate monetary-fiscal mix for correcting the *BOP* disequilibrium. Their models are jointly called ***Mundell-Fleming Model***. The Mundell-Fleming model of *BOP* adjustment is discussed in the following section in the framework of *IS-LM* model for an open economy under the 'expenditure switching policies.

We will discuss the various policy measures, listed above, in the subsequent sections with emphasis on the expenditure changing and expenditure switching policies in the *IS-LM* model. In our analysis, we will assume (i) *fixed exchange rate*, and (ii) *international mobility* of capital. In both the cases, we will assume *BOP deficit* arising out of *trade deficit*.

28.3 THE EXPENDITURE CHANGING POLICIES

The *expenditure changing policies*, also called 'expenditure adjusting' policies, refer to the policies that are aimed at changing (reducing or increasing) the aggregate expenditure in the domestic economy. Countries facing *BOP* deficit due to trade deficits adopt expenditure reducing policies. In a macroeconomic framework, trade deficit (*TD*) can be measured as follows. We know that at equilibrium,

$$Y \equiv C + I + G + X - M$$

If $M > X$, $\quad M - X \equiv TD$

By substitution, Y at equilibrium can be expressed as

$$Y \equiv C + I + G - TD$$

Thus,

$$TD \equiv (C + I + G) - Y$$

This equation implies that there is trade deficit because $(C + I + G) > Y$, i.e., aggregate expenditure exceeds aggregate income. It means that trade deficit can be reduced or eliminated by reducing the aggregate expenditure that equals $C + I + G$. The policies that are used to reduce the aggregate expenditure include: (i) *monetary policy*, (ii) *fiscal policy*, and (iii) *monetary-fiscal policy mix*. Let us now discuss the working and effectiveness of these policy measures in eliminating the *BOP imbalances*. In this part of analysis, we will assume *a fixed exchange rate* and free flow of capital.

3. Robert A. Mundell, "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates", *Canadian Journal of Economics and Political Science*, 29 (November 1963). See also his *International Economics* (Macmillan, NY, 1967) and *Monetary Theory* (Pacific Palisades, California, 1971). For more recent discussion of Mundell model, see D. MacDonald and M. Taylor, "Exchange Rate Economics: A Survey", *IMF Staff Papers*, 1992 and Peter Kenen (ed), *Understanding Interdependence: The Macroeconomics of the Open Economy* (Princeton University Press, Princeton, N.J., 1995).

4. J. Marcus Fleming, "Domestic Financial Policies under Fixed and Under Floating Exchange Rate", *IMF Staff Papers*, 9 (November 1962).

28.3.1 *BOP* Adjustment through Monetary Policy

Monetary policy refers to the measures adopted by the monetary authority to increase or decrease the money supply and availability of credit.[5] A monetary policy aimed at increasing the money supply and availability of credit to the public is called ***expansionary monetary policy*** or 'easy money policy.' And, a monetary policy aimed at decreasing the money supply and availability of credit to the public is called ***contractionary monetary policy*** or 'dear money policy.' We will analyse here the working of monetary policy in correcting the adverse *BOP* position and in restoring equilibrium in the *BOP*, all other things remaining the same.

The working and effects of monetary policy are illustrated in Fig. 28.4. Suppose that the internal economy of a country is in equilibrium at point E_1, the point of intersection between the *IS* and LM_1 schedules. The external balance (*EB*) at different combinations of income levels and interest rates is given by the *EB* schedule which is the same as *BOP* schedule. Note that *EB* schedule does not pass through the internal equilibrium point E_1. Therefore, the internal and external sectors are not simultaneously in equilibrium. Note also that the initial internal equilibrium point E_1 is on the right side and below the external balance schedule *EB*. It means that the country is faced with a *BOP* deficit at income level OY_1 and interest rate Or_2.

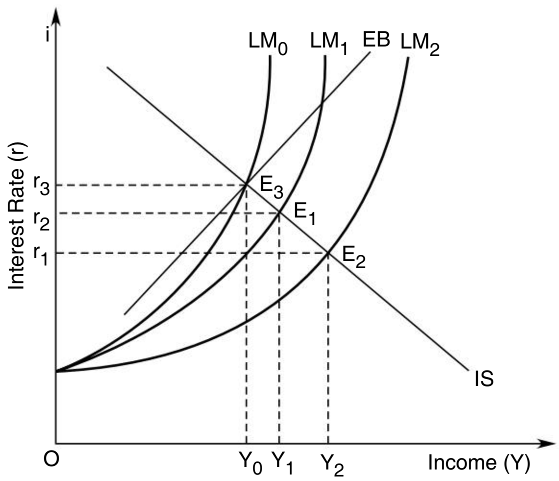


Fig. 28.4 *BOP* Adjustment through Monetary Policy

Now the question arises: What kind of monetary policy would be helpful in solving the problems of *BOP* deficit and surplus and in achieving internal and external balance? To answer this question, let us suppose that a country is facing *BOP* deficit. In that case, the answer is that a ***contractionary monetary policy*** would reduce the *BOP* deficit. Let us now examine what happens when the

5. The monetary measures that are used to change the money supply include (a) bank rate, the rate at which central bank lends money to banks or discounts the bills of the commercial banks, (b) open market operation, i.e. buying and selling the government bond and treasury bills in the open market, and (c) statutory cash reserve ratio, the ratio of term deposits that commercial banks are, by statute, required to maintain in the form of cash reserves. The working of these monetary policy instruments will be discussed in detail in Chapter 30.

government adopts a *contractionary monetary policy,* that is, a policy of reducing money supply. When a contractionary monetary policy is adopted, it decreases money supply. The decrease in money supply reduces the *BOP* deficit in two ways.

On the one hand, a decrease in money supply shifts the LM_1 schedule leftward towards LM_0 and the internal equilibrium point upward to the left. This takes the internal equilibrium point closure to the *EB* schedule. It means reduction in the *BOP* deficits. The reason is, a decrease in money supply increases the rate of interest. Increase in the interest rate reduces domestic investment. A fall in investment reduces the level of income and hence the level of imports. Reduction in imports reduces the trade deficit and therefore the *BOP* deficit.

On the other hand, increase in the interest rate results in short-term capital inflow which too reduces the *BOP* deficit. As shown in Fig. 28.4, a decrease in money supply shifts the *LM* schedule from LM_1 to LM_0. This shift increases the interest rate to Or_3. The rise in the domestic rate of interest works as an incentive for foreign investment. This causes inflow of foreign capital. The inflow of foreign capital reduces the capital account defficits. As a result, the *BOP* deficit decreases and it may disappear finally.

Let us now see what kind of monetary policy is adopted by a country to correct its *BOP* disequilibrium of *surplus* nature. In that case, the country adopts an **expansionary monetary policy**. When the government adopts a policy of monetary expansion, the schedule LM_1 will shift rightward to LM_2, all other things remaining the same, and the internal equilibrium shifts to point E_2. Point E_2 is below and to the right of the *EB* schedule. It means that monetary expansion would increase the *BOP* deficit and reduce *BOP* surplus. The reason is that monetary expansion reduces the rate of interest. This has a two-way effects on the economy. On the one hand, it increases the domestic investment which increases the level of income and increase in income increases imports, widening the gap between exports and imports. That is, monetary expansion enhances the trade deficit and reduces trade surplus. On the other hand, a lower interest rate leads to capital outflow which decreases capital account surplus. Thus, the combined effect of the monetary expansion is deterioration in the *BOP* surplus.

Conclusion. The conclusions that emerge from the analysis of effects of the monetary policy is that a contractionary monetary policy reduces the *BOP* deficits and helps in achieving internal and external balance, and an expansionary monetary policy reduces country's *BOP* surplus.

28.3.2 *BOP* Adjustment through Fiscal Policy

Before we explain the working and effectiveness of fiscal policy in bringing about *BOP* adjustment, let us recall that *fiscal policy* refers to the deliberate changes made by the government in its expenditure and taxation policies or both. Fiscal policy can be used as an effective tool of changing the aggregate demand and aggregate expenditure in the economy. Like monetary policy, a fiscal policy can be an ***expansionary fiscal policy*** or a ***contractionary fiscal policy***. An expansionary fiscal policy increases the aggregate demand and a contractionary fiscal policy reduces the aggregate demand. A country adopting an expansionary fiscal policy increases government spending or decreases the level of taxation or adopts both the measures simultaneously. A country adopting a contractionary fiscal policy cuts down government spending or raises the level of taxation, or uses both measures simultaneously. What kind of fiscal policy is adopted depends on the causes and the nature of *BOP* disequilibrium and the need for *BOP* adjustment.

Let us now examine the effect of fiscal policy on the *BOP* deficit and *BOP* surplus. We will analyze first the effect of fiscal policy on *BOP* deficit—the major problem. With a view to avoiding complications that might arise due to other policy measures, we assume that the government uses only fiscal policy to influence country's balance of payments, all other factors remaining the same.

The effect of fiscal policy on the *BOP* is illustrated in Fig. 28.5. Let us assume that a country is faced with *BOP* deficit and examine what kind of fiscal policy would be appropriate for restoring the *BOP* to equilibrium. Suppose that internal equilibrium of the country is given at point E_2, the point of intersection between the *LM* and IS_2 schedules and that country's external balance is given by schedule *EB*. Note that the internal equilibrium point E_2 falls below and to the right of the *EB* schedule. This indicates that the country is faced with a *BOP* deficit indicated by point *J*.

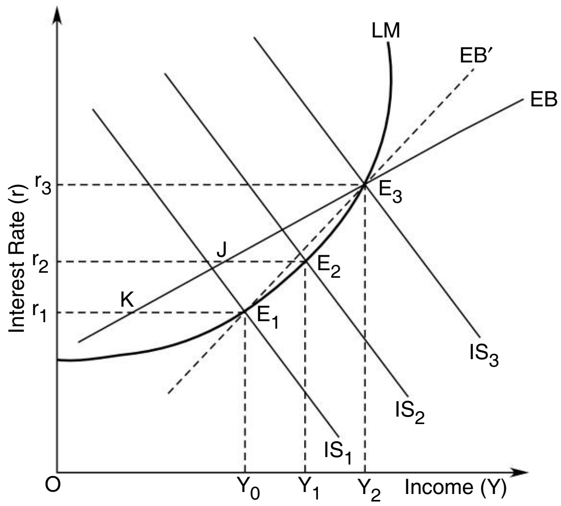


Fig. 28.5 BOP Adjustment through Fiscal Policy

It may be added here that there is some ambiguity in the effectiveness of both *expansionary* and *contractionary* fiscal polices. To explain it further, let us examine the effect of contractionary and expansionary fiscal policies alternatively on the country's *BOP* position. Let us first look at the effect of a *contractionary fiscal policy* on the *BOP* deficit and internal and external balance.

When the government adopts a ***contractionary fiscal policy*****,** leaving other things undisturbed, the schedule IS_2 shifts downward to IS_1. A new internal equilibrium is reached at point E_1, the point where schedule IS_1 intersects with *LM* schedule. At this point of equilibrium, the *BOP* deficit increases further as indicated by point *K* which is further away from equilibrium point E_1. That is, contractionary fiscal policy causes *BOP* to deteriorate. What is worse, the level of income decreases, causing increase in unemployment. The reason for the deterioration in the *BOP* is the decrease in interest rate from Or_2 to Or_1 which causes outflow of capital. Although, a contractionary fiscal policy decreases simultaneously the imports by decreasing national income, the outflow of capital overweighs the decrease in the imports caused by the decrease in income. Therefore, country's *BOP* position deteriorates.

It is, however, important to note that whether a contractionary fiscal policy worsens or improves *EB* depends on the slope of the *EB* schedule in relation to the *LM* curve. Given the slope of the

LM schedule, for example, if *EB* schedule rotates anticlockwise, it will get closer to the equilibrium point E_1, showing improvement in *EB*, as shown by *EB′* schedule. It is however equally important to note that the improvement in *EB* achieved by contractionary fiscal policy results in a lower level of equilibrium income and employment and also at a lower rate of interest. Fall in the interest rate may cause outflow of capital which will have adverse effect on the economy.

Let us now examine the effect of ***expansionary fiscal policy***. An expansionary fiscal policy will shift the schedule IS_2 upward to IS_3. Note that the schedules IS_3, *LM* and *EB* all intersect at point E_3. This implies that E_3 is the point of internal and external balance which determines the income level at OY_2 and interest rate at Or_3. Although imports increase due to increase in income, capital inflow and increase in imports are presumably in balance. Therefore, external sector is in balance with the internal sector.

The effect of expansionary fiscal policy on *BOP* may appear to be ambiguous. As noted above, the effect of expansionary fiscal policy depends on the slope of the *EB* schedule. If *EB* schedule has a higher slope as shown by the dashed schedule *EB′* and *LM* schedule is curvilinear, then there will be two equilibrium points E_1 and E_3. Then the country will have to make a choice between the expansionary fiscal policy and contractionary fiscal policy. An expansionary fiscal policy is however a clear choice as it gives a higher level of income and employment and solves the problem of *BOP* deficit.

28.3.3 Monetary-Fiscal Mix and *BOP* Adjustment

In the preceding sections, we have examined the effects of monetary and fiscal policies assuming the only one of these policies is adopted at a time. In practice, however, most countries use a monetary-fiscal mix to correct their adverse *BOP*. We have noted that a contractionary monetary policy is helpful in correcting the *BOP* deficit, whereas an expansionary fiscal policy is preferable for correcting the *BOP* deficit. So a country opting for using a monetary-fiscal mix for correcting its *BOP* deficit would adopt a combination of ***contractionary monetary*** and an ***expansionary fiscal policy***. We will discuss here how a policy-mix works to correct the *BOP* deficit and to attain internal and external balance, assuming ***fixed exchange rate*** and relative interest-elasticity of capital mobility.

The working of monetary-fiscal mix is illustrated in Fig. 28.6 which is a combination of Figs. 28.4 and 28.5. Suppose that the initial internal equilibrium of a country is given at point *E*, the point of intersection between schedules IS_1 and LM_3. Since point *E* is below and to the right of *EB* schedule, the country has a *BOP* deficit. Now the problem before the country is how to correct the *BOP* deficit. To achieve this goal, the country has three alternative options: (i) to use only monetary policy, (ii) to use only fiscal policy, and (iii) to use a mix of monetary and fiscal policies. The effects of monetary and fiscal policies have already been discussed. This part of the analysis will however be repeated here briefly to show the links between the three options. We will then analyse the combined effect of monetary-fiscal mix.

Suppose that the country chooses to use only ***monetary policy***, and adopts a contractionary monetary policy to correct its *BOP* deficit. The use of a contractionary monetary policy makes its original *LM* schedule (LM_3) shift leftward to LM_1 intersecting schedule *EB* at point *F*. Now all the three schedules, *EB*, LM_1 and IS_1, intersect at point *F*. Point *F* is therefore the point of internal and external balance. The *BOP* deficit is totally eliminated. But the country has to pay a high cost in

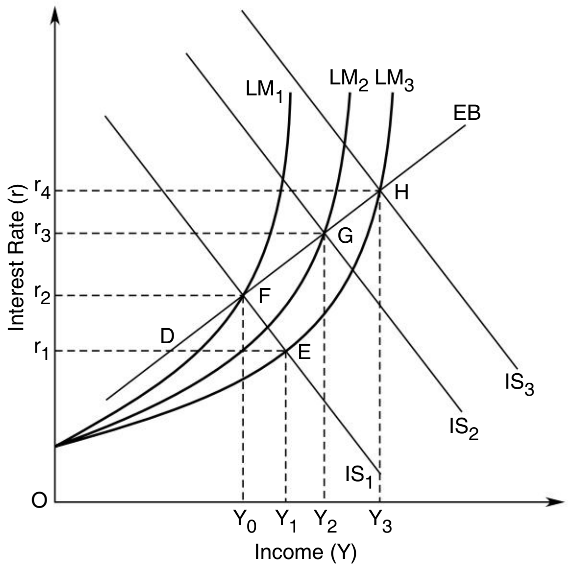


Fig. 28.6 Monetary-Fiscal Policy-Mix for Eliminating *BOP* Deficit

terms of fall in the national income from OY_1 to OY_0 and a rise in the interest rate from Or_1 to Or_2. It means that the *BOP* deficit is eliminated at the cost of decrease in national income and increase in unemployment. This is, of course, a heavy cost of eliminating the *BOP* deficit.

Let us now look at the effects of ***fiscal policy*** in isolation. When a country decides to use only fiscal policy to eliminate its *BOP* deficit, it will have to use an expansionary fiscal policy. To begin the analysis, let us suppose that the economy is in equilibrium at point *E* with *BOP* deficit and the government uses expansionary fiscal policy. The use of an expansionary fiscal policy shifts the original *IS* schedule from IS_1 to IS_3 which intersects with schedules *EB* and LM_3 at point H. All the three schedules, *EB*, LM_3 and IS_3, intersect at point *H*. Point *H* is, therefore, the point of internal and external balance. The *BOP* deficit is totally eliminated. What are the other consequences? The level of national income increases from OY_1 to OY_3 and interest rate increases from Or_1 to Or_4. This increase in national income and interest rate has a very high inflationary potential. It means that the *BOP* deficit is eliminated at the risk of high potential inflation. Inflation involves high economic and social costs. This solution may therefore not be socially and politically desirable.

Let us now examine the effect of ***monetary-fiscal mix***. When the government decides to use a policy-mix, it will have to adopt a contractionary monetary policy combined with an expansionary fiscal policy. A policy-mix approach requires using an expansionary fiscal and a contractionary monetary policy. The expansionary fiscal policy shifts schedule IS_1 to IS_2 and contractionary monetary policy shifts schedule LM_3 to LM_2. In Fig. 28.6, schedules IS_2, LM_2 and *EB* intersect at point *G*. Point *G* is therefore the point of internal and external balance. This solution is comparatively better and preferable as it mitigates the disadvantages of both monetary and fiscal policies used separately. Unlike monetary policy, it does not cause unemployment and decrease the level of income, and unlike fiscal policy, it does not create conditions for hyper inflation though some inflation will be there. A policy mix approach is, therefore, preferable to other options available to the country.

28.3.4 Assignment Dilemmas in Policy Mix

The use of monetary-fiscal mix in not as simple and straightforward as concluded above. The choice and implementation of monetary-fiscal mix is a complex problem in the real world. Complexity arises on account of the following two factors.

(i) Lack of Perfect Knowledge and Accurate Data. The policy makers, in general, do not have perfect knowledge about the shape and place of the *IS* and *LM* schedules. Nor do they have complete and accurate data about the economic variables used in the *IS-LM* model. The policy-makers have data, often inaccurate, only on national income, unemployment, inflation, interest rate and balance of payments. This is just not sufficient to determine the shape, slope and place of the *IS* and *LM* curves. Therefore, it is immensely difficult to formulate an optimum monetary-fiscal mix. Besides, what is largely unknown and unpredictable—but a crucial requirement in the formulation of an appropriate monetary-fiscal mix—is the possible outcome of interaction between the monetary and fiscal policies. It is therefore, extremely difficult to adjust the monetary and fiscal levers to find an optimal combination of monetary-fiscal policy mix.

(ii) Disagreement on the Role and Effectiveness of Monetary and Fiscal Policies. As discussed earlier, the economists disagree on the role and effectiveness of monetary and fiscal policies. The disagreement on the role and effectiveness of monetary and fiscal policies and the ensuing a prolonged debate has created more confusion rather than providing guidelines for finding an appropriate policy mix. The final choice is then made on the political and ethical grounds which conflict often with economic goals.

The nature and the classification of problems involved in policy choice is illustrated in Fig. 28.7. The schedule *EB* is the same as in Fig. 28.6. It represents the path of external balance. The vertical line, *IB,* represents the path of *internal balance*. It is drawn through the possible points of intersection between the *IS* and *LM* schedules. The schedule *IB* need not necessarily be a vertical

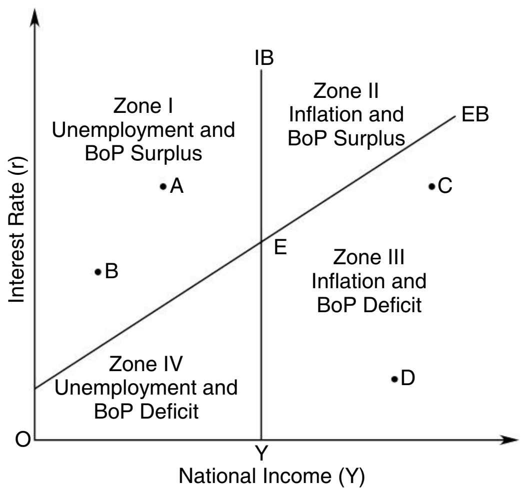


Fig. 28.7 The Four Zones of Different Kinds of Internal and External Disequilibrium

line. Depending on the placement of the *IS* and *LM* schedules, it may have a negative slope or a positive slope. However, we proceed to analyse the conflicting results of different kinds of monetary fiscal mix by assuming a vertical *IB* schedule. As shown in Fig. 28.7, schedules *IB* and *EB* intersect at point *E*. Point *E* is, therefore, the only point of simultaneous internal and external balance. The points on schedule *IB* are the points of only internal equilibrium, and points on schedule *EB* are the points of only external equilibrium. All other points in the diagram, e.g., points *A*, *B*, *C* and *D*, are the point of both internal and external disequilibrium. The intersecting schedules *IB* and *EB*, divide the diagram into four zones of internal and external disequilibrium. Each of these zones represents different kinds of economic problem. The different kinds of economic problems associated with each zone is listed below.

Zone I : Unemployment and *BOP* surplus
Zone II : Inflation and *BOP* surplus
Zone III : Inflation and *BOP* deficit
Zone IV : Unemployment and *BOP* deficit

An economy which is not operating at point *E* or at any point on the *IB* and *EB* schedules is operating on a point in any of these four zones. From policy point of view, Zones I and III are the zones of dilemma. The dilemma is that no uniform policy can be adopted if the economy is operating on any two different points in any of these zones. For example, points *A* and *B* in Zone I need two different combinations of monetary and fiscal policies. At point *A* the authorities are required to cut down the government spending and to increase money supply in order to move towards point *E*. But, when the economy is operating at point *B,* the authorities will be required to do the opposite. Similarly, two opposite policies are required on points *C* and *D* in Zone III.

The situation is not as bad in Zones II and IV because, in these two zones, the direction of change in at least the government spending is predictable. For example, in Zone II the authorities are required to reduce the government spending irrespective of the point on which the economy is placed. Similarly, in Zone IV, the government spending has to be increased on any point in the zone. But, the direction of change in money supply remain uncertain as in case of Zones I and III.

28.3.5 The Mundellian Policy Assignment

Mundell suggested in 1962 and again in 1968 a solution to the problem of policy predicament discussed in the preceding section. We discuss here briefly the Mundellian approach to the problem of *policy assignment*. Mundell developed a *principle of effective market classification* and suggested a rule for efficacy and stability of policy measures following Tinbergen's rule. According to Tinbergen rule, *a policy instrument should be assigned a target which it can hit relatively most effectively.* Going by this rule, monetary policy or fiscal policy should be assigned a task which it can perform most successfully in achieving internal and external balance. Since monetary and fiscal policies have both their relative advantages and disadvantages, these policies need to be so combined that their positive effects are maximized and negative effects minimized.

Mundell's rule of policy assignment for the four different kinds of economic problems in four zones are summarized below.[6]

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6. For a detailed discussion, see M. Chacholiades, *International Economics, op. cit*., p. 422.

Zone	*Nature of Imbalance*	*Monetary Policy*	*Fiscal Policy*
I	Unemployment and *BOP* surplus	Expansionary	Expansionary
II	Inflation and *BOP* surplus	Expansionary	Contractionary
III	Inflation and *BOP* deficit	Contractionary	Contractionary
IV	Unemployment and *BOP* deficit	Contractionary	Expansionary

However, Mundellian solution has its own problems. These policy assignment rules offer a stable solution to the problem of internal and external balance only when (i) policies are chosen judiciously and implemented without discretionary changes, and (ii) there is no time lag in the working of monetary and fiscal policies. These are big conditions, particularly, the condition regarding the time lag. Therefore, Mundell's solution is considered to be ***unstable*** and, therefore, impractible.

28.3.6 Problems in Applying Mundellian Monetary-Fiscal Policy Mix

The monetary-fiscal policy-mix as a means to attaining internal and external balance has strong theoretical underpinning. In reality, however, this approach has serious practical problems.

One, the Mundellian approach assumes that policy-makers are fully aware of (i) the internal balance path (i.e., *IB* schedule), (ii) the external balance path (i.e., the *EB* schedule), (iii) the zone in which the economy is placed, and (iv) how away is the economy placed from the *IB* schedule. In reality, however, these parameters are unknown and difficult to determine.

Two, for lack of necessary data, determination of an exact combination of monetary and fiscal measures compatible with one another for achieving internal and external balance is an extremely difficult task. Therefore, some arbitrariness has to be there in the policy formulation. Besides, political considerations do affect the decision-making. Any mismatch between the monetary-fiscal mix on these accounts affects the efficacy of the policy mix.

Three, the monetary-fiscal mix is based on some predictable relationship between the interest rate and capital flows. This relationship may be disturbed after the implementation of the policy for some non-economic factors, e.g., political uncertainty, labour unions, war, etc. For example, India was facing a double digit inflation—11.25 percent in June-July 2008. The GOI was in dilemma as to what mix of monetary and fiscal policies to adopt. Only interest rate was marginally raised, which had not proved to be effective.

Four, the Mundellian approach does not provide a 'true adjustment mechanism'. This approach considers capital flows as autonomous, whereas, in reality, a considerable part of capital flows is accommodating, not autonomous. The accommodating capital flows are not affected by the change in the interest rate. This condition may seriously affect the efficacy of Mundell's solution.

Finally, Mundellian approach assumes (implicitly) that other countries are not affected by the monetary-fiscal policy mix adopted by a country, and even if they are, they do not react. In reality, however, a great deal of conflict arises between the nations. Finding an appropriate monetary-fiscal mix compatible with that of other countries is rather an impossible task. And, even if a compatible monetary-fiscal mix is somehow worked out by trial and error, it may push the economy away from the equilibrium point rather than bringing it closer to the equilibrium.

28.4 THE EXPENDITURE SWITCHING POLICY: DEVALUATION

In the preceding section, we have discussed the *expenditure changing policies*, *viz*., monetary and fiscal policies, aimed at changing the aggregate spending with the purpose of correcting the adverse *BOP*. We have discussed also the practical problems associated with expenditure changing policies and the problems related to monetary-fiscal mix. In this section, we discuss the *expenditure switching policies* to solve the problem of *BOP deficit* and their effectiveness.

The *expenditure-switching* policy is one that aims at attaining the internal and external balance by switching the domestic expenditure from imported to domestic goods or the other way round depending on the need of the country. The expenditure-switching policy works through the change in relative prices of imports and domestic goods. Under free market conditions, the relative prices of imports and domestic goods change on their own either due to ***exchange depreciation*** or ***exchange appreciation.*** Exchange depreciation or appreciation is the result of the market mechanism. The market determined *exchange appreciation* is often a major cause of *BOP* deficit as it increases imports and decreases exports. It does so because it makes imports cheaper than domestic goods. Therefore, the nations suffering from *BOP* deficit are forced to adopt policy measures to reverse the process, i.e., to switch the domestic demand from foreign to domestic goods. The policy instrument that is generally used for expenditure-switching is ***devaluation***. ***Devaluation*** is a deliberate policy action taken by the government to devalue the domestic currency in terms of gold or in terms of the foreign currency to which the domestic currency is tied. Devaluation has, in fact, been used as a major policy tool for expenditure switching combined, generally, with restrictive monetary and/or fiscal policy.

In this section, we discuss first the working mechanism of currency devaluation and then its effectiveness. Since *BOP* deficit is the major concern of most countries, we confine our discussion to how devaluation helps in eliminating *BOP* deficit. We discuss here the following aspects of devaluation as an expenditure-switching policy measure.

(i) Working mechanism of devaluation,
(ii) *BOP* adjustment under devaluations,
(iii) Effectiveness of devaluation, and
(iv) Empirical evidence of its effectiveness.

28.4.1 Working Mechanism of Devaluation

When the central bank of a country (RBI in India) reduces the value of the domestic currency officially in terms of foreign (reserve) currency, it is called devaluation. The objective of devaluation is to reverse the flow of domestic consumer expenditure from imported to domestic goods. Devaluation changes the exchange rate *ipso facto*. The immediate effect of change in the exchange rate is the change in the relative prices of imports and domestic goods. In effect, devaluation increases the price of imported goods in relation to the prices of domestic goods. Therefore, if demand for imports is price-elastic, the demand for imported goods decreases and the demand for their domestic substitutes increases. In the process, expenditure on imports decreases and that on the domestic goods increases. This is what is called 'expenditure-switching, i.e., consumer expenditure is switched from foreign goods to domestic goods. Due to expenditure-switching, imports decrease in the devaluing country and exports from the country increase. This reverses the trade balance. This is how devaluation is supposed to correct the adverse *BOP*.

Let us now explain the mechanism by which devaluation helps in correcting *BOP* deficit in a two-country model under the following simplifying assumptions.

(i) There are only two countries, *A* and *B*, with currencies A_c and B_c, respectively;
(ii) There are only two goods, *X* and *Y*, involved in the foreign trade between the countries *A* and *B*.
(iii) Country *A* exports *X* to country *B* and imports *Y*, and country *B* exports *Y* and imports *X* from country *A*.
(iv) There is no capital movement between the two countries, *A* and *B*.

The mechanism by which devaluation eliminates the *BOP* deficit is illustrated in Fig. 28.8. Panel (a) shows the trade in commodity *Y.* Suppose that the exchange rate between *A*'s currency (A_c) and *B*'s currency (B_c) is given as B_c 1 = A_c 5. Given the exchange rate, *A*'s demand for *B*'s exportable *Y* and *B*'s supply schedule for *Y* are given as shown in panel (a). Note that *A*'s demand schedule and *B*'s supply schedule intersect at point *K*. Thus, the trade equilibrium between the two countries in respect of commodity *Y* is determined at 350 units of *Y* at price 30 B_c per unit.

Likewise, panel (b) shows the trade in commodity *X* between the two countries. At exchange rate B_c 1 = A_c 5, country *B's* demand schedule and country *A*'s supply intersect at point *R* determining export and import of commodity *X* at 100 units at price 60 B_c per unit.

We can now work out pre-devaluation *trade balance* for country *A* from data given in panels (a) and (b) of Fig. 28.8.

Pre-devaluation Trade Balance of Country A

A's import = 350 (*Y*) × B_c 30 =	B_c 10,500
A's export = 100 (*X*) × B_c 60 =	B_c 6,000
Pre-devaluation trade deficit =	B_c 4,500

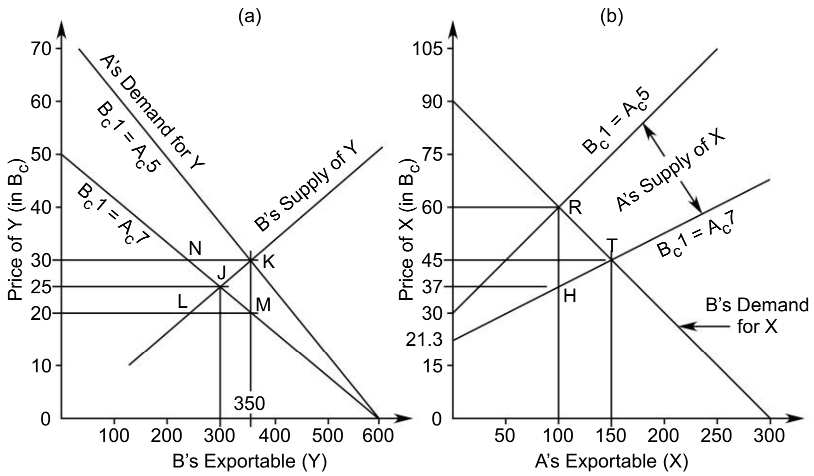

Fig. 28.8 The Effects of Devaluation on Imports and Exports

Since, by assumption, there is no capital movement between the two countries, *trade deficit* equals the *BOP deficit*. As shown in pre-devaluation trade balance accounting, country *A* is thus faced with a *BOP* deficit of B_c 4,500. Now let us suppose that country *A* decides to use devaluation to correct its *BOP* deficit and devalues its currency by, say, 40% so that a new exchange rate is fixed at B_c 1 = A_c 7. The immediate effect of devaluation is the increase in the price of commodity *Y* (*A's* importable) in terms of *A*'s currency. For example, the equilibrium price increases from A_c 150 (= 30 B_c × 5) to A_c 210 (= 30 B_c × 7). Assuming that *A's* demand for *Y* is price-elastic, its demand for *Y* decreases by *NK* as shown in panel (a). Since this applies to all the prices, *A*'s demand schedule for *Y* shifts downward as shown in panel (a). As a result of shift in *A*'s demand schedule (*B*'s supply schedule remaining the same) trade is determined at point J. It shows that *A*'s import of *Y* decreases from 350 units to 300 units.

What happens to A's exports after devaluation? Due to devaluation of *A*'s currency (A_c), *B's* currency is automatically appreciated. The rate of appreciation equals 28.58%.[7] It means that *A's* exportable (commodity *X*) becomes cheaper by 28.58% in terms of *B*'s currency (B_c). As a result, *A*'s supply curve shifts rightward as shown in panel (b). *B's* demand schedule for *X* remaining the same, *A*'s new supply schedule intersects *B*'s demand schedule at point *T*. The new equilibrium point shows decrease in the price of *A's* exportable (*X*) from B_c 60 to B_c 45. Consequently, *B's* demand for A's exportable *X* increases from 100 units to 150 units.

Let us now find the post-devaluation trade balance and the effect of devaluation on *BOP* deficit.

Post-devaluation Trade Balance

A's import = 300 (*Y*) × B_c 25 = B_c 7,500
A's export = 150 (*X*) × B_c 45 = B_c 6,750
Post-devaluation trade deficit = B_c 750

We can now find the effect of devaluation on *A*'s *BOP* deficit by comparing the trade balance before and after devaluation. Our calculations show that devaluation reduces the trade deficit from B_c 4500 to B_c 750. It reduces, thereby, *BOP* deficit to the same extent.

28.4.2 Devaluation and Internal-External Balance

In the preceding section, we have shown how devaluation switches the domestic expenditure from imported goods to domestic goods; how it reduces imports and increases exports; and how it restores external balance. However, restoring external balance alone is not enough: external balance must coincide with internal balance. For, if there is internal imbalance, it may create conditions for decline in income and employment which may lead to external imbalance. In this section, we explain how devaluation—the expenditure switching policy instrument—can help restoring external balance with internal balance.

The process of restoration of internal and external balance is illustrated in Fig. 28.9 in *AD-AS* model. Let us suppose that the aggregate demand (*AD*) and aggregate supply (*AS*) curves of a country, say A, are given as *AD* and *AS* curves in Fig. 28.9 and country A in equilibrium at point

7. The rate of appreciation = $\frac{7-5}{7}(100) = 28.58.$

E. Note that the external balance curve *EB* passes through the equilibrium point *E*. It means that country A has attained both internal and external balance at equilibrium point *E*.

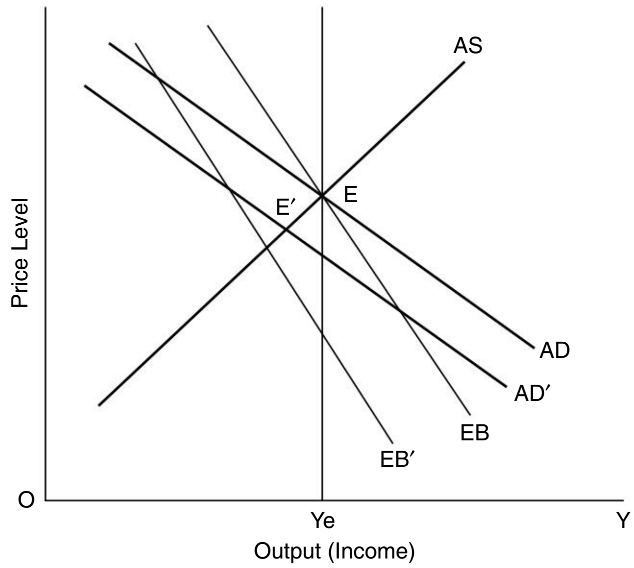

Fig. 28.9 Devaluation and Internal-External Balance

Now suppose that for some extraneous reason, export of country A declines, resulting in fall in output, employment and in incomes. As a result, aggregate demand curve *AD* shifts downward to *AD′* shifting the equilibrium point to *E′*. This leads to fall in the imports and exports of the country. Consequently, the external balance curve *EB* shifts downward to the position of *EB′*. However, as shown in Fig. 28.9, country A is in equilibrium at point *E′*. Note that point *E′* happens to fall above the *EB′* curve. It means that at point *E′*, there is external imbalance with a trade deficit.

Let country A now devalue its currency. As a result, prices of its imports increase and prices of its export goods decrease. Assuming imports and exports are both price-elastic, imports of the country would decline and its exports would increase. As a result, its external balance curve *EB′* would shift upward to its original position of *EB* passing through equilibrium point *E*. Trade deficits would be wiped out. This marks the restoration of both internal and external balance. Whether devaluation of currency alone restores the internal and external balance in reality depends on a number of internal and external factors, like trade policy of other countries, reaction of other countries to devaluation by a country, the elasticity of exports and imports etc. These factors are discussed in the following section.

28.4.3 The Effectiveness of Devaluation: The Marshall-Lerner Condition

It may appear from the foregoing analysis that devaluation is a sure cure of *BOP* deficit. It may however not be true in reality. The effectiveness of devaluation depends on certain conditions. For example, decrease in imports due do devaluation depends on price and income elasticity of imports, availability of substitutes, and customs. However, the most important condition of the effectiveness of devaluation is, what is called, the ***Marshall-Lerner condition***. The Marshall–Lerner condition states that *when the sum of the price-elasticities of the demand for imports of any two countries trading their goods between them is greater than unity, then devaluation (or exchange depreciation) increases exports and decreases imports*. In our example of countries *A* and *B*, the effect of devaluation on country *A*'s *BOP* can now be summarized in terms of Marshall-Lerner condition as follows.

(i) *Devaluation reduces BOP deficit when the sum of price-elasticity of A's demand for imports and price-elasticity of B's demand for A's exportables, in absolute terms, is* ***greater than unity.*** This condition is satisfied by the demand curves given in Fig. 28.8. Therefore, devaluation reduces the *BOP deficit.*

(ii) *Devaluation increases BOP deficits when the sum of price-elasticity of demand for imports of country A and the price-elasticity of demand for its exportable, in absolute terms, is* ***less than unity.*** To prove this point, let us look back at Fig. 28.8. In case *A*'s demand for *Y* is perfectly inelastic, then the devaluation would shift the equilibrium from point *K* to *M* in panel (a) of Fig. 28.8. This indicates no change in *A's* imports. At point *M,* demand exceeds supply by *LM.* Therefore, import price moves up to point *K.* It means that devaluation is ineffective under this condition. On the other hand, if *B*'s demand for *X* is perfectly inelastic, devaluation will make equilibrium shift from point *R* to *H* which means that *A's* export does not change. But, export price goes down from B_c 60 to B_c 37. As a result, *A*'s export earning decreases. The final position is that *A*'s import bill does not decrease and export earnings decrease. Consequently, *A's BOP* deficit increase due to devaluation.

(iii) *When the sum of price-elasticity of demand for importable of country A and the price-elasticity of demand for its exportable, in absolute terms, equals one, then devaluation leaves the trade balance of country A unchanged and hence the BOP remains unaffected.*

28.4.4 The Empirical Evidence and the J-Curve Effect

The empirical evidence shows the Marshall–Lerner condition (i) holds, in general, for all industrial nations, except for Australia and the UK[8]. That is, the sum of price-elasticities of imports and exports for the industrialized nations have been found to be considerably higher than unity. It may, therefore, be concluded that devaluation is an effective method of correcting adverse *BOP* in the developed countries.

However, further emprical evidences show that this conclusion holds in the long run, not in the short run. In the short run, devaluation causes a deterioration in the *BOP*. The short-run deterioration in *BOP* is caused by the tendency of import prices to increase faster in the domestic market immediately after devaluation than the export prices, without much change in the quantities imported and exported. The reason is that the existing export-imports deals cannot be reversed. Importers will have to import at post-devaluation higher prices, causing a high import bill. The result is deterioration in the *BOP*. In the *long run*, however, imports begin to decline and exports pick up

8. For a brief summary of empirical evidence, see Salvatore, D., *op. cit*., pp. 462–67 and Chacholiades, *op. cit*., pp. 343–45.

at post-devaluation prices. Consequently, the deterioration in the trade balance is halted and over time *BOP* begins to improve. When the overall trend is plotted on a graph paper, it produces a *J*-shape curve, as shown in Fig. 28.10. The economists call it *J-curve effect* of devaluation.

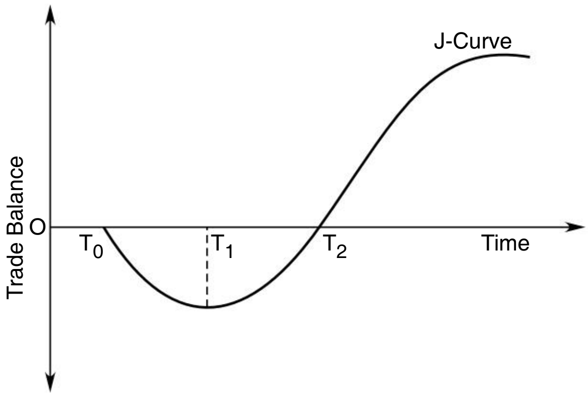

Fig. 28.10 The J-Curve Effect

In Fig. 28.10, vertical axis measures balance of trade ($X – M$) and horizontal axis measure 'time'. Point T_0 marks the time of devaluation. As the figure shows, the balance of trade deteriorates immediately after devaluation, i.e., during the period from T_0 to T_1. It begins to improve after time T_1 and deficit begins to decrease. It is only after some time, say time T_2, that devaluation becomes effective and balance of payment goes into surplus. The duration of period between point T_0 and T_2 varies from country to country.

28.5 MONETARY APPROACH TO *BOP* ADJUSTMENTS

Correcting disequilibrium in the *BOP* has been, as noted above, a knotty problem for both economists and policy-makers. However, efforts continued to find a general solution to the problem of *BOP* adjustment. In the process, there emerged another important approach to *BOP* adjustment, called ***monetary approach***. The monetary approach was developed by Robert A. Mundell in 1968 and 1971 and Harry G. Johnson in 1972. It must be borne in mind that the monetary approach developed by these economists is different from monetary-policy approach. The monetary approach to *BOP* adjustments is discussed below.

According to the modern monetary approach, *BOP disequilibrium is a monetary phenomenon. The BOP disequilibrium (deficit or surplus) arises because of inbalance between the demand for and supply of money*. The ***BOP* deficits** arise because money supply exceeds the demand for money and ***BOP surplus*** is the outcome of the excess of demand for money over the supply of money. The monetary approach is based on the premise that *BOP* disequilibrium arising out of discrepancy between the demand for and supply of money is a transitory phenomenon and is self-correcting in the long run.

Another important feature of the monetary approach is that it looks at the *BOP* "bottoms up." That is, it begins the analysis of *BOP* disequilibrium by looking at the bottom of the *BOP* accounts, i.e., the change in the official foreign exchange reserves. Rather than analyzing 'above the line' entries in the *BOP* accounts, monetary approach lumps together all the transactions in the current and capital accounts and looks at the changes in the final outcome of the international transactions. The final outcome is reflected by the change in the official reserves of foreign exchange.

Pending the details, let us first look at the process of *self-correction.* The self-correction process begins with the change in the *official reserves*. In case there is deficit in the *BOP*, it causes a decline in the official reserves of foreign exchange. Decline in the foreign exchange reserves leads to a decline in the money supply. The decrease in money supply leads to decrease in domestic prices, increase in exports, decrease in imports, and decrease in trade deficits. These trends automatically correct the *BOP* disequilibrium. On the other hand, a surplus in the *BOP* increases money supply which causes rise in prices, decrease in exports, and rise in imports. This decreases the trade surplus. Thus, the surplus in *BOP* is automatically eliminated and *BOP* disequilibrium is corrected. These conclusions can be established through the basic model of the monetary approach.

28.5.1 The Model of Monetary Approach

According to the monetary approach, *BOP* imbalance (B) equals the difference between the demand for money (M_d) and the supply of money (M_s).

$$B = M_d - M_s \tag{28.1}$$

The relationship between the *BOP* and money demand and supply is illustrated in Fig. 28.11. In this figure, the demand for money, M_d, is assumed to be exogenously determined and to remain constant. This assumption can be explained as follows. We know that,

$$M_d = M_t + M_{sp} \tag{28.2}$$

where, M_t = transaction demand, and M_{sp} = speculative demand for money.

We know also that $M_t = f(Y)$ and $M_{sp} = f(i)$, where Y = national income, and i = interest rate. The monetary approach to *BOP* adjustment assumes that both Y and i are exogenously determined. It implies that so long as Y and i remain constant, the demand for money remains constant as shown by the schedule M_d in Fig. 28.11.

As regards the supply of money, monetary approach assumes that money supply in an open economy equals *domestic component of money supply* plus *external component of money supply.* The domestic component of money supply equals *money multiplier* times the commercial bank reserves with the central bank (i.e., the domestic component of the monetary base). The external component of money supply equals money multiplier times the 'international reserves' (i.e., the external component of the monetary base). Given these components of money supply, M_s, in Eq. 28.1 can be defined as:

$$M_s = m(DB + IB) \tag{28.3}$$

where, m = money multiplier; DB = domestic base (commercial banks' deposits with the central bank); and IB = international base (international reserves).

The monetary approach to *BOP* adjustment assumes DB and money multiplier (m) to remain constant. Therefore, domestic component of money supply remains constant. The constant

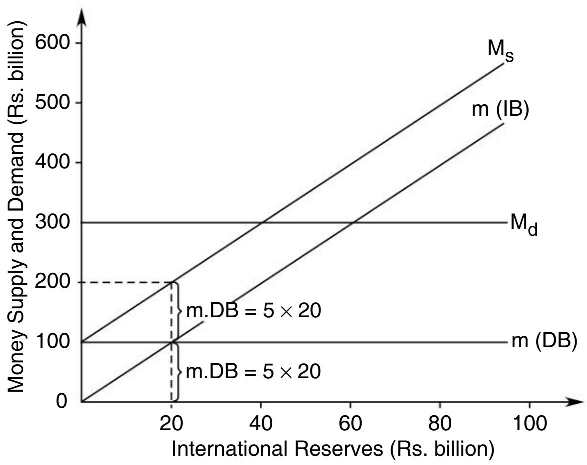

Fig. 28.11 Money Demand and Supply and International Balance

domestic component of money supply has been shown in Fig. 28.10 by the horizontal schedule *m*(*DB*) by assuming *mDB* = Rs 100 billion. The schedule *m*(*DB*) has been drawn by assuming *m* = 5 and *DB* = *Rs* 20 billion (constant).

On the other hand, the international balance (*IB*) is supposed to be a variable factor. Therefore, the international component of money supply changes with the change in the international balance (*IB*). It equals *m* × *IB*. The international component of money supply schedule thus obtained is given by the schedule *m*(*IB*). The *m*(*IB*) schedules in our example is based on 5(*IB*). The aggregate money supply schedule, M_s, is the vertical sum of schedules *m*(*DB*) and *m*(*IB*). This is precisely the *monetary approach* model. Let us now look at the self-correcting mechanism of the *BOP* disequilibrium as envisaged by the monetary approach to the problem.

28.5.2 The Self-Correcting Mechanism

The self-correcting mechanism under monetary approach is illustrated in Fig. 28.12 assuming a fixed exchange rate. Panel (a) of this figure is reproduction of Fig. 28.11 and panel (b) is a derivation from panel (a). As shown in panel (a) the total money supply schedule (M_s) and the total money demand schedule (M_d) intersect at point *E* where M_d equals M_s at Rs 300 billion and, at the equilibrium, international reserves equals Rs 40 billion. It implies that if international reserves equal Rs 40 billion, then M_d will always be equal to M_s and the monetary sector will be in equilibrium.

The point that needs to be noted here is that, according to the monetary approach, when total demand for money equals total money supply, then *BOP* is in equilibrium—there is neither surplus nor deficit in the *BOP*. As shown in panel (a) of Fig. 28.12, at no point other than point *E* money supply equals money demand. Therefore, at all other points along the M_s and M_d schedules, there is either deficit or surplus in the *BOP*. This phenomenon is illustrated in panel (b) of Fig. 28.12. The *payments imbalance schedule* represents the vertical difference between the M_d and M_s schedules in panel (a). Point *E'* in panel (b) shows zero *BOP* balance corresponding to point *E* in panel (a).

The Self-Correcting Process. According to the monetary approach, the self-correcting process is an in-built system. When demand for money exceeds the supply of money, it means that there is surplus in the *BOP*. As Fig. 28.12 shows, at all the points below point *E* along the schedule M_s in panel (a), demand for money exceeds supply of money. It means that, in accordance with Eq. 28.1, there is *BOP* surplus, that is, increase in the foreign exchange reserves. For example, at foreign exchange reserves of Rs 20 billion, the demand for money equals Rs 300 billion and money supply equals Rs 200 billion. It means that money demand exceeds money supply by *JK* = Rs 100 billion. This means a *BOP* surplus of Rs 100 billion, which enhances the foreign exchange reserves. This rise in the foreign exchange reserves pushes the money supply up over time along the schedule M_s towards point *E.* At point *E,* demand for money equals the supply of money. Therefore, there is neither surplus nor deficit in the *BOP*. That is, the *BOP* is automatically restored to equilibrium.

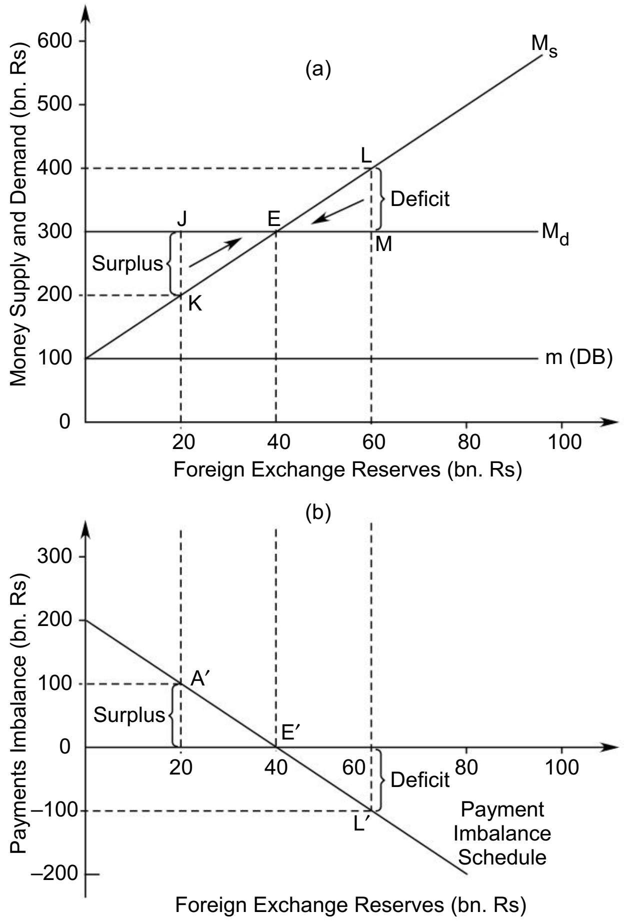

Fig. 28.12 Self-Correcting Monetary Mechanism

Similarly, when money supply exceeds money demand, *BOP* shows a deficit. For example, at foreign exchange reserves of Rs 60 billion, money supply exceeds money demand by *LM* = Rs 400 billion – Rs 300 billion = Rs 100 billion. This means a *BOP* deficits of Rs 100 billion. The deficit in the *BOP* decreases the money supply over time. The decrease in money supply makes the system move back to point *E*. This process continues until the money supply falls to Rs 400 billion to equal the money demand. At point *E,* the demand for money equals the supply of money. It means $B = 0$ [in Eq. (28.1)] and their is neither deficit nor surplus in the balance of payment. This is how the *BOP* equilibrium is automatically restored.

SUGGESTED READINGS

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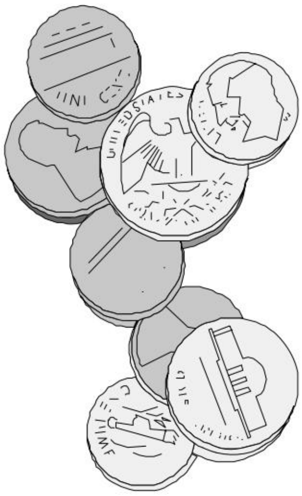
QUESTIONS FOR REVIEW

1. How is the *BOP* function derived? Derive it graphically and explain how does it show surplus or deficit in the balance of payments.
2. Show graphically that the internal and external sectors are both simultaneously in equilibrium where *IS* and *LM* curves and the balance-of-payment function all intersect one another. Give reason why any other point cannot be the point of *general equilibrium*.
3. Why is policy intervention to correct adverse balance-of-payments position preferred to the automatic adjustment mechanism? What is the IMF approach in this regard?
4. How will you distinguish between exchange depreciation and devaluation? How does devaluation work to correct the disequilibrium in the balance of payments?
5. Distinguish between 'expenditure changing' and 'expenditure switching' policies of correcting disequilibrium in the balance of payments. Which of the two kinds of policies will you recommend for less developed economies facing balance-of-payment deficits?
6. How does monetary policy work to remove balance of payment deficits? Will you recommend a contractionary or an expansionary monetary policy to correct an adverse balance of payment? Give reason.
7. What is the role of fiscal policy in the balance of payments adjustment? Is a contractionary or an expansionary policy suitable for correcting deficit in the balance of payments?
8. What is meant by devaluation? How does devaluation work in solving the *BOP* deficit? What are the factors that determine the effectiveness of devaluation?

9. Does devaluation work always effectively in increasing exports and decreasing imports? If not, why? What is the *J*-curve effect of devaluation?
10. Why is a monetary-fiscal policy mix preferable to monetary or fiscal policy alone? Why does the 'assignment problem' arise in case of monetary-fiscal mix and how is it resolved?
11. Explain monetary approach to balance of payments adjustments. How does it differ from expenditure-changing approach to balance of payments adjustments?
12. What, according to monetary approach, is the reason for disequilibrium in the balance of payments? What is monetary authority supposed to do to correct the disequilibrium in the balance of payments?
13. What is the basic proposition of monetary approach to the balance of payments adjustments? How does a disequilibrium in balance of payments correct itself? Illustrate graphically.
14. What are the policy implications of monetary approach to balance of payments adjustments? What kind of monetary policy is required for correcting the disequilibrium in the balance of payments?
15. What is the basic model of monetary approach? What is self-correcting mechanism of monetary approach?

Part 9

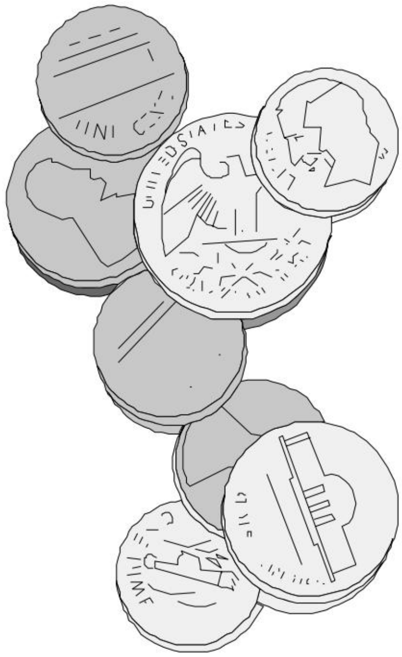
Macroeconomic Policies: Monetary and Fiscal Policies



The world has witnessed that free market mechanism does not ensure general equilibrium and stability in the economy and that macroeconomic problems—business cycles, inflation, deflation, stagflation and unemployment—continue to arise time and again. Therefore, the government has to adopt policy measures to redress the problems as and when they arise. Two most important macroeconomic policy measures are monetary measures and fiscal measures. Although contextual references to monetary and fiscal policies have been made in several preceding chapters, here these policies have been discussed in a wider scope. The meaning, scope, objectives and method of formulating macroeconomic policies, in general, are discussed in Chapter 29. Monetary and fiscal policies work through and affect different macro variables. Therefore, their desirability and effectiveness vary from condition to condition and from problem to problem. Hence they need to be discussed separately. While Chapter 30 discusses the meaning, scope, and instruments of monetary policy, Chapter 31 discusses the same aspects of fiscal policy.

Chapter 29

Macroeconomic Policy: Meaning, Objectives and Formulation



INTRODUCTION

Recall that the working and the effectiveness of the two most important macroeconomic policies—monetary and fiscal policies—have already been discussed in Chapter 17 in the framework of the *IS*-*LM* model. Our objective there was purely theoretical—how fiscal changes affect the *IS* schedule and how monetary changes affect the *LM* schedule, and how these changes affect the equilibrium level of income and interest rate. In this Part of the book, we discuss monetary and fiscal policies in a wider perspective from practical and empirical points of view. The aspects that will be covered here include the need for and the evolution of macroeconomic policies, the basic principles of policy formulation, determination of policy objectives and policy instruments.

Although major macroeconomic policies include (i) monetary policy, (ii) fiscal policy, (iii) income policy, (iv) growth policy, (v) stabilization policy, and (vi) employment policy, we will concentrate, in this Part of the book, on only two main macroeconomic policies, *viz. monetary policy* and *fiscal policy*. In fact, these two macroeconomic policies are the two most important instruments of achieving economic growth, stabilization and employment. Before we discuss these policies at length, it will be useful to have an overview of macroeconomic policy, including its meaning, need, objectives and method of formulation.

29.1 MACROECONOMIC POLICY: MEANING AND SCOPE

What is Macroconomic Policy? *Macroeconomic policy* can be defined *as a programme of economic action undertaken by the government to control, regulate and manipulate macroeconomic variables to achieve certain predetermined macroeconomic goals, viz., economic growth, price stability and employment*. In the words of Brooks and Evans, "Macroeconomic policy can be thought of as an attempt by the authorities to achieve particular target levels of certain major economic aggregates."[1] A macroeconomic policy is, in fact, an instrument of policing the economy (if one may use the phrase) to achieve certain economic goals. In general, macroeconomic goals include a sustainable growth rate, full or near full employment, equitable distribution of national income, a stable price level, and equilibrium in the balance of payments.

As regards the ***scope of macroeconomic policy,*** it encompasses (i) the targets—the objectives, and (ii) the target variables. The objectives have already been mentioned above. The *target variables* include all major macroeconomic variables. Macroeconomic variables include both *real* and *monetary* variables. *Real variables* including *GDP*, total employment, aggregate expenditure, saving and investment, government expenditure and tax and non-tax revenue, exports and imports, and the balance of payments. *Monetary variables* include supply of money, demand for money, supply of credit, bank deposits and interest rate. Given the two categories of macro variables, there are two kinds of tools or measures to control and regulate the macrovariables, *viz, monetary measures* and *fiscal measures*. The working of monetary and fiscal policy measures will be discussed in detail in the forthcoming chapters. In this introductory Chapter, we focus on the need for macroeconomic policies, their objectives in general and the problems encountered in the policy formulation.

29.2 THE NEED FOR AND ADVENT OF MACROECONOMIC POLICIES

Macroeconomic problems have always been there ever since the countries began their endeavour to improve their living conditions. But the role of government in managing the economy and use of macroeconomic policies to solve the macroeconomic problems are of recent origin. Until the Great Depression of 1930s, there was nothing like macroeconomic policy. The reason was the prevalence of the classical economic thoughts that the economy should be left to work on the principles of free market mechanism and the government role in economic activities and its intervention with the economic system must be minimum.[2] However, the Great Depression (1929-1933) shattered the classical doctrine as it could offer neither an explanation nor a solution to the devastating and unprecedented economic problems caused by the Great Depression. The Great Depression had caused an unprecedented decline in GDP of the industrialised nations and an

1. John Brooks and Robert W. Evans, *Macroeconomic Policy in Theory and Practice,* 1978, (George Allen & Unwin, London), p. 2.

2. According to Adam Smith the government functions should be limited to (i) national defence, (ii) law and order and internal security, (iii) judiciary, and (iv) establishment of basic institutions and enactment of law to foster the working of the market system.

unprecedented increase in unemployment and poverty[3]. The classical and neo-classical economic thoughts and theories that had prevailed over 150 years could not be applied to diagnose the problem nor could they provide guidlines to revive the economies from depression. One possible the reason was that the classical economies was of microeconomic nature whereas the Great Depression was of macroeconomic nature.

It was Keynes—the founder of the macroeconomics—who showed the need for the government role in economic management to achieve growth and stability. Keynes' view gained prominence in the post-Second World War period, specially in the reconstruction of the war-ravaged economies. A fairly successful role of the government in the reconstruction of the war-ravaged economies established the Keynesian view that the government can play an important role of the prime-mover and can accelerate the pace of economic growth, reduce unemployment and stabilize the economy through its fiscal measures. "Many early enthusiasts of the Keynesian approach believed that fiscal policy was like a knob [the government] could turn to control the pace of the economy."[4] Incidentally, most countries are using fiscal measures under their 'bail out scheme' for reviving their economies from the current global recession (2008-09).

Some economists believe that "The need for macroeconomic policy arises because the economic system does not adjust appropriately to the shocks to which it is constantly subjected."[5] However, the role of macroeconomic policy did not remain confined to controlling business cycles: it was extended far beyond. In fact, the early success of Keynesian prescription to cure economic problems of the 1930s and to reconstruct the War II-devastated economies created a strong belief that macroeconomic policies could be used to solve the problems of underdevelopment in the underdeveloped countries, *viz*., (i) breaking the 'vicious circle of poverty' of the backward economies and pushing them out of their 'low equilibrium trap,' (ii) creating conditions for capital formation and economic growth, (iii) solving their problem of chronic mass open and disguised unemployment, and (iv) reducing the inexplicable wide gap between the rich and the poor. In most backward economies, therefore, the need for macroeconomic policy was felt for creating conditions for economic growth. In the post-Independence period, India adopted broadly the Keynesian model to develop its Five Year Plans to lift the Indian economy out of its 'low equilibrium trap'.

It may be added here that the Kaynesian macroeconomic policy was based broadly on fiscal measures. But fiscal policy began to show its weaknesses and proved ineffective during the 1960s. Therefore, another school of thought emerged, called *monetarism*, led by Milton Friedman. Monetarists emphasized the role of money in working of the economy and suggested monetary policy as the basic macroeconomic policy for controlling and regulating the economy to achieve macroeconomic goals. Whether *fiscal policy* or *monetary policy* is more effective in achieving the macroeconomic goals has been a controversial issue. This aspect has already been discussed in preceding chapters in different context.

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3. For instance, the US economy had experienced, between 1929 and 1933, a fall of 30% in her *GNP*, increase in unemployment from 3 to 25%, decline in stock prices by 85%, and negative net investment between 1931 and 1935.

4. Samuelson, P. A. and Nordhaus, W. D., *Economics*, 15th edn., p. 626.

5. M.H. Piston, *Theory of Macroeconomic Policy* (Philip Allan, Oxford, 1974), p. 1.

29.3 OBJECTIVES OF MACROECONOMIC POLICIES

The objectives of macroeconomic policies are determined by the policy-makers in view of the social and economic aspirations of the people, which, of course, vary from country to country and from time to time depending on the changing economic conditions. Therefore, the policy objectives are bound to vary from country to country and from time to time. However, *employment* and *economic stabilization* were the two primary objectives of macroeconomic policies of most developed countries in the post-Depression period, though many other objectives were added later to the list of macroeconomic policy objectives. We discuss here the major and common objectives of macroeconomic policies.

29.3.1 Economic Growth

Achieving and maintaining a high growth rate has been accorded a top priority in the economic agenda of most nations—rich and poor. Also, the emphasis on a reasonably high growth rate in accordance with growth potentials of the nation has increased tremendously over the past half-a-century. To quote Samuelson again, "Economists and politicians from all nations, rich and poor, capitalist, socialist, and mixed, have worshipped at the shrine of economic growth". The reasons for predominance of growth objective are:

(i) the level of economic growth determines the level of fulfillment of social and economic aspirations of the people;
(ii) it ensures the very survival of a country as a free and independent nation;
(iii) it determines the capability of a nation to defend its borders and sovereignty;
(iv) it determines the respect and honour a country receives in the world community;
(v) it is the only way of creating job for unemployed and eradicating poverty; and
(vi) it helps maintaining peace and preventing a possible disintegration of the nation.

For these reasons, a reasonably high growth rate (5-6% p.a.) is viewed as an indispensable economic and political objective of most nations. Since the 1970s, however, there has been a remarkable change in the private and public perception of economic growth and economic well-being of the people. There is growing disillusionment in both the rich and poor nations regarding the 'relentless pursuit of growth' being 'the principal economic objective of society.'[6] The issue of cost of economic growth in terms of degradation of social life and environment has overtaken the issue of growth. The experience of many developing countries show that growth does not necessarily improve the quality of life, social relationships, economic condition of the poor. Economic growth in Africa, Asia and Latin America has left millions of poor untouched from the benefits of growth over the past half-a-century. Therefore, emphasis has shifted from growth to eradication of poverty and economic inequality. Some economists call for 'dethronement of *GNP*' and crowning the eradication of poverty'. For example, Mahbub-ul-Haq, a renowned economist of Pakistan, asserts, "We were taught to take care of our *GNP* as this will take care of poverty. Let us reverse this and take care of poverty as this will take care of the *GNP*."[7]

6. Michael P. Todaro, *Economic Development in the Third World,* 4th Edn. (Orient Longman, Hyderabad, 1993), p. 143.

7. Mahbub-ul-Haq, "Employment and Income Distribution in the 1970s: A New Perspective," *Development Digest,* October 1971.

Notwithstanding the disillusionment with economic growth as the prime objective of economic policy, a well conceived growth plan and a well managed economic growth is undeniably the only answer to the widespread problem of poverty and unemployment. For instance, according to the Tenth Plan Projections, in India, the percentage of population below poverty line (BPL) decreased from 51.50 percent in 1972–73 to 27.50 percent in 2004–05 due, mainly, to economic growth of the country. With the rise in growth rate since 2000, the rate of unemployment too declined, from about 9.22 percent in 1983 to 8.28 percent in 2004–05[8]. However, in spite of a high growth rate of 6-7 percent, the rate of unemployment and poverty ratio in India are very high. It implies that growth alone does not ensure a rapid decline in poverty and unemployment. What is needed is to shift the emphasis from growth to 'inclusive growth'.

29.3.2 High Rate of Employment

Achieving and maintaining full employment has been one of the major objectives of Keynesian macroeconomic policy. Keynes is regarded as the first economist who emphasized the need for full employment and a justification for making it a macroeconomic target. According to him, one of the "outstanding faults of the economic society in which we live is its failure to provide full employment" (*The General Theory,* p.372). Full employment is defined variously. Keynes defined full employment as "a situation in which aggregate employment is inelastic in response to increase in the effective demand (*ibid.* p. 26). As already mentioned, UN Experts on *National and International Measures of Full Employment*, define full employment more meaningfully as "a situation in which employment cannot be increased by an increase in effective demand and unemployment does not exceed the minimum allowance that must be made for effects of frictional and seasonal factors."

The desirability of full employment as an objective of macroeconomic policy lies in the social benefits of employment in terms of additional output lost due to unemployment. Besides, employment of unemployed reduces the social and economic misery causing suicide and killing of family members and mental agony suffered by the unemployed. The desirability of full employment as an objective of macroeconomic policy was, in fact, established more profoundly than ever before by Arthur M Okun in his famous law. Recall the Okun's law (see Chapter 25, Section 25.1) stated as "In the post-War II period, on the average, each extra percentage point in the unemployment rate above 4% has been associated with about a 3% decrement in real GNP."[9]

The employment objective is congruent with growth objective. Generally, they go hand in hand. However, a high growth rate does not necessarily ensure a high rate of employment. Therefore, during and the post-War II period, the economists and economic advisors suggested that the government should own the responsibility of creating additional job opportunities and maintaining high level of employment. For instance, Britain's White Paper (1944) recommended, "The Governments accept as one of their primary aims and responsibilities the maintenance of a high and stable level of employment after the war." The US Employment Act (1946) lays down that the Federal Government should "use all practicable means consistent with its needs and obligations and other considerations of national policy ... to coordinate and utilize all its plans, functions, and resources

8. *Economic Survey—2008–09*, MOF, GOI, Table 10.2, p. 260 and Table 10.5, p. 264.

9. Arthur M. Okun, "Potential GNP : Its Measurement and Significance," *ibid.,* p. 135. Although later researches on the subject show that Okun's coefficient has not been stable, it does provide an insight into the social cost of unemployment.

for the purpose of creating and maintaining ... useful employment opportunities, ... and to promote maximum employment, production and purchasing power." The governments in many developed countries adopted employment promotion as one of the main objectives of their macroeconomic policy.

The acute problem of unemployment in the *LDCs,* especially those who achieved their independence after the Second World War, adopted the Keynesian policy in their development programmes. Employment promotion has been one of the main objectives of their macroeconomic policy and of the development plans. For example, creation of employment has been one of the basic aims of all the Five Year Plans of India.

29.3.3 Stabilization of Prices, Output and Employment

Price stabilization was the foremost objective of macroeconomic policy of the industrial countries during and after the Great Depression. In Britain, the Macmillan Committee on Finance and Industry (1931), had suggested that 'our objective should be, as far it lies within the powers of this country to influence the international price level,' to raise the price level above its Depression level and to maintain it at that level 'with as much stability as can be managed' and that 'this objective be accepted as the guiding aim of the monetary policy' of this country.'[10] In the Foreword to the British White Paper (1944), it was specifically recommended that "The government accept as one of their primary aims and responsibilities the maintenance of a high and stable level of employment after the war."[11] These recommendations by the advisory committees mark the beginning of a new policy approach towards the macroeconomic problems of the post-War period and the beginning of the government assuming a new role.

The USA had adopted a similar approach to the problems of unemployment and price stability. Although stabilization aspect was not clearly mentioned in the US Employment Act (1946), it was 'clearly implicit' in the Act. However, it was made an explicit objective of the Federal Economic Policy during the late 1950s. When the US economy faced severe inflation in the late 1950s, President Eisenhower recommended in his Economic Report of 1959 that Employment Act 1946 should be amended to make a 'reasonable price stability an explicit goal of Federal Economic Policy.' Apart from the developed countries, like UK and USA, most developing economies had adopted price stability as one of the objectives of their macroeconomic policy. The reason was that their growth efforts had created conditions for a high rate of inflation, as was the case in India.

It may be added here that price stability as an objective of macroeconomic policy does not mean maintaining price index at a constant level. Some authors define price stability as "stability of some appropriate price index in the sense that we can detect no definite upward trend in the index after making proper allowance for the upward bias inherent in all price indexes."[12] Besides, a moderate rate of inflation is considered to be desirable. Therefore, from practical point of view, price stabilization objective may mean preventing price rise in excess of its desirable limits, that is,

10. The Report of Committee on Finance and Industry, June 1931, p.117.

11. Quoted in Dasgupta, A. K. and Hagger, A. J., *The Objectives of Macroeconomic Policy* (Macmillan, London, 1971), p.4.

12. A. K. Dasgupta and A. J. Hagger, *The Objectives of Macroeconomic Policy* (Macmillan, London, 1971), p.21.

2–3 percent in *DCs* and 4–5 percent in *LDCs*. In effect, however, price stabilization means preventing violent fluctuations in the price level.

29.3.4 Economic Equity

The experience of both the developed and developing economies shows that economic growth does not ensure equitable distribution of national income, nor does it promote economic well-being of all its people. More importantly, growth has been generally accompanied by the widening of income inequalities marked with affluence of a section of the society and abject poverty of the rest of the society, even though the average level of income has been rising. Income inequality puts a limit to overall economic growth of the country by limiting the aggregate demand. So economic equity has become as one of the objectives of macroeconomic policy. The policy purpose in this regard is to create conditions for a high rise in the income of the low-income group or to transfer the income from the rich to the poor.

29.3.5 Stabilizing Balance of Payments

The phenomenal growth in the foreign trade in the post-War II period and a relatively slow growth of international liquidity (the means of external payments) led to disequilibrium in the balance of payments position in many countries. The problem aggravated due to protectionist policy, competitive devaluation and countervailing tariffs and other trade restrictions. Therefore, maintaining a satisfactory balance of payments position has been accepted as one of the important objectives of the macroeconomic policy since the 1950s. It is, however, difficult to specify as to what constitutes the satisfactory balance of payments position.[13] Nevertheless, as discussed in Chapter 27, disequilibrium may be in the form of increasing *surplus* or *deficit* in the *BOP* position. A disequilibrium of deficit nature, specially when it is of perpetual nature and of a large magnitude, it is a matter of great concern for a country as it creates external payment problem and international indebtedness. For instance, the foreign exchange crisis of July 1990 in India led to a near collapse of the economy and country falling into a situation of debt trap. Argentina, Brazil and Mexico have suffered severe economic upheavals in the past decade due mainly to their adverse *BOP*. Therefore, maintaining a healthy *BOP* position is accepted as an important objective of macroeconomic policy.

29.4 OBJECTIVES OF INDIA'S MACROECONOMIC POLICY

The objectives of India's macroeconomic policy have been specified in the Five Year Plan documents and policy papers of the Ministry of Finance and the Planning Commission. The objectives of India's macroeconomic policies are reiterated, from time to time, in the annual budget of the government of India, and the publications of the Reserve Bank of India. Interaction of government bodies with the economists of the country, foreign economic experts and economic bodies like International Monetary Fund and World Bank provide insight and perspective for determining the objectives of the macroeconomic policies. The major objectives of India's macroeconomic policy are summarized below.

(i) Achieving a growth rate of 5-6 percent per annum,
(ii) Creating job opportunities for unemployed and underemployed,
(iii) Removing economic disparity,

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13. G. K. Shaw, *An Introduction to the Theory of Macroeconomic Policy,* (Macmillan, London, 1973), p. 1.

(iv) Eradicating poverty,
(v) Controlling inflation and price stabilization, and
(vi) Managing balance of payments imbalances.

It may be mentioned here that the, emphasis on these policy objectives changes from time to time depending on the urgency of the problem. However, none of the objectives of India's macroeconomic policies have been achieved satisfactorily. Achievements have been far below the target rates: (i) long-term growth rate had been about 3-4 percent till 1970, though it increased during the 1980s and reached 9 percent in 2007; (ii) employment rate has been much lower[14] (1 to 1.5 percent p.a.); (iii) economic disparity is claimed to have widened instead of decreasing as claimed by many researchers, and (iv) the price level has almost continuously increased—the annual average rate of inflation has been about 8 percent per annum since 1960–61. The inflation rate was 10 percent plus in 2008. Not only in India, it has been a common experience of many developed and developing countries that policy targets have not been satisfactorily achieved.

29.5 FORMULATION OF THE MACROECONOMIC POLICY

The task of policy formulation is, in fact, the responsibility of the government. It has to find a balance or a point of trade-off between the conflicting objectives of macroeconomic policy. For example, India faced the problem of policy conflict in the recent past. In 2007, India had a growth rate of 8–9% but inflation rate had gone up to 13%. The high rate of inflation was unacceptable. So India had to adopt a contractionary monetary policy. But this might affect the growth rate adversely. However, the problem was automatically resolved by the global recession of 2008-09 as both growth rate and inflation rate had declined sharply. It may be noted at the outset that there are no set rules for the formulation of macroeconomic policies. There is, however, a general procedure which is followed in the policy formulation. Three most important aspects of policy formulation are:

(i) determination of policy objectives,
(ii) choice of policy and policy instruments, and
(iii) determining the target variables and targets.

Let us now look at the process of determining policy objectives, choice of policy and policy instruments.

29.5.1 Determination of Policy Objectives

As already mentioned, policy objectives are determined in the light of economic needs and social aspirations of the people of the country. The economic needs and social aspirations are reflected in the social and political philosophy of the politicians, social thinkers and philosophers, and intelligentsia, which they reveal in their writings and speeches. However, the major policy objectives are *economic growth, employment, equity and stability.* The priority and emphasis accorded to each of these objectives may vary from country to country and from time to time. It is for the policy-makers to make choice from these objectives and fix their priorities.

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14. During 1960s and 1970s, employment had grown at a reasonably high rate of over 2% per annum. See T. S. Papola, "The Question of Unemployment," in Bimal Jalan, *The Indian Economy: Problems and Prospects* (Viking Penguin India, New Delhi, 1992), p. 300.

The choice of policy objectives and their prioritization depends on: (a) policy-makers' perception of the economic, social and political aspirations of the country; (b) their approach to the analysis and measure of economic needs and political compulsions of the society; (c) their own ideological predilections or bias towards a particular political and economic thought, and (d) their skills and expertise in economic theory, logic and tools.

In general, however, the objectives of macroeconomic policy are determined in view of the overall economic imperatives and socio-economic compulsions of the society. In a poor country, breaking the vicious circle of poverty and creating the conditions for rapid economic growth and creating employment opportunities are invariably the first and the predominant objective of its macroeconomic policy. In economically developed countries, however, price stabilization and employment promotion have been the top item on their economic agenda under normal economic conditions.

29.5.2 The Choice of Policy

Once macroeconomic goals are determined, the next step in policy formulation is the choice of an appropriate policy. Given the current policy structure, a policy or a combination thereof has to be chosen from a set of policies including (a) fiscal policy, (b) monetary policy, and (c) income policy.

After the determination of the objectives of macroeconomic policy, the policy-makers select an appropriate policy for achieving the predetermined goals. The choice of policy and policy instruments depend on the development level and economic structure of the country. The choice is first made between the fiscal and monetary policy. For, in an economy with underdeveloped banking system and capital market, monetary policy has a little chance to be effective. Under these conditions, the choice falls in favour of the fiscal policy. In a developed economy which has, in general, a highly developed money market, monetary policy is preferred. However, policy priority may change if conditions change. For example, the financial sector in the US had collapsed in 2008–09 recession. It was for this reason, the US government had adopted fiscal measures to revive the economy. In general, however, in both developed and developing economies, attempt is made to find an appropriate combination of fiscal and monetary policies. Where fiscal or monetary policy or a combination thereof fails to achieve the macroeconomic goals, the policy-makers look for direct controls like price and wage freeze, industrial licencing system for controlling choice of industries and choice of technology, control of imports and foreign exchange, and so on.

29.5.3 Choice of Target Variables and Policy Instruments

After a policy has been chosen, the policy-makers are required to select the target variables and the corresponding policy instruments. Let us first define these variables.

Target variables are the macro variables which need to be controlled and regulated to obtain a desired result, the ultimate economic goal. The *target variables* of the monetary policy include (i) aggregate supply of money, (ii) aggregate demand for money, and (iii) credit created by the banks. *Fiscal policy target variables* include (i) disposable income, (ii) consumption expenditure, (iii) savings and investment, and (iv) wealth holding of the people.

Policy instruments are the variables—the rates and values—which are under the direct control of the authorities and can be changed at the discretion of the government. For example, central bank's bank rate or repo rate, cash reserve ratio (*CRR*), statutory liquidity ratio (SLR), prime lending rate (PLR), tax rate and the level on public expenditure are the main policy instruments. Policy instruments are also called as ***instrumental variables***. The policy instruments can be classified under two categories:

(i) monetary policy instruments, and
(ii) fiscal policy instruments.

Monetary policy instruments include (i) bank rate or repo rate, (ii) open market operations (*OMO*), (iii) cash reserve ratio (*CRR*), and (iv) selective credit controls. Monetary instruments affect the demand and supply of money. In effect, they work on the flow of money from the banks to the public and from the public to the banks. Precisely, tools of monetary control affect largely the flow of institutional credit. This increases or decreases the demand for money by the people. Since money is a medium of exchange, monetary controls affect the real variables.

The ***fiscal policy instruments*** include (i) public expenditure, (ii) taxation, (iii) public borrowings, and (iv) deficit financing. Discretionary changes in fiscal instruments bring about a change in the fiscal target variables. The changes made in the fiscal target variables work mainly through the real variables like disposable income, consumption expenditure, savings and investment, and wealth holding of the people. Obviously, fiscal measures of economic control affect almost all real macro variables and, therefore, have a wide area of influence. It influences economic decisions of all those who possess taxable income, consume taxable goods and services, have some savings and investment, or have wealth in the form of public bonds (e.g., government bonds like *Indira Vikas Patra, Kisan bond, Zamindari* bonds, etc.).

Monetary and Fiscal Variables are Interactive. It is important to note here that fiscal and monetary variables are interlinked. Therefore, the two kinds of control measures are interactive in nature, that is, change in one kind of variables affects the other kind of variables. More explicitly, a change in a fiscal variable affects monetary variables and a change in a monetary variable affects the fiscal variables. For example, increase in public expenditure increases money supply with the people and increase in money supply increases aggregate household spending.

Direct controls In case monetary and fiscal policies prove ineffective, the government adopts direct control measures. The direct controls include mainly (i) price control, (ii) wage control, (iii) credit control, (iv) industrial licencing, (v) import control, and (vi) control of foreign exchange.

29.5.4 The Rules for Selecting Policy Instruments

After the choice of a policy or policy-mix has been made—fiscal, monetary or a fiscal-monetary mix—the policy-makers are required to select instruments of a policy or of a combination thereof, in case of each policy. This is necessary because each policy contains different instruments—what Samuelson calls "nut and bolts"—for achieving the same goal, and all instruments are not equally suitable and effective in an economy. There are no fixed rules for making a choice between the policy instruments. It depends mostly on the analytical ability and the judgment of the policy-makers. There are however following procedural rules and requirements of policy formulation,[15] which when followed prove helpful in avoiding policy conflicts and in reducing the area of uncertainty.

15. See also G. K. Shaw, *Fiscal Policy* (Macmillan, London, 1972).

(i) Reliable estimates of key macro variables to be controlled and regulated;
(ii) Trends and rate of change in key macro variables over a reasonably long period;
(iii) Reliable estimates of key coefficients and relationships between interrelated variables;
(iv) Projections of target macro variables based on simulations;
(v) Selection of policy instruments in the light of (i) to (iv);
(vi) Assessing the time lag and acceptability of the time lag; and
(vii) Checking administrative and political feasibility of the selected policy instruments.

So far as economists' contribution in this regard is concerned, only a few contributions are worth mention in this regard. Jan Tinbergen of Netherlands, a Nobel Prize winner in Economics, was first to propound a theory of policy formulation.[16] According to Tinbergen's rule, once policy objectives are chosen, the policy instruments should be chosen accordingly. He suggested that the number of policy instruments must be equal to the number of policy objectives. Otherwise, the system will be inappropriately determined. If policy objectives exceed the number of available policy instruments, the system will be underdetermined and if policy instruments exceed the policy objectives, there will be number of optional combination of instruments and the system will be over determined. Some economists[17] have tried to demonstrate the application of the Tinbergen's Principle for finding an appropriate combination of fiscal and monetary policies. However, Tinbergen's theory has not found wide application to the policy formulation. Besides, the choice of policy tools alone does not ensure the efficient working of the system. In fact, what matters in policy formulation is *pragmatism* rather than theoretical *dogmatism*.

Conclusion. This chapter introduces the macroeconomic policy with its major policy measures, objectives in general and the method of policy formulation. Macroeconomic policies differ from country to country and from time to time. There are no set rules for policy choice. It all depends on the economic conditions of the country.

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16. Jan Tinbergen, *On the Theory of Economic Policy* (North Holland Publishing Company, Amsterdam, 1952) and *Economic Policy: Principles and Design* (North-Holland, Amsterdam, 1956). For a brief description of Tinbergen's rule, see Thomas S. Dernburg, *Macroeconomics: Concepts, Theories and Policies* (McGraw-Hill Int., NY, 1985), Ch. 17.

17. See, for example, R. A. Mundell, "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Imbalance," *IMF Staff Papers,* March 1962.

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QUESTIONS FOR REVIEW

1. What was the classical approach towards the solution of the macroeconomic problems? How is Keynesian approach different from the classical approach towards macroeconomic management?
2. What is macroeconomic policy? Why does the need for macroeconomic policy arise? What was Keynes's contribution in this regard?
3. What are the macroeconomic variables? What are the relevant monetary and fiscal tools of controlling and regulating monetary and fiscal variables?
4. What are the major objectives of macroeconomic policies? Point out the conflicts between the various objectives of macroeconomic policy.
5. How are the policy conflicts reconciled? How is the macroeconomic policy formulated?
6. What are the problems in policy formulation? Describe briefly the procedure of policy formulation. Describe in this regard Tinbergen's rule of policy formulation.

Chapter 30

Monetary Policy

INTRODUCTION

Monetary policy, in general, refers to the action taken by the monetary authorities to control and regulate the demand for and supply of money with a given purpose. Monetary policy is one of the two most powerful tools of economic control and management of the economy. The various aspects of monetary policy have been discussed in a theoretical framework in different previous chapters, especially the effect of different kinds of monetary policies on the aggregate production, interest rate and the price level. In this chapter, we will discuss monetary policy in detail. The major aspects of the monetary policy discussed in this chapter include:

(i) Meaning and scope of monetary policy;
(ii) Monetary policy instruments and target variables;
(iii) Role of monetary policy in achieving macroeconomic goals;
(iv) Effectiveness and limitations of monetary policy; and
(v) Monetary *vs* Fiscal policy controversy.

These aspects of monetary policy are discussed in theoretical tone with brief inputs from India's monetary policy.

30.1 MEANING AND SCOPE OF MONETARY POLICY

30.1.1 Meaning of Monetary Policy

The economists have defined monetary policy in different words. For example, Harry Johnson defines monetary policy as a "policy employing central bank's control of the supply of money as an instrument of achieving the objectives of general economic policy."[1] G. K. Shaw defines monetary policy as "any conscious action undertaken by the monetary authorities to change the quantity, availability or cost ... of money."[2] ***Monetary policy is essentially a programme of action undertaken by the monetary authorities, generally the central bank, to control and regulate the supply of money with the public and the flow of credit with a view to achieving predetermined macroeconomic goals***.

The objectives of monetary policy are generally the objectives of macroeconomic policy, *viz. growth, employment, stability of price and foreign exchange*, and the *balance-of-payment equilibrium*[3]. The macroeconomic goals are determined on the basis of the economic needs of the country. Once macroeconomic goals are determined, then the monetary authorities will have to decide accordingly *whether to increase or decrease the supply of money*. Then the next step is to make the choice of instruments that can effectively increase or decrease money supply with the public.

30.1.2 Scope of Monetary Policy

The scope of monetary policy spans the entire area of economic transactions involving money and the macroeconomic variables that monetary authorities can influence and alter by using the monetary policy instruments. The scope of monetary policy depends, by and large, on two factors:

(i) the level of monetization of the economy, and
(ii) the level of development of the financial market.

In a *fully monetized economy*, the scope of monetary policy encompasses the entire economic activities. In such an economy, all economic transactions are carried out with money as a medium of exchange. In that case, monetary policy works by changing the supply of and demand for money and the general price level. It is therefore capable of affecting all economic activities—production, consumption, savings and investment. The monetary policy can influence all major macro variables—*GDP*, savings and investment, employment, the general price level, foreign trade and balance of payments.

Another factor that matters in determining the scope and the effectiveness of the monetary policy is how developed and integrated is the capital-market. Some instruments of monetary control (bank rate and cash reserve ratio) work through the capital market. Where capital market is fairly developed, monetary policy affects the level of economic activities through the changes in the capital market. It works faster and more effectively in an economy with a fully developed financial market. Incidentally, a developed financial market is one which has the following features: (i) there exists a large number of financially strong commercial banks, financial institutions, credit organizations, and short-term bill market, (ii) a major part of financial transactions are routed through the banks and the capital markets, (iii) the working of capital sub-markets is inter-linked

1. Johnson, Harry G., "Monetary Theory and Policy," *Am. Eco. Rev.*, Vol. LII, No. 3, June 1962, p. 335. Reprinted in his *Essays in Monetary Economics* (ed), (George Allen and Unwin, London, 1969), p.15.

2. *An Introduction to the Theory of Macroeconomic Policy, op. cit.,* p.65.

3. For details, see Ch. 29.

and interdependent, and (iv) commodity sector is highly sensitive to the changes in the capital market. Monetary weapons like bank rate and cash reserves ratio work through the commercial banks. Therefore, for the monetary policy to have a widespread impact on the economy, other capital sub-markets must have a strong financial link with the commercial banks.

30.2 INSTRUMENTS OF MONETARY POLICY

The instruments of monetary policy refer to the economic variables that the central bank is empowered to change at its discretion with a view to controlling and regulating the supply of and demand for money and the availability of credit. The instruments are also called '*weapons of monetary control*.' Samuelson and Nordhaus call them 'The Nuts and Bolts of Monetary Policy.' Monetary instruments are generally classified under two categories:

(i) General credit control measures, and
(ii) Selective credit controls.

30.2.1 The General Credit Control Measures

The general measures of monetary control include the monetary weapons that aim at controlling the aggregate supply of and demand for money, given the objective of the monetary policy. As noted in the previous chapter, general credit control measures, also called as *traditional measures* of monetary control are following.

(i) Bank rate
(ii) Cash Reserve Ratio (*CRR*), and
(iii) Open Market Operations

In addition to these traditional measure of monetary control, Reserve Bank of India has introduced an extra-ordinary measure, named ***Statutory Liquidity Ratio (SLR)*** to facilitate the government borrowing from the banks. We describe here briefly the meaning and working of these monetary measures. While discussing these aspects, brief references will be made to the *RBI* approach. A detailed discussion follows in the forthcoming section.

(i) Bank Rate Policy. 'Bank rate' is the rate at which central bank lends money to the commercial bank and rediscounts the bills of exchange presented by the commercial banks. The RBI Act 1935 defines 'bank rate' as the ***"standard rate at which (the bank) is prepared to buy or rediscount bills of exchange or other commercial papers eligible for purchase under this Act."*** The RBI rediscounts only the government securities, approved bills and the 'first class bills of exchange.' When commercial banks are faced with shortage of cash reserves, they approach the central bank to borrow money for short term or get their bills of exchange rediscounted. It is a general method of borrowing by the commercial banks from the central bank, the 'lender of the last resort'. The central bank rediscounts the bills presented by the commercial bank at a discount rate. This rate is traditionally called ***bank rate***. Thus, *bank rate is the rate which central bank charges on the loans and advances made to the commercial banks.*

The central bank can change this rate—increase or decrease—depending on whether it wants to expand or reduce the flow of credit from the commercial banks. When it wants to increase the credit creation capacity of the commercial banks, it reduces the discount rate and when it decides to decrease the credit creation capacity of the banks, it increases the bank rate. This policy action by the central bank is called the ***bank rate policy***.

The bank rate policy was first adopted by the Bank of England in 1839. It was the only and the most widely used weapon of credit control until the open market operation, first used in 1922 in the US, emerged as a more powerful instrument of monetary control. In India, the RBI has been using the bank rate as monetary control measure, though infrequently, since its inception in 1935. The bank rate remained constant at 3% till 1950. In 1951, it was increased to 3.5% and to 4% in 1956, and remained in force till 1962. In the subsequent year, the bank rate was increased more frequently and it was raised to 12% in 1992 and was maintained till 1997. With growing need for credit facility with economy growing at 5–6% and also decreasing rate of inflation, the bank rate was reduced gradually to 6.5% in 2001, which was lowest since 1973. The bank rate was reduced to 6 percent in 2004 which was maintained till 2006–07. However, bank rate was raised to 7.5 percent in 2008 with the objective of controlling inflation which was as high as 11.5 percent in July 2008.

The ***working of the bank rate policy*** is simple. When the central bank changes the bank rate, commercial banks change their own discount rate accordingly with a difference of generally one percent. The change in the bank rate affects the flow of bank credit to the public. For example, if the central bank wants to reduce the money supply by reducing the flow of credit from the banks to the public, it will raise the bank rate. Raising bank rate reduces credit flow in three ways.

One**,** a rise in the bank rate (virtually the interest rate) reduces the net worth of the government bonds (the Treasury Bills and Promissory Notes) against which commercial banks borrow funds from the central bank. This reduces commercial banks' capacity to borrow from the central bank. As a result, commercial banks find it difficult to maintain a high cash reserve. This reduces the credit creation capacity of the commercial banks. So the flow of credit is reduced.

Two, when the central bank raises its bank rate, commercial banks raise their discount rate too. Rise in the discount rate raises the *cost of bank credit* which discourages business firms to get their bill of exchange discounted. Also, a rise in the bank rate pushes the market interest rate structure up. If demand for credit is interest-elastic, the demand for funds decreases too.

Three, bankers' lending rate is quickly adjusted to deposit rates. Therefore, a rise in the bank rate causes a rise in the deposit rate. Therefore, savings flow into the banks in the form of time deposits and money with public decreases. This is called ***deposit mobilization effect***.

Exactly reverse happens when the central bank cuts down the bank rate.

Limitations of Bank Rate as a Weapon of Credit Control. The bank rate policy has lost its effectiveness as a weapon of monetary control over time for the following reasons.

(i) The variation in the discount rate works effectively only when commercial banks have no alternative to borrowing from the central bank. In modern times, the commercial banks have built their financial resources. They are not dependent on the central bank for financial support. Therefore, their own discount rate is not affected even if central bank raise the bank rate.

(ii) With the growth of credit institutions and financial intermediaries, the capital market has widened extensively and the share of banking credit has declined. For example, in India, credit created by the scheduled commercial banks increased from Rs. 1,20,610 crore in

2003 to Rs. 2,20,498 crore—by about 85 percent—in 2006, whereas finance mobilization through the primary market increased from Rs. 69,543 crore in 2003 to Rs. 1,61,769 crore in 2006, i.e., by 131 percent. The growing share of the primary market (including debt, equity, private placements and Euro Issues, etc.) in the financial resources of the country reduces the effectiveness of the bank rate policy. Therefore, changes made by the central bank in the bank rate make only limited impact on the credit market especially when it raises the rate.

(iii) Looking from the credit demand angle, variations in the discount rate work effectively only where demand for credit is interest-elastic. The structure of the credit market in the less developed countries is such that the interest rates are sticky. Hence change in the discount rate has not been found to be very effective.

India's experience, and also of most other countries, shows that bank rate policy has not proved to be very effective in achieving its goals. The important reasons for ineffectiveness of bank rate policy are (i) changing bank rate alone does not necessarily change the interest rate structure, (ii) it does not necessarily alter the banks' lending rate, (iii) 'announcement effect' of bank rate policy gives banks time leverage to make necessary adjustments in their lending policy, and (iv) making frequent changes in the bank rate, even if it is required, is not desirable especially during the expansionary phase of the economy.

However, effectiveness of bank rate varies from time to time, depending on the financial market conditions. For instance, when *RBI* raised bank rate from 6 percent in 2006 to 7.5 percent in 2008, most banks raised their lending rates almost immediately though its effect remained limited mainly to the realty sector.

(ii) The Cash Reserve Ratio (CRR). The 'cash reserve ratio' (CRR), known also as 'statutory reserve ratio (SRR), is the percentage of total deposits which commercial banks are required to maintain in the form of cash reserve with the central bank.[4] The objective of cash reserve is to prevent shortage of cash for meeting the cash demand by the depositors. The cash reserve ratio (*CRR*) depends, normally, on the banks' experience regarding the cash demand by the depositors. But, "If there were no government rules, banks would probably keep only a very small fraction of their deposits in the form of reserves."[5] Since the cash reserves are *non-interest bearing*, commercial banks often keep their cash reserves below the safe limits. This situation might lead to a financial crisis in the banking sector and collapse of the banking system. In order to prevent this eventuality, the central banks impose a *CRR* on the banks. The *CRR* has proved to be a handy tool

4. In India, the scheduled commercial banks were required until 1956 to maintain 5 percent of the demand liabilities and 2 percent of the time liabilities in the forms of cash reserves. The RBI Amendment Act, 1956 empowered the RBI to vary minimum cash deposit ratio between 5 percent and 20 percent for demand deposits and between 2 percent and 5 percent for time deposits. In 1962, however, this distinction between the demand and time deposits was removed and a flat rate of 3 percent was fixed for all deposits with the provision that this could be raised to 15 percent. The *CRR* was raised over time from 3% to 8.0% in 2000 but it was reduced to 5.5% in October 2001. However, in response to emerging conditions, *CRR* was raised to 6% in 2006–07. The *CRR* was gradually raised to 9% in the last week of September 2008 and was gradually reduced to 7.5% in the 2nd week of October 2008 to protect the economy from the global recession.

5. Samuelson, P. A. and Nordhaus, W. D., *Economics,* 1995, *op. cit.*, p. 511.

for the central bank to control money supply. The central bank enjoys the legal powers to change the cash reserve ratio of the banks. Maintaining a certain cash reserve under this provision takes the form of a *legal requirement*. Therefore, cash reserve ratio is also called ***statutory reserve ratio (SRR)***.

By changing the *CRR,* the central bank can change the money supply overnight. When economic conditions demand a contractionary monetary policy, the central bank raises the *CRR* and when economic conditions demand monetary expansion, the central bank cuts down the *CRR*. The effect of change in the *CRR* on the supply of money and credit creation by the banks is briefly explained here. Suppose commercial banks possess a total deposit of Rs 100 million and *CRR* is 20 percent. It means (a) that the banks can lend money only upto Rs 80 million, and (b) that credit or deposit multiplier[6] equals 5. Given these conditions and the process of credit creation, the banks can create, through the process of credit multiplier, a total credit of Rs 500 million or an additional credit of Rs 80 million × 5 = Rs 400 million. Now suppose that the central bank decides to reduce the money supply with the public and it raises the *CRR* to 25 percent. The credit multiplier will then be reduced to 4. With this provision, the banks can lend only Rs 75 million (Rs 100 million – Rs 25 million). Thus, the total credit created by the banks goes down to Rs 100 million × 4 = Rs 400 million and additional credit goes down to Rs 75 million × 4 = Rs 300 million. This means a 25 percent decline in the credit creation and a 25 percent fall in the bank credit is supposed to have considerable impact on the money market.

(iii) Open Market Operations. The 'open market operation' is the sale and purchase of government securities and Treasury Bills[7] by the central bank of the country. When the central bank decides to pump money into circulation, it buys back the government securities, bills and bonds, and when it decides to reduce money in circulation, it sells the government bonds and securities. The open market operation is the most powerful and widely used tool of monetary control. First used in the US by the Federal Reserve System in 1922 has ever since been used as a major weapon of credit control in most developed countries.

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6. The formula for deposit multiplier (D_m) is given below.

$$D_m = \frac{1}{CRR} = \frac{1}{20/100} = \frac{1}{2.0} = 5$$

The total credit creation (*TCC)* can be worked out as follows.

$$TCC = \frac{1}{CRR}\text{ (Deposit)} = \frac{1}{20/100}\text{ (100 million)} = 500\text{ million}$$

7. In India, Treasury Bills are short-term promissory notes issued by the Government of India through the Reserve Bank of India (RBI). There are two kinds of Treasury Bills—91-Day and 182-Day Bills. The 91-day Treasury Bills are issued by the RBI on behalf of the Government at fixed discount rate of 4.6%. The RBI provides rediscounting facility within 14 days of issue at an 'additional rediscounting fees.' The 182-days Treasury Bills, introduced in 1986, are sold by auction to residents of India (excluding State Governments and Provident Funds), for a minimum value of Rs 100,000. The auction bid is invited every fortnight and the 'discount rate' is decided on the basis of the auction rate. As regards the auction procedure, the auction bids invited and scrutinized by a Committee headed by the Deputy Governor of the RBI. The Committee decides on the cut-off price or the minimum official price. Bids quoting a price equal to or higher than the cut-off price are accepted: other bids are rejected.

The central bank carries out its open market operations through the commercial banks—it does not deal directly with the public. The buyers of the government bonds include commercial banks, financial corporations, big business corporations and individuals with high savings. These categories of buyers of government bonds hold their accounts with the banks. Therefore, when the central bank carries out its open market operations, it affects banks deposits and reserves and, thereby, their capacity to create credit. For instance, suppose the central bank decides to reduce the money supply with the public and the availability of credit with the objective of preventing inflation. To this end, the central bank will offer the government bonds and treasury bills for sale through the commercial banks. The task becomes easier when the government owns the commercial banks as in India. The sale of government bonds and securities affects both the *supply of* and *demand for credit*—supply of credit by affecting the credit creation capacity of the banks and demand for credit by changing the rate of interest.

The sale of government bonds, affects the ***supply of credit*** in the following ways.

(i) When people buy the government bonds and securities through the cheques drawn on the commercial banks in favour of the central bank, the money is transferred from the buyers' account to the central bank account. This reduces the total deposits with the commercial banks and also their cash reserves. As a result, credit creation capacity of commercial banks decreases and, therefore, the flow of bank credit to the society decreases.

(ii) When commercial banks themselves decide to buy the government bonds and securities, their cash reserves go down. The fall in banks' cash reserves reduces their credit creation capacity further. The ultimate result is fall in the flow of credit to the public.

The sale of bonds reduces also the ***demand for credit.*** When the central bank sells the government bonds, it sells them at a reduced price, i.e., at a price less than their denominated price. Consequently, the actual rate of interest on the bonds goes up[8]. This causes an upward push in the overall interest rate structure. The rise in the rate of interest reduces the demand for credit. Thus, not only the supply of credit but also the demand for credit is affected by the open market operations.

On the contrary, when the central bank decides to increase money supply, it buys back the government bonds and securities. In the process transaction money flows from the central bank account to the people's account with the commercial banks. As a result, deposits with the commercial banks and their cash reserves increase. This enhances their capacity to create credit. Other things given, the flow of money from the banks to the public increases. This leads to increase in money supply.

Effectiveness of Open Market Operations. Open market operations do not work effectively under the following conditions.

(i) When commercial banks possess excess liquidity, the open market does not work effectively, especially when central bank wants to buy back bonds.

[8] For example, if a 100-rupee bond bearing 10% interest is sold at a reduced price of Rs. 90, the rate of interest on the bond rises to $(10/90) \times 100 = 11.11$ percent.

(ii) In a very buoyant market situation, the effective control of demand for credit through the open market operations is doubtful. And, during the period of depression, open market operations are not very effective for lack of demand for credit.

(iii) In underdeveloped countries where banking system is not well developed and security capital markets are not interdependent, open market operations have a limited effectiveness.

(iv) The popularity of government bonds and securities in the public also matters a great deal. The government debt instruments are generally not popular due to low rate of return. In recent years, however, the popularity of government bonds has increased due to increasing risk factor in the stock market.

30.2.2 Selective Credit Control Measures

The *general credit control methods* of monetary controls affect, when they are effective, the entire credit market in the same direction. They lead either to expansion or to contraction of the total credit as intended by the monetary authorities. Besides, their impact on all the sectors of the economy is uniform. This may not be always desirable or intended by the policy-makers. The monetary authorities are often required to take policy actions for (a) rationing of credit for different sectors of the economy. (b) diverting the flow of credit from the non-priority sectors to the priority sectors, and (c) curbing speculative tendency based on the availability of bank credit. These objectives of credit control are not well served by the quantitative measures of credit control. The monetary authorities resort, therefore, to ***qualitative*** or ***selective credit controls.*** Some of the common selective credit controls are dicussed below.

(i) Credit Rationing. When there is a shortage of institutional credit available for the business sector, the highly developed and financially strong sectors and industries tend to capture the lion's share in the total institutional credit. As a result, priority sectors and essential industries are starved of necessary funds, while the bank credit goes to the non-priority sectors. In order to curb this tendency, the central bank resorts to credit rationing measures. Generally, two measures are adopted: (a) imposition of upper limits on the credit available to well-developed industries and large-scale firms, and (b) charging a higher or progressive interest rate on bank loans beyond a certain limit. This is done with a view to making bank credit available to the essential and priority sectors.

(ii) Change in Lending Margins. The banks advance money more often than not against the mortgage of some asset or property—land, building, jewelry, share, stock of goods, and so on. The banks provide loans only up to a certain percentage of the value of the mortgaged property. The gap between the value of the mortgaged property and amount advanced is called 'lending margin.' For example, if value of stock is Rs 10 million and the amount advanced is only Rs 6 million, the lending margin is 40 percent. The central bank is empowered to increase the lending margin with a view to decreasing the bank credit. This method was used for the first time by the RBI in 1949 with the objective of controlling speculative activity in the stock market. Since 1956, the RBI has made an extensive use of this method with a view to preventing speculation in scarce agricultural products, namely, food grains, cotton, oil seeds, vegetable oil (*vanaspati),* sugar, *Khandsari* and *gur,* and cotton textiles and yarns. The speculative rise in the price of scarce agricultural products had taken place because high price of such goods could secure higher loans through mortgaging. Higher loans provided more funds to buy and accumulate the stock of the scarce agricultural commodities to be mortgaged for further borrowing. This created a kind of artificial scarcity which pushed the prices further up. By increasing the lending margin, the RBI could curb this kind of speculative borrowing. This method is no more used widely India.

(iii) Moral Suasion. The moral suasion is a method of persuading and convincing the commercial banks to advance credit in accordance with the directives of the central bank in overall economic interest of the country. This method is adopted in addition to quantitative and other qualitative methods, particularly when effectiveness of other methods is doubtful. Besides, quantitative and qualitative methods are, in fact, ineffective in the underdeveloped countries with underdeveloped money and credit markets. Under this method, the central bank writes letter to and hold meetings with the banks on money and credit matters.

(iv) Direct Controls. When all other methods prove ineffective, the monetary authorities resort to direct control measures with clear directive to carry out their lending activity in a specified manner. There are, however, rare instances of use of direct control measures.

30.3 TRANSMISSION MECHANISM OF MONETARY POLICY: THE PORTFOLIO ADJUSTMENT

We have discussed above the instruments, 'the nuts and bolts' of monetary policy. In this section, we discuss how changes made in the monetary policy instruments affect the monetary and real sectors and the economy as a whole.

To begin with, let us recall that the basic approach of monetary policy is to change the money supply and money demand. So the working mechanism of monetary policy has to be traced through the effects of change in money supply and demand, and their effect on real variables. How a change in money supply changes the interest rate, investment and real output has already been discussed in Chapter 18 by using *IS-LM* model. In brief, a rise in money supply shifts the *LM* curve rightward causing a fall in the interest rate. A fall in the interest rate increases investment. A rise in the investment causes a rise in the level of national income. This simple analysis does not bring out the entire complex process through which an increase in money supply causes a fall in the interest rate and increase in investment spending. However, the developments in macroeconomics during the 1950s and 1960s provided a systematic theory of transmission mechanism of monetary policy, that is, the mechanism by which a change in money supply produces other changes in the monetary sector that interact with real sector to bring about a change in levels of income and prices. The central theme of the transmission mechanism is *portfolio adjustment* by the households and the firms. The portfolio adjustment theory was developed by James Tobin.[9] The portfolio adjustment theory deals with how firms and households adjust their asset portfolio to maximize their returns when there is a change in money supply and the interest rate.

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9. James Tobin, "Money, Capital and Other Stores of Value," *Am. Eco. Rev.,* May 1961.

What is Portfolio Adjustment? To appreciate fully the role of portfolio adjustment in transmission mechanism of change in money supply, let us have a quick look at the portfolio adjustment process. The portfolio adjustment refers to reallocation of total investment between the different forms of assets—cash balance, bank deposits, government bonds, treasury bills, land, building, plant and equipments, shares, debentures, and so on. The need for adjustment in portfolio arises due to change in money as wealth, which causes disequilibrium in portfolio. To look at this point more closely, let us suppose that the portfolios of both the households and the firms are given at a point of time, given the money supply and asset preferences. Their portfolio consists of (a) cash balance (nominal wealth), (b) financial assets including government bonds and securities, corporate shares and debentures, bank deposits, LIC policy, and (c) real assets like land, building, gold, machinery, plant and equipments. When there is a change in money supply, and in the determinants of portfolio, *viz*. rates of interest and returns, the portfolio balance is disturbed. For example, other things remaining the same, when money supply increases, cash balance the non-earning asset with the people increases. As a result, the proportion of non-earning asset in the asset portfolio increases. The increase in the proportion of idle cash balance (a non-earning form of wealth) in the portfolio makes the portfolio-balance inoptimal. This is called *disequilibrium in portfolio balances*.

Disequilibrium in portfolio makes asset-holders to adjust their portfolio to regain their equilibrium position. This is called *portfolio adjustment process*. It is in this process of adjustment that the equilibrium levels of incomes and prices change. The economists of different schools of thought, especially the Keynesians and the monetarists, hold different views on the process of portfolio adjustments and its effect on the levels of income and prices. The Keynesian and Monetarist approaches to portfolio adjustment process are discussed below.

The Keynesian Approach to Portfolio Adjustment. The Keynesian approach is basically Tobin's portfolio adjustment approach. It traces the effect of change in money supply on the levels of income and prices through the process of portfolio adjustment. As mentioned above, when money supply increases, the idle cash balance with the public increases. The increase in the proportion of non-earning assets in portfolio, causes a temporary imbalance in the optimum portfolio. So the households and firms try to readjust their portfolio. In the process of adjustment, they tend to increase their investment in financial assets such as bonds and securities, share and debentures and so on, *not in the real assets*. This point is of specific importance because it is at this point that monetarists deviate from the Keynesian approach in portfolio adjustment. According to the Keynesian approach, increase in demand for financial assets pushes the prices of financial assets up. As a result, the interest rate goes down. Fall in the interest rate increases investment in productive assets which increases the level of income. Increase in incomes causes a rise in the aggregate demand—on account of increase in both investment and consumer demand. The upward shift in the aggregate demand results in further increase in the equilibrium level of income. The process continues until new equilibrium point is attained.

The Monetarist Approach to Portfolio Adjustment. The monetarists trace the effect of change in money supply on the level of income much the same way as the Keynesians do, that is, through the process of portfolio adjustments. The monetarists, however, deviate from the Keynesians at the point of making choice between the cash balance and other forms of assets. While Keynesians treat *cash balance* and *financial assets* as close substitutes, monetarists treat *cash* *balance* and *real assets* as close substitutes. Recall that in the Keynesian analysis, the transmission process works through the change in demand for *financial assets* and the change in the interest rate. In contrast, in the monetarist analysis, change in cash balance changes the demand for *real assets*, not the financial assets. The ultimate result is the same, i.e., the change in the aggregate demand. The distinction between the Keyensian and monetarists approaches is illustrated below *assuming an increase in money supply*.

Keynesian Process: *Increase* in money supply → *increase* in cash balance → *increase* in demand for ***financial assets*** → *fall* in the interest rate → *increase* in investment → *increase* in the aggregate demand.

Monetarist Process: *Increase* in money supply → *increase* in cash balance → *increase* in demand for ***real assets*** → *increase* in aggregate demand.

The *significant difference* between the two approaches can be highlighted as follows. ***In the Keynesian approach, aggregate demand changes due to change in the interest rate, whereas in the monetarist approach, the aggregate demand can change without change in the interest rate***. It must also be noted that the distinction between the two approaches is only of the process, not of the end result—the end result is the same *i.e., the increase in aggregate demand.*

30.4 THE LIMITATIONS AND EFFECTIVENESS OF MONETARY POLICY

The effectiveness of monetary policy, in practice, depends on the following factors, knows as the limiting factors of monetary policy.

(i) The Time Lag[10]. The first and the most important limitation in effective working of monetary policy is the *time lag*, i.e., the time taken in chalking out the policy action, its implementation and response time. The time lag is divided in two parts: (i) 'inside lag' or preparatory lag, and (ii) 'outside lag' or response lag. The ***inside lag*** refers to the time lost in (a) identifying the nature of the problem, (b) identifying the sources of the problem, (c) assessing the magnitude of the problem, (d) choice of appropriate policy action, and (d) implementation of policy actions. The ***outside lag*** refers to the time taken by the households and the firms to react to the policy action taken by the monetary authorities.

If preparatory and operational lags are long, not only the nature and the magnitude of the problem may change rendering the policy ineffective, but also it may worsen the situation. It has been the experience of many countries including developed ones that both inside and outside lags have been unduly long, making monetary policy less effective than expected. The time lag of monetary policy, particularly its response lag, has been found to be generally longer than the time lag of fiscal policy. However, the issue of time lag in case of monetary policy is controversial. Friedman and Schwartz

10. For a comprehensive analysis of time lag in monetary policy, see Michael J. Hamberger, "The Lag in the Effect of Monetary Policy: A Survey of Recent Literature," *Federal Reserve Bank of New York Monthly Review,* December 1971.

find an average time lag of 18 months between peaks (troughs) of money supply and peaks (troughs) of business cycle. Their findings have been questioned by the findings of other economists.[11] However, 'the evidence from several sources suggest that the lag associated with monetary policy is long and possibly variable'[12] and 'the consensus seems to be that the lag is about 12 to 16 months long.'[13]

(ii) Problems in Forecasting. The formulation of an appropriate monetary policy requires that the magnitude of the problem—recession or inflation—is correctly assessed, as it helps in determining the dose of the medicine. What is more important is to forecast the effects of monetary actions. In spite of advances made in the forecasting techniques, reliable forecasting of macroeconomic variables remains an enigma. In this regard, it is interesting to quote Stephen McNees.[14]

> "How can forecasters go wrong? They may not predict disturbances (the Gulf War, for example); they may misread the current state of the economy and hence base their forecasts on a wrong picture of the present situation; and they may misjudge the timings and the vigour of the government's monetary and fiscal responses to booms or recessions. The fact is that forecasting has not reached perfection, particularly at major turning points in the economy, ..."

Because of the low degree of reliability of forecasting, prediction of the outcome of a policy action and hence formulation of an appropriate monetary policy has remained an extremely difficult task. This point has been adequately evidenced by unpredictability of recession in the US economy and inflation in India, both in 2008. An inappropriate policy based on guesswork is bound to be unsatisfactorily effective. There is a large empirical evidence to support this point of view.

(iii) Growth of Non-banking Financial Intermediaries. Apart from the above limitations of the monetary policy, the structural change in the financial market due to rapid growth of non-banking financial intermediaries has reduced the scope of effectiveness of this policy. The proliferation of non-banking financial intermediaries including industrial financial corporations, industrial development banks, mutual saving funds, insurance companies, chits and funds, and so on, have reduced the share of the commercial banks in the total credit. Although financial intermediaries cannot create credit through the process of credit multiplier, their huge share in the financial operations reduces the effectiveness of monetary policy which works through the banking finance.

(iv) Underdeveloped Money and Capital Markets. In addition to the factors discussed above, the effectiveness of monetary policy in the less developed countries is reduced considerably because of the underdeveloped character of their money and capital markets. The money and capital

11. For details, see Michael R. Edgmand, *Macroeconomics: Theory and Policy* (Prentice-Hall of India, 2nd Edn., 1985), Ch.18.

12. Michael R. Edgmand, *op. cit.,* p. 373.

13. Fried R. Glahe, *Macroeconomics: Theory and Policy* (Harcourt Brace Jovanovich, Inc., New York, 1973), p. 287.

14. Stephen McNees, "How Large Are Economic Forecast Errors?", *New England Economic Review,* July-August 1992, part reproduced in Rudiger Dornbusch and Stanley Fischer, *Macroeconomics, op. cit.*, p. 456.

markets are fragmented, while effective working of monetary policy requires a fairly developed money market and that money market and the sub-markets of the capital market are interactive and work interdependently.

30.5 MONETARY POLICY OF INDIA

We have discussed above the meaning, scope, instruments and working mechanism of monetary policy in a general framework and have also used examples of monetary measures adopted by the RBI. In this section, we take a look at India's monetary policy including its objectives, instruments and targets.

The RBI, the central monetary authority of India, has been changing the objectives and their priorities of its monetary policy from time to time in accordance with the needs of the country. The RBI has, in fact, managed monetary affairs of the country, especially the control, regulation and allocation of bank credit as and when required by the needs of the country. However, RBI's monetary policy has not been found to be working very effectively. The reason was that the RBI was severely constrained by the growing deficit financing by the Government of India. A comprehensive knowledge of India's recent monetary policy and its working can be had from the Chakravarty Committee Report[15], the writings of C. Rangarajan[16], a former Governor of RBI and Rakesh Mohan[17], Deputy Governor of RBI.

30.5.1 Monetary Policy Objectives

As already noted above, monetary policy being an organ of the overall economic policy, its objectives could not be different from or be in conflict with the overall objectives of other economic policies of the country. The three major objectives of India's overall economic policy have been (i) economic growth, (ii) social justice, i.e., an equitable distribution of income, and (iii) price stability. Of these objectives, *growth* and *price stability* have been in general the objectives of India's monetary policy. Of these two objectives, however, Chakravarty Committee considered promoting price stability as 'the dominant objective of the monetary policy' (Report, p. 9.25). For, in the Committee's opinion, "It is price stability which provides the appropriate environment under which growth can occur and social justice can be ensured"[18]. "The case for price stability as the dominant objective of monetary policy began to assume importance in the early 1990s".... In essence [however], monetary policy aims to maintain a judicious balance between price stability and economic growth".[19]

15. The Working Committee to Review the Working of the Monetary System (1985), set up by the RBI in 1982 under the Chairmanship of Prof. Sukhmoy Chakravarty. C. Rangarajan, the then Governor of the RBI, was a member of the Committee.

16. "Issues in Monetary Management" and "Monetary Policy Revisited" in his *Indian Economy: Essays on Money and Finance* (UBS Publishers' Distributors Ltd, New Delhi, 1998).

17. "The Role of Fiscal and Monetary Policies in Sustaining Growth with Stability in India", *RBI Bullelin*, December 2008.

18. C. Rangarajan, *op. cit.,* p.6.

19. Rakesh Mohan, *op. cit.,* pp. 2097–98.

However, macroeconomic conditions of the country—especially the financial structure of the country, demand for and supply of money and the nature of monetary management needs of the country—have been changing over time. Therefore, the objectives of monetary policy and instruments of monetary control and management issues have also been changing, though *price stabilization* remained the central theme of India's monetary policy. In simple words, with changing economic conditions of the country, the RBI has been changing *monetary policy objectives*, and it has been using a combination of *monetary policy instruments* to achieve its targets. We discuss here briefly the objectives of monetary policy and instruments adopted by the RBI to achieve its objective.

Price Stabilization: The Main Target As mentioned above, price stabilization—specifically speaking, controlling inflation—has been the prime objective of RBI's monetary policy. The reason for price stabilization being the main objective of monetary policy was that the country has been under inflationary pressure since the Second Plan Period. The inflation rate was around 6 percent on y-t-y basis, though it had shot up to 12 percent during the period from 1971 to 1976. The main cause of inflationary pressure was deficit financing—a fiscal measure—adopted by the Government of India (GOI) to finance the development programmes. As a result, money supply was increasing at a faster rate (16–17 percent p.a) against low economic growth (3–4 percent p.a) causing inflation. However, the Chakravarty Committee emphasized the importance of controlling growth of money supply. The Committee suggested that the growth of money supply should be regulated with the objective of maintaining price stability in compliance with the Plan objective of output growth, even thought price level is affected by several non-monetary factors. In order to control inflation to an acceptable level, the RBI adopted measures to control monetary expansion, at the same time making bank credit available for private investment at a reasonable interest rate.

The question that arises here is: What rate of inflation would comply with Plan objective of growth rate? The Chakravarty Committee (1985) had examined the issue at both theoretical and empirically levels and had recommended an annual inflation rate of 4 percent which was, in its opinion, socially tolerable and conducive to growth. However, since India has had only "moderate inflation"—crossing double digit rarely—'inflation targeting' is not considered to be appropriate for India.

Let us look at the inflationary pressure that India has faced from time to time. The inflation rates in India are given in Table 30.1 – quinquennial rates[20] for the period from 1956-57 to 2000-01 and annual average rate for the subsequent years. As the table shows, India had inflation rate of about 6 percent during the period from 1956-57 to 1970-71. The average rate of inflation during the period 1971-76 had shot up to 12 percent—the highest rate of inflation India had witnessed till then. The inflation rate, however, declined thereafter and averaged 7.5 percent till 1990-91. But the quinquennial average inflation rate shot up again to 10.6 percent. This was the second phase of high inflation in India. Since 1996-97, however, the rate of inflation declined and remained stable around 5 percent till 2007. This rate of inflation was close to the Chakravarty Committee recommendation. But, on 5th July 2008, the inflation rate shot up again to about 12 percent (11.91% to be precise) which is considered to be the highest in the past 13 years. The inflation record shows the inflation rate could hardly be ever maintained to the level of the rate recommended by the Chakraverty

[20] The annual rate of Inflation for the period is given in Appendix to this chapter – Appendix 30.1

Committee. It is understandable, as C. Rangarajan (the then member of the Chakraverty Committee and the Governor of RBI), had remarked, "absolute price stability is not feasible in a large and complex economy undergoing structural transformation. Imbalances to some extent are inevitable."[21] But, the 'imbalance' in India's price stability, as shown by the fluctuation in the inflation rate, has often been so high – except, of course, during 2000-2006 – that it can hardy be explained by transitional factors. So much so that inflation rate had turned to deflation of 1.21 percent in July 2009. However, as can be seen in Table 30.1, high rate of increase in money supply was the main reason for the high rate of inflation, especially during the period from 1970-71 to 1995-96.

Table 30.1 Money Supply and Inflation in India (5-year Average based on WPI)

Period	*Rate of Increase in Money Supply (%)*	*Rate of Inflation (%) (52-Week Average)*
Five-year Average		
1956-57 to 1960-61	6.0	6.3
1961-62 to 1965-66	9.4	5.8
1966-67 to 1970-71	14.4	6.7
1971-72 to 1975-76	16.0	12.0
1976-77 to 1980-81	19.2	8.5
1981-82 to 1985-86	16.9	6.5
1986-87 to 1990-91	17.7	7.8
1991-92 to 1995-96	17.5	10.6
1996-97 to 2000-01	16.0	5.0
2001-02 to 2005-06	15.3	4.7
Annual		
2001-02	16.8	3.6
2002-03	14.4	3.4
2003-04	14.7	5.5
2004-05	16.8	6.5
2005-06	12.3	4.4
2006-07	17.0	5.4
2007-08	21.2	4.7
2008-09	18.4	8.4

Note: Quinquennial averages worked out on the basis of annual averages.

Source: Various issues of *Economic Survey* issued by the GOI, MOF. Annual data from *Economic Survey – 2008–09*, GOI, MOF and S.B. Gupta, *Monetary Planning for India* (Oxford University Press, Bombay, 1995), Appendix G.

Let us now look at the *monetary measures* adopted by the RBI for controlling inflation and their effectiveness in price stabilization.

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21. Rangarajan, C., "The Analytical Framework of the Chakraverty Committee Report on the Monetary System", *Reserve Bank of India Bulletin,* September 1987, p. 702.

30.5.2 Monetary Measures

The RBI has been using various monetary measures from time to time including some non-traditional measures for price stabilization and other monetary policy objectives. We give here a brief description of the measures adopted by the RBI, and also their effectiveness.

1. Bank Rate The bank rate has been one of the important instruments used by the RBI to control inflation, whenever required. As mentioned above, the bank rate remained unchanged at 3 percent during 1935–1950. Since 1951, however, bank rate has been frequently changed – mostly increased – as shown in Table 30.2. As can be seen in Table 30.2, the RBI was using bank rate infrequently as a weapon of monetary control till mid-1990s with the purpose of mitigating mounting inflationary pressure in the country. After mid-l990s, however, inflation rate declined with rise in the growth rate of the economy, due mainly to economic reforms. As a result, the RBI started reducing bank rate from the year 1997 which continued till May 2008. However, the RBI started enhancing the bank rate and raised it to 7.5 percent in July 2008 due to rate of inflation crossing double digit. However, due to fall in the inflation rate in late 2008, the bank rate was cut down to 6 percent in January 2009. This rate is likely to be maintained in fiscal year 2008-09.

Table 30.2 Changes in Bank Rate in India

Year	*Bank Rate (%)*	*Month and Year*	*Bank Rate (%)*
1935	3.0	April 1997	11.0
1951	3.5	June 1997	10.0
1957	4.0	October 1997	9.0
1963	4.5	October 1999	8.0
1964	5.0	April 2000	7.0
1965	6.0	October 2001	6.5
1975	9.0	April 2003	6.0
1981	10.0	April 2004	6.0
1991	11.0	March 2005	6.0
1992	12.0	June 2008	7.0
		July 2008	7.5
		August 2008	6.0
		January 2009	6.0

Source: CMIE, *Basic Statistics Relating to the Indian Economy* – August 1993 and various issues of *Economic Surveys*, MOF, GOI.

As regards the effectiveness of bank rate as an instrument of monetary control, India's experience, and also that of other countries, shows that the bank rate has not proved to be an effective method of controlling money supply. The reason is that banks do not depend on the RBI greatly for their financial requirements. Besides, even if commercial banks borrow from the RBI, their total borrowing accounts for a small proportion of the total credit created by the commercial banks, especially when there are other sources of credit.

2. Cash Reserve Ratio (CRR) The *CRR* is another traditional monetary tool that RBI has been using to control inflation in the country, and also to restrain credit flow to the business sector. Recall that *CRR* refers to the percentage of net demand and time liabilities (NDTL) which commercial banks are required to maintain in the form of '*cash reserves*'. The NDTL are essentially the net demand and time deposits. The *cash reserves* are practically divided under two heads: (i) 'required reserves (*RR*)', and (ii) 'excess reserve'. The ***required reserve*** is the cash reserve that commercial banks are statutorily required to maintain with the RBI. Incidentally, this is a non-traditional method. The RBI was empowered in 1956 to impose the 'statutory cash reserve ratio' between 3 percent and 15 percent of bank's demand and time deposits. The '**required reserve**' is calculated fortnightly[22] (on the second Friday of the month) on the basis of average daily deposits. The ***excess reserve*** is the cash reserve which banks maintain as 'cash in hand' with the purpose of meeting the currency demand by the depositors. The excess reserves are determined generally by the bank's own experience regarding the 'currency drain'.

As regards the use of the *CRR* method as monetary control, till 1973, the RBI used this method only once in 1960. However, As shown in Table 30.3, since 1973, the RBI has been using *CRR* quite frequently as a major instrument of controlling the excess supply of money. The RBI raised the statutory *CRR* from 3 percent fixed in 1935 to 5 percent in 1960 and raised it further frequently. As a result, the bank rate had gone up to 15 percent in July 1989. This rate was maintained till 1994. But, since 1995, the *CRR* has been regularly reduced by the RBI until January 2006, as shown below. However, due to inflationary pressure in the economy, the RBI began to raise the *CRR* and raised it 8.75% in July 2008. With inflation rate declining, the RBI cut down the *CRR* to 5 percent in June 2009.

Table 30.3 Changes Made in CRR

Month and Year	*CRR (%)*
1994-95	15.00
November 1995	14.50
December 1995	14.00
May 1996	13.00
July 1996	12.00
January 1997	10.00
February 2001	7.50
March 2001	7.00
October 2001	6.50
October 2002	6.25
June 2003	4.50
March 2005 to Jan. 2006	5.00
April 2007	6.50
July 2008	8.75

22. Prior to March 29, 1985, it was calculated weekly.

3. Statutory Liquidity Ratio (SLR) In addition to *CRR*, the RBI was empowered to impose 'statutory cash reserve ratio' (*SLR*) to control and regulate the credit creation by the banks for the private sector and the availability of finance to the government. Under the *SLR* scheme, the commercial banks are required by statute to maintain a certain percentage of their total daily demand and time deposits in the form of liquid assets. Liquid assets, as specified by the RBI, include (i) excess reserves, (ii) unencumbered government securities, e.g., bonds of IDBI, NABARD, Development banks, cooperative debentures, debentures of port trusts, etc., and (iii) current account balance with other banks. The method of determining the SLR can be specified as follows.

$$SLR = \frac{ER + GS + CB}{DD + TD}$$

where ER = excess reserves, GS = Government (unencumbered) securities, CB = current account balance with other banks, DD = demand deposits, and TD = time deposits.

The basic purpose of using *SLR* was to prevent the commercial banks from going for liquidating their assets when *CRR* was raised to control money supply. When *CRR* was raised, what commercial banks used to do was to convert their liquid assets into cash to replenish the fall in their funds due to the rise in the *CRR* and maintained their credit creation ability. This made monetary policy ineffective. The *SLR*, as a tool of monetary control, works in two ways: (i) it provides an alternative to the borrowing of the government from the RBI, and (ii) it affects banks' freedom of buying and selling the government bonds. In both ways, it affects the money supply, depending on whether the RBI wants to control or enhance the money supply. When the intention is to increase money supply, the RBI reduces the *SLR* and when it wants to reduce the money supply with the public, it increases the *SLR*.

The *SLR* was first imposed in 1949, and was fixed at 20 percent, and remained unchanged till August 1964. In September 1964, the *SLR* was raised to 25 percent and was maintained at the same level till September 1970. Since then, the *SLR* has been raised quite frequently as shown below. The *SLR* was raised in September 1990 to 38.5 percent – very close to the prescribed upper limit of 40 percent. The *SLR*, as tool of monetary control, has, in fact, been used as a monetary-fiscal tool. The deficit financing method – a fiscal measure – led to rapid increase in money supply which continued to build inflationary pressure in the economy. The RBI now used the *SLR* for controlling the short-term money supply. The use of *SLR* restricted the flow of funds from the banks to the private sector. Since 1992, however, the *SLR* has been gradually reduced. It was reduced to 25 percent in April 1992, mainly because the rate of inflation had declined to around 5 percent in the early 1990s. The *SLR* continues to be maintained at 25 percent.

Year	*SLR (%)*
1971	25.0
1972	30.0
1973	32.0
1974	33.0
1978	34.0
1990	34.5
1992	25.0
2009	25.0

4. Open Market Operations (OMO) In developed countries like the USA and the UK, open market operation is considered to be a very powerful and efficient tool of monetary management. But in India, the open market operation has not been until recently a successful instrument of monetary management for the following reasons.

(i) In India, the security market, especially the Treasury bill market, is not yet well developed and fully organized, and the Government securities market is almost non-existent; and

(ii) The government bonds were earlier not very popular because of low rate of return. The rates were much lower than the market rate of interest.

It is for these reasons that open market operation was not used until the mid 1980s to control money supply, nor was this tool effective when used. In fact, open market operation was not used during the 1970s and the first half of the 1980s. The open market operation failed not only in India but also in other developing economies. In a nutshell, open market operation did not prove to be a very successful tool of monetary control. However, some important changes were made in India on the recommendations of the Chakravarty Committee (1985). The interest rate on Government securities was raised during the late 1980s and scheduled commercial banks were granted freedom to determine their own prime lending rates. These two factors made open market operation a fairly effective tool to control short-term credit.

After the economic reforms of 1991–92, *OMO* was assigned a greater role in monetary management. "Since the onset of reforms,…, the Reserve Bank reactivated open market operations (*OMO*) as an instrument of monetary management…. Active use of *OMO* for mitigating inflationary pressures was undertaken during 1993–1995 in the wake of unprecedented capital flows…"[23].

5. The Repo Rate: A New Monetary Tool Till the late 1980s, the RBI had been using the traditional methods of monetary control. However, as mentioned above, on the recommendations of the Chakravarty Committee (1985), some important changes were made in the monetary policy. However, some major changes were introduced in the monetary policy only after the foreign exchange crisis of 1990 and subsequent economic reforms. But the major problem that the RBI continued to face was to control and regulate the high rise in money supply. The high rise in money supply throughout was mainly due to monetization of the government's deficit financing. It was in 1991 that the World Bank and the IMF—the World Bodies that bailed India out of the foreign exchange crisis—exerted pressure on the government to make certain major economic reforms including monetary reforms. Some major monetary reforms and some new tools of monetary management were introduced including the *repo rate*. We describe here briefly a new monetary tool that is often used by the RBI, i.e., ***Repurchase Operation Rate – the repo rate***.

In April 1997, the RBI introduced a new system, called *Repurchase operation rate* (abbreviated as *repo rate*), to manage the short-run liquidity of the banking system. As mentioned above, under the *SLR* system, the commercial banks are required to invest a certain percentage of their demand and time deposits in government securities. This system blocks the bank money with the RBI, often causing liquidity problem. The repo system provides a solution to this problem of liquidity. Under

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23. Rakesh Mohan, *op. cit.* pp. 2102–03.

the repo system, the RBI buys securities back from the banks and, thereby provides funds to the banks. It is a form of lending money to the banks for a short period 1–14 days. The rate of interest at which the RBI lends money to the bank is the *repo rate*. In contrast, there is ***reverse repo rate***. The reverse repo rate is the rate at which the banks can buy the securities or deposit money with the RBI.

The operational rule of the repo rate is quite simple. When the central bank aims at increasing liquidity or money supply, it buys back the securities at a low repo rate. This increase the funds with commercial banks which can be used to create credit. On the other hand, when the objective is to control the money supply, the RBI uses the reverse repo rate and increases the repo rate. In June 1998, the repo rate was fixed at 5 percent. However, due to anticipated increase in liquidity via Resurgent India bonds and East Asian crisis, the repo rate was raised to 8 percent in August 1998. But it was later reduced gradually to 4.5 percent in 2004, to 5 percent on April 28, 2005, and to 6.25 percent on October 26, 2006. However, due to mounting inflationary pressure in the economy, repo rate was increased to 7.25 percent m 2006-07. Along with the changes made in the repo rate, the reverse repo rate was also simultaneously raised. In 2008, the Indian economy was facing a 13-year high rate of inflation which was touching 12 percent. With the objective of controlling inflation, the RBI kept increasing the repo rate. On July 29, 2008, the RBI raised the repo rate from 8.5 percent in the previous week to 9 percent.

30.5.3 Evaluation of India's Monetary Policy

At the end of the discussion, the question that arises about the monetary measures undertaken by the RBI is: Has the monetary policy of India been successful? This question takes us to the evaluation of monetary policy. Monetary policy, or any policy for that matter, has to be evaluated by examining whether its objectives have been achieved over time. As mentioned above, on the recommendation of the Chakravarty Committee, the RBI had adopted 'price stability', i.e., controlling inflation, as the 'dominant objective of the monetary policy', while at the same time, maintaining an adequate liquidity in the economy. The question arises here is: Price stability at what rate of inflation? This question arises because some inflation is inevitable in a growing economy like India. It is, perhaps, in view of this fact that the Chakravarty Committee had recommendation price stability at 4 percent rate of inflation. Even other economists have suggested, on empirical basis, that a 3-5 percent annual inflation is desirable for a developing economy.

Examined against the price stability objective, India's monetary policy appears to be only partially successful. Instead of looking at annual variation in the inflation rate, let us look at decennial rate of inflation to examine the effectiveness of monetary policy.

In India, inflationary pressure started building up during the 1960s, due to the Chinese war in 1962, the Pakistan war in 1965, and near-famine conditions in 1965-66. As a result, inflationary pressure started mounting from 1962-63, and inflation rate shot up to 13.9% in 1966-67. The decennial average rate of the 1960s was worked out at 6.4 percent.

The things were much worse in the 1970s. The inflation rate during the 1970s was much higher – the highest rate during the period was 25.2 percent in 1974-75. This has been the highest rate of inflation in India so far. The decennial average inflation rate was 9 percent, due mainly, to the failure of the kharif crop and rise in oil prices. Incidentally, these aspects fall outside the scope of monetary controls.

During the 1980s, things improved marginally. The decennial rate of inflation declined from 9 percent in the 1970s to 8 percent in the 1980s, with the highest inflation rate of 18.2 percent in 1980-81. However, there was an upsurge of inflationary pressure during the first five years of 1990s. The average rate of inflation during the period from 1990-91 to 1995-96 was worked out at 10.6 percent. Thereafter, however, the inflation rate declined considerably. The inflation rate varied between 3.4 percent in 2002-03 and 6.4 percent in 2004-05. The annual average rate of inflation during the period from 1995-96 to 2006-07 works out to be 5 percent. This was quite close to the economically and socially desirable rate of inflation.

If one compares the high rate of inflation (varying between 6% and 10%), one would conclude that during the entire period from 1960-61 to 1995-96, i.e., during a period of 35 years, the monetary policy was unsuccessful in achieving its objectives. Although inflation rate was quite within the desirable limit 4-5% during the period from 1995-96 to 2006-07, it can hardly be attributed to the monetary policy. The lower rate of inflation was mainly due to high growth rate—7-9 percent. The only point that goes in favour of the monetary policy is the fact that things might be much worse in the absence of monetary controls adopted by the RBI. What is alarming is the fact that, in spite of all monetary measures, inflation rate shot up to about 12 percent—to be precise, 11.98 percent—in June-July 2008. However, had RBI not adopted a monetary policy with prime objective of price stabilization, inflation rate could have been much higher.

It may be added at the end that inflation rate has been within the desirable limit (5%) during the period from 1995-96 to 2006-07, which can be attributed to the monetary policy. It may be argued that the lower rate of inflation was mainly due to high growth rate. But then maintaining a reasonably high growth rate was also the second most important objective of the monetary policy. It may be this be concluded that monetary policy of India has been only fairly successful.

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QUESTIONS FOR REVIEW

1. What is meant by monetary policy? How does it differ from fiscal policy?
2. Describe the instruments of monetary policy. How do they work and what are their limitations?
3. Distinguish between total credit control and selective credit control measures of monetary control. Under what conditions are the qualitative controls preferred to quantitative controls?
4. What is open market operation? How does it work to affect the money supply? Why is this measure considered to be more effective than other measures of monetary control?
5. Explain the transmission mechanism of monetary policy. How does a change in money supply changes the levels of income and prices? What is portfolio adjustment? How does Keynesian approach in this regard differ from the monetarist approach?
6. What are the factors that determine the effectiveness of monetary policy? How does empirical evidence corroborate with theoretical propositions?
7. What is meant by 'time lag'? How does it affect the effectiveness of monetary policy?
8. What are the limitations of the monetary policy in developed and less developed economies? Why is monetary policy less effective in the developing economies?
9. What are the objectives of India's monetary policy? Have the policy measures used by the RBI been effective in achieving the policy targets?
10. What monetary measures have been used by the RBI to control in the country? Which of the measures proved to be more effective.
11. Price stabilization has been the dominant objective of India's monetary policy. Has the RBI succeeded in stabilizing the price level at a desirable level.
12. Inflation rate in India touched 12 percent in July 2008. What was the dilemma faced by the RBI and the government in adopting strong measures for controlling inflation. Explain in detail.

APPENDIX TO CHAPTER 30

Table 30.1A Growth in Money Supply (M_3) and Rate of Inflation: 1960-61 to 2005-06 (52-week average)

Year	*Rise in Money Supply (%)*	*Inflation (%)*	*Year*	*Rise in Money Supply (%)*	*Inflation (%)*
1950-51	—	-5.1	1990-91	14.9	10.3
1955-56	6.0	6.6	1991-92	19.3	13.5
1960-61	7.0	0.2	1992-93	14.8	10.1
1965-66	11.6	7.7	1993-94	18.4	8.4
1970-71	17.4	5.5	1994-95	22.4	12.6
1975-76	14.5	-1.1[@]	1995-96[$]	13.6	8.0
1977-78	20.6	5.2	1996-97	16.0	4.6
1979-80	17.6	17.1	1997-98	17.0	5.0
1980-81	18.3	18.2	1998-99	19.4	6.9
1981-82	12.8	11.3	1999-00	16.6	3.3
1982-83	16.7	4.9	2000-01	16.8	7.2
1983-84	17.9	7.5	2001-02	14.4	3.6
1984-85	18.7	6.5	2002-03	14.7	3.4
1985-86	16.1	4.7	2003-04	16.8	5.5
1986-87	18.8	5.8	2004-05	12.3	6.4
1987-88	15.3	9.4	2005-06	17.0	4.4
1988-89	18.4	6.3	2006-07	21.3	5.4
1989-90	19.9	8.1	2007-08	21.2	4.7
			2008-09	18.4	8.4

@ The negative rate of inflation in 1975-76 was the result of very severe direct price control imposed on the economy due to an unprecedented rate of inflation (25.2%) in 1974-75, by the then PM, Mrs. Indira Gandhi.

$ Inflation data since 1995-96 onwards is based on WPI 1993-94 = 100.

Sources: (i) Data on Money Supply and inflation rate for the period from 1950-51 to 1970-71 compiled from Center for Monitoring Indian Economy (CMIE), *Basic Statistics Relating to the Indian Economy*, August 1993, (ii) the money supply growth rate for period 1961-62 to 1989-90 computed from money supply data published in Narendra Jadhav, *Monetary Economics for India* (Macmillan India, Delhi, 1994, pp. 241 and 245, and (iii) The data on inflation rate compiled from different issues of *Economic Survey*, MOF, GOI.

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Chapter 31

Fiscal Policy

INTRODUCTION

Reference to fiscal policy has been made at several points in the previous chapters. There our discussion was confined to measuring theoretically the effect of the changes made in the fiscal policy. Some important questions remain unanswered: How does fiscal policy work to achieve its objectives? Does it work effectively, and what are its limitations? How fiscal policy—the change in government spending and taxation—affects the equilibrium level of output and employment have already been discussed in Chapter 17 in the framework of the *IS-LM* model. In this chapter, we discuss in detail four aspects of fiscal policy: (i) meaning and scope of the fiscal policy, (ii) working of the fiscal policy, (iii) use of the fiscal measures for achieving the macroeconomic goals, and (iv) limitations of fiscal policy. These aspects of fiscal policy are first discussed in the theoretical mode. At the and, we present a brief discussion on India's fiscal policy and its effectiveness. Let us begin with a fresh look at the meaning and origin of the fiscal policy.

31.1 MEANING AND SCOPE OF FISCAL POLICY

31.1.1 Meaning of Fiscal Policy

The word 'fisc' means 'state treasury' and 'fiscal policy' refers to policy concerning the use of 'state treasury' or the government finances to achieve certain macroeconomic goals. Fiscal policy has however been variously defined by the economists. Arthur Smithies defined fiscal policy as "a policy under which government uses its expenditure and revenue programs to produce desirable effects and avoid undesirable effects on the national income, production, and employment."[1] G. K. Shaw, a well-known expert on the subject, defines fiscal policy as "any decision to change the level, composition or timing of government expenditure or to vary the burden, structure or frequency of the tax payment."[2] Shaw's definition presumes that national economic goals are given. Samuelson and Nordhaus offer a more complete definition of fiscal policy. By fiscal policy they "mean the process of shaping taxation and public expenditure to help dampen the swings of the business cycle and contribute to the maintenance of a growing, high-employment economy, free from high or volatile inflation."[3] In their opinion, the role of fiscal policy is confined largely to stabilization of employment and the price level. Its seems, they have defined fiscal policy keeping in view the problems of the developed countries. Fiscal policy can be defined in more general terms as follows. ***Fiscal policy is the government programme of making discretionary changes in the pattern and level of its expenditure, taxation and borrowings in order to achieve certain economic goals such as economic growth, employment, income equality, and stabilization of the economy on a growth path***.

A narrow concept of fiscal policy is ***budgetary policy***. While *budgetary policy* refers to current revenue and expenditure of the financial year, fiscal policy refers to budgetary operations including both current and capital receipts and expenditure. The essence of fiscal policy lies, in fact, in the budgetary operations of the government. The two sides of the government budget are *receipts* and *expenditure*. The ***total receipts*** of the government are constituted of tax and non-tax revenue and borrowings (including deficit financing). These items in the budget represent the budgetary resources of the government. The ***government expenditure*** refers to the total expenditure made by the government in the fiscal year. The total government expenditure consists of payments for goods and services, wages and salaries, interest and loan repayments, subsidies, pensions and grants-in-aid, and so on. From economic analysis point of view, receipt items give the measure of the flow of money from the private sector to the government sector. The government expenditure, on the other hand, represents the flow of money from the government to the economy as a whole. The government receipts are *inflows* and expenditures are *outflows*.

The government can, by using its statutory powers, change the magnitude and composition of inflows and outflows and thereby the magnitudes of macroeconomic variables—aggregate consumption expenditure and private savings and investment. The magnitude and composition of inflows and outflows can be altered by making changes in taxation and government spending. The policy under which these changes are made is called *fiscal policy*.

31.1.2 The Scope of Fiscal Policy

The scope of fiscal policy comprises the *fiscal instruments* and the *target variables*. *Fiscal instruments* are the variables that government can use and maneuver at its own discretion to achieve certain economic goals. *Fiscal instruments* include taxation (direct and indirect), government expenditure, transfer payments (grants and subsidies) and public investment. The *target variables* are the

1. Arthur Smithies, "Fiscal Budgeting and Fiscal Policy," in *A Survey of Contemporary Economics,* Vol. I (The Blakiston Co., Philadelphia, 1949), p.174.
2. G. K. Shaw, *An Introduction to the Theory of Economic Policy,* Macmillan 1971, p.87.
3. Samuelson, P. A. and Nordhaus, W. D., *Economics* (McGraw-Hill, NY, 15th Edn., 1995), p.626.

macro variables including disposable income, aggregate consumption expenditure, savings and investment, imports and exports, and the level and structure of prices. The fiscal policy instruments and target variables are discussed below in detail.

31.2 FISCAL INSTRUMENTS AND TARGET VARIABLES

Fiscal policy is implemented through fiscal instruments also called 'fiscal handles', 'fiscal tools' and 'fiscal levers'. The changes made in fiscal tools work through their linkage to the target variables. The policy instruments and target variables are briefly described below.

31.2.1 Fiscal Instruments

Fiscal instruments refer to the budgetary measures which the government uses and manipulates to achieve some predetermined objectives. The major fiscal instruments include the following measures.

(i) Budgetary policy deficit or surplus budgeting,
(ii) Government expenditure,
(iii) Taxation, and
(iv) Public borrowings.

The features and the working of these fiscal instruments are briefly described here.

(i) Budgetary Policy. In narrow sense of the term, budgetary policy refers to government's plan to keep its budget in balance, in surplus or in deficit. This kind of budgeting is in itself a fiscal instrument. When the government keeps its total expenditure equal to its revenue, as a matter of policy, it means it has adopted a *balanced-budget policy*. When the government decides to spend more than its expected revenue, as a matter of policy, it is pursuing a *deficit-budget policy*. And, when the government adopts a policy of keeping its expenditure substantially below its current revenue, it is following a *surplus-budget policy*. Balanced, deficit and surplus budgets affect the economy in different ways, to different extents, and in different directions. The effects of different kinds of budget balances will be discussed further in a following section.

(ii) Government Expenditure. The government expenditure includes total public spending on purchase of goods and services, payment of wages and salaries to public servants, public investment, infrastructure development, transfer payments (e.g., pensions, subsidies, unemployment allowance, grants and aid, payments of interest, and amortization of loans). Given the expendable resources the government, the size and the composition of government expenditure is a matter of government discretion. ***The government expenditure is an injection into the economy: it adds to the aggregate demand.*** The overall effect of government expenditure on the economy depends on how it is financed and what is its multiplier effect. The effect of the government expenditure on the economy has already been discussed in Chapter 17.

(iii) Taxation. A tax is a *non quid pro quo* payment by the people to the government, i.e., tax is a payment by the people to the government against which there is no direct return to the tax-payers. By this definition, taxation means *non quid pro quo* transfer of private income to public coffers by means of taxes. Taxes are classified as *direct taxes* and *indirect taxes*. ***Direct taxes***

include taxes on personal incomes, corporate incomes, wealth and property. Personal income tax and corporate income tax are the two most important direct taxes imposed by the central government in India. In 2007-08, personal income tax contributed 17.3 percent and corporate income tax 32.5 percent of the gross tax revenue. These two direct taxes together contribute nearly 50 percent of the gross tax revenue of the central government. More importantly, corporate income tax has of late emerged as the most important single source of government revenue. These two taxes contributed 50 percent of the gross revenue in 2007-08. ***Indirect taxes*** includes taxes on production and sale of the goods and services. Indirect taxes are also called *commodity taxes*. In India, the two most important central indirect taxes are excise duty (or VAT) and customs. In 2007-08, central excise yielded 20.8 percent and customs 17.6 percent of the gross tax revenue[4]. These two taxes together contributed 38.4 percent of gross revenue in 2007-08, though it is much lower than their share in 2006-07.

(iv) Public Borrowings. Public borrowings include both internal and external borrowings. The governments make borrowings, generally, with a view to financing their budget deficits. ***Internal borrowings*** are of two types: (i) borrowings from the public by means of government bonds and treasury bills, and (ii) borrowing from the central bank. The two types of borrowings have different effects on the economy. Borrowings from the public to finance budget deficit is, in effect, simply a transfer of purchasing power from the public to the government, whereas borrowings from the central bank for financing budget deficits, i.e., *monetized deficit financing*, is straightaway an injection into the economy. ***External borrowings*** include borrowings from (a) foreign governments, (b) international organizations like World Bank and IMF, and (c) market borrowings. It has the same effect on the economy as deficit financing. In India, the total borrowing accounted for about 18 percent of the total central government expenditure in 2007-08.

31.2.2 Target Variables

In the Keynesian framework of analysis, the ultimate target variable of fiscal policy is the intended change in the *aggregate demand*. The change in aggregate demand is sought through the change in its various components and level, and in the price structure. The target variables of fiscal policy, i.e., the variables which are sought to be changed through fiscal instruments are:

(i) Private disposable incomes,
(ii) Private consumption expenditure,
(iii) Private savings and investment,
(iv) Exports and imports, and
(v) Level and structure of prices.

31.2.3 How Fiscal Instruments Affect Target Variables

In order to understand how fiscal instruments affect the target variables, we need to recall that fiscal instruments and target variables are interrelated and interdependent. Therefore, a change in one policy variable affects all other macro variables. The extent of effect depends on the extent of their relationships. For example, a change in taxation changes first the disposable income which in

4. *Economic Survey,* 2008-09, Economic Division, Ministry of Finance, Government of India, p. 39, Table 3.3.

turn changes the consumption expenditure, savings and investment. The change in aggregate demand affects the external balance by changing imports. Also, an autonomous change in one of the macro variables can cause a change in other macro variables and policy variables. The relationship between the macro variables is demonstrated below. While describing the relationship between the policy instruments and target variables, we assume *all other things to remain constant*.

The interdependence of target variables—disposable income, consumption expenditure, savings, investment, imports, and price level—can be demonstrated by using the aggregate demand function. We know that the aggregate demand (*AD*) is given as:

$$AD = C + I + G + X - M$$

where, C = consumer demand, I = investment, G = public spending, M = imports, and X = exports.

We know also that, in the short run,

$$C = f(Y_d), \text{ and}$$
$$M = f(Y)$$

where, $Y_d = Y - tY$ = disposable income, Y = gross income, and t = tax rate.

Given these relationships, the government can change the aggregate demand: (a) by changing aggregate consumption expenditure by changing disposable income through direct taxation, (b) by changing imports through tariffs, (c) by changing investments through tax incentive or disincentive, and (d) by changing government expenditure. The aggregate demand can be changed by changing any one or more of these factors.

31.3 KINDS OF FISCAL POLICY

There is no unique fiscal policy that can provide appropriate solution to all kinds of economic problems and under different condition in different countries and at different points of time. In fact, different kinds of fiscal policies have been suggested by the economists and used by the policy-makers in different countries under different economic conditions to achieve specific macroeconomic goals. However, fiscal policy actions are generally classified under the following categories.

1. Automatic Stabilization Fiscal Policy,
2. Compensatory Fiscal Policy, and
3. Discretionary Fiscal Policy.

This classification of fiscal policy is based on the frequency and purpose of changes made in the revenue and expenditure programmes by the government of different countries. The frequency of fiscal changes may vary from country to country and from time to time. The fiscal changes may be made 'once-for-all', or made once a year, or made more frequently within a year, as it happens in India[5]. The working of the different kinds of fiscal policies are discussed here briefly.

5. In India, budgetary changes are made at three stages every year: *first*, prices of essential goods supplied by the government, e.g., prices of petrol, diesel and cooking gas, are enhanced before the annual budget is placed before the Parliament, normally on the 28th February; *second*, railway fair rates are enhanced in the Railway Budget placed before the Parliament before the annual budget; and *finally*, a variety of mindboggling changes are made in the annual budget. Fiscal changes are also made during the fiscal year as and when need arises.

31.3.1 Automatic Stabilization Policy

The automatic fiscal policy means adopting a fiscal system with *built-in-flexibility* of tax revenue and government spending. *Built-in-flexibility* means automatic adjustment in the government expenditure and tax revenue in response to rise and fall in *GDP*. In this kind of fiscal policy, the government adopts a tax system and an expenditure programme linked to *GDP* and unemployment. As a result, tax revenue increases and government expenditure decreases *automatically*, with an increase in *GDP*. Tax revenue increases because household income increases with increase in *GDP*. Likewise, tax revenue decreases and government expenditure increases *automatically*, with decrease in *GDP* and increase in unemployment.

Let us now examine the effects of automatic changes in tax collections and government expenditure on the level of economic activities[6]. A convenient starting point is to recall, from Chapter 8, the analysis of the effects of *discretionary* changes in taxation and government expenditure on the national income. Recall that in a three-sector model, the equilibrium condition for the national income is given as:

$$Y = \frac{1}{1-b}(a - bT + I + G) \tag{31.1}$$

Recall also that the tax multiplier (T_m) and expenditure multiplier (G_m) are given as

$$T_m = \frac{\Delta Y}{\Delta T} = \frac{-b}{1-b} \tag{31.2}$$

$$G_m = \frac{\Delta Y}{\Delta G} = \frac{1}{1-b} \tag{31.3}$$

Given the national income equilibrium condition and the measures of tax-multiplier and government expenditure multiplier, let us now analyze the working and effect of the *automatic stabilizers* on the level of economic activities. For this purpose, *two changes* are made in the three-sector model.

(i) Instead of using *gross tax collection* (T) in the model, *net tax collection* (T_N) will be used. The net tax collection (T_N) means gross tax collection (T) minus government *transfer payments* (T_P), i.e.,

$$T_N = T - T_P.$$

(ii) The earlier assumption that T is exogenously determined is dropped and it is instead assumed that *net tax collection is the function of the national income*, i.e.,

$$T_N = t_0 + t_1 Y, \ (t_0 < 0 \text{ and } t_1 > 0) \tag{31.4}$$

The parameters t_0 and t_1 in Eq. (31.4) need some explanation. The parameter t_0 is negative. It implies that when income (Y) goes below a certain level, the government will go for a ***negative***

6. For details, see Richard T. Froyen, *Macroeconomics: Theories and Policies,* 3rd Edn (Macmillan, 1990), pp. 529-35.

taxation, that is, make transfer payments in the forms of unemployment relief, and so on. The parameter t_1 is the average tax rate. The significance of using the net tax function is that both taxation and transfer payments (a part of the government spending) are linked to national income. This spares the task of using a separate G-function. *The net tax function works, in fact, as automatic stabilizer*.

With changes (i) and (ii) made in the income determination model, the consumption function can now be written as:

$$\begin{aligned} C &= a + b(Y - T_N) \\ &= a + b[Y - (t_0 + t_1 Y)] \\ C &= a - bt_0 + b(1 - t_1) Y \end{aligned} \tag{31.5}$$

By substituting Eq. (31.5) for C in the national income equilibrium equation given as $Y = C + I + G$, we get the equilibrium condition with fiscal stabilizer as follows.

$$Y = a - bt_0 + b(1 - t_1) Y + I + G$$

$$Y[1 - b(1 - t_1)] = a - bt_0 + I + G$$

$$Y = \frac{1}{1 - b(1 - t_1)}(a - bt_0 + I + G) \tag{31.6}$$

Note that with the introduction of T_N-function, national income equilibrium Eq. (31.1) changes to Eq. (31.6). Equation (31.6) gives the equilibrium level of income with fiscal stabilizers. The factor

$$\frac{1}{1 - b(1 - t_1)}$$

in Eq. (31.6) is the ***automatic stabilization multiplier*** (A_m).

We may now compare *automatic stabilizer multiplier* (A_m) with *government expenditure multiplier* (G_m) and find the effect of the automatic stabilizers on the economy. On comparison, we find that

$$\frac{1}{1 - b(1 - t_1)} < \frac{1}{1 - b} \tag{31.7}$$

Eq. (31.7) implies that A_m is less than G_m. This comparison shows that the *multiplier effect* of automatic stabilization policy is much smaller than that of the government expenditure. This point can be proved with a numerical example. Let us suppose $b = 0.75$ and $t_1 = 0.20$. By substituting these values in the measures of A_m and G_m, we get

$$\frac{1}{1 - 0.75(1 - 0.20)} < \frac{1}{1 - 0.75}$$

$$\frac{1}{0.4} < \frac{1}{0.25}$$

$$2.5 < 5$$

This shows the multiplier effect of the automatic stabilization policy is much lower (half in our example) than the multiplier effect of autonomous investment and government spending.

The automatic stabilization policy serves as an *automatic stabilizer* of the economy. Trade cycle theories reveal that an uncontrolled growth creates the conditions for inflation and then depression. During the period of growth, the automatic stabilization policy controls the growth rate automatically and the possible inflation by restraining the effective demand and prevents, thereby, the eventual depression.

The working of automatic stabilizer is simple. In a fast growing economy, tax collection increases with increase in incomes which constraints aggregate demand. On the other hand, unemployment decreases causing decline in government spending. The increase in tax burden and fall in public expenditure work as restraint on the effective demand—these factors reduce the growth of aggregate demand. This prevents excessive rise in the price level. During the period of depression, on the other hand, this policy is supposed to result in reduced taxation due to fall in taxable incomes and increase in government expenditure on unemployment compensation, or unemployment relief payments and unemployment insurance. This kind of taxation system halts decrease in private aggregate demand by way of lower taxation, and adds to the aggregate demand by increasing government expenditure. This prevents the economy going into deep depression.

Limitations of Automatic Stabilizers. Although automatic stabilization policy is supposed to work—at least theoretically—to control boom and depression automatically, it has its own *limitations*.

First, the theory of automatic stabilizers suggests that it can automatically smoothen the ups and downs and growth and depression in the economy. In reality, however, automatic stabilizers work only in the framework of the model presented above, and they work only when cyclical factors arise within the economy due to change in income and spending. This policy does not work if inflation is caused by the factors other than factors affecting aggregate demand. For example, if inflation is caused by excess money supply, this policy may not work.

Second, this policy does not work when an economy is overaffected by external factors. When an economy is subjected to external shocks, automatic stabilizers fail to smoothen the ups and downs. In that case, it becomes unavoidable to make discretionary changes in fiscal policy.

Third, as mentioned earlier, automatic stabilization model works efficiently only in the advanced economies—not in less developed economies. Even in developed economies, it has not been found to work as efficiently as projected in theoretical models. For, the real economic system is much more complex than stipulated in the model.

31.3.2 Compensatory Fiscal Policy

Another variant of stabilizing policy is *compensatory fiscal policy*. The compensatory fiscal policy is a deliberate budgetary action taken by the government to compensate for the deficiency in, and to reduce the excess of, aggregate demand. The compensatory action is taken by the government in the form of *surplus budgeting* or *deficit budgeting*. In this kind of fiscal policy, the government uses a greater degree of discretion than in automatic stabilization policy and compensatory fiscal policy can be revised from time to time as per need of the country. Besides, the policy of surplus budgeting is adopted when the government is required to control inflation and policy of deficit budgeting is adopted when the objective is to control deflation.

The policy of ***deficit budgeting*** is adopted to fight depression in the economy. During the period of depression, the government is required to boost up the aggregate demand, especially when the economy is facing depression due to lack of effective demand. The government in this case is required to take compensatory fiscal measures. The compensatory measures may be in the form of tax reduction and enhanced government spending. This kind of fiscal measures increases aggregate demand. Increase in aggregate demand leads first to the rise in price level. It adds to the producers' profit with a time lag in increase in costs. This increase in profits creates an optimistic environment. Therefore, both opportunity and incentive to invest increase. This is supposed to push up the level of employment and output. This is the kind of fiscal policy that most countries affected by the recent global recession had adopted.

The policy of ***surplus budgeting*** is adopted by the governments during the period of high rate of inflation, especially when inflation is caused by excessive demand. Surplus budgeting is a powerful tool to control the aggregate demand. Under this policy, the government keeps its expenditure lower than its revenue. If necessary the government may resort to a higher rate of taxation and cut its expenditure further down. Taxation reduces disposable income. As a result, the aggregate demand decreases at the rate of tax multiplier. On the expenditure side, a cut in the government expenditure reduces the aggregate demand at the rate of expenditure multiplier. The two-prong attack on the aggregate demand helps reducing the demand pressure and, thereby, the inflation.

31.3.3 Discretionary Fiscal Policy

A discretionary fiscal policy is one in which ad hoc changes are made in the government expenditure and taxation system and tax rates at the *discretion* of the government as and when required. In discretionary fiscal policy, the government makes deliberate changes in (a) the level and pattern of taxation, (b) the size and pattern of its expenditure, and (c) the size and composition of public debt. The discretionary changes in these fiscal instruments are made with a view to achieving certain specific objectives. The discretionary changes in taxation and government expenditure and their effects on the target variables are described here briefly.

(a) Changes in Taxation. The discretionary changes in taxation include such changes in both direct and indirect taxes as (i) increasing or decreasing the tax rates, (ii) imposition of new taxes or abolition of existing taxes, and (iii) imposition of taxes on new tax bases. All these kinds of changes in taxation result in either *the flow of household incomes to the government* or to *reduction in such flows*. Tax changes that reduce disposable incomes of the housholds cause a decline in the consumer demand and, therefore, a *contractionary effect* on the economy. This proves helpful in reducing the *inflationary pressure* in the economy.

(b) Discretionary Changes in Government Expenditure. The discretionary changes in the government spending include change in (i) the size of the government expenditure, (ii) the pattern of government expenditure, (iii) the methods of financing government expenditure, (iv) transfer payments (e.g., subsidies, old age pensions, unemployment relief, etc.), (v) overall budgetary surplus and deficit, and (vi) the methods of deficit financing.

Here again, there are no set rules for making changes in the fiscal policy. Any or many of these changes can be made at any time at the discretion of the government. Changes can be altered or reversed at the discretion of the government. It is this character of fiscal policy which makes a *discretionary policy*.

Limitations of Discretionary Fiscal Policy. It is generally alleged that a discretionary fiscal policy works in theory better than in practice. The discretionary fiscal policy does not work effectively in practice because it has certain limitations.

First, an *important limitation* of discretionary policy is that it is suitable and effective only when it is used for short-run corrections in the economy. Attempts to solve the macroeconomic maladjustments or disequilibrium of long-term nature through the discretionary fiscal policy creates a greater mess and distortions in the economy rather than resolving them.

Second, an important factor that makes effectiveness of discretionary fiscal policy doubtful even in the short run is the problem in making an accurate assessment of the magnitude of the problem and forecasting expected results of policy changes. In the absence of reliable estimates and forecasting, the decisions are likely to go wrong and the consequences may be disastrous. For example, like all other countries affected by the global recession, India had implemented certain short-run stimulus package. Since the economy has started recovering, the government is in dilemma as to whether or not to withdraw the stimulus package because its effects are unpredictable.

Third, there are two kinds of ***time-lags*** in the implementation of fiscal actions: pre-implementation and post-implementation time-lags. Pre-implementation time-lag arises due to time taken in the process of decision-making, called 'decision lag'. The policy measures and policy tools are decided upon by the policy-makers and the think-tank of the government. For instance, in India, for all long-term fiscal actions or policy reforms, a committee is appointed to make its recommendation. The committee takes more time than stipulated in its terms of reference. After the committee makes its recommendations, the report is placed for the bureaucratic appraisal. It is then sent for ministerial consideration for its approval. The committee's recommendations are then placed before the Parliament for discussion. After its approval by the Parliament, proposals find a place in the Finance Bill. The time lost in decision-making is called 'decision lag. After the Finance Bill is voted, it takes further time in the implementation of the policy. It is called 'execution lag'.

Thus, a considerable time is lost in the process of decision-making and its execution. As regards the post-implementation time-lag, it arises due to lagged effect of fiscal actions. The lagged effect arises because fiscal changes work through the related variables and, therefore, take a long time to produce the expected result or unexpected/undesired effects or to show that they cannot produce any satisfactory results.

The time-lag associated with the working of the discretionary fiscal policy makes the efficacy of the policy doubtful. Its working is further complicated when other changes are made in the fiscal policy before the full effect of a previous action is realized. This also complicates the assessment of the performance of the policy. In India, such changes were of regular nature—fiscal changes were made invariably in each annual budget—before the Economic Reforms were made in 1990–91. Changes in taxation and expenditure are also made within a financial year. Now, the frequency of discretionary fiscal changes has considerably reduced.

Automatic Vs Discretionary Fiscal Policy: A Comparison

Peston has rightly remarked, "The literature on economic policy makes a great deal of fuss about discretionary versus automatic policy making."[7] The distinction between *automatic* and *discretionary*

[7] M. H. Peston, *Theory of Macroeconomic Policy* (Philip Allan, Oxford, 1974), p. 6.

fiscal policies is a matter of frequency of government discretion in changing the taxation and expenditure programmes. The automatic fiscal policy is adopted with a belief that this policy will automatically maintain stability in the economy and that there is no need to change taxation and expenditure programmes quite often. This belief has however not been born out by the historical experience.

There are two kinds of problems with the automatic fiscal policy. *First,* the economies do not work as expected under the automatic fiscal policy regime. Economic fluctuations, despite increasing government intervention, have been taking place, forcing the government to make discretionary changes in the budgetary policy. The discretionary policy has therefore become the most common form of the fiscal policy. *Second*, this kind of fiscal policy can be suitable for mature and developed economies. In *LDCs*, the levels of revenue and expenditure are generally so low that automatic changes in tax revenue and expenditure are hardly sufficient to maintain economic stability.

31.4 FISCAL POLICY AND MACROECONOMIC GOALS

In the preceding section, we have discussed the nature and the conditions for effectiveness of discretionary fiscals policy in a general framework. In this section, we discuss the use and the role of the fiscal policy with reference to each macroeconomic goal, *viz*., economic growth, employment promotion, economic stability, reduction of income disparity, and maintaining *BOP* equilibrium. The working of fiscal policy in respect of different macroeconomic goals is discussed here theoretically in the Keynesian framework.

31.4.1 Fiscal Policy for Economic Growth

Economic growth, that is, a sustained increase in *GDP*, has been the main endeavour of all the societies at all times. In recent times, achieving the potential growth rate is the prime concern of the *LDCs* and maintaining growth rate at its potential level is the major concern of the *DCs*. Fiscal policy has been used and is being used by all the countries to achieve and maintain a reasonable growth rate though there has been an endless debate on the usefulness and effectiveness of fiscal policy. The use of fiscal policy for economic growth came to prominence with the developments in the theory of economic growth, especially with the emergence of Harrod-Domar growth model[8] and proliferation of writings[9] during the 1950s and 1960s on the use of fiscal policy for breaking the vicious circle of poverty in the backward economies caught in low equilibrium trap and for accelerating the pace of growing economies. We explain here first the role of fiscal policy in the growth of the underdeveloped countries.

Given the manpower, technology and the natural resources, the growth rate of a country depends on the rate of savings and investment. Therefore, the roles that are assigned to fiscal policy in this regard are to create conditions for increase in private savings and investment and to enhance investment in the public sector. In order to promote savings, the rate of income tax is reduced; tax incentives are provided for savings; and corporate sector is provided with a number of incentives

8. Shaw, G. K., *Fiscal Policy* (Macmillan, London, 1972), p. 27.

9. See, for example, Nurkse, R., *The Problem of Capital Formation in the Underdeveloped Countries*, (Oxford University Press, 1952); Lewis, W.A., *Theory of Economic Growth*, (George Allen and Unwin, Ltd. London, 1955); Baran, P. A., *The Political Economy of Growth,* (Modern Reader Paperbacks, N.Y., 1957); Bauer P. T., *Dissent on Developments* (Weidenfeld and Nicholson, London, 1972).

and concessions to promote private investment. The incentives and concessions provided to the corporate sector include tax holidays, high depreciation allowance, development rebate for capacity expansion, investment subsidies, exemption of import duties on capital imports, and so on. All these measures have been used in India from time to time.

These measures often prove to be inadequate to promote savings and investment in *LDCs* due to (i) low level of per capita income and high rate of *MPC*; (ii) a small fraction of population with taxable income (1.4% in India); (iii) inadequate growth infrastructure and social overhead capital; and (iv) lack of effective aggregate demand.

Mobilization of Resources through Taxation. The resources of the private sector of the *LDCs* are severely limited and prove to be inadequate to pull the economy out of 'low equilibrium trap'. Therefore, the government is required to play the role of a ***prime mover***. This requires expansion of the public sector and enhancement of the public sector investment. Huge amount of resources are needed to accomplish this task. It is here that fiscal policy can play a great role. In order to raise additional resources, the tax net is cast as wide as possible, irrespective of who pays the taxes, particularly indirect taxes. The following tax measures are generally used for the purpose of resource mobilization.

(a) Progressive taxation of personal and corporate incomes,
(b) Widespread taxation of all kinds of goods and services,
(c) Taxation of luxury goods at a prohibitive rate,
(d) Imposition of new taxes, for example, service tax and fringe benefit tax imposed by India after 2003, and
(e) Imposition of exorbitantly high duty on import of consumer goods.

Resource Mobilization through Public Borrowings. Where resource mobilization through tax measures proves inadequate, the governments resort to borrowings to finance the growth projects. Borrowings, as mentioned above, include internal and external borrowings. Internal borrowings include market borrowing and deficit financing. Financing economic growth through borrowings has been a global practice. We have already explained in Chapter 8 that government deficit spending has an expansionary effect on the economy—it leads to rise in employment and output, at least as far as Keynesian theory of income and employment is applicable. Since we are concerned here with the use of fiscal policy for economic growth, it is pertinent to ask: Does financing of growth through government borrowings always lead to economic growth? The answer is: Not necessarily. The reasons are following.

(i) Government's deficit spending crowds out private investments,
(ii) Government's internal borrowings through government bonds, etc. often imposes excessive burden on the government, on the one hand, and reduces availability of funds for private investment, on the other, and
(iii) Government borrowing reduces private investment for reasons other than *crowding-out effect*. An important reason is that the flow of household savings to the government bonds reduces the flow of savings to the banks—the source of private investment funds.

These are some big and complicated issues and need a detailed discussion. These issues are, therefore, discussed separately later in this chapter.

31.4.2 Fiscal Policy for Employment

Maintaining full employment in the developed countries (*DCs*) and creation of employment opportunities for millions of unemployed persons in the less developed countries (*LDCs*) has been one of the main objectives of their macroeconomic policy, especially of their fiscal policy. The nature of the unemployment problem in *DCs* differs from that in the *LDCs*. The main problem of *DCs* is to find a trade-off between employment and inflation. This issue has already been discussed in detail in Chapter 25. Here we discuss the use of fiscal policy for promoting employment in *LDCs*.

It may be noted at the outset that employment objective in *LDCs* is congruent with their growth objective. According to the Keynesian theory of employment, all fiscal measures that accelerate the pace of economic growth promote employment also. This proposition, however, does not hold under all conditions. There are certain conditions under which employment may not necessarily increase commensurate with the growth rate. For example, employment would not keep pace with growth if there is increasing use of capital-intensive or labour-saving technology in general in the process of growth. It is here that the government intervention with fiscal measures becomes inevitable. What the government needs to do is to discourage the use of labour-saving technology and encourage the use of labour-absorbing technology. This can be accomplished by such fiscal measures as:

(i) Heavy taxation of capital-intensive goods,
(ii) Subsidization of labour-intensive goods,
(iii) Heavy duty on imports of capital-intensive technology, and
(iv) Concessions in customs for the import of inputs for labour-intensive products.

However, these measures work effectively only when

(i) Price-elasticity of demand for capital-intensive goods is high,
(ii) Incomes are not very unevenly distributed,
(iii) Larger parts of growth benefits flow to the lower income classes that consume labour-intensive goods, and
(iv) There is no tax evasion.

Furthermore, where such fiscal measures prove inadequate, the governments can use their expenditure measure to promote employment. The government needs to allocate an adequate sum to labour-intensive public works programmes like construction of roads, dams, canals and bridges, schools, colleges and hospitals. The government may also be required to undertake employment-specific projects, like *Jawahar Rozgar Yojna* implemented by India in the Tenth Five Year Plan. The government of India launched in 2006 a more comprehansive employment scheme—the National Rural Employment Guarantee scheme (NREGS).

An important aspect of the employment-oriented fiscal measures and employment programmes is that they help generating additional employment. The generation of addition employment creates additional income and, thereby, additional consumer demand at the rate of multiplier. In this process, employment-oriented programmes contribute to the effective demand and often induce new private investments. However, employment programmes and projects have, by their very nature, long gestation period and low-productivity. Consequently, money incomes are generated at a much faster rate than the real output. The reason is that there is a long time lag between generation of additional demand and additional supply of output. This results in a widening gap between aggregate demand and aggregate supply. This leads to a rise in inflationary pressure. Inflation is found to create more employment in *DCs*. But, in *LDCs*, a high rate of inflation causes escalation of cost of living and cost of production. The problem of inflation is aggravated when employment projects are financed through deficit financing because it increases money supply without contributing to the production in a short span of time. A high rate of inflation puts the employment programmes in jeopardy often because it increases financial needs for providing employment to a given number of persons.

31.4.3 Fiscal Policy for Stabilization

Economic stability is one of the important objectives of fiscal policy in both *DCs* and *LDCs*. Fiscal policy for stabilization can take any of the two forms of fiscal policy, *viz.,* automatic stabilization policy and discretionary policy changes. Automatic stabilization policy is generally more suitable and effective in the developed countries. This kind of fiscal policy has already been discussed in Section 31.3. Here, we concentrate on discretionary fiscal measures for stabilization.

Discretionary measures, as mentioned earlier, include changes in taxation and government spending made by the government at its own discretion. Theoretically, such discretionary changes can guide the economy on to a desired path and can be used to control economic depression and boom. For example, depressionary trends can be reverted by increasing government spending and/or by cutting down the rates of taxation. The effects of increase in government spending and tax cut on the level of aggregate demand and the national income have already been discussed in theoretical framework in Chapter 7. Briefly speaking, increase in government expenditure has an expansionary effect on the economy and a cut in it does otherwise. The policy implication of this theoretical proposition is that the government needs to adopt a ***contra-cyclical fiscal policy***. The provisions of contra-cyclical fiscal policy can be specified as follow.

To fight ***depression*** the government needs to increase its spending and cut down its taxation. These fiscal measures help boosting aggregate demand in the economy. This method is more suitable where depression is caused by the lack of or decreasing aggregate demand. If necessary, the government may resort to an *ad hoc* fiscal measure, called ***pump priming***. Pump priming means an *ad hoc* increase in the government spending on goods and services produced in the private sector. The objective is to increase the aggregate demand and to give a boost to the sagging morale of the economy. Pump priming is a short-run *ad hoc* measure aimed at increasing the utilization of available resources. This is an *ad hoc* measure in the sense that it is used once-for-all or as a boost-up dose. It cannot be used as a regular feature of the fiscal policy. Or else, it may cause inflation without increasing production. During the ***boom*** period, the economy expands at a faster rate. But there is generally a risk of overheating the economy, as it happened during the period of Asian crisis in 1980s, making the economy to down turn. When there are indications of overheating of the economy, the government is required to control the growth rate. For this purpose, the government has to increase taxation and cut down its spending with the objective of controlling the excessive rise in aggregate demand.

Apart from the theoretics of fiscal policy, there are some practical aspects of change in public expenditure and tax cut. The effectiveness of the change in public expenditure and taxation depends, by and large, on the size of the public sector. That is, whether change in government spending and taxation matters in controlling business cycles depends on the size of the government spending and the level of taxation. If the size of the government spending accounts for a small proportion of *GDP*, then the changes in spending and taxation level are bound to be relatively small. In that case, such fiscal changes may not be effective in controlling trade cycles. Besides, there may not be much scope for cut in the government spending when a major part of it goes to the socially desirable sectors like schools and colleges, hospitals and public utility services, including socio-economic infrastructure. A cut in government expenditure on these items may not be socially desirable too.

31.4.4 Fiscal Policy for Economic Equality

Economic disparity is inherent in any economic system. Economic disparity beyond a level is, however, socially, economically and politically undesirable. Therefore, economic disparity needs to be curbed to its socially acceptable level. In a market economy, fiscal policy is the only powerful instrument of reducing economic disparities. Both taxation and expenditure measures are used to reduce income and wealth gaps between the rich and poor. Tax policy aimed at economic equality includes the following measures.

(i) Taxation of personal and corporate incomes at progressive rates;
(ii) Impositions of wealth and property tax; and
(iii) Taxation of high priced and luxury goods at higher rates.

Government expenditure policy includes the following measures.

(i) Spending government money on projects that enhance the earning capacity of the low income people like free education and medical facility;
(ii) Re-allocating capital expenditure so as to enhance the employment opportunities for unemployed and underemployed people;
(iii) Making provision for financial aid for the unemployed for their self-employment; and
(iv) Making provision for unemployment relief and unemployment insurance.

These tax and expenditure measures make two-way attack on economic disparity. Tax measures limit the growth of incomes in the high-income groups and transfer a part of rich people's income to the government treasury which enhances government resources to help the poor. Expenditure policy, on the other hand, creates condition for the growth of incomes in low-income groups, especially when it is at employment promotion.

It must, however, be noted that fiscal policy can be used to reduce economic disparity only to an extent. Excessive use of the suggested measures tend to become counter-productive. For example, Indian government had raised the income tax rate (including surcharge) to about 98% in 1973-74 for taxable income beyond Rs. 10 lakh with twin objective of reducing income disparities and raising additional revenue. The result was large scale tax evasion and corruption of entire tax collection machinery, and emergence of a parallel economy. Income gaps between rich and poor widened instead of reducing.

31.4.5 Fiscal Policy and External Balance

External imbalances arise when external payment obligations exceed the foreign exchange earnings. A short-run gap of small magnitude does not cause much concern. But, when the gap between foreign payment obligations and the external earnings is of a large magnitude and persistent, and *BOP* deficit increases over time, it becomes a matter of serious concern. The government is then required to intervene to restore the external balance. Fiscal policy is one of the important measures to reduce the gap between external payment obligations and external earnings. This gap arises mainly due to unfavourable trade balance or current account deficits. Fiscal policy, especially tax policy, can be used as an effective tool of restoring the external balance where current account deficits increase mainly due to the widening gap between imports and exports. The fiscal measures that are adopted for this purpose are: (a) imposition of heavy import duty, especially on the import of consumer goods, and (b) subsidization of exports. These measures, however, work efficiently only when both imports and exports are *price-elastic* and countervailing measures are not adopted by the trading partners. In the absence of a high price-elasticity, these measures may not work.

31.5 LIMITATIONS OF FISCAL POLICY

The mechanism of fiscal policy described above appears to be theoretically simple and feasible. In practice, however, policy-makers face a number of problems in the formulation and execution of the fiscal policy. Besides, the theoretics of fiscal policy, as presented in the foregoing sections of this Chapter, may prove to be misleading when attempts are made to put them in practice. The policy theoretics can be misleading because they may lead the policy-makers to believe that they can change the course of the economy anytime simply by changing the tax rates and the size of the government expenditure. In reality, however, as Baumol and Blinder warn, authorities cannot take it for granted that they can 'drive the *GNP* to any level simply by manipulating spending and tax programs' or they can 'hit the full-employment bull's eye every time.' They draw an apt analogy between achieving fiscal policy goals and shooting a moving target through dense fog. To them, achieving economic goals through fiscal policy is like "shooting through dense fog at an erratically moving target with an inaccurate gun."[10] In reality, the effectiveness of fiscal policy is limited by the following factors.

First, formulation of an appropriate fiscal policy requires reliable forecasting of the target variables, viz., *GNP*, consumption, expenditure, investment and its determinants, technological changes, and so on. But, 'no one has yet discovered a foolproof method of economic forecasting.'[11]

Second, the overall effect of changes in the policy instruments—government spending and taxation—is determined by the rate of dynamic multiplier. In the first place, forecasting dynamic multiplier is in itself an extremely difficult task, if not impossible, due to uncertainty in the consumer behaviour. In the second place, the working of the dynamic multiplier has a time lag. Therefore, by the time the full impact of one policy change is realized, economic conditions change necessitating another change in the fiscal policy. Subsequent changes in fiscal policy create more problems than they solve, if at all they do.

Third, as already mentioned, *decision and execution lags* in case of discretionary fiscal policy makes both working and efficacy of fiscal policy shrouded with uncertainty. This kind of uncertainty creates, in fact, a dilemma as to 'why fiscal policy at all?'

10. Baumol, William J. and Blinder, Alan S., *Economics: Principles and Policy* (Harcourt Brace Jovanocich, London, 1988), p. 233.

11. Baumol, William J. And Blinder, Alan S., *op. cit*., p. 233.

Fourth, the working and effectiveness of fiscal polices in underdeveloped countries is severely limited by (i) low levels of incomes, (ii) small proportion of population in taxable income groups, (iii) the existence of a large non-monetized sector, and (iv) all pervasive corruption and inefficiency in administration, especially in tax collection machinery.

Fifth, in countries which are largely dependent on fiscal policy for their economic management and have inadequate scope for taxation, the governments are often forced to have recourse to internal and external borrowings and deficit financing. These modes of financing have often been found to have undesirable repercussions for the economy. This puts a limit on the use of fiscal policy. Excessive borrowings take such countries close to debt trap. The case of Mexico, Brazil and India is in view. Deficit financing beyond the absorption capacity of the economy accelerates the pace of inflation. Inflation creates other kinds of economic problems. What is more important, this kind of government expenditure based on deficit financing is alleged to crowd out the private investment. The crowding-out effect of public expenditure is elaborately discussed below.

31.6 CROWDING-OUT[12] AND CROWDING-IN CONTROVERSY

We have so far discussed the mechanism of fiscal policy and its limitations. In this section, we discuss an important controversy related to the effect of government spending on the economy.

As already noted in Chapter 17, Keynes and his followers held the view that the government expenditure has an expansionary effect on the economy and it helps fighting the depression in the economy as it induces more investment and output. This proposition has been questioned in the context of the developed countries. The US politicians and businessmen, for example, argue, "Government spending saps our nation's vitality" and "Public spending crowds-out private projects with higher yields and great social utility."[13] The crowding-out effect of government spending on the equilibrium level of income has been illustrated in Chapter 17 in the framework of *IS-LM* model. In contrast to crowding-out effect of government spending, some economists argue that government spending 'crowds-in' the private investment, instead of crowding it out. Obviously, there is a controversy on whether public expenditure crowds out or crowds in private investment.

In this section, we discuss the theoretical basis of the controversy on the crowd-out and crowd-in effects and the empirical evidence either way assuming deficit spending by the government.

31.6.1 Arguments for Crowding-out Effect of Deficit Spending

Crowding-out refers to the adverse effect of high deficit spending by the government on private investment. More formally, "Crowding out occurs when deficit spending by the government forces private investment spending to contract."[14] The *mechanism of crowding-out* is simple. When the government takes recourse to high deficit spending, it plans to spend more than it tax revenue. The

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12 The crowding-out effect of government spending on the equilibrium income and the method of working out crowding-out effect has already been discussed in detail in Chapter 18. Here we concentrate on the controversy associated with crowding-out effect of government spending.

13. Samuelson, P. A. and Nordhaus, W. D., *Economics, op. cit.*, p. 632.

14. Baumol, W. J., Blinder A. S., *Economics: Principles and Policies,* 1988, *op. cit.*, p. 335.

government has then to borrow from the central bank or from the market through the sale of its bonds for the purpose of financing its budgetary deficits. The two methods of borrowing force crowding-out of private investment in *two different ways*.

Deficit spending financed through ***deficit financing*** results in net injection into the economy. This results in an increase in aggregate demand and, therefore, rise in the general price level. More so, when the government increases its spending on remote-return projects like economic and social infrastuctural projects, such as construction of irrigation canals, roads, railways, hospitals, colleges and universities. Deficit spending results in an increase in money incomes at the rate of expenditure multiplier without a matching increase in the production of goods and services. This sets an inflationary trend in the economy. To control inflation, the central bank intervention becomes inevitable as it is happening currently in India. The central bank will have to offset the expansionary effects of the government spending. In order to control inflation, the central bank adopts a 'tight money policy' as the *RBI* was doing in India in 2008. In effect, it tightens the credit availability and raises the interest rate[15]. Rise in the interest rate 'chokes off' or crowds-out the private investment.

In case deficit spending is financed through ***market borrowings***, crowding-out effect occurs even without central bank intervention by its tight money policy. When government spending is financed through market borrowings through the sale of government bonds, bond prices go down and interest rate goes up. The rise in the interest rate causes a decline in all the interest-sensitive private investments. Besides, when households decide to invest in government bonds, their investment in real estate, like land, building and property, decreases. Therefore, it is argued that there is a fall in the private investment. This is another aspect of crowding-out effect of deficit spending financed through market borrowings.

Complete Crowding-Out. Complete crowding-out occurs when the fall in the private investment equals the amount of additional government spending. In that case, for each rupee of deficit spending, private investment falls by one rupee. When there is 'complete crowding out,' then the total expansionary effect of the government spending is wiped out and the economy returns to its pre-government-spending equilibrium point. In other words, the expansionary effect of government spending is completely neutralized by its crowding out effect. The case of complete crowding-out can be explained through the national income equilibrium equation. Suppose pre-deficit-spending equilibrium equation is given as $AD = C + I + G$. With complete crowding-out effect, the equilibrium equation can be written as

$$AD = C + I + G + \Delta G - \Delta I$$

Since crowding-out effect $-\Delta I = \Delta G$, the equilibrium equation is reduced to $AD = C + I + G$.

Is there always complete crowding-out? Under normal circumstances, complete crowding-out is not expected to occur for at least two reasons. ***One,*** the relationship between deficit spending

15. In July 2008, the *RBI* raised the bank rate and *CRR* thrice within a month. Interest rate was also increased thrice. Corporate sector resented these policy measures as, in its opinion, it might affect the private investment and growth rate thereby.

and the interest is not always one-to-one. The rise in the interest rate depends also on the conditions of the capital market. Where rise in the interest rate is moderate, the crowd-out effect can be expected to be moderate. ***Two***, interest-elasticity of investment is not always equal to 1. For these reasons, the probability of complete crowd-out is very low. And, when there is no complete crowding-out or when there is only partial crowding-out, then the expansionary effect of the government spending is greater than zero. It means that when complete crowing-out is not there, then there is net expansion in the incomes and output caused by the government spending.

There are **two important points** that need to be borne in mind in this regard. ***One***, crowding out is a short-run phenomenon. For, in the long run, the reaction or response of the private investment to the tight money policy (including higher interest rate and credit restriction) lose their effectiveness. We have shown earlier that expansion in employment and output can take place along with the rise in the interest rate in the long run. ***Two***, crowding out logic applies only to *structural deficits*, that is, the budget deficits that arise due to a planned or discretionary increase in government spending as a policy matter. It does not apply to *cyclical deficits* which arise due to fall in tax revenue caused by fall in incomes or rise in government spending as employment relief and social security payments during the recession.

31.6.2 Arguments for Crowding-in Effect of Deficit Spending

Crowding-in means rise in the private investment due to deficit spending by the government. This is contrary to the crowding-out argument. The crowding-in argument runs as follows. Deficit spending leads, undoubtedly, to the rise in the interest rate which discourages private investment. But, government deficit spending leads to rise in the aggregate demand. The incremental demand is met by increasing the production from the existing capital stock. This brings the *acceleration principle* in force and intensive use of existing capital results in a greater depreciation. Therefore, demand for capital increases. That is, deficit spending stimulates new investments. Thus, there is crowding-in, instead of crowding out, of the private investment. This argument, however, holds only when there are *unutilized resources*. This had happened, in fact, throughout the period of India's economic growth. Deficit spending accelerated price rise, no doubt, but also created an optimistic environment and private investment started increasing, though slowly. Gross capital formation in the private sector increased five times during 1955–56 to 1970–71.

Empirical Evidence—The US Experience. The empirical evidence on 'crowding-out' and 'crowding in' is scanty. The available evidence is inconclusive either way. For instance, in the US, deficit spending had crowded-in private investment during the 1960s because there were unutilised resources. But, during 1980s, deficit spending had crowded-out private investment.[16] A report published by the Congressional Budget Office (US) found that deficit spending during the deep depression of mid-1970s had crowding-in effect in 1974-75. In fact, the relationship between government deficit spending depends on a number of factors including saving and investment behaviour of the households, transaction demand for money, expectations of producers, foreign exchange rate, behaviour of the financial market and monetary policy of the government.

16. For details, see Samuelson, P.A. and Nordhaus, W.D., *Economics, op. cit.,* pp. 634–36.

It may be interesting to note that India has been deficit financing its public expenditure throughout. But, on the contrary private investment too has been rising continuously at a significantly high rate. These facts show that crowding-out arguments do not apply to Indian conditions.

31.7 FISCAL POLICY OF INDIA

31.7.1 The Background

India's fiscal policy was formulated initially in 1950-51 in the background of India's economic conditions at the time of Independence. The Indian economy was trapped in a *vicious circle of poverty* with the lowest per capita income and consumption in the world. Over the entire period of 40 years from 1910 to 1950, the growth rate of the economy had been nearly zero. After Independence, the government assumed the responsibility of creating conditions for the growth of economy. The Government of India adopted a policy of 'mixed economy' under democratic framework, in which the public sector had to play a leading role. The government assumed a leading role in the economy because the economy was dominated by the primitive agricultural sector. The private industrial sector of the country was underdeveloped and, therefore, could not be relied upon to play a significant role in the economic development of the country for at least a decade or two. As a strategic measure, the government adopted the Five Year Development Plans. The basic objectives of Development Plans are (i) to achieve a target growth rate, generally 5 percent, (ii) to promote employment opportunities, (iii) to remove poverty, and (iv) to reduce income inequalities. The basic philosophy of the government's overall economic policy was 'growth with social justice'.

31.7.2 India's Discretionary Fiscal Policy

The most difficult problem that the Government of India faced was how to mobilize resources for development. It was with this background that the government formulated its *fiscal policy.* Under the conditions highlighted above, the Government of India adopted ***discretionary fiscal policy***. The government has throughout used its discretion to determine the pattern and level of both taxation and its expenditure. In order to raise financial resources, the government adopted very extensive direct and indirect taxation with highly progressive tax rates. Prior to economic reforms of 1991, the government changed its tax rate and exemption limits almost every third year, sometimes in each annual budget. So was the case with the level and pattern of its expenditure. The dominant aspect of the government's discretionary fiscal policy was to raise maximum possible revenue through direct and indirect taxation for meeting its revenue requirement, and to allocate expenditure in the manner that could promote growth and employment. Whether the government succeeded in these objectives with its fiscal policy is a different issue.

However, total tax revenue collected through taxation had fallen much short of government's plan expenditure. Therefore, the government had rely heavily on *deficit financing*, especially on borrowing from the RBI. In effect, India has adopted a *deficit budgeting policy.*

The fiscal policy of the Central Government is reflected in its annual budget. Let us have an overview of the annual budgets of the Government of India in recent years. The annual budget has two sides: (i) revenue side, and (ii) expenditure side. The government revenue includes tax revenue and non-tax revenue, and government expenditure includes both development and non-development expenditures. Both government revenue and expenditure are further classified under: (i) revenue account, and (ii) capital account. Let us have a glance at the pattern of government revenue and expenditure in some detail.

31.7.3 The Revenue and Capital Accounts of the Central Government Budget

In order to understand the basic features of India's fiscal policy, let us study the central government's budget's of the last few years. The revenue and expenditure pattern of the central government on both revenue and capital accounts is given in Table 31.1

Table 31.1 Revenue Receipts and Expenditure of the Central Government

(Rs. Crore)

Receipts and Expenditure	*1995-96*	*2001-02*	*2005-06*	*2007-08*
A: Revenue Account				
1. Revenue Receipts (a + b)	110130	201306	347462	541926
(a) Tax Revenue*	81939	133532	270264	439547
(b) Non-tax Revenue	28191	67774	71198	102378
2. Revenue Expenditure (a + b + c)	139861	301468	439761	594494
(a) Interest Payment	50045	107460	132630	171030
(b) Major Subsidies	12430	30447	44480	67494
(c) Defence Expenditure	18841	38059	48211	54219
3. Revenue Deficit (2 – 1)	**29731**	**100162**	**92299**	**52569**
B: Capital Account				
1. Capital Receipts (a + b + c)	48348	161004	158661	170807
(a) Recovery of Loans	6505	16403	10645	5100
(b) Other Receipts**	1397	3646	1581	38795
(c) Borrowings and other Liabilities	40446	140955	146435	126912
2. Capital Expenditure	28424	60842	66362	118238
C: Total Expenditure (A.2 + B.2)	**168285**	**362310**	**506123**	**712732**
1. Plan Expenditure	46374	101194	140638	205082
2. Non-Plan Expenditure	121911	261116	365485	507650
D: Fiscal Deficit = [C – A.1 – B.1(a) – B.1(b)]	**50253**	**140955**	**146435**	**126912**
E: Primary Deficit (D – A.2(a))	208	33495	13805	-75870

* Net of States' share

** Consisting mainly of PSU disinvestment

Source: Economic Survey: 2000-01, 2007-08 and 2008-09, MOF, GOI.

As can be seen in Table 31.1, the total budget expenditure has always exceeded the total revenue receipts of the government. Therefore, the central government budget has mostly shown both revenue deficits and fiscal deficits. This, as a matter of fact, has been, the budgetary policy of the Central Government. As already stated, the fiscal policy's objectives have been to achieve a targeted growth rate, employment promotion, and income equity, while ensuring price stability at the same time. Although the government has adopted a highly progressive and extensive taxation policy to meet its revenue needs, the required resources could not be raised through taxation. The non-tax sources of revenue were of little consequence. The total revenue collected through taxation and non-tax sources had fallen much short of budgeted expenditure. Therefore, the government resorted to ***deficit financing,*** i.e., financing the budgetary deficits through borrowings from public, the RBI and external sources. This method of financing budgetary deficits resulted in almost continuous rise in ***fiscal deficits***.

It is useful to note here that prior to 1990-91, ***fiscal deficit*** was referred to as ***budgetary deficit***[17]. Conventionally, budgetary deficit was estimated as 'the difference between all receipts and expenditure (both revenue and capital)'. However, the concept of 'budgetary deficit' is a narrow concept as it gives only a 'partial' measure of the overall 'fiscal imbalance' faced by the government. It is a narrow concept because it excludes the 'Government's draft on domestic savings and [its] dependence on external borrowings'. Besides, it does not indicate the *monetized deficits,* i.e., 'the increase in the net RBI credit to the Central Government'. The monetized deficits result in increase in money supply which leads to inflation—contrary to the objective of price stabilization. It is for this reason that a broader concept of budgetary deficit has now been adopted, known as *fiscal deficit.* The difference between the two concepts of budget related deficits can be understood more by looking at the specific measures of the two kinds of deficits—*budgetary deficits* and *fiscal deficits*—as given below.

Budgetary Deficit = Revenue Expenditure (RE) – Revenue Receipts (RR)
where RR = Tax revenue + Non-tax revenue, and
RE = Interest payments + Subsidies + Defence expenditure

Fiscal Deficit = Total Budget Expenditure
Less Tax Revenue (net of States' share)
Less Recovery of Loans
Less Other Receipts (mainly PSU disinvestment)

The fiscal policy of the Indian government is essentially formulated to manage its fiscal affairs prudently. A prudent fiscal management requires that the revenue receipts should not only meet the revenue expenditure but should also leave a surplus for financing public investment and development programmes. On the contrary, budgetary deficits of the Central Government have almost continuously increased over the years, especially after the financial year 1980-81. For instance, budgetary deficit of the Central Government increased from Rs 2,037 crore in 1980-81 to Rs 18,562 crore in 1990-91, to Rs 85,233 crore in 2000-01 and to Rs 92,299 crore in 2005-06, though the government managed to reduce its revenue deficits from the financial year 2006-07. The rapid

17. *Economic Survey*: 1990-91, MOF, GOI (p. 99).

growth in budgetary deficits led to unmanageable rise in *fiscal deficits*. The growing fiscal deficit has been a matter of great concern for the Government. The growing magnitude of the problem arising out of fiscal deficits is assessed in terms of the ratio of budgetary deficits to *GDP*. The ratio of revenue receipts, revenue expenditure, fiscal deficits and primary deficit to *GDP* for the period 1980-81 to 2007-08 is presented in Table 31.1A in the Appendix to this Chapter.

31.7.4 Changing Structure of Revenue Sources

Before we proceed to look at the recent changes made in the fiscal policy, let us have a glance at the important features of the changing pattern of sources of government revenue. Revenue receipts of the government are classified under two heads:

(i) Tax Revenue, and
(ii) Non-tax Revenue.

Tax Revenue consists, mainly, of (a) ***direct taxes*** including income tax, corporate tax, expenditure tax, and wealth tax, and (b) ***indirect taxes*** including union excise duties, customs duties, service tax. The relative share of revenue yield from direct and indirect taxes have changed significantly over the years, as shown in Table 31.2.

Table 31.2 Percentage Share of Major Direct and Indirect Taxes in Total Tax Revenue

Taxes	*1900-01*	*1995-96*	*2000-01*	*2005-06*	*2007-08*
1. Direct Taxes	**19.1**	**30.2**	**37.0**	**43.8**	**49.9**
Personal Income tax	9.3	14.0	17.1	16.5	17.3
Corporate Tax	9.3	14.8	19.6	27.2	32.5
2. Indirect Taxes	**78.4**	**69.1**	**62.1**	**54.5**	**47.0**
Excise Duties	42.6	36.1	38.8	30.4	20.8
Customs Duties	35.9	32.3	21.5	17.8	17.6
Service Tax	—	0.8	1.8	6.3	8.6
3. Other Taxes	**2.5**	**0.7**	**0.9**	**1.7**	**4.1**
4. Total Tax Revenue	100.0	100.0	100.0	100.0	100.0

As the data given in Table 31.2 shows, the share of direct taxes in total tax revenue has increased over time whereas that of indirect taxes has decreased. Within the *direct taxes*, the share of both personal income tax and corporate taxes has increased, though the share of personal income tax has increased at a lower rate whereas that of corporate tax has increased rapidly from 9.3 percent in 1900-01 to 30.3 percent in 2006-07. The relative share of revenue yield from the *indirect taxes* has declined sharply—it declined from 78.4 percent in 1990-01 to 52.1 percent in 2006-07.

Non-Tax Revenue consists of government's interest earnings, dividends and profits of PSUs, and external grants. All put together contribute a relatively small proportion of the total revenue. For instance, in 1990-91, non-tax revenue accounted for only 10.1 percent and 18.9 percent in 2007-08 of the total revenue receipts. Most of the non-tax revenue comes from the PSUs.

31.7.5 Fiscal Reforms and Fiscal Deficits Since 1991

Till 1990-91, the Government of India made minor modifications in its fiscal policy (including both taxation policy and expenditure pattern). But drastic changes were made in the fiscal policy and fiscal management of the country in 1991. Here we present a brief analysis of the reforms made by the government in its fiscal policy since 1991.

In 1990, India faced an unprecedented foreign exchange crisis mainly due to rise in crude oil prices following the Gulf War. Due to a sharp rise in oil price, import bill of the country shot up from a monthly average of $287 million in June-August 1991 to $671 million in the following 6 months. As a result, the foreign exchange reserves declined from $3.11 billion in August 1990 to $896 million in 16 January 1991. The Indian economy was almost on the verge of economic collapse. However, financial help provided by the IMF in the form of a loan of $665 million in September 1990 helped the country tide over the crisis. This crisis created conditions and need for evaluating the significance and relevance of country's economic policies in general and fiscal policy and foreign trade policy in particular. Fiscal reform was one of the main aspects of the economic policy reforms made in 1990-91.

In the opinion of the experts, a reversal of the fiscal expansionism was essential for restoring the macroeconomic balance in the economy. The government adopted a policy to reduce the fiscal deficit. As a result, the ratio of fiscal deficit to *GDP* declined considerably. It declined from 5.5 percent in the late 1980s to 4.5 percent in the 1990s, and then to 3.2 percent in the 2007-08 Budget (see Appendix). Fiscal deficit was reduced by restraining the growth rate of both the revenue and capital expenditures. In order to regularize the fiscal management of the country, an Act – Fiscal Responsibility and Budget Management Act (FRBMA) – was passed in 2003. The FRBM Act prescribes 3 percent of *GDP* as the upper limit for fiscal deficit, to be achieved by 2008-09. The 2007-08 budget estimates show that the government is close to achieving this target.

Apart from constraints imposed by the FRBM Act, robust economic growth and improved performance of the manufacturing and services sectors kept the tax revenue buoyant in the last five years. The average revenue growth rate, over this period, was 16.2 percent and growth rate of net tax revenue of the central government was 20.7 percent. The gross tax-*GDP* ratio increased from 8-9 percent during the preceding decade to 11.5 percent in 2006-07, and is estimated to rise to 12.9 percent in 2008-09 (BE). However, inflation rate has risen from about 5 percent during 2003-07 to 12 percent in July 2008. In order to control inflation, the RBI adopted a stringent monetary policy. It had raised the prime lending rates. However, due to low impact of global recession on the Indian economy and a prudent monetary policy, inflation rate has gone down to a negative rate of –1.6 percent. But, in 2008-09, (RE) the fiscal deficit was 6.1 of *GDP*. The fiscal deficit remains a challenge for the government.

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QUESTIONS FOR REVIEW

1. What is meant by fiscal policy? Under what circumstances did fiscal policy come to prominence?
2. Distinguish between fiscal instruments and target variables. What are the fiscal instruments and target variables in fiscal policy?
3. Describe the relationship between fiscal instruments and target variables of fiscal policy. Explain how fiscal instruments affect the target variables.
4. What are the general objectives of fiscal policy? Are the various objectives of fiscal policy always consistent with one another? Do the fiscal policy objectives differ between developed and underdeveloped countries?
5. Describe the role of fiscal policy in achieving economic growth and in stabilizing the economy. Do the policy measures for growth and stability conflict with one another?
6. What is automatic stabilization policy? How does it work? What are its limitations?
7. What is discretionary fiscal policy? Why is discretionary fiscal policy preferable to other kinds of fiscal policies in both developed and underdeveloped countries?
8. Distinguish between automatic stabilization policy and discretionary fiscal policy. Do they work equally efficiently in developed and underdeveloped countries? If not why?
9. What are the factors that limit the effectiveness of the fiscal policy in achieving macroeconomic goals?
10. Fiscal policy is the most powerful tool of achieving macroeconomic goals. Do you agree with this statement? Give reasons for your answer.
11. Deficit spending as a fiscal measure of financing growth projects creates more problems than it solves. Comment.
12. What kind of fiscal policy is suitable for controlling inflation? What are the necessary conditions for fiscal policy to control inflation effectively? Does it involve any social cost?
13. What is meant by crowding-out effect of public expenditure? What is crowding-out mechanism? Does it always occur?
14. It is alleged that inflationary financing or deficit financing causes reduction in the private investment. Do you agree with this statement? Give reasons.
15. What are the different methods of deficit financing? How do the different methods of deficit financing affect the economy?
16. How is the private investment affected if public spending is financed by sale of government bonds? Do you think borrowing from the central bank is preferable?
17. What is crowding-in effect of public expenditure? Explain the crowding-in mechanism? What is the factor responsible for crowding-in of private investment?
18. What is the controversy about crowding-out and crowding-in controversy? What do you think is a more realistic phenomenon?
19. Narrate the fiscal policy of India. What are the important features of India's fiscal policy?
20. Distinguish between budgetary deficit and fiscal deficit. What important changes have been made in India's fiscal policy since 1990–91?

APPENDIX TO CHAPTER 31

Table 31.1A: Revenue Receipts, Revenue Expenditure and Fiscal Deficits – 1980-81 to 2008-09 (RE)

(As percentage of GDP at current prices)

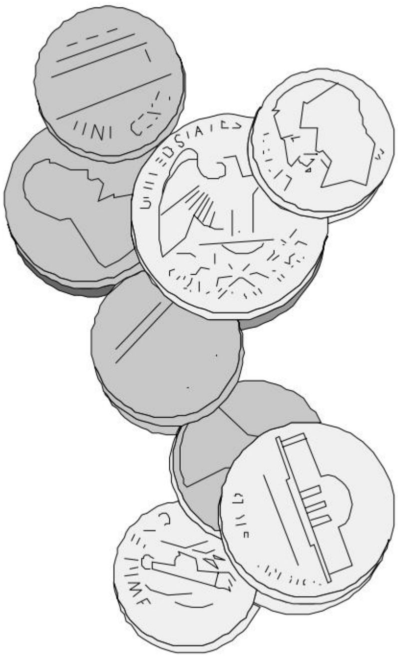
Year	*Revenue Receipts*	*Revenue Expenditure*	*Revenue Deficits*	*Fiscal Deficit*	*Primary Deficit*
1980-81	9.1	10.6	1.5	5.7	3.6
1981-82	9.3	10.7	0.2	5.4	4.3*
1982-83	10.3	10.9	0.7	6.0	3.4*
1983-84	9.9	11.0	1.2	6.3	4.1
1984-85	10.5	10.5	1.8	7.5	4.7
1985-86	11.2	11.2	2.2	7.9	5.3
1986-87	11.7	11.7	2.7	8.5	5.5
1987-88	11.5	11.5	2.7	7.6	4.5
1988-89	11.5	11.4	2.7	7.3	3.9
1989-90	11.4	14.1	2.6	7.3	3.7
1990-91	9.7	12.9	3.3	6.6	2.8
1991-92	10.7	13.3	2.5	4.7	0.7
1992-93	10.5	13.1	2.5	4.8	0.6
1993-94	9.4	13.5	3.8	6.4	2.2
1994-95	8.8	11.8	3.1	4.7	0.4
1995-96	9.3	11.8	2.5	4.2	0.0
1996-97	9.2	11.6	2.4	4.1	-0.2
1997-98	8.8	11.8	3.1	4.8	0.5
1998-99	8.6	12.4	3.8	5.1	0.7
1999-00	9.4	12.9	3.5	5.4	0.7
2000-01	9.1	13.2	4.1	5.7	0.9
2001-02	8.8	13.2	4.4	6.2	1.5
2002-03	9.4	13.8	4.4	5.9	1.1
2003-04	9.6	13.1	3.6	4.5	0.0
2004-05	9.7	12.2	2.5	4.0	-0.1
2005-06	9.7	12.3	2.7	4.1	0.4
2006-07	10.5	12.4	2.1	3.4	-0.2
2007-08	11.5	12.6	1.1	2.7	-0.9
2008-09 (RE)	10.6	15.1	4.5	6.1	2.5

* Gross primary deficit

Source: Various issues of *Economic Survey,* MOF, GOI.

Appendix

Solution to the Numerical Questions



CHAPTER 6

Ans/Q8

The equilibrium level of national income in two-sector model is given as

$$Y = [1/(1 - b)]\ (a + I)$$

In question 8, $a = 50$, $b = 0.8$ and $I = 50$. So by substitution,

$$Y = \frac{1}{1 - 0.8}\ (50 + 50) = 5\ (100) = 500$$

Ans/Q9

The equilibrium level of national income in two-sector model is given as

$$Y = \frac{1}{1 - b}\ (a + I)$$

In question 9, $a = 100$, $b = 0.75$ and $I = 100$. By substitution,

(a) $Y = \dfrac{1}{1 - 0.75}\ (100 + 100) = 4\ (200) = 800$

(b) $C = a + bY$

By substitution, $C = 100 + 0.75\ (800) = 700$

Ans/Q14

Multiplier $(m) = 4$

$$m = 1 \,/\, (1 - mpc)$$
$$4 = 1/(\ 1 - mpc)$$
$$mpc = 0.75$$

Assuming $mpc = b$, $mps = 1 - b$

(a) Saving function : $S = -a + (1 - b)Y$

$= -a + (1 - 0.75)Y$

or $= -a + 0.25Y$

(b) Consumption function : $C = a + bY = a + 0.75Y$

Ans/Q15

Current income (Y_C) = Rs 150 billion and planned income (Y_p) = Rs 300 billion targeted

$$\Delta Y = Y_p - Y_c = 300 - 150 = \text{Rs } 150 \text{ billion}$$

Since $\Delta Y = [1/(1 - b)]\ \Delta I$,

$$\Delta I = 150\ (1 - 0\ .6667) = \text{Rs } 50 \text{ billion}$$

CHAPTER 7

Ans/Q2

(i) C and Y are endogenous variables and I, G and T are exogenous variables.

(ii) $C = 50 + 0.80Y_d = 50 + 0.80\ (Y - 50) = 10 + 0.80\ Y$

$Y = C + I + G = a + bY_d + I + G$

$= a + b\ (Y - T\ ) + I + G$

$$= \frac{1}{1 - b}\ (a - bT + I + G)$$

(iii) 1. Y at equilibrium can be obtained by substituting numerical values in its reduced form of equation given above. Thus,

$$= \frac{1}{1 - 0.80}\ [\ 50 - 0.80(50) + 50 + 50)] = 5\ (110) = 550$$

2. C at equilibrium level can be obtained by substituting the numerical value of Y in the consumption function. Thus,

$C = 50 + 0.80(Y - 50) = 50 + 0.80\ (550 - 50) = 450.$

Ans/Q4

(a) The formula for ΔY in response to a ΔG is given as

$$\Delta Y = [1\ /(1 - b)]\ \Delta G$$

In the formula, $b = mpc = 0.80$. By substitution,

$$\Delta Y = [1/\ (1 - 0.80)]\ 50 = 250$$

(b) Tax multiplier (T_m) when $t = 0.25$

$$T_m = \frac{1}{1 - 0.80\ (1 - 0.25)} = 2.5$$

(c) The equilibrium level of Y when $T = 20 + 0.25Y_d$.

$$Y = \frac{1}{1 - b(1 - t)} (a - b\,\overline{T} + I + G)$$

$$= \frac{1}{1 - 0.80\,(1 - 0.25)} [100 - 0.8\,(100) + 100 + 100]$$

$$= 2.5\,(220) = 550$$

Ans/Q9

Correct statements:

(a), (e), (h), and (j).

CHAPTER 8

Ans/Q2

(i) X-multiplier is a number which multiplied by ΔX gives ΔY. It is given as X-multiplier $= \Delta Y/\Delta X = 1/\,(1 - b)$

(ii) *X-multiplier* can be derived from the given model as follows. In a 4-sector model,

$$Y = a + b(Y - T) + I + G + X$$

$$Y = \frac{1}{1 - b} (a - bT + I + G + X) \qquad \text{(i)}$$

Assuming an increase in X by ΔX, the equilibrium equation can be written as

$$Y + \Delta Y = \frac{1}{1 - b} (a - bT + I + G + X + \Delta X) \qquad \text{(ii)}$$

Subtracting Eq.(i) from Eq.(ii), we get

$$\Delta Y = \frac{1}{1 - b} (\Delta X)$$

$$X\text{-multiplier} = \frac{\Delta Y}{\Delta X} = \frac{1}{1 - b}$$

Ans/Q3

Difference between import and export function. In the theory of income determination, import is assumed to be a function of income though it depends also on inter-country relative prices, exchange rate, trade relations and agreements between the trading partners. On the other hand, exports are assumed to be exogenously determined.

Derivation of foreign trade multiplier. The equilibrium equation in a four-sector model

$$Y = C + I + G + (X - M)$$

Given the parameters of the model,

$$Y = a + b(Y - T) + \bar{I} + \overline{G} + \overline{X} - \overline{M} - mY$$

$$= a + bY - bT + \bar{I} + \overline{G} + \overline{X} - \overline{M} - mY$$

$$= \frac{1}{1 - b + m}\,[a - bT + \bar{I} + \overline{G} + \overline{X} - \overline{M}\,]$$

The term $1/(1 - b + m)$ is *foreign trade multiplier.*

Ans/Q4

At equilibrium, $Y = C + I + G + \overline{X} - M$

Given the model (in Q.3) and the same substitute functions in Q. 4,

$$Y = a + b\,(Y + G_T - \overline{T} - tY) + \bar{I} + \overline{G} + \overline{X} - \overline{M} - mY$$

$$Y = \frac{1}{1 - b(1 - t) + m}\,[\,a + \bar{I} + \overline{G} + \overline{X} - \overline{M} - bT_0 + bG_T]$$

In this equation, the term $1/[1 - b(1 - t) + m]$ is the *foreign trade multiplier.*

Ans/Q5

(b) Given the model, at equilibrium,

$$Y = 100 + b\,(Y - 50 - tY) + \bar{I} + \overline{G} + \overline{X} - M$$

By substitution,

$$= 100 + 0.80(Y - 50 - 0.25Y) + 50 + 50 + 10 - 5 - 0.10Y$$

$$= 100 + 0.80Y - 40 - 0.20Y + 105 - 0.10Y$$

$$= \frac{1}{1 - 0.80 + 0.20 + 0.10}\,(165) = 330$$

Alternatively, solution to the problem can be found by substituting the values from the model into the final form of the equilibrium equation given below.

$$Y = \frac{1}{1 - b\,(1 - t) + m}\,[a + \bar{I} + \overline{G} - b\,\overline{T} + \overline{X} - \overline{M}\,]$$

By substitution,

$$Y = \frac{1}{1 - 0.8\,(1 - 0.25) + 0.1}\,[100 + 50 + 50 - 0.80(50) + 10 - 5]$$

$$= \frac{1}{0.5}\,(165) = 330$$

(c) Imports at the equilibrium level of income:

$$M = 5 + 0.1Y = 5 + 0.10\,(330) = 38$$

Ans/Q6

(a) ***National income at equilibrium.*** Given the model, equilibrium equation is given as

$$Y = C + I + G + G_T + (X - M)$$

By substituting the parametric values in the model, we get

$$Y = 50 + b\,(Y - 50 - tY + G_T\,) + 100 + 50 + 25 + (10 - 5 - 0.1Y)$$
$$= 50 + 0.8(Y - 50 - 0.25Y + 25\,) + 180 - 0.1Y$$
$$= 50 + 0.8Y - 40 - 0.2Y + 20 + 180 - 0.1Y$$

$$Y = \frac{1}{1 - 0.8 + 0.2 + 0.1}\,[50 - 40 + 20 + 180] = \frac{1}{0.5}\,[210] = 420$$

Equilibrium level of national income equals 420.

(b) *Foreign trade multiplier*. The formula for foreign trade multiplier (M_{FT}) is given as

$$M_{FT} = \frac{1}{1 - b\,(1 - t) + m} = \frac{1}{1 - 0.8\,(1 - 0.25) + 0.1} = 2$$

(c) ΔG needed for $\Delta Y = 50$. All other things given,

$$\Delta Y = M_{FT} \cdot \Delta G$$

Since $\Delta Y = 50$, and $M_{FT} = 2$, ΔG can be obtained as

$$50 = 2 \cdot \Delta G$$
$$50/2 = \Delta G = 25$$

(d) Trade balance $= X - M$

$$= 10 - 5 - 0.1(420)$$
$$= -37$$

The economy has trade deficit.

Ans/Q7

(i) Consumption function: $C = 50 + 0.6(Y - 20)$

$$= 38 + 0.6\,Y$$

At equilibrium, $Y = C + I + G + X - M - mY$

$$= 38 + 0.6Y + 35 + 25 + 30 - 8 - 0.1Y$$
$$Y - 0.6Y + 0.1Y = 120$$
$$Y = 240$$

(ii) Targeted equilibrium $Y = 256$

Targeted $\Delta Y = 256 - 240 = 16$

Since $\Delta Y = \dfrac{1}{1 - b + m}\,\Delta G$

by substitution, $16 = \dfrac{1}{1 - 0.6 + 0.1}\Delta G$

$$\Delta G = 16/(1 - 0.6 + 0.1) = 8$$

To increase the national income to 256, a $\Delta G = 8$ will be required.

(iii) If G and T are raised by an equal amount. balanced budget multiplier is applicable.

Then $\Delta Y = \dfrac{1}{1-b+m}\,[-b\Delta T + \Delta G]$

Since $\Delta G = \Delta T$.

By substitution, $\Delta Y = \dfrac{1}{1-0.6+0.1}\,[-0.6\Delta G + \Delta G]$

Since targeted $\Delta Y = 16$, $16 = \dfrac{-0.6\Delta G + \Delta G}{0.5} = \dfrac{(1-0.6)}{0.5}\Delta G$

$$16 = \frac{0.4}{0.5}\Delta \text{G} \text{ and } \Delta G = 16\ (0.5/0.4) = 20$$

Thus, $\Delta G = 20 = \Delta T$

That is, in an open economy, if ΔG has to be financed through an equal amount of ΔT, a targeted increase of 16 in GNP will require an additional taxation and government expenditure of 20.

(iv) Total import at $Y = 256$ equals $M = 8 + 0.1(256) = 25.6$. Since $X = 30$, there is trade surplus of $X - M = 30 - 25.6 = 4.4$.

Ans/Q8

(a) At equilibrium,

$$Y = C + I + G + X - M$$

Given the tax function, consumption function can be expressed as

$$C = a + b(Y - \bar{T} - tY + T_r)$$

By substitution of *C-function* into equilibrium equation for *C*,

$$Y = a + b(Y - \bar{T} - tY + T_r) + I + G + X - M$$

By incorporating actual functions into the equilibrium equation,

$$Y = 150 + 0.75(Y - 20 - 0.20Y + 40) + 100 + 115 + 35 - 15 - 0.1Y$$

$$Y - 0.75Y + 0.15Y + 0.1Y = 150 - 15 + 30 + 100 + 115 + 35 - 15$$

$$Y - 0.5Y = \text{Rs. } 400$$

$$Y = \frac{1}{0.5}\ (400) = 800$$

Alternatively, the final form of equilibrium equation in four-sector model is given as

$$Y = \frac{1}{1-b+bt+m}\ (a - b\ \bar{T} + bT_r + I + G + X - \bar{M})$$

$$Y = \frac{1}{1-0.75+0.75(0.2)+0.1}\ (150 - 15 + 30 + 100 + 115 + 35 - 15)$$

$$Y = \frac{1}{0.5}(400) = 800$$

At equilibrium national income equals Rs. 800.

(b) $C = a + b(Y - \bar{T} - tY + T_r)$

By substitution of actual values,

$$\begin{aligned} C &= 150 + 0.75\ (Y - 20 - 0.2Y + 40) \\ &= 150 + 0.75\ [800 - 20 - 0.2(800) + 40] \\ &= 150 + 600 - 15 - 120 + 30 \\ &= 645 \end{aligned}$$

At equilibrium, consumption expenditure equals Rs. 645 crores.

(c) Net exports: $(X - M) = X - (\bar{M} - m\ Y)$

$$\begin{aligned} &= 35 - [15 - 0.1\ (800)] \\ &= 35 - 15 - 80 \\ &= \text{Rs} - 60 \text{ crores} \end{aligned}$$

At equilibrium, the economy has a trade deficit of Rs. 60.

(d) Four-sector multiplier (k)

$$k = \frac{1}{1 - b + bt + m} = \frac{1}{1 - 0.75 + 0.75(0.2) + 0.1}$$

$$= \frac{1}{0.5} = 2$$

$$\Delta\ I\ (k) = \Delta Y$$

$$50\ (2) = 100$$

An increase in investment of Rs 50 increases equilibrium income by Rs. 100.

(e) Government spending (ΔG) required for full employment level of income of Rs 1200.

Full employment Y = Rs 1200

Current equilibrium income = Rs 800

ΔY required for full employment = Rs 1200 – Rs 800 = Rs 400.

Required $\Delta G = \Delta Y/k$ where $k = 2$

= Rs 400/2 = Rs 200

The increase in government spending required to achieve full employment equals Rs 200.

Ans/Q9

(a) Difference between the equilibrium income of the closed economy and the open economy.

Equilibrium income (Y_c) in closed economy:

$$Y_c = C + I + G$$

Given the consumption function, I and G,

$$Y_c = 4 + 0.75\ (Y - 0.2Y + 8) + 110 + 120$$

$$= \frac{1}{1 - 0.75 + 0.75(0.2)}\ (240)$$

$$= 600$$

Equilibrium income (Y_o) in open economy:

$$Y_o = C + I + G + X - M$$

$$= 4 + 0.75\ (Y - 0.2Y + 8) + 110 + 120 + 55 - 5 - 0.1Y$$

$$= \frac{1}{1 - 0.75 + 0.75(0.2) + 0.1}\ (290)$$

$$= 580$$

Difference between Y_c and $Y_o = 600 - 580 = 20$

(b) Calculating Budget Surplus (*BS*)/Budget Deficit (*BD*) at full employment income of 600:

$$BS/BD = T - (G + T_r)$$

$$= tY - (G + T_r)$$

$$= 0.2(600) - (120 + 8)$$

$$= 120 - 128$$

$$= -8$$

It means there is *BD* of 8.

(c) Computation of government spending and new rate of tax:

At Balanced Budget (*BB*) equilibrium, new tax rate (t_n) can be calculated as follows.

$$T = G + T_r$$

Since, T is a function of income (Y),

or $$t_n Y = G + T_r$$

By substitution, at *BB* equilibrium Y of 600,

$$t_n\ (600) = 120 + 8 = 128$$

$$t_n = 600/128 = 0.213333$$

Thus, new tax rate will be 21.3333 percent.

At *BB* full employment equilibrium, new government spending (G_n) can be estimated as follows.

$$G_n + T_r = T$$

Since T is a function of income (Y),

$$G_n = tY - T_r$$

$$= 0.213333\ (600) - 8$$

$$= 128 - 8$$
$$= 120$$

Thus, at full employment equilibrium in the open economy, $G_n = 120$.

CHAPTER 16

Ans/Q7

The *LM-function* is derived from the equation

$$M_d = M_s,$$

or $$M_t + M_{sp} = M_s$$

By substituting actual M_t and M_{sp} functions, we get

$$0.5Y + 105 - 1500i = 150$$
$$Y = 90 + 3000\ i$$

The *LM* function is $Y = 90 + 3000\ i$.

Ans/Q10

(a) Equation for the *IS* curve:

$$Y = C(Y) + I(i)$$

By substitution, $Y = 100 + 0.8\ Y + 120 - 5i$

The *IS* curve can be obtained by solving this equation for *Y*. We get

$$Y = 1100 - 25\ i$$

(b) Equation for the *LM* curve:

$$M_d = M_s$$

Given the M_d-function and the value of M_s, by substitution, we get

$$0.2Y - 5i = 120$$

By rearranging the terms, we get equation for the *LM* curve as

$$Y = 600 + 25i$$

(c) Interest rate at equilibrium can be obtained by equating the *IS* and *LM* functions.

$$IS = LM$$
$$1100 - 25\ i = 600 + 25i$$
$$500 = 50i$$
$$i = 10$$

(d) Income at equilibrium can be obtained by substituting interest rate (10) in either *IS* or *LM* function. Using *IS* function,

$$Y = 1100 - 25i$$
$$= 1100 - 25\ (10) = 850$$

Using *LM* function, $Y = 600 + 25i = 600 + 25\ (10) = 850$

Ans/Q11

The equilibrium level of Y and i is determined at the point of intersection between the IS and LM schedules. So we need to derive first the IS and LM schedules.

IS Schedule:
$$Y = C(Y) + I(i)$$
$$= 15 + 0.5Y + 200 - 2000i$$
$$Y = 430 - 4000i$$

LM Schedule:
$$M_t + M_{sp} = M_s$$
$$0.5\,Y + 105 - 1500i = 150$$
$$Y = 80 + 3000i$$

The equilibrium rate of interest (i) is determined where
$$IS = LM$$
$$430 - 4000i = 80 + 3000i$$
$$350 = 7000i$$
$$i = 0.05 \text{ (i.e., 5.0\%)}$$

The equilibrium level of Y can be obtained by substituting 0.05 for i in either of the IS and LM schedules. Using the IS function, we get
$$Y = 430 - 4000\,i = 430 - 4000\,(0.05) = 230$$

CHAPTER 17

Ans/Q3

The condition for product-market equilibrium:
$$Y = C + I + G$$
$$= a + b\,[Y - (\bar{T} + t\,Y)] + \bar{I} - hi + \bar{G}$$
$$= a + bY - b\bar{T} - btY + \bar{I} - hi + \bar{G}$$
or
$$Y - bY + btY = a - b\bar{T} + \bar{I} - hi + \bar{G}$$
$$Y = \frac{1}{1 - b(1 - t)}\,(a - b\bar{T} + \bar{I} - hi + \bar{G})$$

This equation gives also the IS curve.

Ans/Q4

(a) At equilibrium
$$Y = C + I + G$$

By substitution,
$$Y = 100 + 0.80\,(Y - T) + 200 - 1080i + 100$$

$$= 400 + 0.80\,(Y - 50 - 0.20Y) - 1080i$$
$$= 400 + 0.80Y - 40 - 0.16Y + 1080i$$

By solving this equation for Y, we get the *equilibrium equation* as

$$Y = \frac{1}{1-0.8(1-0.2)}\,(360 - 1080i)$$

(b) By simplifying the equilibrium equation, given above, we get the *IS* function as

$$Y = 1000 - 3000i$$

Ans/Q5

(a) With the inclusion of $\Delta G = 72$, the equilibrium equation (in Q. 4) reads as

$$Y = 100 + 0.80\,(Y - 50 - 0.20Y) + 200 - 1080i + 100 + 72$$
$$= 432 + 0.80Y - 40 - 0.16Y - 1080i$$
$$Y = \frac{1}{1-0.8(1-0.20)}\,(432 - 1080i)$$

This equilibrium equation gives an *IS* function as

$$Y = 1200 - 3000I$$

The change in the *IS* function from

$$Y = 1000 - 3000i \quad \text{(in Q. 4)}$$

to $\quad Y = 1200 - 3000i$

gives the shift in the *IS* function.

The shift in IS schedule $= 1200 - 3000i - (1000 - 3000i)$

$$= 200\ Y.$$

(b) When t increases from 0.20 to 0.25, all other things given, the equilibrium equation reads as

$$Y = 100 + 0.80\,(Y - 50 - 0.25Y) + 200 - 1080i + 100$$
$$Y = \frac{1}{1 - 0.8\,(1 - 0.25)}\,(360 - 1080i)$$

By simplifying this equation, we get *IS* function as

$$Y = 900 - 2700i$$

(c) Shift in the *IS* schedule with $\Delta G = 72$ and $\Delta t = 0.05$. With the introduction of these changes, the equilibrium equation reads as

$$Y = 100 + 0.80\,(Y - 50 - 0.25Y) + 200 - 1080i + 100 + 72$$
$$= \frac{1}{1 - 0.8\,(1 - 0.25)}\,(432 - 1080i)$$

This equilibrium equation gives the *IS* function as

$$Y = 1080 - 2700i.$$

Ans/Q6

(a) The *LM* function is given by $M_d = M_s$. By substitution,

$$100 + 0.5Y - 2500\, i = 250 \text{ (billion)}$$
$$0.5Y = 150 + 2500i$$

By solving this equation for *Y,* we get the *LM* function as

$$Y = 300 + 5000i$$

(b) When ΔM_s = Rs 50 billion, the *LM* function changes to

$$M_d = M_s + \Delta M_s$$

By substitution,

or $$100 + 0.5Y - 2500\, i = 250 + 50$$
$$0.5Y = 200 + 2500i$$
$$Y = 400 + 5000i$$

Ans/Q7

(a) The condition for the general equilibrium is given as $IS = LM$.
From model in Q. 4, we get *IS* functions as $Y = 1000 - 3000i$

(b) From model in Q.6 (b), we get *LM* functions as $Y = 400 + 5000i$

(c) By equating the *IS* and *LM* functions we get the equilibrium equation as

$$1000 - 3000i = 400 + 5000i$$

(d) Find *first* the value of *i*. It can be obtained straightaway from the equilibrium equation. Since at equilibrium,

$$1000 - 3000i = 400 + 5000i$$
$$i = 0.075, \text{ i.e., } 7.5\ \%$$

The equilibrium level of income (Y) can be obtained by substituting 0.075 for the interest rate (i) in *IS* or *LM* function. Selecting *IS* function,

$$Y = 1000 - 3000\ (0.075) = 775$$

(e) Equilibrium interest rate (i) can be obtained by solving the *IS* and *LM* functions simultaneously. We have

IS function: $$Y = 1000 - 3000i \quad \text{(i)}$$

LM function: $$Y = 400 + 5000i \quad \text{(ii)}$$

Eqs. (i) and (ii) can be written, respectively, as

$$Y + 3000\, i = 1000 \quad \text{(iii)}$$
$$Y - 5000\, i = 400 \quad \text{(iv)}$$

Subtracting Eq. (iv) from Eq. (iii), we get

$$8000\, i = 600$$
$$i = 0.075 \text{ (i.e., } 7.5\%)$$

Ans/Q8

(i) To find i, first find the IS and LM functions without change in money supply.

IS function: $Y = C + I = 100 + 0.8\,Y + 120 - 0.5i,$

or $Y = 1100 - 2{\cdot}5i,$

LM function: $M_d = M_s,$

or $0.2Y - 5\,i = 120,$

or $0.2Y = 120 + 5i,$

or $Y = 600 + 25i$

The equilibrium interest rate can be obtained by equating the IS and LM functions as follows.

$1100 - 2.5\,i = 600 + 25i$

or $500 = 27.5i$

and $i = 18.18$

(ii) Equilibrium level of income: By substituting i, we get

$Y = 1100 - 2.5\ (18.18) = 1054.55$

Change in Y with $\Delta M_s = 30$. With $\Delta M_s = 30$, LM function changes to

$M_d = M_s + \Delta M_s,$

or $0.2\ Y - 5i = 120 + 30.$

$Y = 750 + 25i$

The new equilibrium i with new LM function:

$1100 - 2.5i = 750 + 25i$

$i = 12.73$

The new equilibrium: $Y = 1100 - 2.5\ (12.73)\ \text{m} = 1068.18$

+# Change in equilibrium income: $\Delta Y = 1068.18 - 1054.55 = 13.63$

Ans/Q10

(i) Equilibrium Y and i before imposition of tax.

(a) *IS: Function*: $Y = C + I$

$= 100 + 0.75Y + 120 - 0.5i$

$= 880 - 2i$

(b) *LM-Function:* $M_d = M_s$

$0.2\ Y - 4i = 150$

$Y = 750 + 20i$

(c) Equilibrium i *determined where LM-function = IS-function*

$880 - 2i = 750 + 20i$

$$130 = 22i$$
$$i = 5.90$$

(d) *Equilibrium* $Y = 880 - 2i$
$$= 880 - 2\ (5.90)$$
$$Y = 868.20$$

(ii) Equilibrium Y and i after imposition of tax: ($T = 20$)

(a) *IS-function*: $Y = 100 + 0.75(Y - 20) + 120 - 0.5i$
$$= 820 - 2i$$

(b) No change in *LM-function*

(c) Equilibrium i *determined where IS = LM*
$$820 - 2\ i = 750 + 20i$$
$$i = 3.19$$

(d) Equilibrium $Y = 820 - 2i = 820 - 2\ (3.19)$
$$= 813.62$$

(e) Effects of taxation:

(i) Equilibrium Y falls by $868.20 - 813.62 = 54.58$ and

(ii) Equilibrium i falls by $5.90 - 3.19 = 2.71$

Ans/Q11

Find first the *LM* and *IS* function.

LM function with ΔM_s: $M_d = M_s + \Delta M_s$
$$0.2Y - 5\ i = 120 + 30$$
$$0.2Y = 150 + 5i$$
$$Y = 750 + 25i \qquad \text{(i)}$$

IS Function with $T = 20$:
$$Y = C + I$$
$$= 100 + 0.75\ (Y - 20) + 120 - 0.5i$$
$$= 100 + 0.75Y - 15 + 120 - 0.5i$$
$$= 820 - 2i \qquad \text{(ii)}$$

By solving (i) and (ii) gives the equilibrium i as
$$750 + 25i = 820 - 2i$$
$$27i = 70$$
$$i = 2.59$$

By substitution, at equilibrium,
$$Y = 750 + 25\ (2.59)$$
$$= 814.75$$

Ans/Q12

(a) To find the equilibrium level of Y and R, we need first to find IS and LM functions.

IS function: $Y = C + I + G$

By substitution,

$$\begin{aligned} Y &= 80 + 0.8Y_d + 200 - 10R + 160 \\ &= 80 + 0.8(Y - T + T_r) + 200 - 10R + 160 \\ &= 80 + 0.8(Y - 60 - 0.2Y - 40) + 200 - 10R + 160 \\ &= 1000 - 27.78R \end{aligned}$$

LM function: $M_1 + M_2 = M_s$.

By substitution,

$$0.4Y + 300 - 20R = 476$$

$$0.4\ Y = 176 + 20R,$$

or $$Y = 440 + 50R$$

Equilibrium R can be found as follows.

$$1000 - 27.78R = 440 + 50R,$$

or $$-77.78R = -560,$$

or $$R = 7.20$$

Equilibrium Y. By substituting 7.20 for R in the IS function, we get

$$Y = 1000 - 27.78\ (7.20) = 800$$

(b) Given the total $G_T = G + T_r = 160 - 40 = 120$, whether government budget has a surplus or a deficit depends on whether $T <$ or $> G_T$ at equilibrium.

At equilibrium, $T = 60 + 0.2\ (800) = 220$

Since $T = 220$ and $G_T = 120$, the budget is in surplus of $T - G = 100$.

(c) Consumption expenditure at equilibrium level of income:

$$\begin{aligned} C &= 80 + 0.8\ (Y - 60 - 0.2Y - 40) \\ &= 80 + 0.8(800) - 0.8(60) - 0.8 \times 0.2\ (800) - 0.8(40) \\ &= 80 + 640 - 48 - 128 - 32 = 512. \end{aligned}$$

Ans/Q13

(a) To find the equilibrium level Y and i, we need first to find IS and LM functions

(i) IS function: $Y = C + I + G$

By substitution,

$$\begin{aligned} Y &= 40 + 0.75(Y - 80) + 140 - 10i + 100 \\ &= 280 + 0.75Y - 60 - 10i \\ &= 880 - 40i \end{aligned}$$

(ii) *LM* function: Money sector is in equilibrium where $M_d = M_s$

By substitution,

$$0.2Y - 5i = 85,$$

or $$0.2Y = 85 + 5i,$$

or $$Y = 425 + 25i$$

(iii) By solving the *IS* and *LM* functions, we get

$$880 - 40i = 425 + 25i$$

$$65i = 455,$$

$$i = 7\ (\%)$$

(iv) Equilibrium *Y* can be found by substituting $i = 7$ in either of the *IS* and *LM* functions. Using *IS* function,

$$Y = 880 - 40\ (7) = 600$$

(*Note:* These results can be obtained by solving the *IS* and *LM* functions simultaneously).

(b) Equilibrium *Y* with ΔG = Rs 65 crores. *LM* function remaining the same, the new *IS* function: $Y = C + I + G + \Delta G$

$$= 40 + 0.75(Y - 80) + 140 - 10i + 100 + 65$$

By solving this equation for *Y*, we get *IS* function as

$$Y = 1140 - 40i$$

(i) Solving *IS* and *LM* functions for *i*, we get

$$1140 - 40\ i = 425 + 25i,$$

or $$715 = 65i$$

or $$i = 11\ (\%)$$

(ii) New income can be found by substituting 11 for *i* in *IS* or *LM* function.

$$Y = 1140 - 40\ (11) = \text{Rs } 700 \text{ crores.}$$

Ans/Q14

(i) (a) Derivation of the *IS* and *LM* equations:

IS equation: $Y = C + I + G$

By substitution,

$$Y = 100 + 0.9Y_d + 600 - 30\ i + 300 \text{ (where } Y_d = Y - tY)$$

$$= 100 + 0.9(Y - 1/3Y) + 600 - 30i + 300$$

$$= 1000 + 0.9Y - 0.3Y - 30i$$

IS equation: $Y = 2500 - 75i$

Alternatively, the *IS* equation can be derived straightaway from the final form of the equilibrium equation for the product market.

$$Y = \frac{1}{1 + b + bt}\ (\bar{A} + \bar{I} - hi + \bar{G})$$

$$Y = \frac{1}{1 - 0.9 + 0.9(1/3)} (100 + 600 - 30i + 300)$$

or $$Y = \frac{1}{0.4} (1000 - 30i)$$

IS equation: $Y = 2500 - 75i$

LM equations: $M_d = M_1 + M_2 = M_s$ and $M_s = \overline{M}/P$

By substitution,

$$0.4Y - 50i = 1040/2$$

$$0.4Y = 520 + 50i$$

LM equation: $Y = 1300 + 125i$

(ii) (a) Equilibrium levels of income (Y) and interest rate (i). First, we compute i. At equilibrium, $IS = LM$. By substitution,

$$2500 - 75i = 1300 + 125i,$$

$$200i = 1200,$$

$$i = 6\ (\%)$$

Substituting 6 for i in the *IS* (or *LM*) function, we get *Y at equilibrium* as

$$Y = 2500 - 75\ (6) = 2050$$

(b) Computing ΔG for full employment.

$$\Delta Y = Y_F - Y, \text{ where } Y_F \text{ is income at full employment}$$

$$= 2500 - 2050 = 450$$

Now ΔG can be obtained as $\Delta G = 450/G_{mc}$

Here, G_{mc} is fiscal multiplier adjusted for the crowding-out effect of rise in the interest rate. The adjusted fiscal multiplier is used to account for the *crowding out effect* arising out of increase in government spending and the consequent increase in the interest rate. The formula for G_{mc} is given as

$$G_{mc} = \frac{1}{(1 - b + bt) + hk/l}$$

where $b = \Delta C/\Delta Y = 0.9$; $h = \Delta I/\Delta i = 0.4$;

$k = \Delta M_t/\Delta Y = 30$ and $l = \Delta M_{sp}/\Delta i = 50$

By substituting the value of the constants, we get

$$G_{mc} = \frac{1}{[1 - 0.9 + 0.9(1/3) + 0.4 \times 30/50]}$$

$$= \frac{1}{0.4 + 0.24} = 1.5625$$

Alternatively, $$G_{mc} = \frac{G_m}{1 + G_m\, kh/j}$$

where, given the model, $G_m = G$-multiplier $= 2.5$; and other constants are the same as above.

By substitution, $G_{mc} = \dfrac{2.5}{1 + 2.5 \times 0.4 \times 30/50} = \dfrac{2.5}{1.6} = 1.5625$

Now that G_{mc} has been worked out, ΔG can be computed as follows.

$$\Delta G = \frac{\Delta Y}{G_{mc}} = \frac{450}{2.5625} = 288$$

A $\Delta G = 288$ will increase income to its full employment level of 2500.

c. Change in the position of IS and LM curves if MPC changes to 0.6.

(i) *Change* in *IS Curve.* When *MPC* changes from 0.9 to 0.6, the equation for *IS* curve changes

from $\quad Y = \dfrac{1}{1 - 0.9 + 0.9(1/3)}(100 + 600 - 30i + 300)$

to $\quad Y = \dfrac{1}{1 - 0.6 + 0.6(1/3)}(100 + 600 - 30i + 300)$

$$= \frac{1}{0.6}(1000 - 30i)$$

IS equation: $\quad Y = 1666 - 50i$

Thus, with change in *MPC* from 0.9 to 0.6, the *IS*-equation changes

from $\quad Y = 2500 - 75i$

to $\quad Y = 1666 - 50i$

(ii) The change in *MPC* does not affect *LM* curve because it is independent of *MPC.*

Ans/Q15

(i) Derivation of *IS* and *LM* equations

- Derivation of *IS* equation:

$$Y = C + I + G$$
$$= 200 + 0.75\,(Y - 200) + 200 - 25\,r + 200$$
$$\text{(where } r = \text{interest rate)}$$
$$= 200 + 0.75\text{Y} - 150 + 200 - 25\,r + 200$$
$$= 1800 - 100r$$

Let *IS* equation be labelled as $Y_o = 1800 - 100r$

- Derivation of *LM* equation: $M^d = M^s/P$ (i.e., M^s in real terms)

$$0.5Y - 100\,r = 900/2 = 450$$
$$0.5\,Y = 450 + 100r$$
$$Y = 900 + 200r$$

Let new *LM* equation be labelled as $Y_o = 900 + 200r$

- Equilibrium interest rate: It is determined where

$$IS = LM$$

$$1800 - 100\,r = 900 + 200r$$
$$300\,r = 900$$
$$r = 3$$

- Equilibrium income:

$$Y_o = 1800 - 100r$$
$$= 1800 - 100\ (3)$$
$$= \text{Rs } 1500 \text{ crore}$$

(ii) The magnitude of shift in *IS* and *LM* curves:

To find the shift in *IS* and *LM* curves, derive the *IS* and *LM* equations with given ΔG and ΔM^d.

- *IS* equation with ΔG = Rs 250 crore – Rs 200 crore = Rs 50 crore

With ΔG = Rs 50 crore, the *IS* equation changes from $Y_o = 1800 - 100\ r$ to

$$Y_1 = 1800 - 100\ r + 50$$
$$= 1850 - 100\ r$$

- The magnitude of shift in *IS* curve equals ΔY and

$$\Delta Y = \frac{1}{1-b}\ (G_m) = \frac{1}{1-0.75}\ (50) = \text{Rs } 200 \text{ crores}$$

- The increase in nominal money supply (ΔM^s) = Rs 1100 crores – Rs 900 crores = Rs 200 crores.

In real terms, ΔM^s = Rs 200 crores/2 = Rs 100 crores.

- With ΔM^s = Rs 100 crores, *LM* equation changes from $Y_o = 900 + 200r$

to $Y_1 = 900 + 200r + 100$

$$= 1000\ Y_o + 200r$$

- The magnitude of shift in *LM* curve equals ΔY and

$$\Delta Y = \Delta M^s\ (1/k), \qquad \text{where } k = \Delta M^d/\Delta Y$$
$$= 100\ (1/0.5)$$
$$= \text{Rs } 200 \text{ crores}$$

(iii) Derivation of Equation for *AD* curve*.

$$AD = f\ (P)$$

Price, *P*, has so far been assumed to be a constant factor. For deriving *AD* equation, however, *P* has to be treated as a variable. To derive *AD* equation in the *IS-LM* model, recall *IS* and *LM* equations—LM equation with variable *P*.

IS Equation ⇒ $Y = 1800 - 100r$ ...(i)

LM Equation ⇒ $Y = 0.5\ Y + 100r = 900/P$ ...(ii)

Note that there are two equations with three variable, *Y, P* and *r*. So the model cannot be solved. Since *Y* and *P* are required for deriving *AD* curve, *r* has to be eliminated. The value of *r* can be obtained from Eq. (i) and substituted in Eq. (ii). Let us solve Eq. (i) for *r*.

$$Y = 1800 - 100r$$
$$100r = 1800 - Y$$
$$r = 18 - 0.01Y \qquad \text{(iii)}$$

By substituting Eq. (iii) for r in Eq. (ii), we get

$$0.5\ Y - 100\ (18 - 0.01Y) = 900/P$$
$$1.5Y - 1800 = 900/P$$
$$1.5Y = 1800 + 900/P$$
$$Y = 1200 + 600/P \qquad \text{(iv)}$$

Eq. (iv) give the *AD* equation.

(b) The effect of an increase in the government expenditure on income and budget surplus in a proportional tax model:

- The effect of an increase in the government expenditure (ΔG) on income can be worked out (i) without crowding-out effect using the Keynesian multiplier (G_m), and (ii) with crowding-out effect by using crowding-out adjusted multiplier (G_{mc}).

  (i) Without crowding-out effect:

  $$\Delta Y = \frac{1}{1 - b - bt}\ (\Delta G)$$

  (ii) With crowding-out effect :

  $$\Delta Y = \frac{1}{(1 - b + bt) + hk/l}\ (\Delta G)$$

- Budget surplus (or deficit) at equilibrium can be obtained by using the following method. Let us assume a tax function. $T = f\ (Y)$, as

  $$T = \bar{T} \;\; tY$$

  and autonomously determined G.

  Budget surplus/deficit = $(\bar{T} + tY) - G$

  If $T + tY > G$, there is budget surplus. Otherwise, there is budget deficit.

CHAPTER 18

Ans/Q5

(a) ***Equilibrium level of income without foreign trade.*** Given the model,

$$Y = \frac{1}{1 - b + bt}\ (\bar{A} + b\overline{TR} + \bar{I} + \bar{G})$$

By substitution,

$$Y = \frac{1}{1 - 0.8 + 0.8(0.2)}\ (50 + 0.8 \times 100 + 70 + 200)$$
$$= 1/\ 0.36\ (400) = 1112$$

Multiplier $= \dfrac{1}{0.36} = 2.78$

(b) **1. Equilibrium Y with X = 25 and M = 5 + 0.2Y.** In open economy model,

$$Y = \frac{1}{1 - b + bt + m}(\bar{A} + b\overline{TR} + \bar{I} + \bar{G} + \bar{X} - \bar{M})$$

$$Y = \frac{1}{1 - 0.8 + 0.8(0.20) + 0.2}(50 + 0.8 \times 100 + 70 + 200 + 25 - 5)$$

$$= \frac{1}{0.56}(420) = 750$$

(b) 2. Balance of Trade (BOT) = $X - M = X - (\bar{M} - mY)$.

By substitution, $BOT = 25 - 5 - 0.2\ (750)$

$= -\ 130$

(c) With $X = 40$, the equilibrium equation can be written as

$$Y = \frac{1}{1 - 0.8 + 0.8\,(0.20) + 0.2}(50 + 0.8 \times 100 + 70 + 200 + 40 - 5)$$

$$= \frac{1}{0.56}(435) = 776.78$$

BOT at new equilibrium $= 40 - 5 - 0.2\ (776.78) = -\ 120.36$

Ans/Q6

(a) ***Equilibrium level of income.*** Using the final form of the equilibrium equation,

$$Y = \frac{1}{1 - b + bt + m}(\bar{A} + b\bar{T} + \bar{I} + \bar{G} + \bar{X})$$

By substitution,

$$Y = \frac{1}{1 - 0.8 + 0.8(0.25) + 0.2}(80 + 0.8 \times -10 + 52 + 50 + 20)$$

$$Y = \frac{1}{0.6}(194) = 323.33$$

(b) **The effect of withdrawal of (income) subsidy by 10 and increase in X by 20.** With these changes, equilibrium equation reads as

$$Y = \frac{1}{1 - b + bt + m}(\bar{A} + \bar{I} + \bar{G} + \bar{X} + \Delta\bar{X}).$$

By substitution,

$$Y = \frac{1}{1 - 0.8 + 0.8(0.25) + 0.2}(80 + 52 + 50 + 20 + 20)$$

$$Y = \frac{1}{0.6}(222) = 370$$

(c) *Change in Balance of Trade (BOT) position:*

Pre-change $BOT = 20 - 0.2(323.33) = -\ 44.67$

Post-change $BOT = 40 - 0.2(370) = -\ 34.0$

The BOT position improves by 10.67 or BOT *deficit* decreases by 10.67.

Ans/Q7

(a) To find equilibrium value of Y and i, we need to derive IS and LM functions.

(i) IS function : $Y = C + I + G + X - M$ (Negative F treated as tax)

By substitution,

$$Y = 86 + 0.8\ (Y - 20) + 240 - 20R + 60 + 40 - 30 - 0.05Y$$

$$= 86 + 0.8Y - 16 + 240 - 20R + 60 + 40 - 30 - 0.05Y$$

$$= \frac{1}{1 - 0.8 + 0.05}\ (380) = 1520 - 80R$$

By substitution,

IS function: $Y = 1520 - 80R$

LM function: $M_d = M_s$ where $M_d = M_1 + M_2$.

By substitution,

$$0.5Y + 300 - 40\ R = 440,$$

$$0.5Y = 140 + 40\ R$$

$$Y = 280 + 80\ R$$

LM function: $Y = 280 + 80\ R$

Equilibrium Interest (R) is determined where

$$IS = LM$$

$$1520 - 80R = 280 - 80R$$

or $\quad 1240 = 160R$

or $\quad R = 7.75$

Equilibrium Income (Y) can be obtained by substituting 7.75 for R in IS (or LM) function. Thus,

$$Y = 1520 - 80R = 1520 - 80\ (7.75)$$

$$Y = 900$$

(b) ***Additional exports (ΔX) to achieve full employment at $Y = 1100$.*** Let Y at full employment be Y_F and Y at less than full employment be Y_U. Then,

ΔY for full employment $= Y_F - Y_U$ (Recall that $Y_F = 1100$ and $Y_U = 900$

Thus, $\quad \Delta Y = 1100 - 900 = 200$

Given the model,

$$\Delta Y = \frac{1}{1 - b + m}\ \Delta X$$

$$200 = \frac{\Delta X}{1 - 0.8 + 0.05}$$

or $\quad \Delta X = 200 \times 0.25 = 50$

(c) With the introduction of tax function $T = 10 + 0.1Y$, the equilibrium equation can be written as

$$Y = \bar{A} + b\,(Y + F - \bar{T} - tY) + I + G + X - M$$
$$Y = 86 + 0.8\,(Y - 20 - 10 - 0.1Y) + 240 - 20R + 60 + 40 - 30 - 0.05Y$$
$$= 86 + 0.8Y - 16 - 8 - 0.08Y + 240 - 20R + 60 + 40 - 30 - 0.05Y$$
$$= 372 + 0.8Y - 0.08Y - 0.05Y - 20R$$
$$Y = \frac{1}{1 - 0.8 + 0.08 + 0.05}\,(372 - 20R)$$
$$= \frac{1}{0.33}\,(372 - 20R) = 1127 - 60.6R$$

This gives the IS function as

$$Y = 1127 - 60.6R$$

The new equilibrium level of income where IS = LM. Find R first.

Since $1127 - 60.6\,R = 280 + 80\,R$

$$847 = 140.6\,R$$

or $\quad R = 6$ (approx.).

Y at equilibrium $= 280 + 80\,(6) = 760$

New $\Delta Y = 1100 - 760 = 340$

Given the model,

$$\Delta Y = \frac{1}{1 - b + bt + m}\,\Delta X$$

Using the method followed above,

$$\Delta X = 340 \times 0.33 = 112$$

With the introduction of tax function, required ΔX increases from 50 to 112.

Ans/Q8

(a) The equilibrium level of income,

$$Y = \frac{1}{1 - b + m}\,(\bar{A} - bT + \bar{I} + \bar{G} + \bar{X} - \bar{M})$$

By substitution,

$$Y = \frac{1}{1 - 0.6 + 0.1}\,(50 - 0.6 \times 20 + 35 + 25 + 30 - 8)$$
$$= \frac{1}{0.5}\,(120) = 240 \text{ crore}$$

(b) Combined effect of withdrawal of subsidy (S_w) by Rs. 10 crore and increase in exports (ΔX) by Rs. 20 crore.

The combined effect of these changes can be obtained by comparing income (Y_1) before the changes and income (Y_2) after the changes.

(i) Pre-change income (Y_1) = 240 crore

(ii) Post-change income (Y_2) can be estimated as follows.

$$Y_2 = \frac{1}{1-b+m}[\bar{A} - b(T + S_w) + \bar{I} + \bar{G} + (X + \Delta X) - \bar{M}]$$

By substitution we get,

$$Y_2 = \frac{1}{1-0.6+0.1}[50 - 0.6(20+10) + 35 + 25 + (30+20) - 8]$$

$$= \frac{1}{0.5}(134) = 268 \text{ crore}$$

Effect on $Y = Y_2 - Y_1 = 268 - 240 = 28$ crore

It means that after policy change, equilibrium level of income increases by Rs. 28 crore.

(c) Combined effect of withdrawal of subsidy and increase in exports ($\Delta X = 20$) on the balance of trade (BOT).

The combined effect = Pre-change BOT – Post-change BOT

Pre-change BOT $= X - M$

$= 30 - 8 - 0.1\ (Y)$

$= 22 - 0.1\ (240)$

$= -2$ (Deficit)

Post-change BOT $= X + \Delta X - M$

$= 30 + 20 - 8 - 0.1\ (268)$

$= 15.2$ (crore of Surplus)

It means that after the policy changes were made, BOT deficit of 2 crore disappears and BOT turns into surplus of 15.2 crore.

Ans/Q9

(a.i) *The IS Equation*. At equilibrium,

$$Y = \frac{1}{1-b+m}(\bar{C} + \bar{I} + \bar{G} + \bar{E} - \overline{IM} - b\,\bar{T}_n - hi)$$

By substitution,

$$Y = \frac{1}{1-0.9+0.1}[50 + 150 + 100 + 20 - 10 - 0.9(100) - 5\,i]$$

$$Y = \frac{1}{0.2}\ (220 - 5i)$$

IS equation : $Y = 1100 - 25i$

The LM function: $L\ (= M_d) = M/P$

By substitution,

$$0.2Y - 10\,i = 100$$

$$0.2Y = 100 + 10i$$

LM function :

$$Y = 500 + 50i$$

(a.ii) ***Equilibrium rate of interest and income*** are determined whose $IS = LM$

$$1100 - 25\,i = 500 + 50i$$

or $\quad 600 = 75i$

or $\quad i = 8$

Equilibrium rate of interest is 8%.

By substituting 8 for i in the LM equation, we get equilibrium Y as

$$Y = 500 + 50i = 500 + 50\ (8) = 900 \text{ crore of rupees}$$

Equilibrium Y equals to Rs. 900 crores.

(a.iii) Balance of trade (BOT) = $\overline{X} - IM$ where $IM = \overline{M} + mY$.

By substitution,

$$BOT = 20 - (10 + 0.1Y) = 20 - 10 - 0.1(900)$$
$$= -80 \text{ crore of rupees}$$

Thus, BOT is in deficit of Rs 80 crore.

(b) The effect of change in G from 100 to 100 + ΔG on equilibrium level of interest (i) and income (Y).

Let $\Delta G = 30$. When there is ΔG, the LM equation remains the same, but product market equilibrium equation changes

from $\quad Y = \dfrac{1}{0.2}(220 - 5i)$

to $\quad Y = \dfrac{1}{0.2}(220 + 30 - 5i)$

As a result, the IS equation changes

from $\quad Y = 1100 - 25i$

to $\quad Y = 1250 - 25i$

New equilibrium interest rate can now be computed as

$$1250 - 25i = 500 + 50i$$

or $\quad 750 = 75i$

or $\quad i = 10$

Thus, with increase in G by 30, the interest rate rises from 8 % to 10%.

As regards the new equilibrium level of income, using LM equation, we get,

$$Y = 500 + 50i = 500 + 50\ (10) = 1000 \text{ crores of rupees.}$$

Thus, with $\Delta G = 30$, the equilibrium level of income increases from Rs 900 crore to Rs 1000 crore.

Ans/Q10

(i) At equilibrium level of income, $Y = C + I + \overline{G} + \overline{X} - M$

By substitution,

$$Y = 60 + 0.8(Y + 60 - 15) + 100 - 5(6) + 76 + 70 - 12 - 0.2Y$$
$$= 300 + 0.8Y - 0.2Y \text{ or } Y\ (1 - 0.8 + 0.2) = 300$$

$$Y = \frac{1}{0.4}\ (300) = 750$$

The equilibrium level of income = 750

(ii) Foreign trade multiplier (k_F): $k_F = \dfrac{1}{1-b+m} = \dfrac{1}{1-0.8+0.2} = 2.5$

(iii) The equilibrium Y if $\Delta G = 20$. New equilibrium income = $Y + \Delta Y$. As computed above, $Y = 750$. So we need to compute ΔY and add it to Y.

$$\Delta Y = \frac{1}{1-b+m}\ \Delta G = \frac{1}{1-0.8+0.2}\ (20) = 50$$

Thus, the new equilibrium $Y = 750 + 50 = 800$

(iv) The effect of wholly tax-financed increase in transfer payments on the equilibrium level of Y can be obtained by comparing Y before and after the tax and transfer payments. Let Y before change be Y_1 and Y after change Y_2. Thus, the effect of $\Delta T = \Delta TR = Y_2 - Y_1 = \Delta Y$. Given the model, we know that

$$Y_1 = \frac{1}{1-b+m}(\bar{A} - b\bar{T} + \bar{I} + \bar{G} + \bar{X} - \bar{M})$$

With ΔT and ΔTR, Y_2 can be written as

$$Y_2 = \frac{1}{1-b+m}[\bar{A} - b(\bar{T} + \Delta T) + \bar{I} + \bar{G} + \Delta TR + \bar{X} - \bar{M}]$$

$$\Delta Y = Y_2 - Y_1 = \frac{1}{1-b+m}(-b\Delta T + \Delta TR)$$

Since $\Delta T = \Delta TR$, by substitution, we get

$$\Delta Y = \frac{1}{1-b+m}(-b\Delta TR + \Delta TR)$$

$$= \frac{1}{1-b+m}(1-b)\,\Delta TR$$

$$\Delta Y = \frac{1-b}{1-b+m}\ \Delta TR$$

Suppose $\Delta T = \Delta TR = 20$. Its effect on income equals

$$\Delta Y = \frac{1-0.8}{1-0.8+0.2}(20)$$

$$= 0.5(20) = 10$$

Thus, a $\Delta T = \Delta TR = 20$ affects income by 10, given $b = 0.8$ and $m = 0.2$.

Ans/Q12

Given the functions, the *BOP* function can be derived as:

$$BOP = X - M - K = 0 \text{ (where } X > M)$$

By substitution, the *BOP* function can be written as

$$BOP = 200 - (40 + 0.1Y) - (120 - 5i) = 0$$
$$= 200 - 40 - 0.1Y - 120 + 5i = 0$$

$$= 40 - 0.1Y + 5\,i = 0$$

$$\text{or } BOP = 40 - 5\,i - 0.1Y = 0$$

Ans/Q15

(1) ***Computation of equilibrium level of income and interest in a closed economy:***
Equilibrium level of income and interest are determined where $IS = LM$

- *Derivation of IS Equation: At equilibrium,*

$$Y = \frac{1}{a - b + bt}\,(a + I + G)$$

By substituting the values from the question.

$$= \frac{1}{1 - 0.8 + 0.8(0.25)}\,(100 + 150 - 6i + 100)$$

$$= 875 - 15i$$

IS equation $\Rightarrow Y = 875 - 15i$

- *Derivation of LM equation: At equilibrium,*

$$M^d = M^s/P$$

$$0.2Y - 2\,i = 300/2 = 150$$

$$0.2Y = 150 - 2i$$

$$Y = 750 + 10i$$

LM Equation $\Rightarrow \quad Y = 750 + 10i$

- *Computation of equilibrium interest (i)*: The equilibrium rate of interest is determined where

$$IS = LM$$

$$875 - 15i\ y = 750 + 10i$$

$$125 = 25i$$

$$i = 5$$

- *Computation of equilibrium Y:* Equilibrium Y can be obtained by substituting 5 for i in *IS* (or *LM)* equation.

IS equation	*LM equation*
$Y = 875 - 15i$	$Y = 750 + 10i$
$= 875 - 15\ (5)$	$= 750 + 10(5)$
= Rs 800 crores	= Rs 800 crores

(ii) ***Computation of Equilibrium Y and i in an open economy***
With the economy opening up, only the *IS* equation *changes. LM* equation remains the same. The *IS* equation with $X = 100$ and $M = 20 + 0.1Y$ can be specified as

$$Y = \frac{1}{a - b + bt + m}\,(a + I + G + X - \overline{M})$$

$$= \frac{1}{1 - 0.8 + 0.8(0.25) + 0.1}\,(100 + 150 - 6i + 100 + 100 - 20)$$

$$= \frac{1}{0.5}\,(430 - 6\,i)$$

IS equation for open economy: $Y = 860 - 12i$

- Equilibrium i is determined where $IS = LM$

$$860 - 12i = 750 + 10i$$
$$110 = 22i$$
$$i = 5$$

- Equilibrium Y computed by substituting 5 for i in the open economy IS equation.

$$Y = 860 - 12i$$
$$= 860 - 12\,(5)$$
$$= \text{Rs } 800 \text{ crores}$$

Note that the equilibrium Y in open economy is the same (Rs 800 crore) as in the closed economy. Why ? The reason is at Equilibrium Y = Rs 800 crore, $M = 20 + 0.1(800)$ = Rs 100 crore which equals the fixed X = Rs 100 crore. Because $X = M$, the positive effects of exports (injections) and negative effects of imports (withdrawals) counterbalance one another.

(iii) ***Shift in LM curve due to doubling of money supply***

The shift in *LM* curve can be measured by finding the difference between Y_1 (i.e., equilibrium Y after increase in nominal money supply) and Y_0 (i.e., equilibrium Y before increase in nominal money supply), both at the same interest rate.

Shift in *LM* curve $= \Delta Y = Y_1 - Y_0$

$$= \text{Rs } 1550 \text{ crores} - \text{Rs } 800 \text{ crores}$$
$$= \text{Rs } 750 \text{ crores}$$

Alternatively, find ΔY due to increase in real money supply (M^s/P) by using, what may be called, money-income multiplier, at constant rate of interest.

$$\Delta Y = 1/k\,(\Delta M/P),$$

(where k = the slope of M_t function and ΔM = Rs 300 crores)

$$= 1/0.2\,(300/2)$$
$$= 5\,(150) = \text{Rs } 750 \text{ crores}$$

Given the model, a ΔY of Rs 750 crores measures the shift in the *LM* curve.

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