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BAECO 102
ECONOMIC THEORY-II

BA (ECONOMICS)
2nd SEMESTER

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ECONOMIC THEORIES - II

BA [Economics]

Second Semester

BAECO-102

RAJIV GANDHI UNIVERSITY

Arunachal Pradesh, INDIA - 791112

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Vikas revised edition, 2021

About the University

Rajiv Gandhi University (formerly Arunachal University) is a premier institution for higher education in the state of Arunachal Pradesh and has completed twenty-five years of its existence. Late Smt. Indira Gandhi, the then Prime Minister of India, laid the foundation stone of the university on 4th February, 1984 at Rono Hills, where the present campus is located.

Ever since its inception, the university has been trying to achieve excellence and fulfill the objectives as envisaged in the University Act. The university received academic recognition under Section 2(f) from the University Grants Commission on 28th March, 1985 and started functioning from 1st April, 1985. It got financial recognition under section 12-B of the UGC on 25th March, 1994. Since then Rajiv Gandhi University, (then Arunachal University) has carved a niche for itself in the educational scenario of the country following its selection as a University with potential for excellence by a high-level expert committee of the University Grants Commission from among universities in India.

The University was converted into a Central University with effect from 9th April, 2007 as per notification of the Ministry of Human Resource Development, Government of India.

The University is located atop Rono Hills on a picturesque tableland of 302 acres overlooking the river Dikrong. It is 6.5 km from the National Highway 52-A and 25 km from Itanagar, the State capital. The campus is linked with the National Highway by the Dikrong bridge.

The teaching and research programmes of the University are designed with a view to play a positive role in the socio-economic and cultural development of the State. The University offers Undergraduate, Post-graduate, M.Phil and Ph.D. programmes. The Department of Education also offers the B.Ed. programme.

There are fifteen colleges affiliated to the University. The University has been extending educational facilities to students from the neighbouring states, particularly Assam. The strength of students in different departments of the University and in affiliated colleges has been steadily increasing.

The faculty members have been actively engaged in research activities with financial support from UGC and other funding agencies. Since inception, a number of proposals on research projects have been sanctioned by various funding agencies to the University. Various departments have organized numerous seminars, workshops and conferences. Many faculty members have participated in national and international conferences and seminars held within the country and abroad. Eminent scholars and distinguished personalities have visited the University and delivered lectures on various disciplines.

The academic year 2000-2001 was a year of consolidation for the University. The switch over from the annual to the semester system took off smoothly and the performance of the students registered a marked improvement. Various syllabi designed by Boards of Post-graduate Studies (BPGS) have been implemented. VSAT facility installed by the ERNET India, New Delhi under the UGC-Infonet program, provides Internet access.

In spite of infrastructural constraints, the University has been maintaining its academic excellence. The University has strictly adhered to the academic calendar, conducted the examinations and declared the results on time. The students from the University have found placements not only in State and Central Government Services, but also in various institutions, industries and organizations. Many students have emerged successful in the National Eligibility Test (NET).

Since inception, the University has made significant progress in teaching, research, innovations in curriculum development and developing infrastructure.

SYLLABI-BOOK MAPPING TABLE

Economic Theory - II

Syllabi	Mapping in Book
Unit I: Price Determination Demand, Supply and Price Determination,	**Unit I: Price Determination**
Unit II: Market Structure Market Structure - Features of Perfect Competition and its Limitations, Imperfect Competition: Monopoly, Duopoly and Oligopoly: Their Features.	**Unit II: Market Structure**
Unit III: National Income and its Classical Determination Gross Domestic Product (GDP), NDP, GNP, NNP and Per Capita Income, Methods of National Income Estimation - Product, Income and Expenditure: Circular Flow of Income and Expenditure, Classical theory of Output and Employment and its Limitations.	**Unit III: National Income and its Classical Determination**
Unit IV: Keynesian Model and Macro-Policies Keynesian Determination of Income: Consumption Function, Saving Function, Investment Multiplier, Fiscal Policy: Its Objectives and Instruments.	**Unit IV: Keynesian Model and Macro-Policies**

CONTENTS

INTRODUCTION

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Economic theory or analysis furnishes the economists with a set of tools which they use to analyse the nature of the observed economic phenomena in the real world. Economic theory may, therefore, be appropriately defined as a 'box of tools' with which the economists construct economic models in order to study the economic phenomena which frequently occur in the real world. Although the analytical tools in the kit-bag of an economist are inadequate to enable him to handle each and every individual economic occurrence in so far as it reveals its own peculiarities, these nevertheless enable him to analyse certain common features of individual economic occurrences. Like other sciences, economic theory also provides us with the general propositions which are employed in the analysis of economic phenomena within certain limits. The limitations of these theoretical economic propositions in analysing the individual economic phenomenon emanate from the assumptions which form the basis of these propositions. Since the assumptions forming the bedrock of economic theory are very seldom realistic, economic theory resembling actual reality is a rare occurrence. To the extent that all economic theories are based on certain assumptions, these theories abstract from reality. The more general or universal is the economic theory the greater is its abstraction from reality.

Formally tracing its origin to Adam Smith's mounmental work entitled *An Inquiry into the Nature and Causes of the Wealth of Nations*, first published in 1776, economic theory can today take pride in calling itself more than two centuries and three decades old. Its development during this long period, however, has failed in following any set pattern, being seldom in the same direction. Economic theory, both past and contemporary, is the product of numerous influences and factors affecting one another. The philosophical thought of a particular period or of a particular writer has also influenced the kind of theory which has developed over this period. Its development has also been influenced by the political biases of writers over the long period of its history. For example, the classical economic theory was influenced, in no small measure, by the political biases of the classical economists. Similarly, the Marxian economic theory was couched in Karl Marx's political philosophy.

It is doubtful to say if David Ricardo would have developed his theory of international trade without a strong animus against the landed class. The theory, however, survives the removal of his prejudices. The development of economic theory has taken place over several periods with each period marked by certain special features not found in the other periods. Consequently, economic theory does not belong to any single individual, country or age. Obviously, its outlook and ownership is essentially cosmopolitan.

There is no unanimity among economists about the nature and purpose of economic theory. Should economic theory accurately describe its assumptions? Or, should it predict actual future events? Or, should it predict consequences of certain causes in an 'ideal' world? The principal function of an economic theory is to explain the nature of economic activity and to predict as to what will happen in the economy at a given time in future.

A perfect theory, besides being realistic in its presentation, should be competent to predict the consequences of certain given events. For instance, assuming that the producer's objective function is only to maximize their profits, given the data about the supply and demand functions and input prices, it should be logically possible to deduce the total amount of the commodity output which producers will produce and the total

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amount of net profit earned by them. If the government now imposes an *ad valorem* commodity tax on the producers, we can find out its impact on the output, price and profit. By its very nature, however, economic theory cannot always be descriptively realistic. The purpose of economic theory is to develop hypotheses which are abstract from the essential features of the complex real world. Economic theory should formulate questions pertaining to an economic phenomenon. It should also indicate the mode of answering these questions. This book *Economic Theory*, will deal with the various aspects of economic theory.

The book, *Economic Theory*, is written in a self-instructional format and is divided into six units. Each unit begins with an *Introduction* to the topic followed by an outline of the *Unit objectives*. The content is then presented in a simple and easy-to-understand manner, and is interspersed with *Check Your Progress* questions to test the reader's understanding of the topic. A list of *Questions and Exercises* is also provided at the end of each unit, and includes short-answer as well as long-answer questions. The *Summary* and *Key Terms* section are useful tools for students and are meant for effective recapitulation of the text.

UNIT I PRICE AND MARKET STRUCTURE

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Structure

1.0 INTRODUCTION

Maximization of output or minimization of cost or optimization of resource allocation is, however, only one aspect of the profit maximizing behaviour of the firm. Another and equally important aspect of profit maximization is to find the price from the set of prices revealed by the demand schedule that is in agreement with profit maximization objective of the firm. It must be noted that there is only one price for each product, commensurate with profit maximization, under the given conditions. The profit maximizing price does not necessarily coincide with minimum cost of production. Besides, the level of profit-

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maximizing price is generally different in different kinds of markets, depending on the degree of competition between the sellers. Therefore, while determining the price of its product, a firm has to take into account the nature of the market. In this unit, we discuss the theory of price determination and also the firm's equilibrium in various kinds of market structures. To begin with, let us look at different kinds of market structures and the level of competition.

1.1 UNIT OBJECTIVES

After going through unit, you will be able to:

- Discuss the concept of market structure and degree of competition
- Describe price determination under perfect competition
- Explain price determination under pure monopoly
- Evaluate price determination and output decisions under monopolistic competition
- Assess pricing and output decisions under oligopoly
- Analyse the game theory and the prisoners' dilemma under an oligopoly

1.2 MARKET STRUCTURE AND DEGREE OF COMPETITION

In the economic sense, a market is a system through which buyers and sellers bargain for the price of a product, settle the price and transact their business—buy and sell a product. Personal contact between the buyers and sellers is not necessary. In some cases, e.g., forward sale and purchase, even immediate transfer of ownership of goods is not necessary. Market does not necessarily mean a place. The market for a commodity may be local, regional, national or international. What makes a market is a set of buyers, a set of sellers and a commodity. Buyers are willing to buy and sellers are willing to sell, and there is a price for the commodity.

We are concerned in this unit with the question: How is the price of a commodity determined in different kinds of markets? The determination of price of a commodity depends on the number of sellers and the number of buyers. Barring a few cases, e.g., occasional phases in share and property markets, the number of buyers is larger than the number of sellers. The number of sellers of a product in a market determines the *nature and degree of competition* in the market. The nature and degree of competition make the *structure of the market*. Depending on the number of sellers and the degree of competition, the market structure is broadly classified as given in Table 4.1.

Table 4.1 *Types of Market Structures*

Market structure	*No. of firms and degree of production differentiation*	*Nature of industry where prevalent*	*Control over price*	*Method of marketing*
1. **Perfect Competition**	Large no. of firms with homogenous products	Financial markets and some farm products	None	Market exchange or auction

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2. **Imperfect Competition:**

(*a*) **Monopolistic competition**	Many firms with real or perceived product differentiation	Manufacturing: tea, toothpastes, TV sets, shoes, refrigerators, etc.	Some	Competitive advertising, quality rivalry
(*b*) **Oligopoly**	Little or no product differentiation	Aluminium, steel, cigarettes, cars, passenger cars, etc.	Some	Competitive, advertising, quality rivalry
(*c*) **Monopoly**	A single producer, without close substitute	Public utilities: Telephones, Electricity, etc. regulated	Considerable but usually is large	Promotional advertising if supply

Source: Samuelson, P.A. and W.D. Nordhaus, *Economics*, McGraw-Hill, 15th Edn., 1995, p. 152.

1.3 Demand, Supply and Price Determination

The market structure determines a firm's power to fix the price of its product a great deal. The degree of competition determines a firm's degree of freedom in determining the price of its product. The degree of freedom implies the extent to which a firm is free or independent of the rival firms in taking its own pricing decisions. Depending on the market structure, the degree of competition varies between zero and one. And, a firm's discretion or the degree of freedom in setting the price for its product varies between one and none in the reverse order of the degree of competition. As a matter of rule, the *higher the degree of competition, the lower the firm's degree of freedom in pricing decision and control over the price of its own product and vice versa.* Let us now see how the degree of competition affects pricing decisions in different kinds of market structures.

Price is arrived at by the interaction between demand and supply. Price is dependent upon the characteristics of both these fundamental components of a market. Demand and supply represent the willingness of consumers and producers to engage in buying and selling. An exchange of a product takes place when buyers and sellers can agree upon a price.

Under ***perfect competition,*** a large number of firms compete against each other for selling their product. Therefore, the degree of competition under perfect competition is close to one, i.e., the market is highly competitive. Consequently, firm's discretion in determining the price of its product is close to none. In fact, in perfectly competitive market, price is determined by the market forces of demand and supply and a firm has to accept the price determined by the market forces. If a firm uses its discretion to fix the price of its product above or below its market level, it loses its revenue and profit in either case. For, if it fixes the price of its product above the ruling price, it will not be able to sell its product, and if it cuts the price down below its market level, it will not be able to cover its average cost. In a perfectly competitive market, therefore, firms have little or no choice in respect to price determination.

As the degree of competition decreases, firm's control over the price and its discretion in pricing decision increases. For example, under ***monopolistic competition,*** where degree of competition is high but less than one, the firms have some discretion in setting the price of their products. Under monopolistic competition, the degree of freedom depends largely on the number of firms and the level of product differentiation. Where product differentiation is real, firm's discretion and control over the price is fairly high

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and where product differentiation is nominal or only notional, firm's pricing decision is highly constrained by the prices of the rival products.

The control over the pricing discretion increases under ***oligopoly*** where degree of competition is quite low, lower than that under monopolistic competition. The firms, therefore, have a good deal of control over the price of their products and can exercise their discretion in pricing decisions, especially where product differentiation is prominent. However, the fewness of the firms gives them an opportunity to form a cartel or to make some settlement among themselves for fixation of price and non-price competition.

In case of a ***monopoly***, the degree of competition is close to nil. An uncontrolled monopoly firm has full control over the price of its product. Amonopoly, in the true sense of the term, is free to fix any price for its product, of course, under certain constraints, viz., (*i*) the objective of the firm, and (*ii*) demand conditions.

The theory of pricing explains pricing decisions and pricing behaviour of the firms in different kinds of market structures. In this unit, we will describe the characteristics of different kinds of market structures and price determination in each type of market in a theoretical framework. We begin with price determination under perfect competition.

UNIT II MARKET STRUCTURE

2.0 PRICE DETERMINATION UNDER PERFECT COMPETITION

The term perfect competition refers to a set of conditions prevailing in the market. A perfectly competitive market is one which has the following characteristics.

2.0.1 Characteristics of Perfect Competition

1. **A large number of sellers and buyers:** Under perfect competition, the number of sellers and buyers is very large. The number of sellers is so large that the share of each seller in total supply of a product is too small for a single seller to affect the market price by changing his supply. Likewise, the number of buyers is so large that the share of each buyer in total demand is too small for a single buyer to influence the market price by changing his demand.

2. **Homogeneous products:** Products supplied by all firms are almost homogeneous. Homogeneity of products means that products supplied by various firms are so identical in appearance and use that buyers do not distinguish between them nor do they prefer the product of one firm to that of another. Product of each firm is regarded as a perfect substitute for the product of other firms. Hence, no firm can gain any competitive advantage over the other firms. Nor do the firms distinguish between the buyers. For example, wheat and vegetables produced by all the farmers, other things given, are treated as homogeneous.
3. **Perfect mobility of factors of production:** For a market to be perfectly competitive, there should be perfect mobility of resources. This means that the factors of production must be in a position to move freely into or out of an industry and from one firm to another. This is however, a purely theoretical assumption.
4. **Free entry and free exit of firms:** There is no barrier, legal or market-related, on the entry of new firms into or exit of existing ones from the industry. Firms are free to enter the industry and quit it at their free will.

Check Your Progress

1. What is a market in the economic sense?
2. How is price related to demand and supply in a market?

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5. **Perfect knowledge:** There is perfect dissemination of the information about the market conditions. Both buyers and sellers are fully aware of the nature of the product, its availability or saleability and of the price prevailing in the market.
6. **Absence of collusion or artificial restraint:** There is no sellers' union or other kinds of collusions between the sellers such as cartels or guilds, nor is there any kind of collusion between the buyers, e.g., consumers' associations or consumer forum. Each seller and buyer acts independently. The firms enjoy the freedom of independent decisions.
7. **No government intervention:** In a perfectly competitive market, there is no government intervention with the working of the market system. There is no licencing system regulating the entry of firms to the industry, no regulation of market prices, i.e., fixation of lower or upper limits of prices, no control over the supply of inputs, no fixation of quota on production, and no rationing of consumer demand, no subsidy to producers or to consumers, etc.

Perfect competition, as characterized above, is **an uncommon phenomenon** in the real business world. However, the actual markets that approximate to the conditions of perfectly competitive model include the share markets, securities and bond markets, and agricultural product markets, e.g., local vegetable markets. Although perfectly competitive markets are uncommon phenomena, perfect competition model has been the most popular model used in economic theories due to its analytical value as it provides a starting point and analytical framework for pricing theory.

Perfect Competition and Pure Competition

Sometimes a distinction is made between perfect competition and pure competition. The difference between the two is only a matter of degree. *Perfect competition less perfect mobility of factors and perfect knowledge is regarded as pure competition.* Here, however, we shall use the two terms interchangeably.

2.0.2 Price and Output

As noted above, perfect competition is a market setting in which there are a large number of sellers of a homogeneous product. Each seller supplies a very small fraction of the total supply. No single seller is powerful enough to influence the market price. Nor can a single buyer influence the market price. Market price in a perfectly competitive market is determined by the market forces—market demand and market supply. *Market demand* refers to the demand for the industry as a whole: it is the sum of the quantity demanded by each individual consumer or user at different prices. Similarly, market supply is the sum of quantity supplied by the individual firms in the industry. The market price is, therefore, determined for the industry, and is given for each individual firm and for each buyer. Thus, a seller in a perfectly competitive market is a 'price-taker, not a 'price-maker'.

In a perfectly competitive market, therefore, the main problem for a profit maximizing firm is not to determine the price of its product but to adjust its output to the market price so that profit is maximum.

The mode of price determination—price level and its variation—depends on the time taken by the supply position to adjust itself to the changing demand conditions.

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Therefore, price determination under perfect competition is analysed under three different time periods:

- Market period or very short-run
- Short-run
- Long-run

As regards the market period or very short-run, it refers to a time period during which quantity supplied is absolutely fixed or, in other words, supply response to price is nil, i.e., supply of the product is inelastic. Price determination in the three types of time periods is described below.

(i) ***Price determination in market period:*** In the market period, the total output of a product is fixed. Each firm has a stock of commodity to be sold. The stock of goods with all the firms makes the total supply. Since the stock is fixed, the supply curve is perfectly inelastic, as shown by the line *SQ* in Fig. 4.1(*a*). In this situation, price is determined solely by the demand condition. Supply remains an inactive factor. For instance, suppose that the number of marriage houses (or tents) in a city in a marriage season is given at *OQ* [(Fig. 4.1(*a*)] and the supply curve takes the shape of a straight vertical line, as shown by the line *SQ*. Suppose also that the demand curve for marriage houses (or tents) during an average marriage season is given by D_1. Demand curve and supply line intersect at point *M*, determining the rent for each marriage house at $MQ = OP_1$. But, suppose during a marriage season, demand for marriage houses (or tents) increases suddenly because a larger number of parents decide to celebrate the marriage of their daughters and sons, because auspicious dates for marriage are not available in the next few years. In that case, the demand curve D_1 shifts upward to D_2. The equilibrium point—the point of intersection between demand and supply curves—shifts from point *M* to *P*, and marriage house rentals rise to $PQ = OP_2$. This price becomes a parametric price for all the buyers.

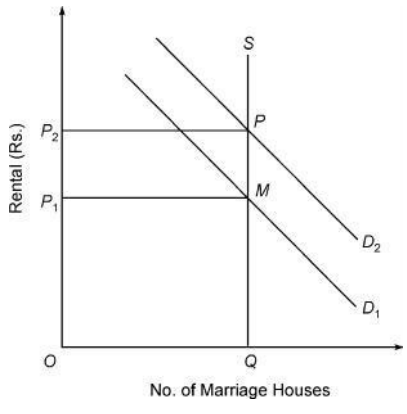

Fig. 4.1 *(a) Demand Determined Price in Market Period*

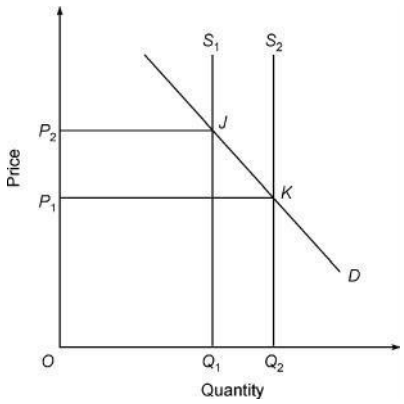

Fig. 4.1 *(b) Supply Determined Price in Market Period*

Similarly, given the demand for a product, if its supply decreases suddenly for such reasons as droughts, floods (in case of agricultural products) and sudden increase in export of a product, prices of such products shoot up. For example, price of onions had shot up in Delhi from ` 12 per kg to ` 36 kg. in 1998 due to export of onion. In case of supply determined price, supply curve shifts leftward causing rise in price of the goods in short supply.

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This phenomenon is illustrated in Fig. 4.1(*b*). Given the demand curve (*D*) and supply curve (S_2), the price is determined at OP_1. Demand curve remaining the same, the fall in supply makes the supply curve shift leftward to S_1. As a result price increases from OP_1 to OP_2.

The other examples of very short-run markets may be daily fish market, stock markets, daily milk market, coffin markets during a period of natural calamities, certain essential medicines during epidemics, etc.

(ii) ***Price in the short-run:*** Ashort-run is, by definition, a period in which firms can neither change their scale of production or quit, nor can new firms enter the industry. While in the market period (or very short-run) supply is absolutely fixed; in the short-run, it is possible to increase (or decrease) the supply by increasing (or decreasing) the variable inputs. In the short-run, therefore, supply curve is elastic.

The determination of market price in the short-run is illustrated in Fig. 4.2(*a*) and adjustment of output by the firms to the market price and firm's equilibrium are shown in Fig. 4.2(*b*). Fig. 4.2(*a*) shows the price determination for the industry by the demand curve *DD* and supply curve *SS*, at price OP_1 or *PQ*. This price is fixed for all the firms in the industry.

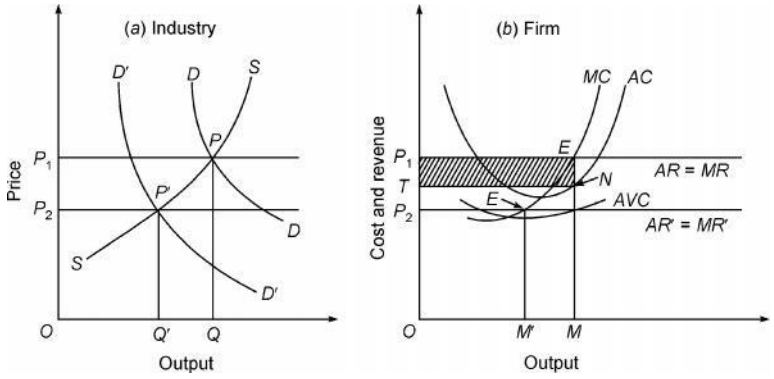

Fig. 4.2 *Pricing under Perfect Competition in the Short-run*

Given the price *PQ* (= OP_1), an individual firm can produce and sell any quantity at this price. But any quantity will not yield maximum profit. Given their cost curves, the firms are required to adjust their output to the price *PQ* so that they maximize their profit.

The process of firm's output determination and its equilibrium are shown in Fig. 4.2(*b*). Profit is maximum at the level of output where *MR* = *MC*. Since price is fixed at *PQ*, firm's *AR* = *PQ*. If *AR* is constant, *MR* = *AR*. The firm's *MR* is shown by *AR* = *MR* line. Firm's upward sloping *MC* curve intersects *AR* = *MR* at point *E*. At point *E*, *MR* = *MC*. Point *E* is, therefore, the firm's equilibrium point. An ordinate drawn from point *E* to the output axis, as shown by the line *EM*, determines the profit-maximizing output at *OM*. At this output the firm's *MR* = *MC*. This satisfies the necessary condition of maximum profit. The total maximum profit has been shown by the area P_1TNE.

The total profit is calculated as Profit = (*AR* – *AC*) *Q*. In Fig. 4.2(*b*), *AR* = *EM*; *AC* = *NM*; and *Q* = *OM*. Substituting these values into the profit equation, we get Profit = (*EM* – *NM*) *OM*. Since *EM* – *NM* = *EN*, Profit = *EN* ´ *OM* = P_1TNE. This is the maximum supernormal profit, given the price and cost curves, in the short run.

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Firms may make losses in the short-run: While firms may make supernormal profit, there may be conditions under which firms make losses in the short-run. For instance, this may happen if market price decreases to P_1Q' due to downward shift in the demand curve from DD to D_1D_1' [Fig. 4.2(*a*)]. This will force a process of output adjustments till firms reach a new equilibrium at point E'. Here again firm's $AR' = MR' = MC$. But, as Fig. 4.2(*b*) shows, $AR < AC$. Therefore, the firms incur a loss. But, since in the short-run, it may not be desirable to close down the production, the firms try to minimize the loss, by adjusting their output downward to OM' where it covers only its *MC*, i.e., E_1M'. The firms survive in the short-run so long as they cover their *MC*.

It is important to note here that in the short-run, a firm in a perfectly competitive market may be in a position to earn ***economic profit***. It may as well be forced to make losses. Once market price for the product is determined, it is given for all the firms. No firm is large enough to influence the prices. If a firm fixes the price of its product lower than the market price, it may lose a part of its total profit, or may even incur losses. If it raises the price of its product above the market price, it may not be in a position to sell its produce in a competitive market. The only option for a firm is to produce as much as it can sell at the given price.

(iii) ***Pricing in the long-Run:*** In contrast to the short-run conditions, in the long-run, the firms can adjust their size or quit the industry and new firms can enter the industry. If market price in the long run is such that $AR > AC$, then the firms make economic or super normal profit. As a result, new firms get attracted towards the industry causing increase in market supply at the given price. Increase in market supply causes rightward shift in the supply curve. Similarly, if $AR < AC$, then firms make losses. Therefore, marginal firms quit the industry causing decrease in market supply. This causes a leftward shift in the supply curve. The rightward shift in the supply curve pulls down the price and its leftward shift pushes it up. This process continues until price is so determined that $AR = AC$, and firms earn only normal profit.

The price determination in the long-run and output adjustment by individual firms are illustrated graphically in Fig. 4.3(*a*) and (*b*).

Let us suppose that the long-run demand curve is given by the curve DD', the short-run supply curve is given by the curve SS_1 and price is determined at OP_1. Let us suppose also that all the firms of the industry face identical *LAC* and *LMC* curves as shown in Fig. 4.3(*b*). At market price OP_1, all the firms find their equilibrium at point *M* in panel (*b*) of the figure. At equilibrium point *M*, $OP_1 = AR' = MR' = LMC$. Given the price and cost, firms make an economic profit of *MS* per unit. The supernormal profit lures other firms into the industry. Consequently, industry's supply curve shifts rightward to SS_2 causing a fall in price to OP_2. At this price, firms are in a position to cover only *LMC* ($= NQ_2$) at output OQ_2 and are making losses because $AR < LAC$. Firms incurring losses cannot survive in the long-run. Such firms, therefore, quit the industry. As a result, the total production in the industry decreases causing a leftward shift in the supply curve, say, to the position of *SS* curve. Price is determined at OP_0. The existing firms adjust their output to the new market price OP_0 and reach a new equilibrium at point *E* where equilibrium output is *OQ*. At the output *OQ*, firms are in a position to make

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only normal profit, since at this output, $OP_0 = AR = MR = LMC = LAC$ (= EQ). No firm is in a position to make economic profit, nor does any firm make losses. Therefore, there is no tendency of new firms entering the industry or the existing ones going out. At this price and output, individual firms and the industry are both in long-run equilibrium.

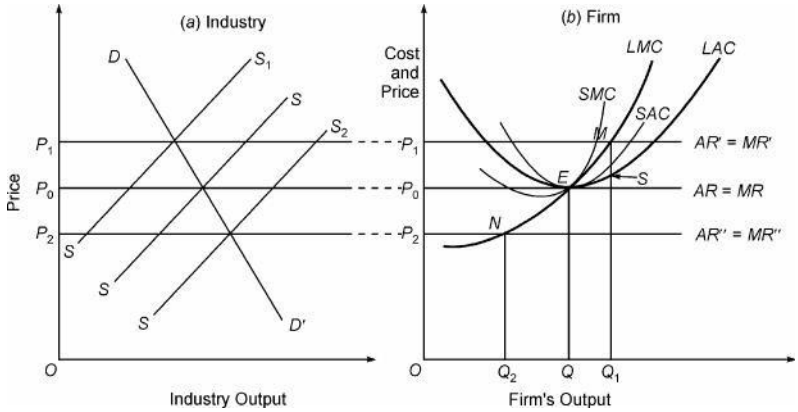

Fig. 4.3 *Pricing under Perfect Competition in the Long-run*

2.1 PRICE DETERMINATION UNDER PURE MONOPOLY

The term *pure monopoly* means an absolute power of a firm to produce and sell a product that has no close substitute. In other words, a monopolized market is one in which there is only one seller of a product having no close substitute. The cross elasticity of demand for a monopoly product is either zero or negative. *A monopolized industry is a single-firm industry*. Firm and industry are identical in a monopoly setting. In a monopolized industry, equilibrium of the monopoly firm signifies the equilibrium of the industry.

However, the precise definition of monopoly has been a matter of opinion and purpose. For instance, in the opinion of Joel Deal,[1] a noted authority on managerial economics, a monopoly market is one in which 'a product of lasting distinctiveness, is sold. The monopolized product has distinct physical properties recognized by its buyers and the distinctiveness lasts over many years.' Such a definition is of practical importance if one recognizes the fact that most of the commodities have their substitutes varying in degree and it is entirely for the consumers/users to distinguish between them and to accept or reject a commodity as a substitute. Another concept of pure monopoly has been advanced by E. H. Chamberlin[2] who envisages monopoly as the control of all goods and services by the monopolist. But such a monopoly has hardly ever existed, hence his definition is questionable. In the opinion of some authors, any firm facing a sloping demand curve is a monopolist. This definition, however, includes all kinds of firms except those under perfect competition.[3] For our purpose here, we use the general definition of pure monopoly, i.e., a firm that produces and sells a commodity which has no close substitute.

Check Your Progress

3. What is the relation between perfect competition and pure competition?
4. What is a short-run period?

2.1.1 Causes and Kinds of Monopolies

The emergence and survival of a monopoly firm is attributed to the factors which prevent the entry of other firms into the industry and eliminate the existing ones. The barriers to

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entry are, therefore, the major sources of monopoly power. The main barriers to entry are:

- Legal restrictions or barriers to entry of new firms
- Sole control over the supply of scarce and key raw materials
- Efficiency in production
- Economies of scale

(i) ***Legal restrictions:*** Some monopolies are created by law in the public interest. Most of the erstwhile monopolies in the public utility sector in India, e.g., postal, telegraph and telephone services, telecommunication services, generation and distribution of electricity, Indian Railways, Indian Airlines and State Roadways, were public monopolies. Entry to these industries was prevented by law. Now most of these industries are being gradually opened to the private sector. Also, the state may create monopolies in the private sector also, through licence or patent, provided they show the potential of and opportunity for reducing cost of production to the minimum by enlarging size and investing in technological innovations. Such monopolies are known as *franchise monopolies*.

(ii) ***Control over key raw materials:*** Some firms acquire monopoly power because of their traditional control over certain scarce and key raw materials which are essential for the production of certain goods, e.g., bauxite, graphite, diamond, etc. For instance, Aluminium Company of America had monopolized the aluminium industry before World War II because it had acquired control over almost all sources of bauxite supply[4]. Such monopolies are often called 'raw material monopolies'. The monopolies of this kind emerge also because of monopoly over certain specific knowledge of technique of production.

(iii) ***Efficiency in production:*** Efficiency in production, especially under imperfect market conditions, may be the result of long experience, innovative ability, financial strength, availability of market finance at lower cost, low marketing cost, managerial efficiency, etc. Efficiency in production reduces cost of production. As a result, a firm's gains higher competitive strength and can eliminate rival firms and gain the status of a monopoly. Such firms are able to gain governments' favour and protection.

(iv) ***Economies of scale:*** The economies of scale are a primary and technical reason for the emergence and existence of monopolies in an unregulated market. If a firm's long-run minimum cost of production or its most efficient scale of production almost coincides with the size of the market, then the large-size firm finds it profitable in the long-run to eliminate competition through price cutting in the short-run. Once its monopoly is established, it becomes almost impossible for the new firms to enter the industry and survive. Monopolies created on account of this factor are known as ***natural monopolies***. A natural monopoly may emerge out of the technical conditions of efficiency or may be created by law on efficiency grounds.

2.1.2 Pricing and Output Decision: Short-Run Analysis

As under perfect competition, pricing and output decisions under monopoly are based on profit maximization hypothesis, given the revenue and cost conditions. Although cost conditions, i.e., *AC* and *MC* curves, in a competitive and monopoly market are generally

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identical, revenue conditions differ. Revenue conditions, i.e., *AR* and *MR* curves, are different under monopoly—unlike a competitive firm, a monopoly firm faces a downward sloping demand curve. The reason is a monopolist has the option and power to reduce the price and sell more or to raise the price and still retain some customers. Therefore, given the price-demand relationship, demand curve under monopoly is a typical downward sloping demand curve.

When a demand curve is sloping downward, marginal revenue (*MR*) curve lies below the *AR* curve and, technically, the slope of the *MR* curve is twice that of *AR* curve[5].

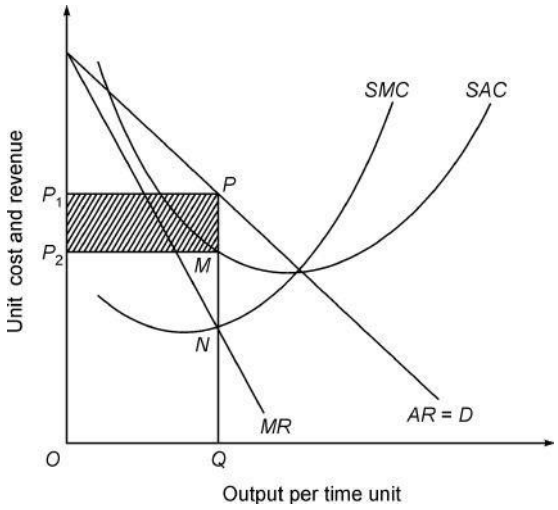

Fig. 4.4 *Price Determination under Monopoly: Short-run*

The short-run revenue and cost conditions faced by a monopoly firm are presented in Fig. 4.4. Firm's average and marginal revenue curves are shown by the *AR* and *MR* curves, respectively, and its short-run average and marginal cost curves are shown by *SAC* and *SMC* curves, respectively. The price and output decision rule for profit maximizing monopoly is the same as for a firm in the competitive industry.

As noted earlier, profit is maximized at the level of output at which $MC = MR$. Given the profit maximization condition, a profit maximizing monopoly firm chooses a price-output combination at which $MR = SMC$. Given the firm's cost and revenue curves in Fig. 4.4, its *MR* and *SMC* intersect at point *N*. An ordinate drawn from point *N* to *X*-axis, determines the profit maximizing output for the firm at *OQ*. At this output, firm's $MR = SMC$. The ordinate *NQ* extended to the demand curve ($AR = D$) gives the profit maximizing price at *PQ*. It means that given the demand curve, the output *OQ* can be sold per time unit at only one price, i.e., *PQ* (= OP_1). Thus, the determination of output simultaneously determines the price for the monopoly firm. Once price is fixed, the unit and total profits are also simultaneously determined. Hence, the monopoly firm is in a state of equilibrium.

At output *OQ* and price *PQ*, the monopoly firm maximizes its unit and total profits. Its per unit monopoly or economic profit (i.e., $AR - SAC$) equals $PQ - MQ = PM$. Its total profit, $p = OQ \times PM$. Since $OQ = P_2M$, $p = P_2M \times PM$ = area P_1PMP_2 as shown by the shaded rectangle. Since in the short-run, cost and revenue conditions are not expected to change, the equilibrium of the monopoly firm will remain stable.

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Determination of Monopoly Price and Output: Algebraic Solution

The determination of price and output by a monopoly firm in the short-run is illustrated above graphically (see Fig. 4.4). Here, we present an algebraic solution to the problem of determination of equilibrium price output under monopoly.

Suppose demand and total cost functions for a monopoly firm are given as follows.

Demand function : $Q = 100 - 0.2\ P$ …(4.1a)

Price function : $P = 500 - 5Q$ ...(4.1b)

Cost function : $TC = 50 + 20Q + Q^2$ ...(4.2)

The problem before the monopoly firm is to find the profit maximizing output and price. The problem can be solved as follows.

We know that profit is maximum at an output that equalizes *MR* and *MC*. So the first step is to find *MR* and *MC* from the demand and cost function respectively. We have noted earlier that *MR* and *MC* are the first derivation of *TR* and *TC* functions respectively. *TC* function is given, but *TR* function is not. So, let us find *TR* function first. We know that:

$$TR = P.Q$$

Since $P = 500 - 5Q$, by substitution, we get:

$$TR = (500 - 5Q)\ Q$$

$$TR = 500Q - 5Q^2 \quad ...(4.3)$$

Given the *TR* function (4.3), *MR* can be obtained by differentiating the function.

$$MR = \frac{\partial TR}{\partial Q} = 500 - 10Q$$

Likewise, *MC* can be obtained by differentiating the *TC* function (4.2).

$$MC = \frac{\partial TR}{\partial Q} = 20 + 2Q$$

Now that *MR* and *MC* are known, profit maximizing output can be easily obtained. Recall that profit is maximum where *MR* = *MC*. As given above,

$$MR = 500 - 10Q$$

and $MC = 20 + 2Q$

By substitution, we get profit maximizing output as:

$$MR = MC$$

$$500 - 10Q = 20 + 2Q$$

$$480 = 12Q$$

$$Q = 40$$

The output $Q = 40$ is the profit maximizing output.

Now profit maximizing price can be obtained by substituting 40 for *Q* in the price function (4.1b).

Thus, $P = 500 - 5\ (40) = 300$

Profit maximizing price is ` 300.

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Total profit (□) can be obtained as follows.

$$\pi = TR - TC$$

By substitution, we get:

$$\pi = 500Q - 5Q^2 - (50 + 20Q + Q^2)$$

$$= 500Q - 5Q^2 - 50 - 20Q - Q^2$$

By substituting profit maximizing output (40) for *Q*, we get:

$$\square = 500(40) - 5(40)(40) - 50 - 20(40) - (40\ \square\ 40)$$

$$= 20{,}000 - 8{,}000 - 50 - 800 - 1600 = 9{,}550$$

Total maximum profit comes to ` 9,550.

Does a Monopoly Firm Always Earn Economic Profit?

There is no certainty that a monopoly firm will always earn an economic or supernormal profit. Whether a monopoly firm earns economic profit or normal profit or incurs loss depends on:

- Its cost and revenue conditions
- Threat from potential competitors
- Government policy in respect of monopoly

If a monopoly firm operates at the level of output where *MR = MC*, its profit depends on the relative levels of *AR* and *AC*. Given the level of output, there are three possibilities.

- If *AR* > *AC*, there is economic profit for the firm
- If *AR* = *AC*, the firm earns only normal profit
- If *AR* < *AC*, though only a theoretical possibility, the firm makes losses

2.1.3 Monopoly Pricing and Output Decision in the Long-Run

The decision rules regarding optimal output and pricing in the long-run are the same as in the short-run. In the long-run, however, a monopolist gets an opportunity to expand the size of its firm with a view to enhance its long-run profits. The expansion of the plant size may, however, be subject to such conditions as: (*a*) size of the market, (*b*) expected economic profit and (*c*) risk of inviting legal restrictions. Let us assume, for the time being, that none of these conditions limits the expansion of a monopoly firm and discuss the price and output determination in the long-run.

The equilibrium of monopoly firm and its price and output determination in the long-run is shown in Fig. 4.5. The *AR* and *MR* curves show the market demand and marginal revenue conditions faced by the monopoly firm. The *LAC* and *LMC* show the long-run cost conditions. It can be seen in Fig. 4.5, that monopoly's *LMC* and *MR* intersect at point *P* determining profit maximizing output at OQ_2. Given the *AR* curve, the price at which the total output OQ_2 can be sold is P_2Q_2. Thus, in the long-run, equilibrium output will be OQ_2 and price P_2Q_2. This output-price combination maximizes monopolist's long-run profit. The total long-runmonopoly profit is shown by the rectangle $LMSP_2$.

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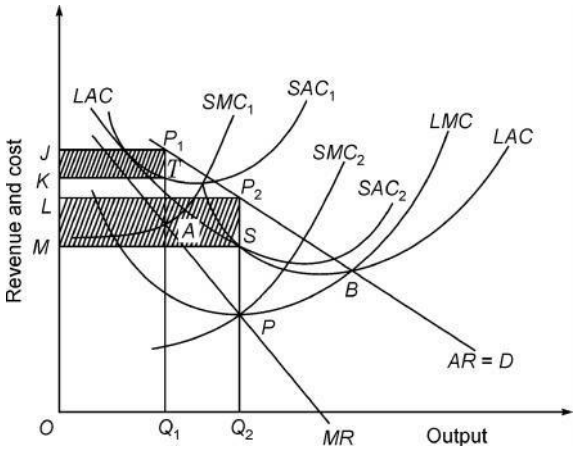

Fig. 4.5 *Equilibrium of Monopoly in the Long-run*

It can be seen in Fig 4.5 that compared to short-run equilibrium, the monopolist produces a larger output and charges a lower price and makes a larger monopoly profit in the long-run. In the short-run, monopoly's equilibrium is determined at point *A*, the point at which SMC_1 intersects the *MR* curve. Thus, monopoly's short-run equilibrium output is OQ_1 which is less than long-run output OQ_2. But the short-run equilibrium price P_1Q_1 is higher than the long-run equilibrium price P_2Q_2. The total short-run monopoly profit is shown by the rectangle JP_1TK which is much smaller than the total long-run profit LP_2SM. This, however, is not necessary: it all depends on the short-run and long-run cost and revenue conditions.

It may be noted at the end that if there are barriers to entry, the monopoly firm may not reach the optimal scale of production (OQ_2) in the long-run, nor can it make full utilization of its existing capacity. The firm's decision regarding plant expansion and full utilization of its capacity depends solely on the market conditions. If long-run market conditions (i.e., revenue and cost conditions and the absence of competition) permit, the firm may reach its optimal level of output.

2.1.4 Price Discrimination Under Monopoly

Price discrimination means selling the same or slightly differentiated product to different sections of consumers at different prices, not commensurate with the cost of differentiation. Consumers are discriminated on the basis of their income or purchasing power, geographical location, age, sex, colour, marital status, quantity purchased, time of purchase, etc. When consumers are discriminated on the basis of these factors in regard to price charged from them, it is called ***price discrimination*****.** There is another kind of price discrimination. The same price is charged from the consumers of different areas while cost of production in two different plants located in different areas is not the same. Some common examples of price discrimination, not necessarily by a monopolist, are given below:

- Physicians and hospitals,[6] lawyers, consultants, etc., charge their customers at different rates mostly on the basis of the latter's ability to pay
- Merchandise sellers sell goods to relatives, friends, old customers, etc., at lower prices than to others and offer off-season discounts to the same set of customers
- Railways and airlines charge lower fares from the children and students, and for different classes of travellers

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- Cinema houses and auditoria charge differential rates for cinema shows, musical concerts, etc
- Some multinationals charge higher prices in domestic and lower prices in foreign markets, called 'dumping'
- Lower rates for the first few telephone calls, lower rates for the evening and night trunk-calls; higher electricity rates for commercial use and lower for domestic consumption, etc. are some other examples of price discrimination.

Necessary Conditions

First, *different markets must be separable* for a seller to be able to practice discriminatory pricing. The markets for different classes of consumers must be so separated that buyers of one market are not in a position to resell the commodity in the other. Markets are separated by: (*i*) geographical distance involving high cost of transportation, i.e., domestic versus foreign markets; (*ii*) exclusive use of the commodity, e.g., doctor's services; (*iii*) lack of distribution channels, e.g., transfer of electricity from domestic use (lower rate) to industrial use (higher rate).

Second, *the elasticity of demand for the product must be different in different markets.* The purpose of price discrimination is to maximize the profit by exploiting the markets with different price elasticities. It is the difference in the elasticity which provides monopoly firm with an opportunity for price discrimination. If price elasticities of demand in different markets are the same, price discrimination would reduce the profit by reducing demand in the high price markets.

Third, *there should be imperfect competition in the market.* The firm must have monopoly over the supply of the product to be able to discriminate between different classes of consumers, and charge different prices.

Fourth, profit maximizing output must be much larger than the quantity demanded in a single market or by a section of consumers.

2.1.5 Price Discrimination by Degrees

The degree of price discrimination refers to the extent to which a seller can divide the market or the consumers and can take advantage of it in extracting the consumer's surplus. The economic literature presents three degrees of price discrimination.

First degree:[7] The *first degree price discrimination* is the limit of discriminatory pricing. First degree or perfect price discrimination is feasible when the market size of the product is small and the monopolist is in a position to know the price each consumer or each group of consumers is willing to pay, (i.e., he knows his buyer's demand curve for his product), then he sets the price accordingly and tries to extract the entire*consumer surplus*.[8] What the seller does is that he sets the price at its highest level—the level at which all those who are willing to buy the commodity buy at least one unit each. After extracting the consumer surplus of this segment of consumers for the first unit of commodity, the monopolist gradually lowers down the price, so that the consumer surplus of the users of the second unit is extracted. This procedure is continued until the entire consumers' surplus available at the equilibrium price, i.e., at the price at which *MC* = *MR*, is extracted. Consider, for example, the case of medical services of exclusive use. A doctor who knows or can guess the paying capacity of his patients can charge the highest possible fee from presumably the richest patient and the lowest fee from the poorest patient.

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Second degree: Where market size is very large, perfect discrimination is neither feasible nor desirable. In that case, a monopolist uses second degree discrimination or the 'block pricing method'. Amonopolist adopting the *second degreeprice discrimination* intends to siphon off only the major part of the consumer's surplus, rather than the whole of it. The monopolist divides the potential buyers into blocks, e.g., rich, middle class and poor, and sells the commodity in blocks. The monopolist sells its product first to the rich customers at the highest possible price. Once this part of the market is supplied, the firm lowers down the price for middle class buyers. Finally, bottom price is used for the poor class of buyers.

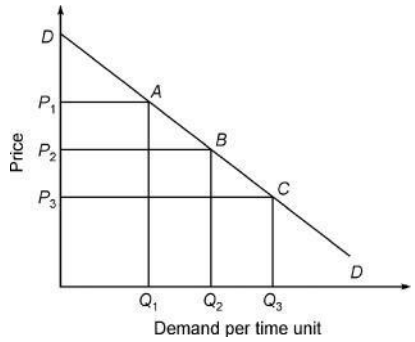

Fig. 4.6 *Second Degree Price Discrimination*

The second degree price discrimination is feasible where: (*i*) the number of consumers is large and price rationing can be done, as in case of utility services like telephones, supply of water, etc.; (*ii*) demand curve for all the consumers is identical; (*iii*) a single rate is applicable for a large number of buyers. As shown in Fig. 4.6, a monopolist practising second degree price discrimination, charges the highest price OP_1 for OQ_1 units and a lower price OP_2 for the next Q_1Q_2 units, and the lowest price OP_3 for the next Q_2Q_3 units. Thus, byadopting a block pricing system, the monopolist maximizes his total revenue (*TR*) at:

$$TR = (OQ_1 . AQ_1) + (Q_1Q_2 . BQ_2) + (Q_2Q_3 . CQ_3)$$

Third degree: When a profit maximizing monopolist sets different prices in different markets having demand curves with different elasticities, he is practising the *third degree price discrimination*. It happens quite often that a monopolist has to sell his goods in two or more markets, completely separated from one another, each having a demand curve with different elasticity. Auniform price cannot be set for all the markets without losing profits. The monopolist is, therefore, required to find different price-quantity combinations that can maximize his profit in each market. For this purpose, he divides his total output between the market segments so that his *MC* = *MR* in each market, and fixes price accordingly.

For example, suppose that a monopolist has only two markets, *A* and *B*. The demand curve (D_a) and marginal revenue curve (MR_a) given in Fig. 4.7(*a*), represent the *AR* and *MR* curves in market *A*. D_b and MR_b in Fig. 4.7(*b*) represent the *AR* and *MR* curves in market *B*. The horizontal summation of D_a and D_b gives the total demand curve for the two markets, a shown by *AR* = *D* in Fig. 4.7(*c*) and the horizontal summation of MR_a and MR_b gives the aggregated *MR* [(Fig. 4.7(*c*)]. The firm's marginal cost is shown by *MC* that intersects *MR* at point *T*. Thus, the optimum level of output for the firm is determined at *OQ* at which *MR* = *MC*.

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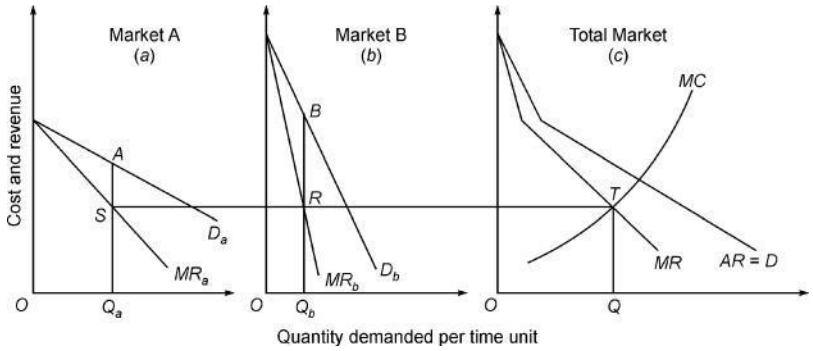

Fig. 4.7 *Third Degree Price Discrimination*

The problem that a monopolist faces is that the whole of his output *OQ* cannot be sold in any one of the markets at a profit maximizing price. Therefore, the monopolist has to allocate output *OQ* between the two markets in such proportions that the necessary condition of profit maximization is satisfied in both the markets, i.e., *MC* must be equal to *MR* in both the markets. This is accomplished by drawing a line from point *T* parallel to *X*-axis, through MR_b and MR_a. The points of intersection, *S* and *R* on curves MR_a and MR_b, respectively, determine the optimum share for markets *A* and *B*. As shown in the Fig. 4.7, the monopolist maximizes his profit in market *A* by selling OQ_a units at price AQ_a and in market *B*, by selling OQ_b units at price BQ_b. Note that $OQ_a + OQ_b = OQ$.

The third degree price discrimination may be suitably practised between any two or more markets separated from each other by geographical distance, transport barriers, cost of transportation and legal restrictions on the inter-regional or inter-state transportation of commodities by individuals.

2.1.6 An Algebraic Solution

Price and output determination under third degree price discrimination has been shown graphically in Fig. 4.7. Here, we present an algebraic analysis of price and output determination by a discriminating monopoly.

Let us suppose that a monopoly firm is faced with two markets, *A* and *B*, with two different demand functions given as $Q_a = 16 - 0.5P_a$ and $Q_b = 22 - P_b$.

The demand functions yield two different price functions given below.

$$P_a = 32 - 2Q_a \quad \ldots(4.4)$$

and $$P_b = 22 - Q_b \quad \ldots(4.5)$$

Suppose also that the firm's total cost function (*TC*) is given as

$$TC = 10 + 2Q + Q^2 \quad \ldots(4.6)$$

The problem is how to determine the most profitable output and to allocate this output between the two markets in such a manner that profit in each market is maximum. Profit (π) is maximum where:

$$\pi = TR - TC \text{ is maximum} \quad \ldots(4.7)$$

In our example, *TC* function is known, but *TR* is not. So we need to find *TR* first. For a price discriminating monopoly, total revenue (*TR*) equals the sum of revenue from the two markets. That is,

$$TR = P_a \cdot Q_a + P_b \cdot Q_b \quad \ldots(4.8)$$

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By substituting Eqs. (4.4) and (4.5) for P_a and P_b, respectively, in Eq. (4.8), we get:

$$TR = (32 - 2Q_a)Q_a + (22 - Q_b)\ Q_b$$
$$= 32Q_a - 2Q_a^2 + 22Q_b - Q_b^2 \quad \ldots(4.9)$$

Now total profit ($\square$) can be obtained by substituting Eqs. (4.6) and (4.9) for *TC* and *TR*, respectively, in Eq. (4.7). Thus, we get the profit function as:

$$\pi = 32Q_a - 2Q_a^2 + 22Q_b - Q_b^2 - (10 + 2Q + Q^2)$$
$$= 32Q_a - 2Q_a^2 + 22Q_b - Q_b^2 - 10 - 2Q - Q^2 \quad \ldots(4.10)$$

For profit to be maximum, *Q* in Eq. (4.10) must be equal to profit maximizing sales in markets *A* and *B*. That is,

$$Q = Q_a + Q_b$$

By substituting, $Q_a + Q_b$ for *Q* in Eq. (4.10), we can rewrite it as:

$$\square = 32\ Q_a - 2Q_a^2 + 22Q_b - Q_b^2 - 10 - 2\ (Q_a + Q_b) - (Q_a + Q_b)^2$$
$$= 32\ Q_a - 2Q_a^2 + 22Q_b - Q_b^2 - 10 - 2Q_a - 2Q_b - Q_a^2 - 2Q_aQ_b - Q_b^2$$
$$= 30\ Q_a + 20Q_b - 3Q_a^2 - 2Q_b^2 - 2Q_aQ_b - 10 \quad \ldots(4.11)$$

Equation (4.11) represents the total profit function. A necessary condition for $\square$ to be maximum is that marginal change in profit must be equal to zero. Total profit is composed of profits in markets *A* and *B*. It implies, therefore, that for total profit to be maximum, marginal change in profit in both the markets must be equal to zero. The marginal change in profits in markets *A* and *B* can be expressed in terms of first derivative of the total profit-function with respect to Q_a and Q_b. Thus, marginal profit in market *A* can be expressed as:

$$\frac{\partial \pi}{\partial Q_a} = 30 - 6Q_a - 2Q_b \quad \ldots(4.12)$$

and for market *B*, as

$$\frac{\partial \pi}{\partial Q_b} = 20 - 4Q_b - 2Q_a \quad \ldots(4.13)$$

The profit maximizing condition may be restated by setting the marginal profit functions (4.12) and (4.13) equal to zero. Thus, for profit to be maximum in market *A*,

$$30 - 6Q_a - 2Q_b = 0 \quad \ldots(4.14)$$

and in market *B*,

$$20 - 4Q_b - 2Q_a = 0 \quad \ldots(4.15)$$

We have now two simultaneous equations—Eqs. (4.14) and (4.15)—with two unknowns (Q_a and Q_b), which can be solved for Q_a and Q_b as follows.

$$30 - 6Q_a - 2Q_b = 0 \quad (1)$$
$$20 - 2Q_a - 4Q_b = 0 \quad (2)$$

In order to solve for Q_b, multiply Eq. (2) by 3 and subtract from Eq. (1).

$$30 - 6Q_a - 2Q_b = 0$$

$$60 - 6Q_a - 12Q_b = 0$$

$$- \quad + \quad +$$

$$-30 + 10Q_b = 0$$

$$10Q_b = 30$$

$$Q_b = 3$$

The value of Q_a can now be obtained by substituting 3 for Q_b in Eq. (1) or (2). Thus,

$$30 - 6Q_a - 2(3) = 0$$

$$-6\ Q_a = -24, \quad Q_a = 4$$

To conclude, the monopoly firm maximizes its total profit by selling 4 units in market *A* and 3 units in market *B*.

Price Determination

The profit maximizing prices can now be obtained by substituting Q_a and Q_b with their estimated values (4 and 3, respectively) in price functions (4.4) and (4.5), respectively. The price for market *A* can be obtained as

$$P_a = 32 - 2\ Q_a = 32 - 2\ (4) = 24$$

and price for market *B* as

$$P_b = 22 - Q_b = 22 - 3 = 19$$

Thus, in market *A*, price = ` 24 and in market *B*, price = ` 19.

Profit Determination

Now that prices and sales for the two markets are known, total profit can be obtained by substituting numerical values for Q_a and Q_b in profit function (4.11). The profit function (4.11) is reproduced below.

$$\square = 30\ Q_a + 20\ Q_b - 3Q_a^2 - 2Q_b^2 - 2Q_aQ_b - 10$$

By substituting 4 for Q_a and 3 for Q_b, we get

$$\square = 30\ (4) + 20(3) - 3(4)(4) - 2\ (3)(3) - 2(4)(3) - 10$$

$$= 120 + 60 - 48 - 18 - 24 - 10 = 80$$

The total profit is ` 80. This profit satisfies the conditions of the maximum profit. It is, therefore, maximum.

2.1.7 Measures of Monopoly Power

Like perfect competition, pure private monopolies are rare phenomena. The real business world is, in fact, characterized largely by monopolistic competition and oligopoly. In these kinds of markets firms hold some monopoly power in the industry which they exercise in determining the price and output. Some economists have suggested methods of measuring monopoly power of a firm in the kinds of markets in their own ways. Before we proceed, let us have a look at the measures of monopoly power of monopolistic and oligopoly firms, suggested by the economists.

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It may be noted at the outset that measuring monopoly power has been a difficult proposition. The efforts to devise a measure of monopoly power have not yielded a universal or non-controversial measure. As Alex Hunter has observed, 'The idea of devising a measure of monopoly power, with reference both to its general incidence and to particular situation, has been and probably always will remain, an attractive prospect for economists who wish to probe in this field'.[9] If not for any other reason, for 'sheer intellectual curiosity' economic theorists feel compelled to work on this problem, for they could not with good conscience go on talking about 'great' or 'little' monopoly power or about various degrees of monopoly power without trying to ascertain the meaning of these words.[10] Therefore, devising at least a 'conceivable' measure of monopoly, even if 'practical' measurement is impossible, continues to interest economists, for at least two reasons.

First, apart from intellectual curiosity, people would like to know about the economy in which they live, about the industrial structure, and about the industries from which they get their supplies and how their prices are determined.

Second, growth of private monopolies has often led to economic inefficiency and exploitation of consumers. Therefore, the governments of many countries have found it necessary to formulate policies and to devise legislative measures to control and regulate monopolies. If the government is to succeed in its policy of restraining monopoly, it must have at least some practicable measure of monopoly power and monopolistic trade practices.

The Methods Suggested for Measuring Monopoly Power

In spite of problems in measuring the power of monopoly, economists have devised a number of measures of monopoly power though none of these measures is free from flaws. Yet the various measures do provide an insight into monopoly power and its impact on the market structure. Besides, they also help in formulating an appropriate public policy to control and regulate the existing monopolies and to prevent their growth. We discuss here briefly the various measures of monopoly power suggested by the economists.

1. ***Number-of-firms criterion:*** One of the simplest measures of degree of monopoly power of firms is to count the number of firms in an industry. The smaller the number of firms, the greater the degree of monopoly power of each firm in the industry, and conversely, the larger the number of firms, the greater the possibility of absence of monopoly power. As a corollary of this, if there is a single firm in an industry, the firm has absolute monopoly power. On the contrary, in an industry characterized by perfect competition, the number of firms is so large that each firm supplies an insignificant proportion of the market and no firm has any control on the price, and, hence, no monopoly power whatsoever.

   This criterion however has a serious **drawback**. The number of firms alone does not reveal much about the relative position of the firms within the industry because: (i) 'firms are not of equal size' and (*ii*) their number does not indicate the degree of control each firm exercises in the industry. Therefore, the 'number-of-firms' criterion of measuring monopoly power is of little practical use.

2. ***Concentration ratio:*** The *concentration ratio* is one of the widely used criteria for measuring monopoly power. The concentration ratio is obtained by calculating the percentage share of a group of large firms in the total output of the industry. 'The number of firms chosen for calculating the ratio usually depends on some

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fortuitous element—normally the census of production arrangement of the country concerned'.[11] In Britain, for example, the share of the three largest firms of a census industry and in the USA, the share of the four largest firms is the basis of calculating concentration ratio.[12] However, the number of firms chosen may be as large as 20 depending on the market size and purpose of enquiry. Apart from the share of the largest firms in the industry output, 'size of the firm and the concentration of control in the industry may be measured … in terms of production capacity, value of assets, number of employees or some other characteristics.'[13]

Concentration ratio, although a very widely used measure of monopoly power, has its own **shortcomings**.

First, the measures of concentration ratio involve statistical and conceptual problems. For example, production capacity may not be used straightaway as it may include 'unused, obsolete or excess capacity' and the value of assets involves valuation problem as accounting method of valuation and market valuation of assets may differ. Employment figure may not be relevant in case of capital-intensive industries and their use may be misleading. The two other convenient measures are 'gross output value' or 'net output' (value added). But the former involves the risk of double counting and the latter, the omission of inter-establishment transfers.[14]

Second, the measures of concentration ratio do not take into account the size of the market. The size of the market may be national or local. A large number of firms supplying the national market may be much less competitive than the small number of firms supplying the local market. For, it is quite likely that the national market is divided among a thousand sellers, each seller being a monopolist in his own area.

Third, the most serious defect of concentration ratio as an index of monopoly power is that it does not reflect the competition from other industries. The degree of competition is measured by the elasticity of substitution that may be different under different classification of industries. Therefore, an industry that has concentration ratio under one may have a very low elasticity of substitution and hence a high degree of monopoly. But, if classification of industries is altered, the same industry with a high concentration ratio may have a very low elasticity of substitution, and hence, may show a low degree of monopoly.

3. ***Excess profit criterion:*** J. S. Bain and, following him, many other economists have used *excess profit*, i.e., profit in excess of the opportunity cost, as a measure of monopoly power. If profit rate of a firm continues to remain sufficiently higher than all opportunity costs required to remain in the industry, it implies that neither competition among sellers nor entry of new firms prevents the firm from making a pure or monopoly profit. While calculating excess profit, the opportunity cost of owner's capital and a margin for the risk must be deducted from the actual profit made by the firm. Assuming no risk, the degree of monopoly may be obtained as the ratio of the divergence between the opportunity costs (O) and the actual profit (R), to the latter. Thus degree of monopoly power may be expressed as:

$$\text{Monopoly Power} = \frac{R - O}{R}$$

If $(R - O)/R = 0$, there exists no monopoly, and if it is greater than zero, there is monopoly. The higher the value of $(R - O)/R$, the greater the degree of monopoly.

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Another measure of degree of monopoly based on *excess profit* has been devised by A. P. Lerner.[15] According to him, the degree of monopoly power may be measured by the following formula.

$$\text{Monopoly Power} = \frac{P - MC}{P}$$

where P = price, MC = marginal cost.

Since for a profit maximizing firm, $MR = MC$, Lerner's measure of monopoly power may be expressed also as

$$\text{Monopoly Power} = \frac{P - MR}{P}$$

Since,

$$P/(P - MR) = e$$

and that,

$$(P - MR)/P = 1/e \quad (\text{where } P = AR)$$

Thus, Lerner's measure of monopoly power may be expressed also in terms of $1/e$. It may thus be inferred that lower the elasticity, the greater the degree of monopoly, and *vice versa*. Therefore, monopoly power may exist even if the firm's $AR = AC$ and it earns only normal profit.

Lerner's formula of measuring the degree of monopoly power is considered to be theoretically most sound. Nevertheless, it has been criticized on the following grounds.

First, any formula devised to measure the degree of monopoly power should bring out the difference between the monopoly output and competitive output or the 'ideal' output under optimum allocation of resources. The divergence between P and MC used in Lerner's formula does not indicate the divergence between the actual monopoly output and 'ideal' output. Lerner has possibly used the divergence between P and MC as the substitute for the divergence between actual monopoly output and 'ideal' output. 'This substitution of a price-cost discrepancy for a difference between actual and "ideal" output is probably the greatest weakness of a formula which is supposed to measure deviation from the optimum allocation of resources.'[16]

Second, price-cost discrepancy may arise for reasons other than monopoly, and price and cost may be equal or close to each other in spite of monopoly power.

Third, since data on MC are hardly available, Lerner's formula is of little practical use for measuring monopoly power.

4. ***Triffin's cross-elasticity criterion:*** According to Robert Triffin, cross-elasticity of demand for the product of a monopoly firm can be used as a measure of its monopoly power. Triffin's criterion seems to have been derived from the definition of monopoly itself. According to his criterion, cross-elasticity is taken as the measure of degree of monopoly. The lower the cross-elasticity of the product of a firm, the greater the degree of its monopoly power. But, this criterion indicates only the relative power of each firm. It does not provide a single index of monopoly power.

Check Your Progress

5. What is a pure monopoly?
6. On what basis are the consumers differentiated, with regard to price?
7. When is a monopolist said to be practising the third degree price discrimination?
8. State the simplest measure of degree of monopoly power of firms.

2.2 PRICING AND OUTPUT DECISIONS UNDER MONOPOLISTIC COMPETITION

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The model of price and output determination under monopolistic competition developed by Edward H. Chamberlin[17] in the early 1930s dominated the pricing theory until recently. Although the relevance of his model has declined in recent years, it has still retained its theoretical flavour. Chamberlin's model is discussed below.

Monopolistic competition is defined as *market setting in which a large number of sellers sell differentiated products.* Monopolistic competition has the following features:

- Large number of sellers
- Free entry and free exit
- Perfect factor mobility
- Complete dissemination of market information
- Differentiated product

2.2.1 Monopolistic vs. Perfect Competition

Monopolistic competition is, in many respects, similar to perfect competition. There are, however, three big differences between the two.

(i) Under perfect competition, products are homogeneous, whereas under monopolistic competition, products are differentiated. Products are differentiated generally by a different brand name, trade mark, design, colour and shape, packaging, credit terms, quality of after-sales service, etc. Products are so differentiated that buyers can easily distinguish between the products supplied by different firms. Despite product differentiation, each product remains a close substitute for the rival products. Although there are many firms, each one possesses a quasi-monopolyover its product.

(ii) There is another difference between perfect competition and monopolistic competition. While decision-making under perfect competition is independent of other firms, in monopolistic competition, firms' decisions and business behaviourare not absolutely independent of each other.

(iii) Another important factor that distinguishes monopolistic competition from perfect competition is the difference in the *number* of sellers. Under perfect competition, the number of sellers is *very large* as in case of agricultural products, retail business and share markets, whereas, under monopolistic competition, the number of sellers is large but limited—50 to 100 or even more.[18] What is more important, conceptually, is that the number of sellers is so large that each seller expects that his/her business decisions, tactics and actions will go unnoticed and will not extracta reaction from rival firms.

Monopolistic competition, as defined and explained above, is most common now in retail trade with firms acquiring agencies and also in service sectors. More and more industries are now tending towards oligopolistic market structure. However, some industries in India, viz., clothing, fabrics, footwear, paper, sugar, vegetable oils, coffee, spices, computers, cars and mobile phones have the characteristics of monopolistic competition.

Let us now explain the price and output determination models of monopolistic competition developed by Chamberlin.

2.2.2 Price and Output Decisions in the Short-Run

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Although monopolistic competition is characteristically close to perfect competition, pricing and output decisions under this kind of market are similar to those under monopoly. The reason is that a firm under monopolistic competition, like a monopolist, faces a downward sloping demand curve.[19] This kind of demand curve is the result of: (*i*) a strong preference of a section of consumers for the product and (*ii*) the quasi-monopoly of the seller over the supply. The strong preference or brand loyalty of the consumers gives the seller an opportunity to raise the price and yet retain some customers. Besides, since each product is a substitute for the other, the firms can attract the consumers of other products by lowering their prices.

The short-term pricing and output determination under monopolistic competition is illustrated in Fig. 4.8. It gives short-run revenue and cost curves faced by the monopolistic firm.

As shown in the figure, firm's *MR* intersects its *MC* at point *N*. This point fulfills the necessary condition of profit-maximization at output *OQ*. Given the demand curve, this output can be sold at price *PQ*. So the price is determined at *PQ*. At this output and price, the firm earns a maximum monopoly or economic profit equal to *PM* per unit of output and a total monopoly profit shown by the rectangle P_1PMP_2. The economic profit, *PM* (per unit) exists in the short-run because there is no or little possibility of new firms entering the industry. But the rate of profit would not be the same for all the firms under monopolistic competition because of difference in the elasticity of demand for their products. Some firms may earn only a normal profit if their costs are higher than those of others. For the same reason, some firms may make even losses in the short-run.

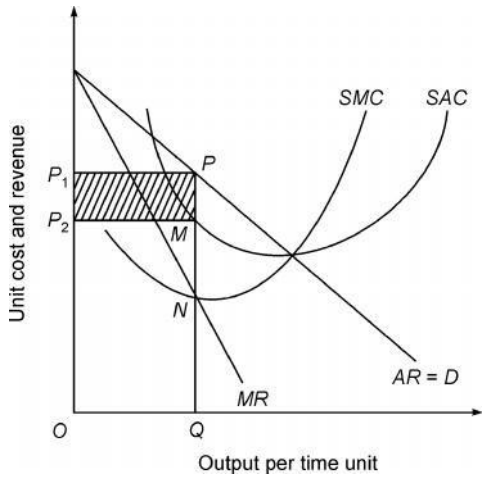

Fig. 4.8 *Price-Output Determination under Monopolistic Competition*

2.2.3 Price and Output Determination in the Long-Run

The mechanism of price and output determination in the long-run under monopolistic competition is illustrated graphically in Fig. 4.9. To begin the analysis, let us suppose that, at some point of time in the long-run, firm's revenue curves are given as AR_1 and MR_1 and long-run cost curves as *LAC* and *LMC*. As the figure shows, MR_1 and *LMC* intersect

at point M determining the equilibrium output at OQ_2 and price at P_2Q_2. At price P_2Q_2, the firms make a supernormal or economic profit of P_2T per unit of output. This situation is similar to short-run equilibrium.

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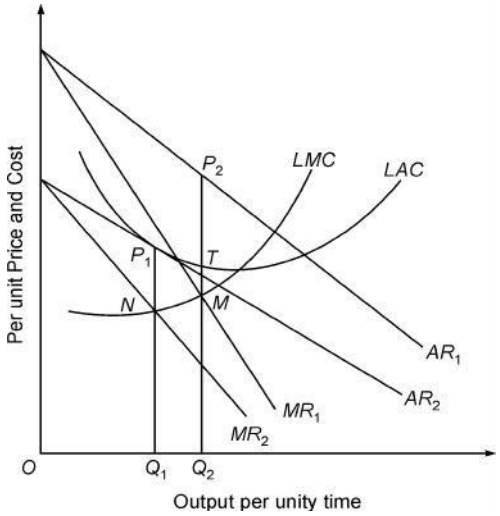

Fig. 4.9 *The Long-Run Price and Output Determination under Monopolistic Competition*

Let us now see what happens in the long-run. The supernormal profit brings about two important changes[20] in a monopolistically competitive market in the long-run.

First, the supernormal profit attracts new firms to the industry. As a result, the existing firms lose a part of their market share to new firms. Consequently, their demand curve shifts downward to the left until *AR* is tangent to *LAC*. This kind of change in the demand curve is shown is Fig. 4.9 by the shift in *AR* curve from AR_1 to AR_2 and the *MR* curve from MR_1 to MR_2.

Second, the increasing number of firms intensifies the price competition between them. Price competition increases because losing firms try to regain or retain their market share by cutting down the price of their product. And, new firms in order to penetrate the market set comparatively low prices for their product. The price competition increases the slope of the firms' demand curve[21] or, in other words, it makes the demand curve more elastic. Note that AR_2 has a greater slope than AR_1 and MR_2 has a greater slope than MR_1.

The ultimate picture of price and output determination under monopolistic competition[22] is shown at point P_1 in Fig. 4.9. As the figure shows, *LMC* intersects MR_2 at point *N* where firm's long-run equilibrium output is determined at OQ_1 and price at P_1Q_1. Note that price at P_1Q_1 equals the *LAC* at the point of tangency. It means that under monopolistic competition, firms make only normal profit in the long-run. Once all the firms reach this stage, there is no attraction (i.e., super normal profit) for the new firms to enter the industry, nor is there any reason for the existing firms to quit the industry. This signifies the long-run equilibrium of the industry.

Numerical Illustration

To illustrate the price and output determination under monopolistic competition through a numerical example, let us suppose that the initial demand function for the firms is given as

$$Q_1 = 100 - 0.5P_1$$

or $$P_1 = 200 - 2Q_1 \quad \ldots(4.16)$$

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Given the price function (4.16), firms' TR_1 function can be worked out as

$$TR_1 = P_1 \cdot Q_1 = (200 - 2Q_1)Q_1$$
$$= 200Q_1 - 2Q_1^2 \quad \ldots(4.17)$$

The marginal revenue function (MR_1) can be obtained by differentiating the TR_1 function (4.17). Thus,

$$MR_1 = 200 - 4Q_1 \quad \ldots(4.18)$$

Suppose also that firms' *TC* function is given as:

$$TC = 1562.50 + 5Q - Q^2 + 0.05Q^3 \quad \ldots(4.19)$$

Given the firms' *TC* function, *LAC* can be obtained as:

$$LAC = \frac{TC}{Q} = \frac{1562.50 + 5Q - Q^2 + 0.05Q^3}{Q}$$

$$= \frac{1562.50}{Q} + 5 - Q + 0.05Q^2 \quad \ldots(4.20)$$

We get firms' *LMC* function by differentiating its *TC* function (4.19). Thus,

$$LMC = 5 - 2Q + 0.15Q^2 \quad \ldots(4.21)$$

Let us now work out the *short-run equilibrium* levels of output and price that maximize firms' profit. The profit maximizing output can be obtained by equating MR_1 and *LMC* functions given in Eqs. (4.18) and (4.21), respectively, and solving for Q_1. That is,

$$MR_1 = LMC$$
$$200 - 4Q_1 = 5 - 2Q + 0.15Q^2 \quad \ldots(4.22)$$

For uniformity sake, let us replace Q in *MC* function as Q_1 and solve[23] the Eq. (4.22) for Q_1.

$$200 - 4Q_1 = 5 - 2Q_1 + 0.15Q_1^2$$
$$195 = 2Q_1 + 0.15Q_1^2$$
$$Q_1 = 30$$

Thus, profit maximizing output in the short-run equals 30.

Let us now find firms' equilibrium price (P_1), *LAC* and supernormal profit. Price P_1 can be obtained by substituting 30 for Q_1 in the price function (4.16).

$$P_1 = 200 - 2Q_1$$
$$= 200 - 2(30) = 140$$

Thus, firms' equilibrium price is determined at ` 140.

Firms' *LAC* can be obtained by substituting equilibrium output 30 for Q in function (4.20). Thus,

$$LAC = \frac{1562.50}{30} + 5 - 30 + 0.05\ (30 \times 30) = 72.08$$

Thus, *the short-run equilibrium condition* gives the following data.

Equilibrium output = 30

$$P_1 = 140$$

$$LAC = 72.08$$

Supernormal profit = $AR_1 - LAC$ = 140 – 72.08 = 67.92 (per unit of output)

Let us now see what happens in the long-run. As already mentioned, the existence of supernormal profit attracts new firms to the industry in the long-run. Consequently, old firms lose a part of their market share to the new firms. This causes a leftward shift in their demand curve with increasing slope. Let us suppose that given the long-run *TC* function, firms' demand function in the long-run takes the following form.

$$Q_2 = 98.75 - P_2$$

and $$P_2 = 98.75 - Q_2 \quad \ldots(4.23)$$

To work out the long-run equilibrium, we need to find the new *TR* function (TR_2) and the new *MR* function (MR_2) corresponding to the new price function (4.23). For this, we need to first work out the new *TR* function (TR_2).

$$TR_2 = P_2 \text{-}Q_2 = (98 \text{-}75 - Q_2)\ Q_2$$
$$= 98 \text{-}75Q_2 - Q_2^2 \quad \ldots(4.24)$$

We get MR_2 by *differentiating TR* function (4.24). Thus,

$$MR_2 = 98 \text{-}75 - 2Q_2 \quad \ldots(4.25)$$

The long-run equilibrium output can now be obtained by equating MR_2 with the *LMC* function (4.21). For the sake of uniformity, we designate *Q* in the *LMC* function as Q_2. The long-run equilibrium output is then determined where:

$$MR_2 = LMC$$

or $$98 \text{-}75 - 2Q_2 = 5 - 2Q_2 + 0 \text{-}15Q_2^2$$

$$93 \text{-}75 = 0 \text{-}15Q_2^2$$

$$625 = Q_2^2$$

$$Q_2 = 25$$

One of the conditions of the long-run equilibrium is that AR_2 or P_2 must be equal to *LAC*. Whether this condition holds can be checked as follows.

$$P_2 = AR_2 = LAC$$

$$98 \text{-}75 - Q_2 = \frac{1562.5}{Q_2} + 5 - Q + 0 \text{-}05Q^2$$

By substitution, we get:

$$98 \text{-}75 - 25 = \frac{1562.5}{25} + 5 - 25 + 0 \text{-}05\ (25)^2$$

$$73 \text{-}75 = 62.50 - 20 + 31 \text{-}25 = 73 \text{-}75$$

It is thus mathematically proved that in the long-run, firm's $P = AR = LAC$ and it earns only a normal profit.

2.2.4 Non-Price Competition: Selling Cost and Equilibrium

In the preceding section, we have presented Chamberlin's analysis of price competition and its effect on the firm's equilibrium output and profits under monopolistic competition. Chamberlin's analysis shows that price competition results in the loss of monopoly profits. All firms are losers: there are no gainers. Therefore, firms find other ways and means to ***non-price competition*** for enlarging their market share and profits. The two most

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common forms of non-price competition are **product innovation** and **advertisement**. Product innovation and advertisement go on simultaneously. In fact, the successful introduction of a new product depends on its effective advertisement. Apart from advertisement expenses, firms under monopolistic competition incur other costs on competitive promotion of their sales, e.g., expenses on sales personnel, allowance to dealers, discounts to customers, expenses on displays, gifts and free samples to customers, additional costs on attractive packaging of goods, etc. All such expenses plus advertisement expenditure constitute firm's ***selling cost.***

Incurring selling cost increases sales, but with varying degrees. Generally, sales increase initially at increasing rates, but eventually at decreasing rates. Consequently, the average cost of selling (*ASC*) initially decreases but ultimately it increases. The *ASC* curve is, therefore, *U*-shaped, similar to the conventional *AC* curve. This implies that total sales are subject to diminishing returns to increasing selling costs. Non-price competition through selling cost leads all the firms to an almost similar equilibrium. Chamberlin calls it 'Group Equilibrium.' We discuss here Chamberlin analysis of firm's group equilibrium.

Selling Cost and Group Equilibrium

To analyse group equilibrium of firms with selling costs, let us recall that the main objective of all firms is to maximize their total profit. When they incur selling costs, they do so with the same objective in mind. All earlier assumptions regarding cost and revenue curves remain the same. The analysis of group equilibrium is presented in Fig. 4.10. Suppose *APC* represents firms' average production cost and competitive price is given at OP_3. None of the firms incurs any selling cost. Also, let all the firms be in equilibrium at point *E* where they make only normal profits.

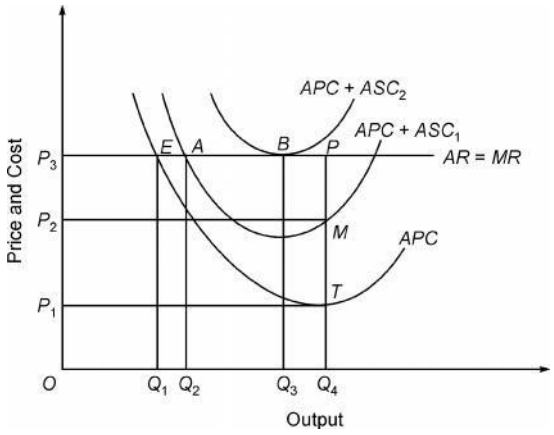

Fig. 4.10 *Selling Costs and Group Equilibrium*

Now suppose that one of the firms incurs selling cost so that its *APC* added with average selling costs (*ASC*) rises to the position of the curve $APC + ASC_1$ and its total sale increases to OQ_4. At output OQ_4, the firm makes supernormal profits of P_3PMP_2. This profit is, however, possible only so long as other firms do not incur selling cost on their products. If other firms do advertise their products competitively and incure the same amount of selling cost, the initial advantage to the firm advertising first disappears and its output falls to OQ_2. In fact, all the firms reach equilibrium at point *A* and produce OQ_2 units. But their short-sightedness compels them to increase their selling cost because

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they expect to reduce their *APC* by expanding their output. With increased selling cost, their *APC + ASC* curve shifts further upward. This process continues until *APC + ASC* rises to $APC + ASC_2$ which is tangent to the *AR = MR* line. This position is shown by point *B*. Beyond point *B*, advertising is of no avail to any firm. The equilibrium will be stable at point *B* where each firm produces OQ_3 and makes only normal profit.

2.2.5 Critical Appraisal of Chamberlin's Theory

Chamberlin's theory of monopolistic competition propounded in the early 1930s is still regarded to be a major contribution to the theory of pricing. In fact, there is no better theoretical explanation of price determination under monopolistic competition. However, his theory has been criticized on both theoretical and empirical grounds. Let us now look into its theoretical weaknesses and empirical relevance.

First, Chamberlin assumes that monopolistic competitors act independently and their price manoeuvring goes unnoticed by the rival firms. This assumption has been questioned on the ground that firms are bound to be affected by decisions of the rival firms since their products are close substitutes for one another and, therefore, they are bound to react.

Second, Chamberlin's model implicitly assumes that monopolistically competitive firms do not learn from their past experience. They continue to commit the mistake of reducing their prices even if successive price reductions lead to decrease in their profits. Such an assumption can hardly be accepted.

Third, Chamberlin's concept of industry as a 'product group' is ambiguous. It is also incompatible with product differentiation. In fact, each firm is an industry by virtue of its specialized and unique product.

Fourth, his 'heroic assumptions' of identical cost and revenue curves are questionable. Since each firm is an industry in itself, there is a greater possibility of variations in the costs and revenue conditions of the various firms.

Fifth, Chamberlin's assumption of free entry is also considered to be incompatible with product differentiation. Even if there are no legal barriers, product differentiation and brand loyalties are in themselves barriers to entry.

Finally, so far as empirical validity of Chamberlin's concept of monopolistic competition is concerned, *it is difficult to find any example in the real world to which his model of monopolistic competition is relevant*.[24] Most markets that exist in the real world may be classified under perfect or pure competition, oligopoly or monopoly.[25] It is, therefore, alleged that Chamberlin's model of monopolistic competition analyses an unrealistic market. Some economists, e.g., Cohen and Cyert, hold the position that the model of monopolistic competition is not a useful addition to economic theory because it does not describe any market in the real world.[26]

Despite the above criticism, Chamberlin's contribution to the theory of price cannot be denied. Chamberlin was the first to introduce the concept of *differentiated product* and *selling costs* as a decision variable and to offer a systematic analysis of these factors. Another important contribution of Chamberlin is the introduction of the concept of demand curve based on market share as a tool of analysing behaviour of firms, which later became the basis of the *kinked-demand* curve analysis.

Check Your Progress

9. Define monopolistic competition.
10. Name the two most common forms of non-price competition.
11. State the two most important contributions made by Chamberlain in monopolistic competition.

2.3 PRICING AND OUTPUT DECISIONS UNDER OLIGOPOLY

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In this section, we will discuss price and output determination under *oligopoly*.[27] Let us first look at the market organization characterized by oligopoly.

2.3.1 Oligopoly: Definition, Sources and Characteristics

Definition: Oligopoly is defined as a market structure in which there are *a few sellers* selling *homogeneous* or *differentiated* products. Where oligopoly firms sell a homogeneous product, it is called *pure* or *homogeneous oligopoly*. For example, industries producing bread, cement, steel, petrol, cooking gas, chemicals, aluminium and sugar are industries characterized by *homogeneous* oligopoly. And, where firms of an oligopoly industry sell *differentiated products*, it is called *differentiated* or *heterogeneous oligopoly*. Automobiles, television sets, soaps and detergents, refrigerators, soft drinks, computers, cigarettes, etc. are some examples of industries characterized by *differentiated* or *heterogeneous oligopoly*.

Be it pure or differentiated, 'Oligopoly is the most prevalent form of market organization in the manufacturing sector of the industrial nations…'[28]. In non-industrial nations like India also, a majority of big and small industries have acquired the features of oligopoly market. The market share of 4 to 10 firms in 84 big and small industries[29] of India is given below.

Market share (%)	*No. of industries*
1 – 24.9	8
25 – 49.9	11
50 – 74.9	15
75 – 100	50
Total	84

As the data presented above shows, in India, in 50 out of 84 selected industries, i.e., in about 60 per cent industries, 4 to 10 firms have a 75 per cent or more market share which gives a *concentration ratio*[30] of 0.500 or above. All such industries can be classified under oligopoly.

Sources of Oligopoly

The factors that give rise to oligopoly are broadly the same as those for monopoly. The main sources of oligopoly are described here briefly.

(i) **Huge capital investment:** Some industries are by nature capital-intensive, e.g., manufacturing automobiles, aircraft, ships, TV sets, computers, mobile phones, refrigerators, steel and aluminium goods, etc. Such industries require huge initial investment. Therefore, only those firms which can make huge investment can enter these kinds of industries. In fact, a huge investment requirement works as a natural barrier to entry to the oligopolistic industries.

(ii) **Economies of scale:** By virtue of huge investment and large scale production, the large units enjoy *absolute cost advantage* due to economies of scale in production, purchase of industrial inputs, market financing, and sales organization.

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This gives the existing firms a comparative advantage over new firms in price competition. This also works as a deterrent for the entry of new firms.

(iii) **Patent rights:** In case of *differentiated oligopoly,* firms get their differentiated product patented which gives them an exclusive right to produce and market the patented commodity. This prevents other firms from producing the patented commodity. Therefore, unless new firms have something new to offer and can match the existing products in respect of quality and cost, they cannot enter the industry. This keeps the number of firms limited.

(iv) **Control over certain raw materials:** Where a few firms acquire control over almost the entire supply of important inputs required to produce a certain commodity, new firms find it extremely difficult to enter the industry. For example, if a few firms acquire the right from the government to import certain raw materials, they control the entire input supply.

(v) **Merger and takeover:** Merger of rival firms or takeover of rival firms by the bigger ones with a view to protecting their joint market share or to put an end to waste of competition is working, in modern times, as an important factor that gives rise to oligopolies and strengthens the oligopolistic tendency in modern industries. Mergers and takeovers have been one of the main features of recent trend in Indian industries.

Features of Oligopoly

Let us now look at the important characteristics of oligopolistic industries.

1. **Small number of sellers:** As already mentioned, there is a small number of *sellers* under oligopoly. How small is the number of sellers in oligopoly markets is difficult to specify precisely for it depends largely on the size of the market. Conceptually, however, the number of sellers is so small that the market share of each firm is large enough for a single firm to influence the market price and the business strategy of its rival firms. The number may vary from industry to industry. Some examples of oligopoly industries in India and market share of the *dominant* firms[31] in 1997-98 is given below.

Industry	*No. of firms*	*Total market share* (%)
Ice-cream	4	100.00
Bread	2	100.00
Infant Milk food	6	99.95
Motorcycles	5	99.95
Passenger cars	5	94.34
Cigarettes	4	99.90
Fruit Juice, pulp & conc.	10	98.21
Fluorescent lamps	3	91.84
Automobile tyres	8	91.37

Source: CMIE, *Industries and Market Share,* August 1999.

2. **Interdependence of decision-making:** The *most striking feature* of an oligopolistic market structure is the interdependence of oligopoly firms in their decision-making. The characteristic fewness of firms under oligopoly brings the firms in keen competition with each other. The competition between the firms takes the form of action, reaction and counter-action in the absence of collusion between the firms. For example, car companies have changed their prices following the change in price made by one of the companies. They have introduced new

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models in competition with one another. Since the number of firms in the industry is small, the business strategy of each firm in respect of pricing, advertising and product modification is closely watched by the rival firms and it evokes imitation and retaliation. What is equally important is that firms initiating a new business strategy anticipate and take into account the possible counter-action by the rival firms. This is called interdependence of oligopoly firms.

An illuminating example of strategic manoeuvring is cited by Robert A. Meyer.[32] To quote the example, one of the US car manufacturing companies announced in one year in the month of September[33] an *increase* of $ 180 in the price list of its car model. Following it, a few days later a second company announced an increase of $ 80 only and a third announced an increase of $ 91. The first company made a counter move: it announced a *reduction* in the enhancement in the list price from $ 180 to $ 71. This is a pertinent example of interdependence of firms in business decisions under oligopolistic market structure. In India, when Maruti Udyog Limited (MUL), announced a price cut of ` 24,000 to ` 36,000 in early 2005 on its passenger cars, other companies followed suit. However, *price competition* is not the major form of competition among the oligopoly firms as price war destroys the profits. A more common form of competition is *non-price competition* on the basis of product differentiation, vigorous advertising and provision of survive.

3. **Barriers to entry:** Barriers to entry to an oligopolistic industry arise due to such market conditions as: (*i*) huge investment requirement to match the production capacity of the existing ones, (*ii*) economies of scale and absolute cost advantage enjoyed by the existing firms, (*iii*) strong consumer loyalty to the products of the established firms based on their quality and service and (*iv*) preventing entry of new firms by the established firms through price cutting. However, the new entrants that can cross these barriers can and do enter the industry, though only a few, that too mostly the branches of *MNCs* that survive.
4. **Indeterminate price and output:** Another important feature, though a controversial one, of the oligopolistic market structure is the indeterminateness of price and output. The characteristic fewness and interdependence of oligopoly firms makes derivation of the demand curve a difficult proposition. Therefore, price and output are said to be indeterminate. However, price and output are said to be determinate under collusive oligopoly. But, there too, collusion may last or it may break down. *An opposite view is that price under oligopoly is sticky*, i.e., if price is once determined, it tends to stabilize.

2.3.2 The Oligopoly Models: An Overview

As already mentioned, under oligopolistic conditions, rival firms indulge in an intricate pattern of actions, reactions and counter-actions showing a variety of behavioural patterns. As Baumol puts it, 'Under [these] circumstances, a very wide variety of behaviour pattern becomes possible. Rivals may decide to get together and cooperate in the pursuit of their objectives,… or, at the other extreme, may try to fight each other to the death. Even if they enter an agreement, it may last or it may break down.'[34] The economists have, therefore, found it extremely difficult to make a systematic analysis of price and output determination under oligopoly.[35] This has, however, not deterred the economists from their efforts to find an agreeable solution to the problem.

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In accordance with the wide variety of behavioural patterns, the economists have developed a variety of analytical models based on different behavioural assumptions. The widely quoted oligopoly models include Cournot's duoply model (1838), Bertrand's leadership model (1880), Edgeworth's duoply model (1897), Stackelberg's model (1933), Sweezy's kinked demand curve model (1939), Neumann and Margenstern Game Theory model (1944) and Baumol's sales maximization model (1959). None of these models, however, provides a universally acceptable analysisof oligopoly, though these models do provide an insight into oligopolistic behaviour.

In this section, we discuss some selected oligopoly models with the purpose of showing the behaviour of oligopoly firms and working of the oligopolistic markets. The analytical models discussed here are selected on the basis of how price and output are determined under price competition, cartel system and the dilemma that oligopoly firms face in their price and output decisions. Specifically, we discuss here the following oligopoly models.

(i) Cournot's duopoly model
(ii) Sweezy's kinked demand curve model
(iii) Price leadership models:
    (a) Price leadership by low-cost firm, (*b*) Price leadership by dominant firm and (*c*) Price leadership by barometric firm
(iv) Collusive model: The Cartel Arrangement
(v) The Game Theory model of oligopoly
(vi) Prisoner's Dilemma

2.3.3 Cournot's Duopoly Model

Augustin Cournot,[36] a French economist, was the first to develop a formal oligopoly model in 1838 in the form of a duopoly model. Cournot developed his model with the example of two firms, each owning a spring of mineral water and water being produced at zero cost. To illustrate his model, Cournot made the following assumptions:

- There are two firms, each owning an artesian mineral water well
- Both the firms operate their wells at zero cost[37]
- Both of them face a demand curve with constant negative slope
- Each seller acts on the assumption that his competitor will not react to his decision to change his output and price. This is Cournot's behavioural assumption.

On the basis of this model, Cournot has concluded that each seller ultimately supplies one-third of the market and both the firms charge the same price. And, one-third of the market remains unsupplied.

Cournot's duopoly model is illustrated in Fig. 4.11. The demand curve for mineral water is given by the *AR* curve and *MR* by the *MR* curve. To begin with, let us suppose that firm *A* is the only seller of mineral water in the market. By assumption, its $MC = 0$. Following the profit maximizing rule, it sells quantity *OQ* where its $MC = 0 = MR$, at price OP_2. Its total profit is OP_2PQ. This is the maximum profit seller *A* can make given the demand curve.

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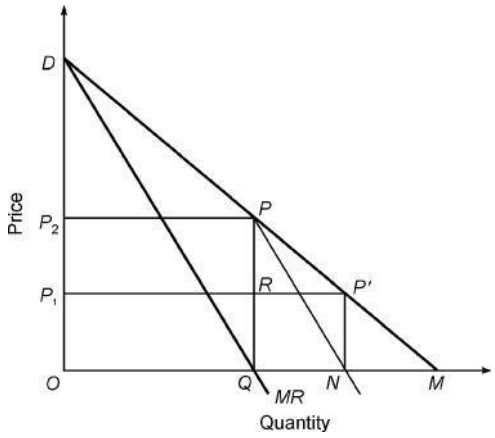

Fig. 4.11 *Price and Output Determination under Duopoly: Cournot's Model*

Now let another firm *B* enter the market. The market open to *B* is the market unsupplied by *A*. This market equals *QM* which is *half* of the total market.[38] That is, *B* can sell its product in the remaining half of the market. *B* assumes that *A* will not change its price and output because *A* is making maximum profit, that is, *B* assumes that *A* will continue to sell *OQ* at prices OP_2. Thus, the market available to firm *B* is *QM* and the relevant part of the demand curve is *PM*. When *B* draws its *MR* curve, *PN*, it bisects *QM* at point *N* where *QN* = *NM*. In order to maximize its revenue, *B* sells *QN* at price $OP_1 = P$ ¶*N*. Its total revenue is maximum at *QRP* ¶*N* which equals its total profit. Note that *B* supplies only *QN* = (1/2)/2 = 1/4 of the market.

With the entry of *B*, price falls to OP_1. Price falls becuase *A*'s customers will also now pay the same price as charged by *B*. Due to fall in price, *A*'s expected profit falls to OP_1RQ. Faced with this situation, firm *A* adjusts its price and output to the changed conditions. *A* assumes that *B* will not change its output *QN* and price OP_1 as it is making maximum profit. Accordingly, *A* assumes that *B* will continue to supply 1/4 of the market. Thus, *A* assumes that it has 3/4 (= 1 – 1/4) of the market available to it. To maximize its profit, *A* supplies 1/2 of the remaining 3/4 of the market, i.e., 1/2 × 3/4 = 3/8 of themarket. It is noteworthy that *A*'s market share has fallen from 1/2 to 3/8.

Now it is *B*'s turn to react. Following Cournot's assumption, *B* assumes that *A* will continue to supply only 3/8 of the market and the rest of the market is open to him, which equals 1 – 3/8 = 5/8. To maximize his profit under the new conditions, *B* supplies 1/2 × 5/8 = 5/16 of the market. It is now for *A* to reappraise the situation and adjust his price and output accordingly.

This process of action and reaction continues in successive periods. In the process, *A* continues to lose his market share and *B* continues to gain. Eventually, a situation is reached when their market shares equal 1/3 each. Any further attempt to adjust output produces the same result. The firms, therefore, reach their equilibrium position where each one supplies one-third of the market and both charge the same price and one-third of the market remains unsupplied.

The actions and reactions and equilibrium of the sellers *A* and *B*, according to Cournot's model, are presented in Table 4.2.

Cournot's equilibrium solution is stable. For, given the action and reaction, it is not possible for any of the two sellers to increase their market share beyond one-third of the market as shown in the last row of the table.

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Cournot's model of duopoly can be extended to a general oligopoly model. For example, if there are three sellers in the industry, each one of them will be in equilibrium when each firm supplies 1/4 of the market. The three sellers together supply 3/4 of the total market, 1/4 of the market remaining unsupplied. Similarly, when there are four firms each one of them supply 1/5th of the market and 1/5th of the market remains unsupplied. The formula for determining the share of each seller in an oligopolistic market is: $Q \div (n + 1)$, where Q = market size, and n = number of sellers.

Table 4.2 *Determination of Market Share*

Period	*A's Market share*	*B's Market share*
I	$\frac{1}{2}(1) = \frac{1}{2}$	$\frac{1}{2}\left(\frac{1}{2}\right) = \frac{1}{4}$
II	$\frac{1}{2}\left(1 - \frac{1}{4}\right) = \frac{3}{8}$	$\frac{1}{2}\left(1 - \frac{3}{8}\right) = \frac{5}{16}$
III	$\frac{1}{2}\left(1 - \frac{5}{16}\right) = \frac{11}{32}$	$\frac{1}{2}\left(1 - \frac{11}{32}\right) = \frac{21}{64}$
IV	$\frac{1}{2}\left(1 - \frac{21}{64}\right) = \frac{43}{128}$	$\frac{1}{2}\left(1 - \frac{43}{128}\right) = \frac{85}{256}$
⋮	⋮	⋮
N	$\frac{1}{2}\left(1 - \frac{1}{3}\right) = \frac{1}{3}$	$\frac{1}{2}\left(1 - \frac{1}{3}\right) = \frac{1}{3}$

Note: In the calculation of market share, number 1 represents the total market.

Algebraic Solution

Cournot's model may also be presented algebraically. Let us suppose that the market demand function for mineral water is given by a linear function as:

$$Q = 90 - P \qquad \ldots(4.26)$$

As noted above, under zero cost condition, profit is maximum where $MC = MR = 0$ and when $MR = 0$, the profit maximizing output is 1/2 (Q).

Thus, when seller A is a monopolist in the market, his profit-maximizing output (Q_A), according to the profit maximizing rule under zero cost condition, is determined at half of the total market. That is, A's initial market share:

$$Q_A = 1/2\ (90 - P) \qquad \ldots(4.27)$$

When another seller, B, enters the market, his profit maximizing output:

$$Q_B = 1/2\ [(1/2(90 - P)] \qquad \ldots(4.28)$$

Thus, the respective shares of sellers, A and B are fixed at Q_A and Q_B.

The division of market output may be expressed as:

$$Q = Q_A + Q_B = 90 - P \qquad \ldots(4.29)$$

The demand function for A may now be expressed as:

$$Q_A = (90 - Q_B) - P \qquad \ldots(4.30)$$

and for B as $Q_B = (90 - Q_A) - P$ …(4.31)

Given the demand function (4.30), the market open to A (at $P = 0$) is $90 - Q_B$. The profit maximizing output for A will be half of the market size, i.e.,

$$Q_A = \frac{90 - Q_B}{2} \quad \ldots(4.32)$$

and similarly for *B*, it will be:

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$$Q_B = \frac{90 - Q_A}{2} \quad \ldots(4.33)$$

The Eqs. (4.32) and (4.33) represent the reaction functions of sellers *A* and *B*, respectively. For example, consider Eq. (4.32). The profit maximizing output of *A* depends on the value of Q_B, i.e., the output which *B* is assumed to produce. If *B* chooses to produce 30 units, (i.e., $Q_B = 30$), then *A*'s output = [(90 – 30)1/2] = 30. If *B* chooses to produce 60 units, *A*'s output = (90 – 60)1/2 = 15. Thus, Eq. (4.32) is *A*'s reaction function. It can similarly be shown that Eq. (4.33) is *B*'s reaction function.

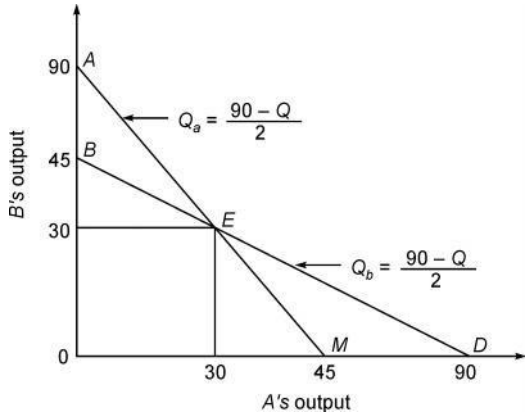

Fig. 4.12 *Reaction Function and Equilibrium: Cournot Model*

The reaction functions of *A* and *B* are graphed in Fig. 4.12. The reaction function shown by line *AM* shows how *A* will react on the assumption that *B* will not react to changes in his output once *B*'s output is fixed. The reaction function *BD* shows a similar reaction of *B*. The two reaction functions intersect at point *E*. It means that the assumptions of *A* and *B* coincide at point *E* and here ends their action and reaction. Point *E* is, therefore, the point of stable equilibrium. At this point, each seller sells only 30 units. The same result can be obtained by equating the two reaction Eqs. (4.32) and (4.33).

The market equilibrium takes place where:

$$= \frac{90 - Q_B}{2} = \frac{90 - Q_A}{2}$$

Since, $Q_b = (90 - Q_A)/2$, by substitution, we get first term as:

$$Q_A = \frac{90 - (90 - Q_A)/2}{2}$$

$$Q_A = 30$$

Similarly, it can be shown that $Q_B = 30$. Thus, both the sellers are in equilibrium. At equilibrium, both the sellers will produce 30 units each. The market output will be 60 units. Given the market demand curve, market price will be $P = 90 - Q = 90 - 60 =$ ` 30.

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Criticism: Although Cournot's model yields a stable equilibrium, it has been criticized on the following grounds.

First, Cournot's behavioural assumption is naïve as it implies that firms continue to make wrong calculations about the competitor's behaviour. That is, each seller continues to assume that his rival will not change his output even though he observes time and again that his rival firm does change its output.

Second, his assumption of zero cost of production is unrealistic though dropping this assumption does not alter his position.

2.3.4 Kinked Demand Curve Analysis of Price Stability: Sweezy's Model

The kinked demand curve model of oligopoly was developed by Paul M. Sweezy[39] and also by Hall and Hitch[40] in the same year (1939). This model is, however, famous by Sweezy's name as his model is treated to be analytically superior. We will, therefore, discuss here the kinked demand curve model as developed by Sweezy. He has shown through his kinked demand curve analysis that price and output once determined under oligopolistic conditions, tend to remain stable.

Sweezy's kinked demand curve model is the best known model explaining relatively more satisfactorily the behaviour of oligopolistic firms. The kinked demand curve analysis does not deal with price and output determination. Rather, it seeks to establish that once a price-quantity combination is determined, an oligopoly firm does not find it profitable to change its price even if there is a considerable change in cost of production. The logic behind this proposition is as follows. An oligopoly firm believes that if it reduces the price of its product, rival firms would follow and neutralize the expected gain from price reduction. But, if it raises its price, rival firms would either maintain their price or may even cut their price down. In either case, the price raising firm stands to lose, at least a part of its market share. This behavioural assumption is made by all the firms with respect to others. The oligopoly firms, therefore, find it more desirable to maintain their price and output at the existing level.

To look more closely at the kinked demand curve analysis, let us look into the possible actions and reactions of the rival firms to the price changes made by one of the firms. There are three possible ways in which rival firms may react to change in price made by one firm.

(i) The rival firms follow the price changes, both cut and hike

(ii) The rival firms do not follow the price changes

(iii) Rival firms follow the price cuts but not the price hikes

To begin with, let us suppose that the market demand curve for a product is given by *dd'* curve and that the initial price is fixed at *PQ* in Fig. 4.13. Now let one of the firms change its price. If rival firms react in manner (*i*), i.e., they react with hike for hike and cut for cut, the price changing firm moves along the demand curve *dd'*. And, if rival firms do not follow the price changes, the price changing firm will move along the demand curve *DD'*.

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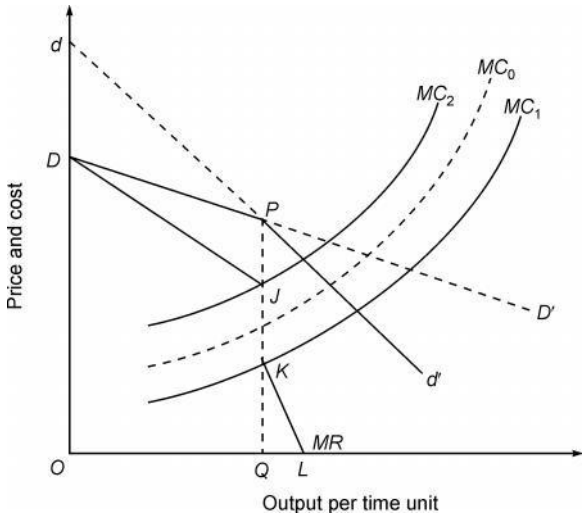

Fig. 4.13 *Kinked Demand Curve Analysis of Oligopoly*

Note that the firm initiating the price change faces two different demand curves —*dd'* and *DD'*—conforming to two different kinds of reactions (*i*) and (*ii*), respectively. Note also that the demand curve *dd'* based on reaction (*i*) is less elastic whereas demand curve *DD'* based on reaction (*ii*) is more elastic. Demand curve *dd'* is less elastic because the expected changes in demand in response to changes in price are neutralized by the counter-moves of the rival firms.

Given the two demand curves, *dd'* and *DD'*, let us now introduce and examine the result of reaction (*iii*), a more realistic one, i.e., the rival firms follow the price-cut but do not follow the price-hike. This asymmetrical behaviour of the rival firms, makes only a part of the two demand curves relevant and produces a kinked demand curve. This can be established by allowing an oligopoly firm to alternatively increase and decrease its price. If a firm increases its price and rivals do not follow, it loses a part of its market to its rivals. The demand for its product decreases due to cross elasticity. The firm is, therefore, forced down from demand curve *dP* to *DP*. Thus, the relevant segment of demand curve for the price hiking firm is *DP*. Now suppose, alternatively, that the firm decreases its prices. Then the rival firms, given their asymmetrical behaviour, cut down their prices. Otherwise, they would lose their customers. This counter price-move by the rivals prevents the firm from taking the advantage of price-cut. Therefore, the price cutting firm moves down along the *Pd'* segment of the demand curve. Thus, the relevant segments of the demand curve for price cut is *Pd'*. Thus, the two parts of the demand curve —*DP* and *Pd'*—put together, give the demand curve for the price changing firm as *DPd'* which has a *kink* at point *P*.

Let us now draw the *MR* curve for the firm initiating the price change. Recall that $MR = AR - AR/e$. The *MR* curve drawn on the basis of this relationship, takes a shape as shown by a discontinuous curve *DJKL* in Fig. 4.13. The *DJ* and *KL* segments of the *MR* curve correspond, respectively, to the *DP* and *Pd'* segments of the kinked demand curve, *DPd'*.

Given the *MR* curve (*DJ–KL*), let us suppose that the original marginal cost curve is given by the curve MC_1 which intersects *MR* at point *K*. Since at output *OQ*, $MR = MC_1$ the firm makes maximum profit. Now, even if cost of production increases and *MC* curve shifts upwards to MC_2 or to any level between points *J* and *K*, firms do not find it gainful to increase the price even though their profit would be affected.

Therefore, the firm has no motivation for increasing or decreasing its price. Thus, both price and output remain fixed. This is what the kinked demand curve analysis seeks to establish.

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Algebraic Solution to Sweezy's Model

Let us suppose market demand curve[41] (D_1) corresponding to demand curve *dd'*, firm's own stipulated demand curve (D_2) corresponding to *DD'* in Fig. 4.13 and its total cost function (*TC*) are given as follows.

(*i*) $D_1 : Q_1 = 100 - 0.5P_1$ …(4.34)

(*ii*) $D_2 : Q_2 = 160 - P_2$ …(4.35)

(*iii*) $TC = 300 + 20Q + 0.5Q^2$ …(4.36)

The demand functions (4.34) and (4.35) are shown by D_1 and D_2 curves in Fig. 4.14. Demand curves D_1 and D_2 intersect at point *K*. The kinked demand curve is drawn and marked by BKD_1.

What we need now is to work out MR_1 and MR_2 corresponding to the two demand functions, and *MC* from the cost function.

To work out MR_1 and MR_2, we need to find TR_1 and TR_2. Given the demand functions (4.34) and (4.35), P_1 and P_2 can be obtained as:

$$P_1 = 200 - 2Q_1 \quad \ldots(4.37)$$

and $$P_2 = 160 - Q_2 \quad \ldots(4.38)$$

The TR_1 and TR_2 functions can be worked out by using price functions (4.37) and (4.38) as follows.

$$TR_1 = P_1 . Q_1$$
$$= (200 - 2Q_1)Q_1$$
$$= 200Q_1 - 2Q_1^2 \quad \ldots(4.39)$$

and $$TR_2 = P_2 . Q_2 = (160 - Q_2)Q_2$$
$$= 160Q_2 - Q_2^2 \quad \ldots(4.40)$$

By differentiating TR_1 and TR_2 functions (4.39) and (4.40), we can derive the MR_1 and MR_2 functions, respectively, as given below.

$$MR_1 = 200 - 4Q_1 \quad \ldots(4.41)$$

and $$MR_2 = 160 - 2Q_2 \quad \ldots(4.42)$$

The MR_1 and MR_2 functions are shown by truncated lines MR_1 and MR_2 in Fig. 4.14. The *MR* curve corresponding to the kinked demand curve is drawn through points *BLM* and along the line MMR_1.

As regards *MC* curve, it can be obtained by differentiating the *TC* function (4.36). Thus,

$$MC = \frac{\partial TC}{\partial Q} = \frac{\partial(300 + 20Q + 0.5Q^2)}{\partial Q} = 20 + Q \quad \ldots(4.43)$$

Having derived the MR_1, MR_2 and *MC* functions, we now illustrate the conclusions of the kinked demand curve analysis. Let us first find price (*P*) and quantity demanded (*Q*) at kink point *K*. At the kink point (*K*), price *P* is given. And, at the point of intersection, D_1 and D_2 are equal at the given price. Let us assume

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that, given the price, $Q_1 = Q_2 = Q$. Now Q and P at the kink point K can be known as follows. Since at the point of intersection of D_1 and D_2 curves, $Q_1 = Q_2 = Q$, by substituting Q for Q_1 and Q_2 in price functions (4.37) and (4.38), we can work out quantity demanded at the point of kink by equating the price functions as follows.

$$P_1 = P_2$$

$$200 - 2Q = 160 - Q$$

$$Q = 40$$

By substituting 40 for Q in any of the price functions, we can get price (P) at the point of intersection. We know that at the intersection point $P_1 = P_2$. So when we get P_1 or P_2, we get P. Thus, by using price function (P_1), we get:

$$P = 200 - 2Q_1 = 200 - 4(40) = ` 120$$

This can be verified from Fig. 4.14.

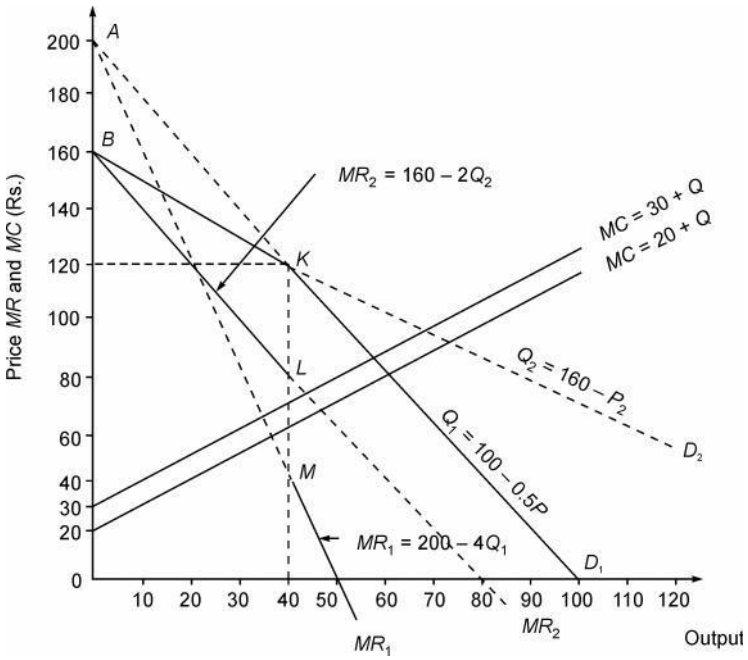

Fig. 4.14 *Sweezy's Kinked Demand Model*

Having worked out P and Q, let us now verify the main thesis of Sweezy's model that the variation in MC within a range will not affect the price. The upper limit of MC variation is given by point M at the MR_1 at price P and the lower limit by point L at MR_2 at the same price. Thus,

$$MR_1 = 200 - 4Q_1 = 200 - 4(40) = ` 40$$

and $$MR_2 = 160 - 2Q_2 = 160 - 2(40) = ` 80$$

Thus, the lower and upper limits of MC variation that will not affect the price at $Q = 40$ lie between ` 40 and ` 80. At $Q = 40$, $MC = 20 + 40 = ` 60$. Now let the cost of production increase and cost function change to:

$$TC = 400 + 30Q + 0.5Q^2$$

Then $MC = 30 + Q$

Given the *MC* function, at $Q = 40$, $MC = 30 + 40 =$ ` 70. Since $MC = 70$ is within the lower and upper range, price will not change. This proves Sweezy hypothesis that prices once determined, tend to be stable in the oligopoly market.

Criticism of Sweezy's Model

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A major *criticism* against Sweezy's model is that it explains only the stability of output and price—it does not say how the initial price is determined at a certain level, e.g., at *PQ*.

Besides, the price stability does not stand the test of empirical verification—there is a surprising lack of price rigidity in oligopolistic markets.

Furthermore, Stigler[42] found in case of seven oligopolistic industries that there was 'little evidence' of reluctance to the price hike made by other firms. Stigler's findings were further supported by the findings of Simon.[43] Even in India, prices of most oligopolistic firms, for example, prices of cars and computers have been fluctuating. Monopoly prices have been found to be more stable than oligopoly prices.

2.3.5 Price Leadership Models

Price leadership is an informal position of a firm in most oligopolistic industries. Price leadership may emerge spontaneously due to technical reasons or out of a tacit or explicit agreement between the firms to assign a leadership role to one of them. The spontaneous price leadership may be the result of such technical reasons as size, efficiency, economies of scale or firm's ability to forecast market conditions accurately or a combination of these factors. The most typical case of price leadership is the leading role played by the *dominant firm*, i.e., the largest firm in the industry. The dominant firm takes lead in making price changes and the smaller ones follow.

Sometimes, price leadership is **barometric.** In the *barometric price leadership*, one of the firms, not necessarily the dominant one, takes the lead generally in announcing a change in price, particularly when such a change is due but is not effected due to uncertainty in the market.

The price leadership is found under both product homogeneity and product differentiation. There may be, however, price differences commensurate with product differentiation. Price differentials may also exist on account of cost differentials.

Another important aspect of price leadership is that it often serves as a means to price discipline and price stabilization. Achievement of this objective establishes an 'effective price leadership'. Such a leadership can, however, exist and work effectively only under the following conditions:

(i) The number of firms is small
(ii) Entry to the industry is restricted
(iii) Products are, by and large, homogeneous
(iv) Demand for industry is inelastic or has very low elasticity
(v) Firms have almost similar cost curves

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Let us now discuss price determination under different kinds of price leadership models.

(a) Price leadership by low-cost firm: The price and output decisions under the leadership of a low-cost firm is illustrated in Fig. 4.15. Suppose all the oligopoly firms face identical revenue curves as shown by *AR* and *MR* curves, but they have different cost curves. The largest firm is the low-cost firm and has its cost curves as shown by AC_1 and MC_1. All the rival firms, smaller in size, have higher cost and their cost curves are as shown by AC_2 and MC_2. This is so because the largest firm has the economies of scale and its cost of production is lower than that of other firms. Given the cost and revenue conditions, the low-cost firm wouldgo by the profit maximization rule andfix its price at OP_2 (= LQ_2) and sell quantity OQ_2. At this level of output its *MC* = *MR* and hence its profit is maximum. On the other hand, the high-cost firms would be in a position to maximize their profit at price OP_3 and quantity OQ_1. But, if they charge a higher price, OP_3, they would lose their customers to the low-cost firm. The high-cost firms are, therefore, forced to accept the price OP_2 and recognize the price leadership of the low-cost firm. Note that the low-cost firm can eliminate other firms and become a monopolist by cutting the price to OP_1 (= JQ_2). The low cost firm can sell its entire output OQ_2 at OP_1. But at price OP_1, the low-cost firm will make only normal profit. It may, however, not do so for the fear of anti-monopoly laws.

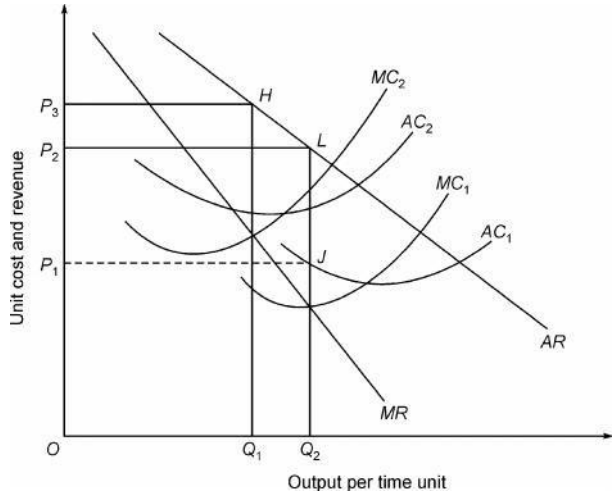

Fig. 4.15 *Price Leadership by a Low-Cost Firm*

Numerical illustration: Suppose there are two oligopoly firms—Firm 1 and Firm 2—selling homogeneous products and, therefore, they face the same demand curve, but it is expressed differently for the sake of computational convenience. Their demand curves are given as follows.

Firm 1: $Q_1 = 50 - 0.5\ P_1$ and $P_1 = 100 - 2\ Q_1$ …(4.44)

Firm 2: $Q_2 = 50 - 0.5\ P_2$ and $P_2 = 100 - 2\ Q_2$ …(4.45)

Suppose also that Firm 1 is a low-cost firm and Firm 2 is a high-cost firm. Their respective cost functions are given as follows.

(*i*) Firm 1: $TC_1 = 100 + 20Q_1 + 2Q_1^2$ …(4.46)

and $AC_1 = (100 + 20Q_1 + 2Q_1^2)/Q_1$ …(4.47)

(*ii*) Firm 2: $TC_2 = 48 + 36Q_2 + 2Q_2^2$ …(4.48)

and $AC_2 = (48 + 36Q_2 + 2Q_2^2)/Q_2$ …(4.49)

Let us now see how oligopoly firms will set their price and output independently acting as monopolies.

Like all other firms, **Firm 1** will determine its output at the level that maximizes its total profit, Π_1.We know that total profit is maximum where:

$$\Pi_1 = TR_1 - TC_1 \text{ is maximum.}$$

For the Firm 1, TC_1 is given in Eq. (4.46). What we need to find is firm's TR_1.

$$TR_1 = P_1 \times Q_1 = (100 - 2Q_1)Q_1$$
$$= 100Q_1 - 2Q_1^2 \quad \ldots(4.50)$$

By substituting TR_1 and TC_1 into the profit equation, we get the profit function for Firm 1 as:

$$\Pi_1 = 100Q_1 - 2Q_1^2 - (100 + 20Q_1 + 2Q_1^2)$$
$$= 80Q_1 - 4Q_1^2 - 100 \quad \ldots(4.51)$$

The profit maximizing output can be obtained by taking the first derivative of the profit function (4.51) and setting it equal to zero. Thus,

$$\frac{\delta \Pi_1}{\delta Q_1} = 80 - 8Q_1 = 0 \quad \ldots(4.52)$$

By solving Eq. (4.52), we get $Q_1 = 10$.

Alternatively, profit maximizing Q_1 can be obtained by finding and equating MC_1 and MR_1. Firm's MC_1 can be obtained by differentiating TC_1 function (4.46) and MR_1 by differentiating its TR_1 function (4.50), as given below.

Given the *TC* function (4.46), and *TR* function (4.50),

$$MC_1 = 20 + 4Q_1$$

and $MR_1 = 100 - 4Q_1$

Given the MC_1 and MR_1 functions, Q_1 can be obtained as follows.

$$MC_1 = MR_1$$
$$20 + 4Q_1 = 100 - 4Q_1$$
$$8Q_1 = 80$$
$$Q_1 = 10$$

Profit maximizing price (P_1) and average cost (AC_1) of Firm 1 can now be obtained by substituting 10 for Q_1 in price functions (4.44) and (4.47), respectively. Thus,

$$P_1 = 100 - 2Q_1 = 100 - 2(10) = ` 80$$

and $AC_1 = (100 + 20Q_1 + 2Q_1^2)/Q_1$

$$= [100 + 20(10) + 2(10)^2]/10 = ` 50$$

Firm 2 will also set its output at the level that maximizes its total profit, Π_2.

$$\Pi_2 = TR_2 - TC_2$$

Firm's TC_2 is given in Eq. (4.48). Its *TR*, i.e., TR_2 can be obtained as follows.

$$TR_2 = P_2 \times Q_2 = (100 - 2\ Q_2)Q_2 = 100Q_2 - 2Q^2_2$$

By substitution, we get profit function as

$$\Pi_2 = 100Q_2 - 2Q_2^2 - (48 + 36Q_2 + 2Q_2^2)$$
$$= 64Q_2 - 4Q_2^2 - 48 \quad \ldots(4.53)$$

NOTES

The profit maximizing output can be obtained by taking the first derivative of the profit function (4.53) and setting it equal to zero. Thus,

$$\frac{\delta \Pi_2}{\delta Q_2} = 64 - 8Q_2 = 0 \qquad \ldots(4.54)$$

By solving Eq. (4.54), we get $Q_2 = 8$.

Profit maximizing price (P_2) and average cost (AC_2) of Firm 2 can now be obtained by substituting 8 for Q_2 in price functions (4.45) and (4.49), respectively. Thus,

$$P_2 = 100 - 2Q_2 = 100 - 2(8) = \text{` } 84$$

and $$AC_2 = (64 + 64Q_2 + 2Q_2^2)/Q_2 = [64 + 36(8) + 2(8^2)]/8 = \text{` } 58$$

To summarize, given the market demand function and individual cost functions, the two firms will set their price and output in the absence of collusion between them as follows.

Firm 1: $Q_1 = 10$ and $P_1 = 80$

and Firm 2: $Q_2 = 8$ and $P_2 = 84$

Under the *price leadership model*, however, Firm 1, a low-cost firm, acting as price leader will set the price of its product at ` 80 and Firm 2 will also set the price of its product at ` 80, the price set by Firm 1. Note that the per unit profit of Firm 2 is reduced from ` 26 to ` 22. But this happens when a high-cost firm has to accept the price-leadership of the low-cost firm.

(b) Price leadership by a dominant firm: Price leadership by a dominant firm is more common than that by a low-cost firm. In the analysis of price leadership by a dominant firm, it is assumed that there exists a large sized firm in the industry, which supplies a large proportion of the total market. The dominance of the large firm is indicated by the fact that it could possibly eliminate all its rival firms by price-cutting. In that case, the large firm gains the status of a monopoly which may invite legal problems. The dominant firm, therefore, compromises with the existence of the rival firms in the market. It uses its dominance to set its price so as to maximize its profit. The smaller firms recognize their weak position and behave just like firms in a perfectly competitive market. That is, smaller firms accept the price set by the dominant firm.

The price leadership and market sharing between the dominant firm and the rival firms as a group is illustrated in Fig. 4.16. Suppose that the market demand curve is given by DD_M and total supply by the small firms by the curve S_S in panel (*a*) of the figure. The problem confronting the dominant firm is how to determine its price and output that will maximize its profit, leaving the rest of the market to be jointly supplied by the small firms. To solve this problem, the dominant firm finds its demand curve by deducting the quantity supplied jointly by the small firms at different prices from the corresponding market demand. The dominant firm considers the residual of the market as the demand for its own product. Thus, at a given price, the market share of the dominant firm equals the market demand *less* the share of small firms.

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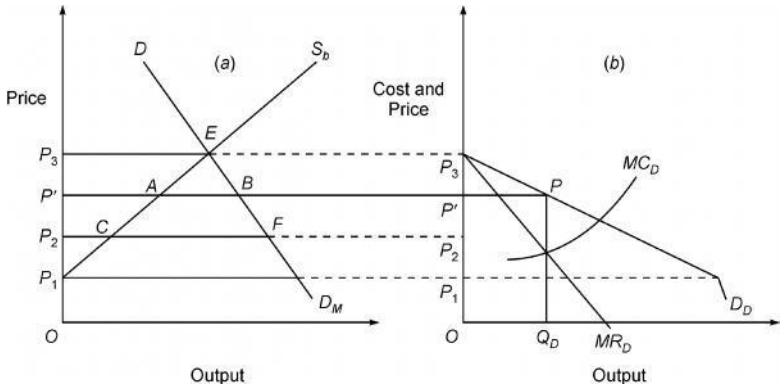

Fig. 4.16 *Price Leadership by a Dominant Firm*

For example, when market price is set at OP_3, the total supply by the smaller firms is P_3E which equals the market demand. Therefore, at price OP_3, the market left to the dominant firm is zero. When price falls to OP_2, total demand increases to P_2F. Of this demand, small firms supply only P_2C. The market left for the dominant firm equals $P_2F - P_2C = CF$. Following this process, the market-share of the dominant firm at other prices can be easily obtained. Note that the gap between demand curve DD_M and supply curve P_1S_s below point E in Fig. 4.16(a) measures the demand for the dominant firm.

The information so derived and plotted graphically gives P_3D_D as the demand curve for the dominant firm [Fig.4.16 (b)]. Since the relation between AR and MR is known, the MR curve for the dominant firm can be derived as MR_D [Fig. 4.16(b)]. If the MC curve of the dominant firm is assumed to be given as MC_D, its profit maximizing output will be OQ_D and price $PQ_D = OP'$.

Once the dominant firm sets its price at OP', the small firms have to accept this price. Given the price OP', their joint market demand curve is the horizontal straight line $P'B$ [in Fig. 4.16(a)], because they can sell at this price as much as they can produce. But, in order to maximize their joint profits, small firms will produce only $P'A$. For small firms, therefore, profit maximizing joint output is $P'A$.

Algebraic Treatment of Dominant Firm Model

Suppose there are six firms—one of them being dominant—in an industry supplying a nearly homogeneous product. Suppose also that market demand function for the product of all the six firms is given as:

$$Q_M = 100 - 2P \qquad \ldots(4.55)$$

and the combined supply function of five small firms is given as:

$$Q_S = 10 + P \qquad \ldots(4.56)$$

Given the demand and supply functions (4.55) and (4.56), respectively, the market equilibrium without the dominant firm can be obtained by equating the demand and supply functions. Thus, the market is in equilibrium where:

$$Q_S = Q_M$$
$$10 + P = 100 - 2P$$
$$P = 30$$

NOTES

The market supplied by the five small firms together can be obtained by substituting 30 for P in either the demand or supply function.

$$Q_S = 100 - 2P = 100 - 2(30) = 40$$

This means that five small firms jointly supply 40 units at $P = 30$.

Let us now see how the dominant firm works out the demand function for its product and sets its price. The demand function for the dominant firm can be obtained by deducting the quantity ($Q_S = 40$) supplied by the small firms from the market demand function (4.55). Thus,

$$Q_D = Q_M - Q_S = 100 - 2P - 40$$
$$= 60 - 2P \quad \ldots(4.57)$$

The dominant firm's profit maximizing output (Q_D) and price (P_D) can be obtained by finding its MC_D and MR_D and equating them. Let us now find MC and MR of the dominant firm.

Suppose total cost function (TC_D) of the dominant firm is given as

$$TC_D = 50 + 6Q_D + 0.25\ Q_D^2 \quad \ldots(4.58)$$

Its marginal cost function (MC_D) can be obtained by differentiating the TC_D function (4.58). Thus,

$$MC_D = \frac{\partial TC_D}{\partial Q_D} = 6 + 0.5\ Q_D \quad \ldots(4.59)$$

The TR function (TR_D) of the dominant firm can be obtained as follows: Given the Q_D function (4.57),

$$P_D = 30 - 0.5\ Q_D \quad \ldots(4.60)$$

Given the price function (4.60), TR_D ($= P_D \times Q_D$) can be obtained as:

$$TR_D = (30 - 0.5\ Q_D)\ Q_D = 30\ Q_D - 0.5\ Q^2{}_D \quad \ldots(4.61)$$

Dominant firm's MR function can be obtained by differentiating the TR function (4.61), as:

$$MR_D = \frac{\partial TR_D}{\partial Q_D} = 30 - Q_D$$

Now that the dominant firm's MC_D and MR_D have been obtained, we can work out the profit maximizing Q_D and P_D as follows. At equilibrium,

$$MC_D = MR_D$$
$$6 + 0.5Q_D = 30 - Q_D$$
$$1.5Q = 24$$
$$Q = 16$$

Given the equilibrium output ($Q_D = 16$), equilibrium price P_D can be obtained by substituting 16 for Q_D in its price function (4.60). That is,

$$P_D = 30 - 0.5\ (16) = 22\ (\grave{}\ )$$

To conclude, the dominant firm fixes its output at 16 and price at ` 22. This price has to be accepted by the small firms. Thus, $P_D =$ ` 22 becomes the market price.

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The final market share of the dominant and small firms can be worked out as follows. The total demand at price $P = 22$ can be obtained by substituting 22 for P in the market demand function (4.55).

$$\text{Total Demand} = 100 - 2\,(22) = 56$$

Of the total demand of 56 units at price ` 22, only 16 units will be supplied by the dominant firm and the remaining part of the market, i.e., 56 – 16 = 40, will be shared by the five small firms.

(c) The Barometric price leadership: Another form of price leadership is *barometric price leadership*. In this form, a firm initiates well publicized changes in price that are generally followed by the rival firms. This kind of price leadership may not necessarily come from the largest firm of the industry. The barometric firm is, however, supposed to have a better knowledge of the prevailing market conditions and has an ability to predict them more precisely than any of its competitors. These qualities of the barometric firm should have been established and recognized over time by the rival firms. The firm having the qualifications of price leadership is regarded as a barometer which reflects the changes in business conditions and environment of the industry. The price changes announced by the barometric firm serve as a barometer of changes in demand and supply conditions in the market.

The barometric leadership evolves for various reasons of which the major ones are the following.

First, the rivalry between the large firms may lead to cut-throat competition to the disadvantage of all the firms. On the other hand, rivalry between the larger firms may make them unacceptable as a leader. So a firm which has better predictive ability emerges as the price leader.

Second, most firms in the industry may have neither the capacity nor the desire to make continuous calculations of cost, demand and supply conditions. Therefore, they find it advantageous to accept the price changes made by a firm that has a proven ability to make reasonably good forecasts.

Third, Kaplan[44] *et. al.* observe that barometric price leadership often develops as a reaction to a long economic warfare in which all the firms are losers.

Critical Appraisal of Dominant Firm Model

The dominant-firm price-leadership model, as presented above, yields a stable solution to the problem of oligopoly pricing and output determination, only if the small firms faithfully follow the leader. That is, small firms produce and supply the quantity and charge the price set by the dominant firm. Besides, the model requires that the dominant firm should be both large and a low-cost firm. For, if a firm does not enjoy the advantage of large size and, consequent upon it, the advantage of low-cost, it cannot act as a price leader.

In practice, however, one finds many cases of price leadership by a firm which is neither large nor is a low-cost firm. But such cases are found mostly under recessionary conditions when a relatively smaller firm reduces its price to survive in the market.

Furthermore, if a leading firm loses its cost advantages, it also loses its leadership. Such cases are frequent in the real business world. Leadership also changes following the innovation of products and techniques of production by the relatively small firms.

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Besides, where there are many large firms of equal size that have some cost advantage, price leadership by any firm or group of firms becomes less probable, particularly when the number of small firms is smaller than that of larger firms. Under such conditions, barometric leadership emerges.

Lastly, it is assumed that the entry of new firms is prevented either by low-cost of the existing firms or by initial high cost of new firms. In practice, however, many firms having the capacity to diversify their products enter the industry with relatively low initial cost.

For these reasons, dominant firm leadership model is not a realistic one as it is based on unrealistic assumptions. For the same reasons, the solution given by this leadership model may not be stable.

The Nature of Non-Price Competition in Oligopoly Markets

It is obvious from the above discussion that oligopolists may be reluctant to wage price wars and encroach upon each other's market share. That is, there is an absence of price competition in the oligopolistic market structure. The absence of price competition should not mean the absence of competition among oligopoly firms. In fact, the competition among oligopoly firms takes the form of *non-price competition.* The forms of non-price competition are diverse. Yet, there are two important techniques of non-price competition.

First, non-price competition involves product differentiation that is intended to attract new customers by creating preference for the new design and product.

Second, perhaps the most important technique of non-price competition is advertisement. The primary objective of advertising is to make the demand curve for the product shift upward. The sellers try to encroach on the market of other sellers through advertising. Advertising is also necessary to retain market-share in the face of tough competition between the firms.

2.3.6 Collusion Model: The Cartel

A cartel is an association of business firms formed by an explicit agreement between them. Cartel agreements represent the most complete form of collusion among the oligopolists. Under cartel agreements, 'the firms jointly establish a cartel organization to make price and output decisions, to establish production quotas for each firm, and to supervise market activities of the firms in the industry.'[45] Cartel type of collusions are formed with a view to: (*i*) eliminating uncertainty surrounding the market and (*ii*) restraining competition and thereby ensuring monopolistic gains to the cartel group.

The cartel works through a Board of Control. One of the main functions of the board is to determine the market share for each of its members. For this purpose, the board calculates the marginal cost and marginal revenue for the industry. *MC* for the industry is the summation of *MCs* of individual firms. On the basis of industry's *MR* and *MC*, the total output for the industry is determined. The total output is then allocated between the member firms on the basis of their own *MC*. The determination of industry output is shown in Fig. 4.17(*c*) and the share of each firm in Figs. 4.17(*a*) and 4.17(*b*). For the sake of convenience, let us suppose that there are only two firms in the industry, Firm *A* and Firm *B*. Their cost curves are given in Fig. 4.17(*a*) and (*b*) respectively.

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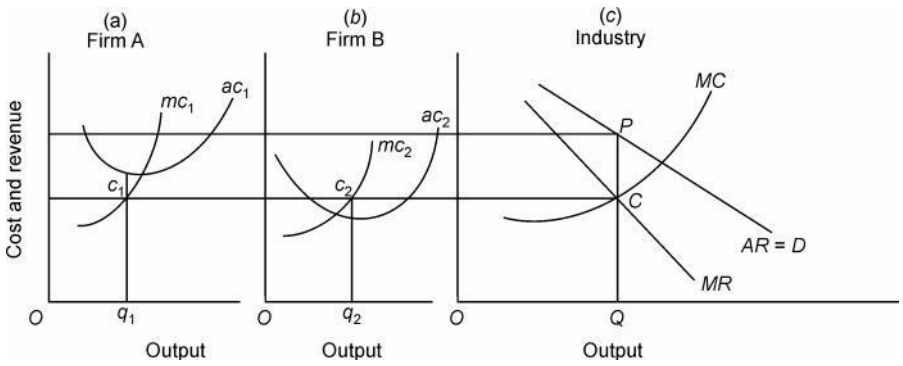

Fig. 4.17 *Market Allocation under Cartel*

As shown in Fig. 4.17(*c*), the industry's output is determined at *OQ* and price at *PQ*. The share of each firm in the industry's output, *OQ*, is determined at the level of their own output which equates their individual *MC* with the industry's *MC*. The industry's marginal cost, *CQ*, is determined by the intersection of industry's *MC* and *MR* at point *C*. The market share of each firm can be obtained by drawing a line from point *C* parallel to *X*-axis through mc_2 and mc_1 to the *Y*-axis. The points of intersection c_1 and c_2 determine the level of output for Firms *A* and *B* respectively. Thus, the share of each of the two firms *A* and *B*, is determined at Oq_1 and Oq_2 respectively, where $Oq_1 + Oq_2 = OQ$. Their total profit can be computed as (price – *ac*) × firm's output. The profit so computed is maximum for each firm. Therefore, there is no motivation for the firms to change their price and output. This shows the stability of price and output in the collusive oligopoly.

2.4 THE GAME THEORY

In the preceding section, we have discussed the classical models of strategic action and reaction among the oligopoly firms and the cartel system of price and output determination. We have also noted that none of the models explains satisfactorily the strategic actions and reactions of and interaction among the oligopoly firms to find a lasting solution to their profit maximization objective. But the search for a reasonable solution to this problem does not end here. Classical theories show, in fact, only the beginning of the effort to analyse the determination of the profit maximizing price and output in an oligopolistic market setting.

In this section, we discuss the ***game theory approach*** to explain the strategic interaction among the oligopoly firms. This approach uses the apparatus of *game theory*—a mathematical technique—to show how oligopoly firms play their game of business. The first systematic attempt was made in this field by von Neumann and Oskar Morgenstern.[46] Though their work was followed by many others, Martin Shubik[47] is regarded as the 'most prominent proponent of the game-theory approach' who 'seems to believe that the only hope for the development of a general theory of oligopoly is the games theory.'[48] The game theory is the choice of the best alternative from the conflicting options. Though his hope does not seem to be borne out by further attempts in this area, the usefulness of game theory in revealing the intricate behavioural pattern of the oligopoly firms cannot be denied. Here, we present an elementary description of the game theory as applied to oligopoly.[49] We will first illustrate the nature of the problem faced by the oligopoly firms in their strategy formulation through a widely used example of 'Prisoners' Dilemma'.

Check Your Progress

12. What is homogenous or pure oligopoly?
13. Name the economist who first developed a formal oligopoly model in 1838.
14. Give one reason for the criticism garneved by Cournot's model of duopoly.
15. What is a cartel?

NOTES

2.4.1 The Nature of the Oligopoly Problem: The Prisoners' Dilemma

The nature of the problem faced by the oligopoly firms is best explained by the *Prisoners' Dilemma Game*. To illustrate *prisoners' dilemma,* let us suppose that there are two persons, *A* and *B*, who are partners in an illegal activity of match fixing. On a tip-off, the CBI arrests *A* and *B*, on suspicion of their involvement in fixing cricket matches. They are arrested and lodged in separate jails with no possibility of communication between them. They are being interrogated separately by the CBI officials with following conditions disclosed to each of them in isolation.

1. If you confess your involvement in match fixing, you will get a 5-year imprisonment.
2. If you deny your involvement and your partner denies too, you will be set free for lack of evidence.
3. If one of you confesses and turns approver, and the other does not, then one who confesses gets a 2-year imprisonment, and one who does not confess gets 10 year imprisonment.

Given these conditions, each suspect has two options open to him: (*i*) to confess or (*ii*) not to confess. Now, both *A* and *B* face a dilemma on how to decide whether or not to confess. While taking a decision, both have a common objective, i.e., to minimize the period of imprisonment. Given this objective, the option is quite simple that both of them deny their involvement in match-fixing. But, there is no certainty that if one denies his involvement, the other will also deny—the other one may confess and turn approver. With this uncertainty, the dilemma in making a choice still remains. For example, if *A* denies his involvement, and *B* confesses (settles for a 2-year imprisonment), then *A* gets a 10 year jail term. So is the case with *B*. If they both confess, then they get a 5-year jail term each. Then what to do? That is the dilemma. The nature of their problem of decision-making is illustrated in the following Table 4.3 in the form of a 'pay-off matrix'. The pay-off matrix shows the pay-offs of their different options in terms of the number of years in jail.

Table 4.3 *Prisoners' Dilemma: The Pay-off Matrix*

		B's Options			
		Confess		*Deny*	
A's Options	Confess	*A* 5	*B* 5	*A* 2	*B* 10
	Deny	*A* 10	*B* 2	*A* 0	*B* 0

Given the conditions, it is quite likely that both the suspects may opt for 'confession', because neither *A* knows what *B* will do, nor *B* knows what *A* will do. When they both confess, each gets a 5-year jail term. This is the second best option. For his decision to confess, *A* might formulate his strategy in the following manner. He reasons: if I confess (though I am innocent), I will get a maximum of 5 years' imprisonment. But, if I deny (which I must) and*B* confesses and turns approver then I will get 10 years' imprisonment. That will be the worst scenario. It is quite likely that suspect *B* also reasons out his case in the same manner, even if he too is innocent. If they both confess, they would avoid 10 years' imprisonment, the maximum possible jail sentence under the law. This is the best they could achieve under the given conditions.

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Relevance of Prisoners' Dilemma to Oligopoly

The prisoners' dilemma illustrates the nature of problems oligopoly firms are confronted with in the formulation of their business strategy with respect to such problems as strategic advertising, price cutting or cheating the cartel if there is one. Look at the nature of problems an oligopoly firm is confronted with when it plans to increase its *advertisement* expenditure (ad-expenditure for short). The basic issue is whether or not to increase the ad-expenditure. If the answer is 'do not increase', then the following questions arise. Will the rival firms increase ad-expenditure or will they not? If they do, what will be the consequences for the firm under consideration? And, if the answer is 'increase', then the following questions arises. What will be the reaction of the rival firms? Will they increase or will they not increase their ad-expenditure? What will be the pay-off if they do not and what if they do? If the rival firms do increase their advertising, what will be the pay-off to the firm? Will the firm be a net gainer or a net loser? The firm planning to increase ad-spending will have to find the answer to these queries under the conditions of uncertainty. To find a reasonable answer, the firm will have to anticipate actions, reactions and counter-actions by the rival firms and chalk out its own strategy. It is in case of such problems that the case of prisoners' dilemma becomes an illustrative example.

2.4.2 Application of Game Theory to Oligopolistic Strategy

Let us now apply the game theory to our example of 'whether or not to increase ad-expenditure', assuming that there are only two firms, *A* and *B*, i.e., the case of a duopoly. We know that in all games, the players have to anticipate the moves of the opposite player(s) and formulate their own strategy to counter them. To apply the game theory to the case of 'whether or not to increase ad-expenditure', the firm needs to know or anticipate the following:

(i) Counter moves by the rival firm in response to increase in ad-expenditure by this firm

(ii) The *pay-offs* of this strategy under two conditions: (*a*) when the rival firm does not react and (*b*) the rival firm does make a counter move by increasing its ad-expenditure

After this data is obtained, the firm will have to decide on the best possible strategy for playing the game and achieving its objective of, say, increasing sales and capturing a larger share of the market. The best possible strategy in game theory is called the 'dominant strategy'. A *dominant strategy is one that gives optimum pay-off, no matter what the opponent does.* Thus, the basic objective of applying the game theory is to arrive at the dominant strategy.

Suppose that the possible outcomes of the ad-game under the alternative moves are given in the pay-off matrix presented in Table 4.4.

Table 4.4 *Pay-off Matrix of the Ad-Game*

(Increase in sales in million `)

		B's Options			
		Increase Ad		*Dont't increase*	
A's Strategy	Increase Ad	*A* 20	*B* 10	*A* 30	*B* 0
	Don't increase	*A* 10	*B* 15	*A* 25	*B* 5

NOTES

As the matrix shows, if Firm *A* decides to increase its ad-expenditure, and Firm *B* counters *A*'s move by increasing its own ad-expenditure, *A*'s sales go up by ` 20 million and those of Firm *B* by ` 10 million. And, if Firm *A* increases its advertisement and *B* does not, then *A*'s sales increase by ` 30 million and there are no sales gain for Firm *B*. One can similarly find the pay-offs of the strategy 'Don't increase' in case of both firms.

Given the pay-off matrix, the question arises, what strategy should Firm *A* choose to optimize its gain from extra ad-expenditure, irrespective of counter-action by the rival Firm *B*. It is clear from the pay-off matrix that Firm *A* will choose the strategy of increasing the ad-expenditure because, no matter what Firm *B* does, its sales increase by at least ` 20 million. This is, therefore, the *dominant strategy* for Firm *A*. A better situation could be that when Firm *A* increases its expenditure on advertisement, Firm *B* does not. In that case, sales of Firm *A* could increase by ` 30 million and sales of Firm *B* do not increase. But there is a greater possibility that Firm *B* will go for counter-advertising in anticipation of losing a part of its market to Firm *A* in future. Therefore, a strategy based on the assumption that Firm *B* will not increase its ad-expenditure involves a great deal of uncertainty.

Nash Equilibrium

In the preceding section, we have used a very simple example to illustrate the application of game theory to an oligopolistic market setting, with the simplifying assumptions:

- That strategy formulation is a one-time affair
- That one firm initiates the competitive warfare and other firms only react to action taken by one firm
- That there exists a *dominant strategy*—a strategy which gives an optimum solution

The real-life situation is, however, much more complex. There is a continuous one-to-one and tit-for-tat kind of warfare. Actions, reactions and counter-actions are regular phenomena. Under these conditions, a *dominant strategy* is often non-existent. To analyse this kind of situation, John Nash,[50] an American mathematician, developed a technique, which is known as *Nash equilibrium*. *Nash equilibrium technique* seeks to establish that each firm does the best it can, given the strategy of its competitors and a *Nash equilibrium is one in which none of the players can improve their pay-off given the strategy of the other players.* In case of our example, Nash equilibrium can be defined as one in which none of the firms can increase its pay-off (sales) given the strategy of the rival firm.

The Nash equilibrium can be illustrated by making some modifications in the pay-off matrix given in Table 4.4. Now we assume that action and counter-action between Firms *A* and *B* is a regular phenomenon and the pay-off matrix that appears finally is given in Table 4.5. The only change in the modified pay-off matrix is that if neither Firm *A* nor Firm *B* increases its ad-expenditure, then pay-offs change from (15, 5) to (25, 5).

Table 4.5 *Nash Equilibrium: Pay-off Matrix of the Ad-Game*

(Increase in sales in million `)

		B's Options			
		Increase AD		Dont't increase	
A's Strategy	Increase Ad	*A* 20	*B* 10	*A* 30	*B* 0
	Don't increase	*A* 10	*B* 15	*A* 25	*B* 5

It can be seen from the pay-off matrix (Table 4.5) that Firm *A* no longer has a *dominant strategy*. Its optimum decision depends now on what Firm *B* does. If Firm *B* increases its ad-expenditure, Firm *A* has no option but to increase its advertisement expenditure. And, if Firm *A* reinforces its advertisement expenditure, Firm *B* will have to follow suit. On the other hand, if Firm *B* does not increase its ad-expenditure, Firm *A* does the best by increasing its ad-expenditure. Under these conditions, the conclusion that both the firms arrive at is to increase ad-expenditure if the other firm does so, and 'don't increase', if the competitor 'does not increase'. In the ultimate analysis, however, both the firms will decide to increase the ad-expenditure. The reason is that if none of the firms increases its ad-outlay, Firm *A* gains more in terms of increase in its sales (` 25 million) and the gain of Firm *B* is much less (` 5 million only). And, if Firm *B* increases advertisement expenditure, its sales increase by ` 10 million. Therefore, Firm *B* would do best to increase its ad-expenditure. In that case, Firm *A* will have no option but to do likewise. Thus, the *final conclusion* that emerges is that both the firms will go for advertisement war. In that case, each firm finds that it is doing the best given what the rival firm is doing. This is the Nash equilibrium.

However, there are situations in which there can be more than one Nash equilibrium. For example, if we change the pay-off in the south-east corner from (25, 5) to (22, 8); each firm may find it worthless to wage advertisement wars and may settle for 'don't increase' situation. Thus, there are two possible Nash equilibria.

2.5 SUMMARY

In this unit you have learnt that,

- In economic sense, a market is a system by which buyers and sellers bargain for the price of a product, settle the price and transact their business—buy and sell a product. Personal contact between the buyers and sellers is not necessary.
- The market structure determines a firm's power to fix the price of its product a great deal. The degree of competition determines a firm's degree of freedom in determining the price of its product.
- Price is arrived at by the interaction between demand and supply. Price is dependent upon the characteristics of both these fundamental components of a market.
- Under perfect competition, a large number of firms compete against each other for selling their product. Therefore, the degree of competition under perfect competition is close to one, i.e., the market is highly competitive.
- The term perfect competition refers to a set of conditions prevailing in the market. Under perfect competition, the number of sellers and buyers is very large.

NOTES

Check Your Progress

16. What apparatus does the game theory approach use?
17. What does the prisoners' dilemma illustrate?
18. What is a dominant strategy?

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- Perfect competition less perfect mobility of factors and perfect knowledge is regarded as pure competition.
- Market demand refers to the demand for the industry as a whole: it is the sum of the quantity demanded by each individual consumer or user at different prices.
- In the market period, the total output of a product is fixed. Each firm has a stock of commodity to be sold. The stock of goods with all the firms makes the total supply.
- The term pure monopoly means an absolute power of a firm to produce and sell a product that has no close substitute. In other words, a monopolized market is one in which there is only one seller of a product having no close substitute.
- Price discrimination means selling the same or slightly differentiated product to different sections of consumers at different prices, not commensurate with the cost of differentiation. Consumers are discriminated on the basis of their income or purchasing power, geographical location, age, sex, colour, marital status, quantity purchased, time of purchase, etc.
- The degree of price discrimination refers to the extent to which a seller can divide the market or the consumers and can take advantage of it in extracting the consumer's surplus.
- Like perfect competition, pure private monopolies are rare phenomena. The real business world is, in fact, characterized largely by monopolistic competition and oligopoly.
- One of the simplest measures of degree of monopoly power of firms is to count the number of firms in an industry. The smaller the number of firms, the greater the degree of monopoly power of each firm in the industry, and conversely, the larger the number of firms, the greater the possibility of absence of monopoly power.
- The model of price and output determination under monopolistic competition developed by Edward H. Chamberlin in the early 1930s dominated the pricing theory until recently. Although the relevance of his model has declined in recent years, it has still retained its theoretical flavour.
- The two most common forms of non-price competition are product innovation and advertisement.
- Chamberlin was the first to introduce the concept of differentiated product and selling costs as a decision variable and to offer a systematic analysis of these factors. Another important contribution of Chamberlin is the introduction of the concept of demand curve based on market share as a tool of analysing behaviour of firms, which later became the basis of the kinked-demand curve analysis.
- Oligopoly is defined as a market structure in which there are a few sellers selling homogeneous or differentiated products.
- The most striking feature of an oligopolistic market structure is the interdependence of oligopoly firms in their decision-making. The characteristic fewness of firms under oligopoly brings the firms in keen competition with each other.
- Augustin Cournot, a French economist, was the first to develop a formal oligopoly model in 1838 in the form of a duopoly model. Cournot developed his model with the example of two firms, each owning a spring of mineral water and water being produced at zero cost.

- The kinked demand curve model of oligopoly was developed by Paul M. Sweezy and also by Hall and Hitch in the same year (1939). This model is, however, famous by Sweezy's name as his model is treated to be analytically superior.
- A major criticism against Sweezy's model is that it explains only the stability of output and price—it does not say how the initial price is determined at a certain level.
- Price leadership by a dominant firm is more common than that by a low-cost firm. In the analysis of price leadership by a dominant firm, it is assumed that there exists a large sized firm in the industry, which supplies a large proportion of the total market.
- The dominant-firm price-leadership model, yields a stable solution to the problem of oligopoly pricing and output determination, only if the small firms faithfully follow the leader. That is, small firms produce and supply the quantity and charge the price set by the dominant firm.
- A cartel is an association of business firms formed by an explicit agreement between them. Cartel agreements represent the most complete form of collusion among the oligopolists.
- The cartel works through a Board of Control. One of the main functions of the board is to determine the market share for each of its members. For this purpose, the board calculates the marginal cost and marginal revenue for the industry.
- The game theory approach uses the apparatus of *game theory*—a mathematical technique—to show how oligopoly firms play their game of business. The first systematic attempt was made in this field by von Neumann and Oskar Morgenstern.
- The nature of the problem faced by the oligopoly firms is best explained by the Prisoners' Dilemma Game.
- The prisoners' dilemma illustrates the nature of problems oligopoly firms are confronted with in the formulation of their business strategy with respect to such problems as strategic advertising, price cutting or cheating the cartel if there is one.
- John Nash, an American mathematician, developed a technique, which is known as Nash equilibrium. Nash equilibrium technique seeks to establish that each firm does the best it can, given the strategy of its competitors and a Nash equilibrium is one in which none of the players can improve their pay-off given the strategy of the other players.

2.6 KEY TERMS

- **Market:** In economic sense, a market is a system by which buyers and sellers bargain for the price of a product, settle the price and transact their business—buy and sell a product.
- **Market demand:** It refers to the demand for the industry as a whole: it is the sum of the quantity demanded by each individual consumer or user at different prices.
- **Short-run:** A short-run is, by definition, a period in which firms can neither change their scale of production or quit, nor can new firms enter the industry.

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- **Pure monopoly:** It means an absolute power of a firm to produce and sell a product that has no close substitute.
- **Price discrimination:** When consumers are discriminated on the basis of these factors in regard to price charged from them, it is called price discrimination.
- **Monopolistic competition:** It is defined as market setting in which a large number of sellers sell differentiated products.
- **Oligopoly:** It is defined as a market structure in which there are a few sellers selling homogeneous or differentiated products.
- **Cartel:** Acartel is an association of business firms formed by an explicit agreement between them.
- **Dominant strategy:** A dominant strategy is one that gives optimum pay-off, no matter what the opponent does.

2.7 ANSWERS TO 'CHECK YOUR PROGRESS'

1. In economic sense, a market is a system by which buyers and sellers bargain for the price of a product, settle the price and transact their business—buy and sell a product. Personal contact between the buyers and sellers is not necessary.
2. Price is arrived at by the interaction between demand and supply. Price is dependent upon the characteristics of both these fundamental components of a market. Demand and supply represent the willingness of consumers and producers to engage in buying and selling. An exchange of a product takes place when buyers and sellers can agree upon a price.
3. Perfect competition less perfect mobility of factors and perfect knowledge is regarded as pure competition.
4. A short-run is, by definition, a period in which firms can neither change their scale of production or quit, nor can new firms enter the industry.
5. The term pure monopoly means an absolute power of a firm to produce and sell a product that has no close substitute. In other words, a monopolized market is one in which there is only one seller of a product having no close substitute.
6. Price discrimination means selling the same or slightly differentiated product to different sections of consumers at different prices, not commensurate with the cost of differentiation. Consumers are discriminated on the basis of their income or purchasing power, geographical location, age, sex, colour, marital status, quantity purchased, time of purchase, etc.
7. When a profit maximizing monopolist sets different prices in different markets having demand curves with different elasticities, he is practising the *third degree price discrimination*.
8. One of the simplest measures of degree of monopoly power of firms is to count the number of firms in an industry. The smaller the number of firms, the greater the degree of monopoly power of each firm in the industry, and conversely, the larger the number of firms, the greater the possibility of absence of monopoly power.
9. Monopolistic competition is defined as market setting in which a large number of sellers sell differentiated products.

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10. The two most common forms of non-price competition are product innovation and advertisement.
11. Chamberlin was the first to introduce the concept of differentiated product and selling costs as a decision variable and to offer a systematic analysis of these factors. Another important contribution of Chamberlin is the introduction of the concept of demand curve based on market share as a tool of analysing behaviour of firms, which later became the basis of the kinked-demand curve analysis.
12. Oligopoly is defined as a market structure in which there are a few sellers selling homogeneous or differentiated products. Where oligopoly firms sell a homogeneous product, it is called pure or homogeneous oligopoly.
13. Augustin Cournot, a French economist, was the first to develop a formal oligopoly model in 1838 in the form of a duopoly model.
14. Cournot's assumption of zero cost of production is unrealistic though dropping this assumption does not alter his position.
15. A cartel is an association of business firms formed by an explicit agreement between them. Cartel agreements represent the most complete form of collusion among the oligopolists.
16. The game theory approach uses the apparatus of *game theory*—a mathematical technique—to show how oligopoly firms play their game of business. The first systematic attempt was made in this field by von Neumann and Oskar Morgenstern.
17. The prisoners' dilemma illustrates the nature of problems oligopoly firms are confronted with in the formulation of their business strategy with respect to such problems as strategic advertising, price cutting or cheating the cartel if there is one.
18. A dominant strategy is one that gives optimum pay-off, no matter what the opponent does.

2.8 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What factors determine the market structure? How does the market structure affect pricing decision of a firm?
2. Define perfect competition. Distinguish between perfect competition and pure competition. What are the characteristics of a perfectly competitive market?
3. What factors determine the price of a product under perfect competition? Why is a firm under perfect competition a price-taker and not a price-maker?
4. What are the conditions that characterize: (*a*) market period or very short-run, (*b*) short-run and (*c*) long-run? How do the firms find their equilibrium in these market periods under perfect competition?
5. (*a*) Define monopoly and describe the measures of monopoly power of a firm.
   (*b*) What are the sources of monopoly of a firm? Distinguish between a franchise monopoly and natural monopoly?
6. (*a*) How is the demand curve for a monopoly firm different from that of a firm under perfect competition? Illustrate the difference graphically.

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(b) Can a monopoly firm charge any price for its product? If not, why?

(c) Can a monopoly firm always earn an abnormal profit?

7. (*a*) What is meant by price discrimination? Why do monopoly firms adopt discriminatory pricing policy?

   (*b*) What are the necessary conditions for price discrimination? Under what conditions is price discrimination desirable and profitable?

8. Suppose price function of a monopoly firm is given as:

   $P = 405 - 4Q$

   and its total cost *(TC)* function is given as:

   $TC = 40 + 5Q + Q^2$

   Find the following.

   (a) Total revenue function;

   (b) Average revenue function;

   (c) Profit maximizing monopoly output; and

   (d) Profit maximizing price.

9. A monopoly firm has to sell its product in two markets—Market 1 and Market 2. The price functions for the two markets are given as follows.

   $P1 = 500 - Q_1$

   $P2 = 300 - Q_2$

   The monopoly firm's total cost (*TC*) function is given as:

   $TC = 50{,}000 + 100Q$

   Find the following.

   (a) Profit maximizing output;

   (b) Allocation of total output between the two markets;

   (c) Equilibrium price for each market; and

   (d) Total profit at profit maximizing output.

10. (*a*) Define monopolistic competition. How is monopolistic competition different from perfect competition?

    (*b*) Theoretically, equilibrium of the firm is so determined that $AC = AR$ under both monopolistic competition and perfect competition. But which of the two market situations is preferable from society's point of view?

11. What is meant by product differentiation? What methods are generally adopted by the firms under monopolistic competition for differentiation of their products from those of the rival firms? How does product differentiation help firms under monopolistic competition?

12. Suppose firms under monopolistic competition face a uniform demand function as given below.

    $Q_1 = 100 - 0.5P_1$

    And their total cost (*TC*) function is given as

    $TC = 1562.50 + 5Q - Q^2 + 0.05Q^3$

    When new firms enter the industry, the demand function for each firm changes to

    $Q_2 = 98.75 - P_2$

Find answers to the following questions.

(a) What was the motivation for the new firms to enter the industry?

(b) How are the equilibrium price and output of the old firms affected by the entry of the new firms?

(Compare your answer with the solution given in the text)

13. Define oligopoly. What is the basic difference between oligopoly and monopolistic competition? In which of the two kinds of markets price and output are indeterminate?
14. What are the basic assumptions of Sweezy's model of oligopoly? What does Sweezy's model seek to establish? Illustrate your answer. Also state the shortcomings of Sweezy's model.
15. What is a cartel? Assuming that there are only two firms, show how market demand is divided between the two firms.
16. The demand curve for oligopoly firms is given by the function

    $D_1 = 50 - 0.5P_1$

    The firms however believe that their individual demand function is

    $D_2 = 80 - P_2$

    Their cost function (identical) is given as

    $TC = 150 + 10Q + 0.05Q^2$

    (i) Find the initial level of price and output, and

    (ii) What is the range of variation in *MC* which will not affect the price and output?

17. Suppose there are two oligopoly firms—Firm 1 and Firm 2. Firm 1 is a low-cost firm whereas Firm 2 is a high-cost firm. Both the firms face an identical demand curve given by the demand function as $Q = 50 - 0.5P$

    The cost functions of the two firms are given, respectively, as

    $TC_1 = 100 + 20Q1 + 2Q1^2$ and $TC_2 = 48 + 36Q_2 + 2Q2^2$

    Find the following:

    (a) Price and output of the firms separately prior to Firm 1 working as the price leader.

    (b) Price and output of Firm 2 after it accepts the price leadership of Firm 1.

Long-Answer Questions

1. Distinguish between (*a*) perfect competition and imperfect competition, (*b*) monopoly and monopolist competition and (*c*) monopolistic competition and oligopoly.
2. How is the price of a commodity determined in a perfectly competitive market? Illustrate and explain how firms under perfect competition find their equilibrium.
3. Explain price and output determination under the conditions of perfect competition in the short-run and in the long-run. Illustrate your answer graphically. How is the short-run equilibrium of a firm different from its long-run equilibrium?

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4. (*a*) Explain and illustrate price and output determination by a monopoly firm in the short-run.

   (*b*) How is long-run equilibrium of a monopoly firm different from short-run equilibrium? Illustrate your answer.

5. Suppose a monopoly firm faces two markets (*A* and *B*) with different demand curves for its product. Explain and illustrate how a discriminatory monopoly firm would determine its profit maximizing output, divide its total output between the two markets and determine price for the two markets.

6. Why is third degree price discrimination more common than the first and second degree price discrimination? Explain the third degree price discrimination and illustrate the final position graphically.

7. Explain and illustrate the determination of equilibrium price and output under monopolistic competition in the short-run. How does a firm's long-run equilibrium differ from its short-run equilibrium?

8. What is the factor that affects firms' equilibrium in the long-run? Explain and illustrate the determination of equilibrium price and output under monopolistic competition in the long-run.

9. What is meant by selling cost? How does competitive selling cost affect firms' equilibrium in the long-run? Explain and illustrate the ultimate position of the firm following Chamberlin's approach.

10. Explain the kinked demand curve model and show that price once determined under oligopoly does not change even if *MC* changes within a range.

11. What are the factors that create price leadership for a firm under oligopoly? Explain price determination by using dominant firm leadership model. Show also how total demand is divided between the dominant firm and small firms.

12. Explain and illustrate the price leadership of a low-cost firm. Why do the high-cost firms accept a price lower than their profit maximizing price?

13. Discuss the game theory and the prisoners' dilemma in an oligopoly.

2.9 FURTHER READING

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Endnotes

1. *Managerial Economics*, (Prentice-Hall, Englewood Cliffs, N.J.), 1951.
2. *The Theory of Monopolistic Competition*, (Harvard University Press, Mass, 1933).
3. Watson, D.S., *Price Theory and its Uses*, (Scientific Book Agency, Calcutta, 1967), p. 294.
4. Ferguson, C.E., *Macroeconomic Theory*, (Richard D. Irwin, Illinois, 1972), p. 28.
5. *Proof.* Let us suppose a linear demand function is given as $Q = \propto - \beta p$. From this demand function, a price function is derived as $P = a - bQ$, where b gives slope of the demand curve.

   Given the price function, total revenue equation can be worked out as

   $TR = Q.\ P = Q\ (a - bQ) = aQ - bQ^2$

   Since *MR* equals the first derivative of the *TR* equation,

   $$\frac{\partial TR}{\partial Q} = a - 2\ bQ$$

   Obviously, the slope of *MR* curve is $-2b$ whereas the slope of $AR = -b$. Thus the rate of fall in *MR* is twice that of *AR*.
6. A study of medical doctors in the US by Ruben A. Kessel, "Price Discrimination in Medicine," *JL of Law and Eco.*, October 1959, reveals that charity, not profit maximization, is the objective of price discrimination. The idea behind charging a higher fee from the rich patients is to finance the treatment of poor. This is however a rare phenomenon. One can find such medical practioners and hospitals in India also.
7. Joan Robinson calls it 'perfect discrimination' from a monopolist's point of view.
8. Consumer surplus is the difference between the price a consumer is willing to pay and the price he actually pays.
9. Hunter, Alex, *Measurement of Monopoly Power* in 'Monopoly and Competition', ed. By Alex Hunter, (Penguin Book, 1970), p. 92.
10. Maclup, Fritz, *The Political Economy of Monopoly*, (The Johns Hopkins Press, Baltimore, 1952), p. 470.
11. Hunter, A., *op. cit.*, p. 101.
12. *Ibid*.
13. Maclup, Fritz, *op. cit.*, p. 477.
14. Hunter, A., *op. cit.*, p. 102.
15. "The Concept of Monopoly and the Measure of Monopoly Power," *Review of Economic Studies*, June 1934.
16. Chamberlin, E.H., *The Theory of Monopolistic Competition*, Harvard University Press, Cambridge, Mass., 1933.
17. *Op. cit.*
18. Mansfield, E., *Managerial Economics: Theory, Applications and Cases*, *op. cit.*, p. 413.

NOTES

19. It is argued that the demand curve under monopolistic competition is indeterminate. However, for analytical convenience, it is assumed that the firms under monopolistic competition face an identical downward sloping demand curve.
20. The other important change is increase in advertisement cost.
21. For a detailed analysis of 'free entry' and 'price competition' and of their combined effects, see author's *Microeconomic Theory and Application* (Pearson Education, 2003), Ch. 18, *Appendix*.
22. Whether slope of the *AR* increases or not is a matter of empirical verification. However, the theory of pricing under monopolistic competition assumes that at least the firms believe that the demand curve for their product is more elastic than the market demand curve.
23. Alternatively, Eq. (4.22) can be solved for Q_1 by setting the equation equal to zero. Thus,

$$0.15Q_1^2 + 2Q_1 - 195 = 0$$

In order to eliminate fraction 0.15, let us multiply both sides by 20. We get an equation as

$$= 3Q^2 + 40Q_1 - 3900 = 0$$

By using quadratic formula, we get

$$Q = \frac{-40 \pm \sqrt{1600 + 12 \times 3900}}{6} = \frac{-40 \pm \sqrt{1600 + 46800}}{6} = \frac{-40 + 220}{6}$$

$$Q = 30$$

24. Cohen, K.J., and R.M. Cyert, *Theory of the Firm*, New Delhi, Prentice-Hall of India, 1976, p. 230.
25. *Ibid.*, pp. 229-30.
26. *Ibid*.
27. The term 'oligopoly' has been derived from two Greek words: *Oligi* meaning 'a few', and *polein* meaning 'sellers'. Thus, oligopoly is a market setting in which there are only a few sellers.
28. Salvatore, D., *Managerial Economics*, (N.Y., McGraw-Hill, 1989), p. 475.
29. On the basis of data published by the CMIE in August 1999 issue of its *Industries and Market Share*.
30. The 'concentration ratio' is the measure of degree by which a small number of firms dominate the industry. It is the percentage share of dominant (4 to 12) firms in the total sales of the industry. The US Census of manufacturing uses 4, 8 and 12 firms for working out the concentration ratio.
31. Market share of individual firms vary to a great extent. For example, in 1997-98, Hindustan Lever had a share of 74% of the ice-cream market; Surya Roshni had 61% share in fluorescent lamp market; MUL had 76.1% market share in passenger cars; and *ITC* had 75.38% market share in cigarettes.
32. *Microeconomic Decisions*, (Houghton Miflin Company, Boston, 1976), p. 249.
33. The month in which automobile manufacturers introduce new models.
34. Baumol, W.J., *Economic Theory and Operations Analysis*, New Delhi, (Prentice Hall of India, 4th edn., 1985), p. 410.
35. Baumol, W.J., *op. cit.*, p. 410.
36. Cournot, Augustin, *Research into the Mathematical Principles of the Theory of Wealth*, Translation by Nathaniel T. Bacon, (New York, Macmillan, 1897).
37. Under zero cost condition, the total revenue is the same as the total profit.
38. Note that where $MR = 0$, price elasticity, $e = 1$, i.e., $PM/PD = 1 = QM/OQ$. This means, $PM = PD$ and $QM = OQ$.
39. Sweezy, Paul M., "Demand under Conditions of Oligopoly", *Jl. of Pol. Eco.*, August 1939, pp. 568–573.

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40. Hall, R.L. and C.J. Hitch, "Price Theory and Price Behaviour", *Oxford University Papers*, May 1939.
41. All the firms in oligopoly market are supposed to face identical demand curve.
42. Stigler, George "The Kinky Oligopoly Demand Curve and Rigid Prices", *Jl. of Pol. Eco*., October 1997, pp. 432–40.
43. Simon, Julian "A Further Test of the Kinky Oligopoly Demand Curve", *Am. Eco. Rev*., December 1969, pp. 971–75.
44. Kaplan, A.D.H., Joel B. Dirlam, and Robet F. Lanzillotti, *Pricing in Big Business*, (Washington, D.C. the Brooking Institution, 1958), p. 206. Quoted in Cohen and Cyret, *op. cit*.
45. Leftwitch, *op. cit.*, p. 184.
46. Neumann Von, and O. Margenstern, *Theory of Games and Economic Behaviour* (*Princeton University Press, Princeton, N.J.*) 1944.
47. See Martin Shubik, *Strategy and Market Structure* (John Wiley, 1959), and his *Game Theory in the Social Sciences* (Cambridge, Mass, MIT Press, 1982). A more recent and in-depth work on the game theory and its application to economic and management problems can be found in Prajit K. Dutta, *Strategies and Games* (Cambridge, Mass., MIT Press, 1990).
48. Koutsoyiannis, A., *Modern Macroeconomics*, 2nd Edn. (Macmillan London, 1979), p. 404.
49. For a comprehensive discussion on the game theory and its application to oligopolistic behaviour, see James W. Friedman, *Game Theory with Application to Economics* (NY, Oxford University Press, 1990), David Krepps, *A Course in Microeconomic Theory* (N.J., Princeton University Press, 1990). For a brief discussion on and application of the game theory to oligopoly, see Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics* (Prentice-Hall of India, New Delhi, 1995), Third Edn., Ch. 13, and F.M. Scherer, *Industrial Market Structure and Economic Performance* (Chicago, Rand McNally, 1980), pp. 160–164.
50. The technique of finding equilibrium where there is no 'dominant strategy', called 'Nash equilibrium' was developed by John Nash, an American mathematician, in 1951.

UNIT III NATIONAL INCOME AND ITS CLASSICAL DETERMINATION

NOTES

Structure

3.0 INTRODUCTION

National income is the final outcome of all economic activities of a nation valued in terms of money. National income is the most important macroeconomic variable and determinant of the business level and economic status of a country. The level of national income determines the level of aggregate demand for goods and services. Its distribution pattern determines the pattern of demand for goods and services, i.e., how much of what good is demanded and produced. The trend in national income determines the trends in aggregate demand and also the economic prospects. Therefore, policy makers and economic analysts need to keep in mind these aspects of the national income, especially those having long-run implications. National income or a relevant component of it is an indispensable variable considered in economic forecasting.

In this unit, we will discuss the basic concepts of national income used in business analysis and business decisions, methods of measuring national income and the classical theory of output and employment.

NOTES

3.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Discuss the various measures of national income like GDP, NDP, GNP and NNP
- Describe the methods of measuring national income
- Explain the circular flow of income and expenditure
- Assess the classical theory of income, output and employment
- Compare the classical and the Keynesian models of income determination

3.2 MEASURES OF NATIONAL INCOME

Conceptually, national income is the money value of all final goods and services produced in a country during a period of one year. Economic activities generate a large number of goods and services and make net addition to the national stock of capital. These together constitute the national income of a 'closed economy'—an economy which has no economic transactions with the rest of the world. In an 'open economy', national income includes also the net results of its transactions with the rest of the world (i.e., exports *less* imports).

Economic activities should be distinguished from the non-economic activities from a national point of view. Broadly speaking, ***economic activities*** include all human activities which create goods and services that can be valued at market price. Economic activities include production by farmers (whether for household consumption or for market), production by firms in the industrial sector, production of goods and services by the government enterprises, and services produced by business intermediaries (wholesalers and retailers), banks and other financial organizations, universities, colleges and hospitals etc. On the other hand, ***non-economic activities*** are those which produce goods and services that do not have any economic value. Non-economic activities include spiritual, psychological, social and political services. The non-economic category of activities also includes hobbies, service to self, services of housewives, services of members of family to other members and exchange of mutual services between neighbours.

3.2.1 Gross National Product (GNP)

Of the various measures of national income used in national income analysis, *GNP* is the most important and widely used measure of national income. It is the most comprehensive measure of the nation's productive activities. *The GNP is defined as the value of all final goods and services produced during a specific period, usually one year, plus incomes earned abroad by the nationals minus incomes earned locally by the foreigners*. The *GNP* so defined is identical to the concept of gross national income (*GNI*). Thus, *GNP = GNI*. The difference between the two is only of procedural nature. While *GNP* is estimated on the basis of product-flows, *GNI* is estimated on the basis of money income flows, (*i.e.*, wages, profits, rent, interest, etc.).

3.2.2 Gross Domestic Product (GDP)

The Gross Domestic Product (*GDP*) is defined as the market value of all final goods and services produced in the domestic economy during a period of one year, *plus* income earned locally by the foreigners *minus* incomes earned abroad by the nationals. The concept of *GDP* is similar to that of *GNP* with a significant procedural difference. In case of *GNP* the incomes earned by the nationals in foreign countries are added and incomes earned locally by the foreigners are deducted from the market value of

domestically produced goods and services. In case of *GDP*, the process is reverse—incomes earned locally by foreigners are added and incomes earned abroad by the nationals are deducted from the total value of domestically produced goods and services.

3.2.3 Net National Product (NNP) and Per Capita Income

NNP is defined as *GNP less* depreciation, i.e.,

NNP = GNP – Depreciation

Depreciation is that part of total productive assets which is used to replace the capital worn out in the process of creating *GNP*. Briefly speaking, in the process of producing goods and services (including capital goods), a part of total stock of capital is used up. 'Depreciation' is the term used to denote the worn out or used up capital. An estimated value of depreciation is deducted from the *GNP* to arrive at *NNP*.

The *NNP*, as defined above, gives the measure of net output available for consumption by the society (including consumers, producers and the government).*NNP* is the real measure of the national income. *NNP = NNI* (net national income). In other words, *NNP* is the same as the national income at *factor cost*. It should be noted that *NNP* is measured at market prices including direct taxes. Indirect taxes are, however, not a part of actual cost of production. Therefore, to obtain real national income, indirect taxes are deducted from the NNP. Thus, NNP *less* indirect taxes = National Income.

3.2.4 Net Domestic Product (NDP)

Net Domestic Product is an annual measure of the economic output of a state that is adjusted to account for depreciation, calculated by subtracting depreciation from the gross domestic product (GDP). The net domestic product (NDP) equals the gross domestic product (GDP) minus depreciation on a country capital goods. Net domestic product accounts for capital that has been consumed over the year in the form of housing, vehicle, or machinery deterioration. The depreciation accounted for is often referred to as capital consumption allowance and represents the amount of capital that would be needed to replace those depreciated assets. The data shows net domestic product.

3.3 METHODS OF NATIONAL INCOME ESTIMATION

National income of a country is generated by its people participating in different kinds of economic activities and produce goods and services for measuring national income. An economy is viewed from three different angles.

- The national economy is considered as an *aggregate of producing units* combining different sectors such as agriculture, mining, manufacturing, trade andcommerce, services, etc.
- The whole national economy is viewed as a *combination of individuals and households owning different kinds of factors of production* which they use themselves or sell factor-services to make their livelihood.
- The national economy may also be viewed as a collection of consuming, savingand investing units (individuals, households and government).

Following these notions of a national economy, national income may be measured by three different corresponding methods:

- *Net product method*—when the entire national economy is considered as an aggregate of producing units

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Check Your Progress

1. What is national income?
2. Define Gross Domestic Product (GDP).
3. What is the net domestic product?

NOTES

- *Factor-income method*—when national economy is considered as combination of factor-owners and users
- *Expenditure method*—when national economy is viewed as a collection of spending units

The procedures which are followed in measuring the national income in a *closed economy*—an economy which has no economic transactions with the rest of the world—are briefly described here. The measurement of national income in an open economy and adjustment with regard to income from abroad will be discussed subsequently.

3.3.1 Net Output or Value Added Method

The net output method is also called the *value added method*. In its standard form, 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 The net value of domestic product thus obtained is often called the *value added* or *income product* which is equal to the sum of wages, salaries, supplementary labour incomes, interest, profits, and net rent paid or accrued. Let us now describe the stages (i) and (ii) in some detail.

(a) Measuring Gross Value

For measuring the gross value of domestic product, output is classified under various categories on the basis of the nature of activities from which they originate. The output classification varies from country to country depending on: (i) the nature of domestic activities; (ii) their significance in aggregate economic activities, and (iii) availability of requisite data. For example, in the US, about seventy-one divisions and subdivisions are used to classify the national output; in Canada and the Netherlands, classification ranges from a dozen to a score; and in Russia, only half a dozen divisions are used. According to the CSO publication, fifteen sub-categories are currently used in India.

After the output is classified under the various categories, the value of gross output is computed in two alternative ways: (i) by multiplying the output of each category of sector by their respective market price and adding them together, or (ii) by collective data about the gross sales and changes in inventories from the account of the manufacturing enterprises and computing the value of GDP on the basis thereof. If there are gaps in data, some estimates are made thereof and gaps are filled.

(b) Estimating Cost of Production

The next step in estimating the net national product is to estimate the cost of production including depreciation. Estimating cost of production is, however, a relatively more complicated and difficult task because of non-availability of adequate and requisite data. Much more difficult is the task of estimating depreciation since 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 calculate the deductible cost. The cost are estimated either in absolute terms (where input data are adequately available) or as an overall ratio of input to the total output. The general practice in estimating depreciation is to follow the usual business practice of depreciation accounting. Traditionally, depreciation is calculated at some percentage of

capital, permissible under the tax-laws. In some estimates of national income, the estimators deviate from the traditional practice and estimate depreciation as some ratio of the current output of final goods.

Following a suitable method, deductible costs including depreciation are estimated for each sector. The cost estimates are then deducted from the sectoral gross output to obtain the net sectoral products. The net sectoral products are then added together. The total thus obtained is taken to be the measure of net national products or national income by net product method.

3.3.2 Factor-Income Method

This method is also known as *income method* and *factor-share method*. Under this method, the national income is calculated by adding up all the 'incomes accruing to the basic factors of production used in producing the national product'. Factors of production are conventionally classified as land, labour, capital and organization. Accordingly, the national income equals the sum of the corresponding factor earning. Thus,

National income = Rent + Wages + Interest + Profit

However, in a modern economy, it is conceptually very difficult to make a distinction between earnings from land and capital, on the one hand, and between the earnings from ordinary labour and entrepreneurial functions, on the other. For the purpose of estimating national income, therefore, factors of production are broadly grouped as labour and capital. Accordingly, national income is supposed to originate from two primary factors, viz., labour and capital. In some activities, however, labour and capital are jointly supplied and it is difficult to separate the labour and capital contents from the total earnings of the supplier. Such incomes are termed as *mixed incomes*. Thus, the total factor-incomes are grouped under three categories; (i) labour incomes; (ii) capital incomes; and (iii) mixed incomes.

(a) Labour Incomes

Labour incomes included in the national income have three components: (a) wages and salaries paid to the residents of the country including bonus and commission, and social security payments; (b) supplementary labour incomes including employer's contribution to social security and employee's welfare funds, and direct pension payments to retired employees; (c) supplementary labour incomes in kind, e.g., free health and education, food and clothing, and accommodation. Compensations in kind in the form of domestic servants and such other free-of-cost services provided to the employees are included in labour income. War bonuses, pensions, service grants are not included in labour income as they are regarded as 'transfer payments'. Certain other categories of income, e.g., incomes from incidental jobs, gratuities, tips etc., are ignored for the lack of data.

(b) Capital Incomes

According to Paul Studenski, capital incomes include the following capital earnings:

- Dividends excluding inter-corporate dividends
- Undistributed before-tax-profits of corporations
- Interest on bonds, mortgages, and saving deposits (excluding interests on war bonds, and on consumer-credit)
- Interest earned by insurance companies and credited to the insurance policy reserves
- Net interest paid out by commercial banks

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- Net rents from land, buildings, etc., including imputed net rents on owner-occupied dwellings
- Royalties
- Profits of government enterprises

The data for the first two items are obtained mostly from the firms' books of accounts submitted for taxation purposes. But the definition of profit for national accounting purposes differs from that employed by taxation authorities. Some adjustments in income tax data become, therefore, necessary. The data adjustments generally pertain to: (i) excessive allowance of depreciation made by the firms; (ii) elimination of capital gains and losses since these do not reflect the changes in current income; and (iii) elimination of under or over-valuation of inventories on book-value.

(c) Mixed Income

Mixed incomes include earnings from: (a) farming enterprises, (b) sole proprietorship (not included under profit or capital income); and (c) other professions, e.g., legal and medical practices, consultancy services, trading and transporting. This category also includes the incomes of those who earn their living through various sources as wages, rent on own property and interest on own capital.

All the three kinds of incomes, viz., labour incomes, capital incomes and mixed incomes added together give the measure of national income by *factor-income method*.

3.3.3 Expenditure Method

The expenditure method, also known as **final product method,** measures national income at the final expenditure stages. In estimating the total national expenditure, any of the two following methods are followed: **first,** all the money expenditures at market price are computed and added up together, and **second,** the value of all the products finally disposed of are computed and added up, to arrive at the total national expenditure. The items of expenditure which are taken into account under the *first method* are: (a) private consumption expenditure; (b) direct tax payments; (c) payments to the non-profit-making institutions and charitable organizations like schools, hospitals, orphanages and (d) private savings. Under the *second method*, the following items are considered: (i) private consumer goods and services; (ii) private investment goods; (iii) public goods and services; and (iv) net investment abroad. The second method is more extensively used because the data required in this method can be collected with greater ease and accuracy.

Check Your Progress

4. What are the two ways by which the value of gross output is computed?
5. Fill in the blanks with appropriate terms.

   (i) National income is supposed to originate from two primary factors, viz.,_____ and_____.

   (ii) In measuring the national income the net result of _____are adjusted to the total.

Treatment of Net Income from Abroad

We have so far discussed methods of measuring national income of a 'closed economy'. But most economies are *open* in the sense that they carry out foreign trade in goods and services and financial transactions with the rest of the world. In the process, some nations get net income through foreign trade while some lose their income to foreigners. The net earnings or loss in foreign trade affects the national income. In measuring the national income, therefore, the net result of external transactions are adjusted to the total. Net incomes from abroad are added to, and net losses to the foreigners are deducted from the total national income arrived at through any of the above three methods.

Briefly speaking, all exports of merchandise and of services like shipping, insurance, banking, tourism, and gifts are added to the national income. And, all the imports of the corresponding items are deducted from the value of national output to arrive at the approximate measure of national income. To this is added the net income from foreign investment. These adjustments for international transactions are based on the international balance of payments of the nations.

3.4 CIRCULAR FLOW OF INCOME AND EXPENDITURE

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An economy is a system of interrelated economic activities and economic transactions. Basic economic activities include production, exchange and consumption. The economic activities are carried out in an integrated system and lead to a continuous process of economic transactions. Economic transactions generate two kinds of flows:

(i) Product or goods flow

(ii) Money flow

The goods flow consists of factor and product flows, i.e., flow of factors of production and of goods and services. In a monetized economy, factor and product flows generate money flows in the form of factor payments and payments for goods and services. The two kinds of flows go in opposite directions in a circular manner and make two kinds of *circular flows.* An economy keeps working so long as the two flows go on uninterrupted. The working of an economy can therefore be viewed as circular flows of product and money and the size of the economy as the volume of goods flow.

This section presents a brief description of how goods and factor flows are generated and how economy works in a systematic manner. To begin with, we will give first a description of circular flows in a simple economy consisting of only two sectors: (i) **households** and (ii) **firms**. The households have two characteristics: (a) they are owners of all factors of production, and (b) they are consumer of all final goods and services. Firms, on the other hand, have two characteristics too: (i) they hire factors of production from the households, and (ii) they sell their final products to the households. This model is then extended to include the government sector making it a 3-sector model. Finally, the model is extended further to include also the foreign sector (comprising only exports and imports goods and services) to make it a complete circular flow model consisting of households, firms, government and foreign sector.

3.4.1 Circular Flows in a Simple Economy Model

We begin with the description of circular flows in a simple economy consisting of only two sectors, viz., households and firms. In our simple economy there is no government and no foreign trade. In our simple economy model, *households* are assumed: (i) to own all the factors of production (ii) to consume all final goods and services, and (iii) their income consists of wages, rent, interest and profits. The *business firms,* on the other hand, are assumed: (a) to hire factors of production from the households; (b) they produce and sell goods and services to the households; and (c) they do not save, i.e., there is no corporate saving.

The working of and circular flows of incomes and expenditure in two-sector model are illustrated in Fig. 5.1. As the figure shows, factors of production flow from the households to the factor market and from the factor market to the firms. As shown in the lower half of the figure, goods and services produced by the firms flow from the firms to the households. The arrows showing factor and product flows make the *product flows* or *real flows.* Note that real flows take a circular path.

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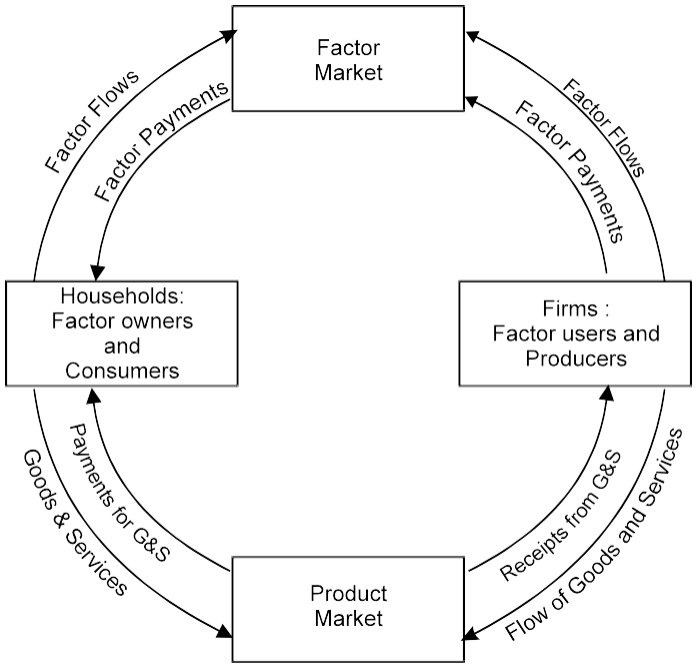

Fig. 5.1 *The Circular Flows of Goods and Money in a Simple Economy*

Real flows generate *money flows*. As the figure shows, money flows from the firms to the households in the form of factor payments in the form of wages, interest, rent and dividends. Factor payments make household incomes. Households spend their incomes on goods and services they consume. As a result, money incomes flow from the households to the firms in the form of payments for goods and services. Thus, factor payments by the firms and payments made by the households for goods and services put together make the circular flow of money.

Note that product and money flows make the circular flows in the economy and that product and money flow in opposite direction. These flows represent the working of the simple economy. An important feature of product and money flows is that the *value* of real flow equals the money flow. This equality results from the fact that *factor payments* are equal to *household incomes* and since households spend their total income on consumer goods and services, *household expenditure* equals the total receipts of the firms, which equals *the value of the output.* These equalities can be summarized in the form of *identities* as follows. In the final analysis, household incomes ≡factor payments ≡the money value of output. This identity holds so long as households spend their total income, i.e., households do not hoard any part of their income, and firms spend their total receipts on hiring factors of production from the households.

3.4.2 The Effect of Withdrawals and Injections

The real and money flows shown in Fig. 5.1 assumes that there are no *withdrawals* from and *injections* into the economy. *Withdrawals* refer to withholding of money incomes from expenditure. Note that this withholding is not 'saving' for savings are returned to the circular flows in the form of purchase of capital goods (investment). Withdrawals are also called *leakages. Injection,* on the other hand, means money expenditure in addition to factor incomes paid by the firm. In reality, however, there are *withdrawals* from and *additions* to the circular flows.

Let us look at the forms and nature of withdrawals and injections. In our two-sector model, a *withdrawal is an amount set aside by the households and/or by the firms, not to be spent on the goods and services over a period of time*. For example, if households set aside a part of their current income as a provision for old age or as security against the loss of job, etc., it is called a *withdrawal*. It is important to note again that *a withdrawal is not saving.* For, savings are ultimately returned to the circular flows in the form of investment expenditure. Likewise, firms may withhold an amount from factor payment stream and not return it to the circular flows in anticipation of depression. *Withdrawals reduce the volume of the circular flow*.

Injections, on the other hand, are *the amount that is spent by the households and/or firms in addition to their current incomes generated within the regular economy*. Injections may be made by the households in the form of spending past savings or hoardings. Injection by the firms may take the form of spending their accumulated savings. Firms may inject money into the economy by borrowing from abroad. *Injections increase the size of the flow.*

3.4.3 Circular Flows of Goods and Money in a Three-Sector Economy

This section presents circular flows in a three-sector model. A three-sector model is created by adding the government sector to the two-sector model. The inclusion of the government into the model brings in the government's economic roles and the effect of its fiscal operations on the circular flows. For simplicity sake, however, we will consider only three kinds of monetary flows between the government and the rest of the economy, viz.,

- Direct taxes on both households and firms
- Government expenditure
- Transfer payments and subsidies

These fiscal operations of the government have different kinds of effects on the circular flows of goods and money flows.

The real and money flows in a three-sector model are shown in Fig. 5.2. Note that in this modified figure, 'factor market' is placed in the center to make place for the 'government sector'at the top. In Fig. 5.2, real and money flows between the households and firms (or business sector) are the same as shown in Fig. 5.1. Let us now look at the real and money flows between the government on one hand and households and firms on the other.

As Fig. 5.2 shows, a part of the household incomes flows to the government in payment for taxes. The government spends a part of its tax revenue as 'factor payments' to the households, i.e., on purchase of factor services (labour and private property) and a part in the form of transfer payments, as pension and food subsidy. These flows make *money flow* between the households and the government. As regards the *real flows,* factors of production move from the households to the government and social services (schools, hospitals, police, roads, etc.) flow from the government sector to the households. These flows make the *real flows.* Thus, a part of household resources (real) and of money incomes keep circulating between the households and the government. Note that the two flows need not be equal.

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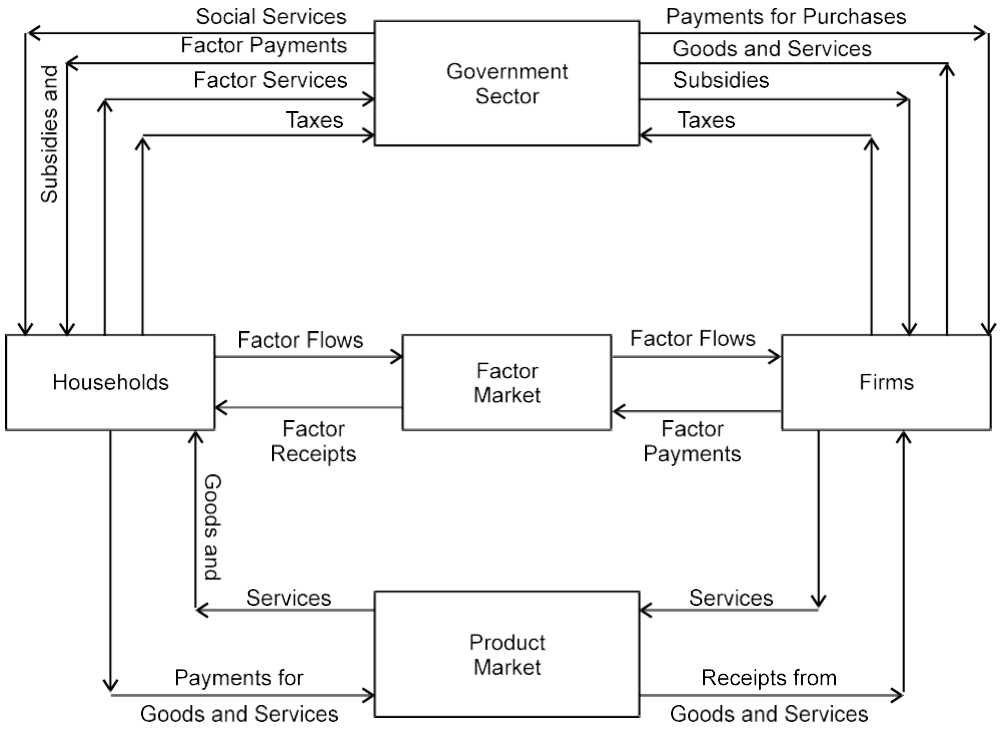

Fig. 5.2 *Real and Money Flows in a Three-Sector Model*

Similar flows take place between the government and the firms. Firms pay a part of their incomes as taxes to the government. In return, the government pays back a part of its tax revenue in the form of payments for purchases from the firms and a part as subsidies. This makes *money flow* between households and firms. The flow of goods and services from firms to government makes the *real flow*.

It may be noted at the end that *taxes are withdrawals* from the circular flows and *government expenditure is an injection* into the income stream. The *transfer payments* by government (e.g., old age pension, subsidies, unemployment allowance, etc.) are *injections* to the circular flows.

3.4.4 Circular Flows in a Four-Sector Model: A Model with Foreign Sector

In this section, we describe circular flows of goods and money in a four-sector model. Four-sector model is formed by adding foreign sector to the three-sector model. Foreign sector consists of two kinds of international economic transactions:

3.4.4.1 Foreign trade, i.e., export and import of goods and services

3.4.4.2 Inflow and outflow of capital

International transactions and the consequent flows of goods and money make a complex system. For simplicity sake, however, we assume that foreign sector consists only of exports (X) and imports (M) of goods and services and that households export only labour but import goods and non-labour services.

The circular flows of goods and money in four-sector model are illustrated in Fig. 5.3. In this figure, the internal flows of goods and money: (i) between households and firms, (ii) between households and government, and (iii) between firms and government are the same as shown in Fig. 5.2. We will therefore concentrate on the flows of goods

and money: (i) between households and the rest of the world, (ii) between domestic firms and the rest of the world, and (iii) between government and the rest of the world.

In Fig. 5.3, 'foreign sector' is shown at the bottom of the figure. As mentioned above, foreign sector consists of exports from and imports to the domestic economy by: (a) households, (b) firms, and (c) government. As shown in the figure, households export only manpower (labour). In return, they receive foreign remittances. But they import goods and services for which they make payments. The inflows and outflows pertaining to households need not be equal. Firms, on the other hand, are shown to import and export both goods and services. So is the case with the government. The government sector exports and imports both good and services.

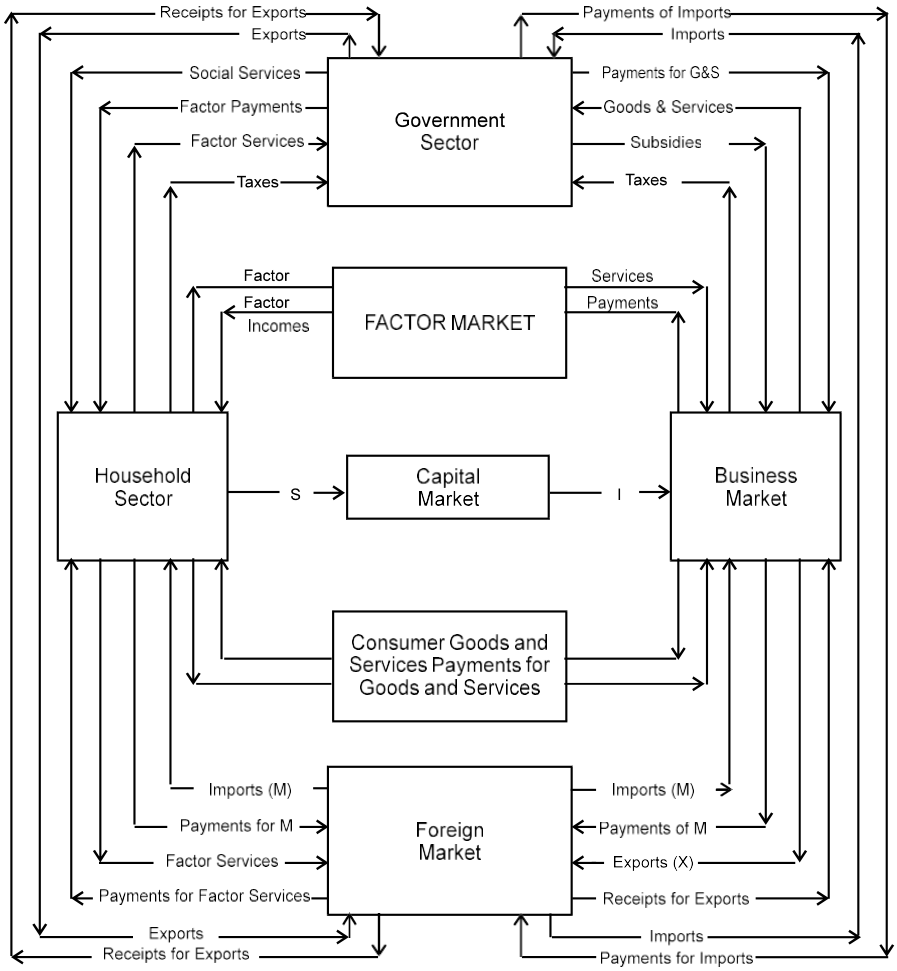

Fig. 5.3 *Circular Flows in Four-Sector Model*

Let us look at the consequences of exports and imports on the volume of circular flows. Exports (*X*) from any sector make goods and services flow outside the domestic economy and make money (foreign exchange) flow into the domestic economy in the form of 'receipts from export'. Exports make foreign incomes flow into the domestic economy. Similarly, imports (*M*) cause inflow of goods and services and outflow of money converted to foreign exchange. This means outflow of domestic income to foreign countries. Another flow is generated by the 'export of manpower' by the households. The export of manpower brings in 'foreign remittances' in terms of foreign exchange. Foreign exchange converted to domestic currency makes another inflow of income.

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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*, defined as $X - M$. If $X > M$, it means inflow of foreign income is greater than its outflow or there is net gain from foreign trade. This increases the magnitude of circular flows of income and expenditure. By the same logic, if $X < M$, it decreases the magnitude of circular flows. And, if $X = M$, inflow and outflows of incomes are equal. This leaves the circular flows unaffected.

3.5 CLASSICAL THEORY OF OUTPUT AND EMPLOYMENT

Following the publication of Adam Smith's classic entitled *An Inquiry into the Nature and Causes of the Wealth of Nations* in 1776, a body of economic theory was gradually developed during the following century and a half. The chief architects of this theory, known as the classical economic theory, were David Ricardo, John Stuart Mill, Jean Baptiste Say[1] and Alfred Marshall. The problem of unemployment was not the primary concern of this theory. Assuming that full employment exists in the economy in the long run, the classical economic theory was mainly concerned with the discussion of those factors which determined:

- What goods and services would be produced in the economy with its given resources
- The allocation of the economy's given resources between their different rival Uses
- The relative prices of different goods and services and of the factors of production
- The distribution of income earned from production between the different co-operating factors of production

The classical economists assumed that full employment was a normal feature in the economy. According to them, in a *laissez-faire* economy market forces operated in the system which maintained full employment and consequently kept the aggregate output at the level producible under conditions of full employment. In the classical economic theory, full employment was a rule in the long period. Deviations from it were viewed only as temporary exceptions. Full employment did not, however, rule out the existence of some unemployment in the economy. Even at the 'full employment' level, there would be some people in the economy who could be either frictionally or voluntarily unemployed. The frictional unemployment was temporary unemployment between job changes or on entry into the labour force while searching for jobs due to the want of adequate knowledge about the available job opportunities in the economy on the part of workers. Voluntary unemployment was due to the reluctance or refusal on the part of workers to work at the going wage. Workers agitating for higher wages were an example of the voluntarily unemployed workers. While frictional unemployment would disappear with the workers getting acquainted with the available job opportunities in due course of time, voluntary unemployment was due to the workers' refusal to work at the current wage and did not worry the classical economists. In short, full employment only implied that involuntary unemployment—a state of being unemployed in spite of the workers' willingness to work at the going wage rate—did not exist in the economy.

Check Your Progress

6. What are the two kinds of flows generated by economic transactions?
7. What are injections?
8. What are the two kinds of international economic transactions in the foreign sector?

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But what would happen if there were workers who were involuntarily unemployed in the economy? According to the classical economic theory, if there is unemployment in the economy, forces of correction will soon eliminate it and will restore full employment in the economy. The basic classical tenet was that in a free market economy, the aggregate demand for goods and services could not, except temporarily, fall short of the aggregate supply of goods and services. As long as the aggregate demand equalled the aggregate supply, there was no barrier to the production of goods and services corresponding to full employment in the economy. In the classical view, lapses from full employment were infrequent and short-lived. Depressions were, therefore, considered infrequent and short-lived occurrences. This conclusion is, however, puzzling to any serious student of economic history who knows about the severe and prolonged depressions of the 1870s, 1930s and other periods.

Although the classical theory of employment, output and price level was attacked by a few dissenters in the 19th century—Thomas Robert Malthus, Jean Charles Leonard de Sismondi, Karl Marx, J. A. Hobson, Silvio Gesell and others—the attack was unsuccessful because no alternative theory was constructed to replace the classical theory. 'Since Malthus was unable to explain clearly (apart from an appeal to the facts of common observation) how and why effective demand could be deficient or excessive, he failed to furnish an alternative construction, and Ricardo conquered England as completely as the Holy Inquisition conquered Spain. Not only was his theory accepted by the city, by statesmen and by the academic world. But controversy ceased; the other point of view completely disappeared; it ceased to be discussed. The great puzzle of Effective Demand with which Malthus had wrestled vanished from economic literature.'[2]

John Maynard Keynes successfully attacked the classical explanation of the determination of aggregate employment, output and general price level. It was the assumption of a given volume of total output, rather than its composition and technique of production, which was severely attacked by Keynes.[3] The great depression of the 30s gave a severe blow to the naïve classical economic theory.

The essential feature of classical macroeconomic analysis is that it presents a model of full employment in the economy in the long period. Underlying the analysis, are the assumptions of perfect competition in the factor and product markets and profit-maximization on the part of firms. There are three markets to study. *First*, there is the labour market which deals with the supply of and the demand for labour. The equilibrium condition for full employment in the labour market requires that the wage should be one corresponding to which the demand for and the supply of labour in the market are in equilibrium, i.e., there is neither an excess supply of nor an excess demand for labour in the market. In the labour market we are concerned with the analysis of the form of the aggregate demand and the aggregate supply functions of labour.

Second, there is the product market with its equilibrium flow condition which is equivalent in macroeconomic equilibrium to an equality between saving and investment. The equilibrium condition in the capital–bonds–market requires the equilibrium between the *ex-ante* investment and *ex-ante* saving. *Third*, there is the money market which is concerned with the demand for and the supply of money. The first two markets deal with the equilibrium of the real sector of the economy while the money market is concerned with the equilibrium of the monetary sector of the economy. The equilibrium in the monetary sector determines the absolute price level which does not influence the relative prices, aggregate employment and output which are determined in the real sector of the economy. In short, there is a dichotomy or separation between the real and monetary

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sectors of the economy in the classical economic system. This dichotomy arises from the argument of the classicists that 'money is a veil' (neutral).

In the classical economic theory, money does not matter and its function in the economy is merely to facilitate the real transactions by serving as a medium of exchange. It is neutral and does not interfere with the real processes of production and distribution in the economy; it only facilitates production, i.e., lubricates the wheels of the economic system. According to the classicists, changes in the money supply cause proportionate changes only in the equilibrium values of the *nominal* variables, leaving the equilibrium values of the *real* variables (output, employment, real wage, interest rate, etc.,) unchanged. The equilibrium values of these real variables are exclusively and solely determined in the real sector—in the labour, capital and commodity markets. In classical macroeconomics, the economy's real sector can, therefore, be dichotomized from its monetary sector.

Money, however, does something more than merely act as a medium of exchange in the economy. In a dynamic world with uncertain future, money is also demanded for asset purposes. Consequently, it influences both the production and distribution in the economic system. In other words, changes which take place in the monetary sector also influence the real sector of the economy.

3.5.1 Aggregate Output and Employment

The classical macroeconomic theory explains the determination of the equilibrium level of aggregate employment and output, real wage, saving and investment, rate of interest, general price level and money wage. According to the classical theory, the equilibrium aggregate real output and employment are determined from the aggregate production function and labour's demand and supply schedules. The demand schedule for labour is derived from the aggregate production function. The aggregate production function shows that with the given capital stock, natural resources and technology, additional labour employed yields diminishing additional output, i.e.,the marginal physical product of labour diminishes. In other words, the falling positive slope of the aggregate production function indicates a positive but diminishing marginal physical product of labour (MPP_L). Consequently, the marginal physical product of labour curve (MPP_L), which is also the short period demand curve for labour (D_L) on the assumption that the profit-maximizing perfectly competitive firms hire labour upto a point where the real wage paid to labour equals the marginal physical product of labour, has a negative slope. All along this short period demand curve for labour, the real wage equals the marginal physical product of labour, i.e.,

$$\frac{W}{P} = MPP_L \qquad ...(5.1)$$

This equation explains the equilibrium condition of the demand for labour for the firm. It explains that the marginal physical product of labour for the competitive firm should be equal to the real wage paid by the firm to labour or the money wage paid by the firm should be equal to the value of the marginal physical product of labour for the firm, i.e.,

$$W = MPP_L \times P \qquad ...(5.2)$$

This condition is similar to the familiar microeconomic theory condition that in equilibrium the marginal cost should be equal to the marginal revenue which is always equal to the average revenue for a perfectly competitive firm[4] because from equation (5.2) we obtain the condition:

$$\frac{W}{MPP_L} = P = MC \qquad ...(5.3)$$

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The demand for labour (D_L) being negatively related to the real wage, the demand function for labour can be written as:

$$D_L = f\left(\frac{W}{P}\right) \text{ and } \frac{dD_L}{d\left(\frac{W}{P}\right)} < 0 \qquad ...(5.4)$$

Furthermore, the real wage of labour should be equal to the marginal physical product labour, i.e.,

$$\frac{W}{P} = \frac{dQ}{dN}$$

where dQ/dN (labour's marginal physical product) is positive but diminishing as employment increases.

The classical supply function of labour is positively sloping in relation to real wage showing that the amount of labour (total number of man-hours) offered by the workers for work increases as real wage increases. The positively sloping supply function of labour explains that work is irksome and this irksomeness increases as the number of man-hours worked per time unit increases. It is, therefore, necessary to pay a higher real wage as payment to workers to compensate for the increasing irksomeness and fatigue experienced by the workers in working for longer hours.[5] Each point located on the supply curve of labour is a full employment point because at the real wage corresponding to each such point the amount of labour offered is the maximum which the workers are willing to offer.

Accordingly, the classical labour supply function can be written as:

$$S_L = g\left(\frac{W}{P}\right) \text{ and } \frac{dS_L}{d\left(\frac{W}{P}\right)} > 0 \qquad ...(5.5)$$

Once the labour's supply and demand functions are determined, equilibrium in the labour market in the economy is determined at that real wage where the demand for and the supply of labour are in equilibrium, i.e., where the supply and demand curves of labour intersect each other. This equilibrium real wage is W/P_1 in Figure 5.4(B). At any real wage higher than this equilibrium real wage, the labour market will not be cleared and there shall emerge an excess supply (unemployment) phenomenon in the labour market.

Conversely, at any real wage lower than this equilibrium real wage, the demand for labour shall exceed its supply resulting in labour shortage. In the first situation, competition among the workers for jobs will bid down the real wage while in the second situation, competition among employers for hiring more workers will raise the real wage eventually to the equilibrium real wage. The equilibrium employment $0N_1$ represents full employment in the labour market. The aggregate real output corresponding to full employment is determined by the short period aggregate production function given in Figure 5.4(A). Corresponding to the $0N_1$ full employment, the aggregate real output is $0Q_1$ which is the full employment output.

According to the classical theory of output and employment, changes in the total employment, real wage and total output are possible only through changes in the supply of labour, economy's total capital stock and technology. For example, an increase in population will, by shifting the labour supply curve (S_LS_L) to the right and by reducing the equilibrium real wage, raise the level of equilibrium employment and output in the economy.

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Similarly, an improvement in technology or an increase in the economy's capital stock will, by shifting the aggregate production function upward, make it profitable for the employers to hire more workers at any given real wage. Consequently, the demand curve for labour ($D_L D_L$) will shift upward to the right raising the equilibrium real wage, total employment and output in the economy.

The equilibrium employment determined in the labour market represents full employment since at this level of employment, all those who are able and willing to work at the prevailing wage are employed. Since any other level of employment denotes disequilibrium in the labour market, it follows from this that equilibrium in the labour market in the classical theory is necessarily a situation of full employment. In the classical system any extent of unemployment, ignoring the frictional unemployment[6] which is a passing phenomenon, which persists at this equilibrium level is necessarily voluntary unemployment which is due to the refusal of workers to work at the going real wage. For example, in Figure 5.4(B) at the W/P_1 real wage any person who is unemployed is considered to be voluntarily unemployed if he insists on accepting work only at a money wage which at the existing general price level would mean a higher than the equilibrium real wage W/P_1. Obviously, he wants a real wage which is inconsistent with the marginal physical product of his labour. Consequently, he himself is to be blamed for remaining unemployed.

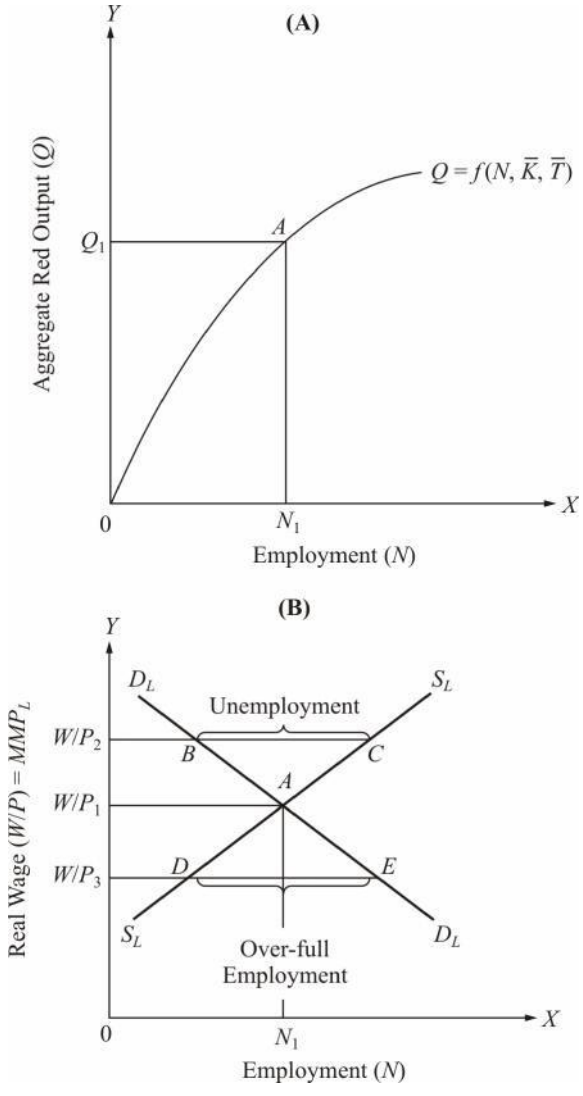

Fig. 5.4 *Equilibrium Real Wage*

Assuming a constant general price level, there is no barrier to full employment in the classical system provided workers are willing to reduce their money wage sufficiently enough to produce that real wage at which the employers will hire all those who are willing to work. Thus, wage-price flexibility is all that is needed to guarantee full employment in the classical economic system. In short, in a free and perfectly competitive labour market, there is some real wage at which the market will be cleared in the sense that no one able and willing to work at that real wage will remain unemployed.

3.5.2 Say's Law of Markets and the Quantity Theory of Money

In the classical macroeconomic theory, the equilibrium real wage gives the level of full employment which, with the given aggregate production function, gives the full employment level of the economy's aggregate real output. Given the system of flexible wage-price, full employment would prevail in the long-run in the economy because the aggregate demand for goods and services would always be adequate to clear the market. Consequently, there was no problem of market glut or of general overproduction in the economy.

The possibility of deficiency of the aggregate effective demand as a barrier to full employment in the economy was ruled out in the classical theory. The argument denying the possibility of general deficiency of the aggregate effective demand causing depression and unemployment in the economy is contained in the statement known as the Say's Law of Markets,[7] named after the famous 19th century French economist Jean Baptiste Say (1767–1862) who popularized Smith's ideas in France. The two basic pillars on which the elegant edifice of the classical macroeconomic theory stands are the Say's Law of Markets and the quantity theory of money. Say's Law of Markets states that supply creates its own demand. Consequently, whatever be the level of aggregate output in the economy, it will always be demanded for consumption and investment. Individuals engage themselves in productive activities with the sole purpose of purchasing goods and services with the remuneration they receive for their labour. Say's Law is a denial of the general overproduction and unemployment in a free market economy. The classic statement of Say's Law of Markets upholds the thesis that the free market price system provides for a growing population and an increase in capital. In an expanding economy, the market is large enough to demand all the products offered in exchange.

According to Keynes, Say's Law of Markets, underlies the whole classical theory which would collapse without it.[8] This assertion is not, however, true. If Say's Law operated, it would be sufficient to uphold the conclusions of the classical economics. However, it is certainly not necessary. When the marginal propensity to consume is less than unity, any deflationary gap which may appear in the economy will be closed by the fall in prices, which by raising the real wealth and lowering the interest rate would raise the aggregate demand. What is needed is that prices should fall low enough to enable the aggregate demand to rise enough to become equal to the aggregate supply at full employment.

In a barter economy, where an individual receives no money but only goods in exchange for goods, Say's Law of Markets unquestionably holds. In such an economy, people work to produce goods solely either to consume these goods themselves or to exchange these for some other goods required for their own consumption. The very act of production implies an equal demand for the goods and services since the aim of each producer is either to satisfy his own wants directly or to exchange his output for other goods and services. Thus, he would not hoard goods.

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Whether people consume the goods produced by them themselves or barter them with the goods produced by others in the economy, they necessarily create the aggregate demand for the goods which is equal to the aggregate supply of the goods which they have created through their productive activities. The price ratio between different goods would be determined by the supply of and the demand for these goods and a set of equilibrium prices would always be reached which would clear the market. If the price of one product was higher compared with the price of the other product with equal cost of production, resources would shift away from the production of lower priced commodity to the production of higher priced commodity. Consequently, the price of the first commodity in the market would fall due to its increased supply. Thus, the price-equalizing process would start in the economy and would continue until the equilibrium prices of both the goods were equal. In a barter economy, the market-clearing mechanism ensures that all goods are either directly consumed or exchanged at some positive prices.

The same argument would apply in a money economy provided the same assumptions which hold for all other goods also hold good for money, i.e., if it is never hoarded and can always be loaned at a positive price. According to the classical economic theory, although in an exchange economy individuals are paid for their work in money instead of being paid in goods and services, by serving as a medium of exchange money merely facilitates trading or exchange which was cumbersome in barter. Money is merely a convenient device for avoiding the clumsiness of barter. It is a 'veil' for concealing the fact that 'what constitutes the means of payment for commodities is simply commodities.'[9] Consequently, money is neutral and does not influence the real processes of production and distribution in the economy. Since money itself is barren, no rational person would hold idle cash balances in excess of his transactional requirements. In a money economy, individuals will exchange money for goods and services instead of bartering the goods and services.

This does not preclude, however, the possibility of some individuals saving a part of their money income in the economy. In fact, saving was considered a rational act on the part of individuals with foresight. In the classical theory, saving did not, however, create any deficiency of the aggregate effective demand. But why? The classical economists' answer was simple. A rational saver would not hoard money—keep his savings in the form of idle cash balances—because money was barren on the income side while its storing involved some cost for its owner. Consequently, no one outside a lunatic asylum would hoard money since he could always either lend his savings to businessmen and financial intermediaries (banks) and earn interest or earn profit by making direct investment in some business enterprise. Since businessmen and banks will invest these funds in the productive activities, money will always be spent keeping the economy's total spending (aggregate demand) always equal to total income (aggregate supply). In the classical economic theory, saving did not pose any serious problem since it was put back through the investment into the aggregate money spending flow thereby keeping the aggregate demand equal to the aggregate supply.

From the macroeconomic consideration, what is important is that the money which is withdrawn from the aggregate spending stream by those who save must be put back in the stream in the form of spending by some others to keep the aggregate money spending flow in the economy constant. From the macro point of view, it is not important who spends the money. Since in the 19th century, new avenues of investment promising handsome positive returns had not been exhausted, there was ready demand for the investible funds (savings) at some positive rate of interest. The rate of interest at which

savings are lent to the borrowers is determined, like any price, by the demand for and the supply of savings or loanable funds. An increase in the demand for investible funds or a decrease in the supply of these funds will raise the rate of interest and *vice versa*. No matter how much the supply and the demand schedules for the investible funds shifted, the classical economists firmly believed that the form[10] of these two schedules was such that the capital market would always be cleared at some positive rate of interest. There would be no dearth of demand for the investible funds if the rate of interest was sufficiently low for another bridge to be constructed, another railway track to be laid down and another tunnel to be drilled. In short, the marginal efficiency of investment schedule was sufficiently interest-elastic in the low interest rate range to warrant the absorption of entire community savings into productive investments. Consequently, the interest rate flexibility was all that was needed to guarantee full employment even when individuals did not spend their total income on consumption. We will have occasion to examine the fact that the rate of interest is not flexible below a certain minimum rate in the downward direction apart from the fact that even if it was so, the form of the investment demand and the saving supply functions could be such that no equilibrium was possible at or above the zero rate of interest. In other words, the capital market did not behave like the commodity market.

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The statement that supply creates its own demand or equivalently that the aggregate investment equals the aggregate saving always holds good in the *ex-post* sense since it is simply an accounting identity. Say's Law of Markets, however, states that these two are equal in the *ex-ante* sense, i.e., the total quantity which people produce (aggregate supply) must be equal to the total quantity which they plan to buy (aggregate demand).

Say's Law of Markets was formulated to apply to a society in which producers were largely self-employed individual proprietors—peasant farmers and master craftsmen—who either raised agricultural products on their own farms or manufactured products in their workshops. Their income comprised the sale proceeds of those products. An individual was self-employed if he worked on his farm or managed his own shop and sold his own output in the market. The entire sale proceeds were spent on the purchase of consumers' goods, on farm equipment and on home buildings. In this typically early 19^{th} century society, saving was investment and not a separate and distinct act. The individual producer sold his product and not his labour. In such a society, the size of the market expanded as the number of producers increased. In other words, supply created its own demand.

In a modern economy, however, where saving and investment are distinct functions and where employment is procured in the labour market by selling one's labour and not by operating one's own farm or workshop, Say's Law of Markets is an anachronism. Criticizing Say's Law of Markets, Keynes argued that in the modern economy, saving and investment were carried out by different classes of people whose motives to save and to invest did not necessarily coincide in magnitude and time. Moreover, since a good deal of investment is autonomous or independent of changes either in the level of income or in the rate of interest, it is not necessary that investment will increase as income expands or as the rate of interest falls; it may or may not increase. Consequently, the *ex-ante* aggregate demand ($C + I$) will not be necessarily equal to the aggregate supply at all levels of the aggregate supply and employment.

The other basic tenet of the classical macroeconomic theory is the quantity theory of money according to which the general price level (P) is a function of the total money supply (MV). According to the naive quantity theory equation, the relationship between

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changes in the money supply (ΔM) and changes in the general price level (ΔP) was strictly proportional. This conclusion is based on several assumptions which are brought out from the identity equation $MV = PQ$, where the terms M, V, Q and P are respectively the total supply of money, velocity of money in circulation, final output and the general price level of this output.

$MV = PQ$ is simply an accounting identity. Consequently, it is completely separate either from the quantity theory of money generally stated in the form of $MV = PQ$ equation of exchange or any other theory. It is analogous to the identity between product and income in national accounting and is completely separate from Say's Law of Markets. Under the assumption of constant V and Q in the short period[11] and a passive P, the quantity theory equation $MV = PQ$ explains the behaviour of changes in the general price level in response to changes in the money supply. Under the above assumptions, a given increase or decrease in the money supply will produce a proportionate rise or fall in the general price level. It is obvious that in the absence of the above assumptions, M and P will not rise or fall equi-proportionately except in the exceptionally rare situation in which changes in V and Q are offset. In the equation of exchange, the transactions velocity of money V is assumed as an institutional constant being determined by the nature of the banking system, the frequency with which the economic units receive and make payments, the regularity of these receipts and payments and the payments which are made on money or barter basis. Over the short period of a business cycle, these determinants of V remain constant although these may change in the long period.

The classical economists argued that the aggregate output was stable in the short period and was produced by the economy's fully employed labour force working with the given capital stock and technology. In short, the aggregate production function in Figure 5.4(A) was given in the short period. It could shift upward only if the total capital stock employed was increased or if the technique of production employed improved. Since both these—growth in the economy's capital stock and improvement in the production technique—could occur only gradually over a long period, the possibility of an increase in the total output through an upward shift in the aggregate production function in the short period was ruled out. Another possible source making for an increase in the aggregate output could result from a rightward shift in the supply curve of labour. Due to the rightward shift in the labour supply curve, the equilibrium real wage would fall inducing the employers to hire more workers raising the level of employment in the economy. The increase in employment would result in the higher aggregate output. But a shift in labour's supply curve would only be possible with the growth in population which is possible only in the long run. Thus, all the possibilities of shift in the aggregate production function and the labour supply curve having been ruled out, it was argued that the aggregate real output in the economy was stable at the full employment level in the short period.

The classical quantity theory of money involves a crude theory of aggregate demand. Assuming the velocity of money V as constant, the supply of money M determines the total money value of purchases made by the people during any given time period. Like the Say's Law of Markets, the quantity theory of money also assumes that money has no utility of its own apart from the utility of commodities which money buys. Consequently, it is not wanted *per se*. People demand money only because it acts as the medium of exchange in the economy. In short, the demand for money arises because money mediates real transactions in the economy. So long as money performed only the 'medium of exchange' function in the economy, changes in the money supply

MV, assuming no change in the aggregate output, would cause proportionate changes in the level of prices. Consequently, a zero asset or speculative demand for money is a necessary part of the rigid quantity theory of money. The classicists regarded hoarding as an irrational act on the part of economically rational individual. The possibility of hoarding having been ruled out, it was believed that any change in the total supply of money would, by causing a similar change in the aggregate money spending, cause an equi-proportionate change in the general price level *P*, assuming the velocity of money *V* and the aggregate real output *Q* to be constant.

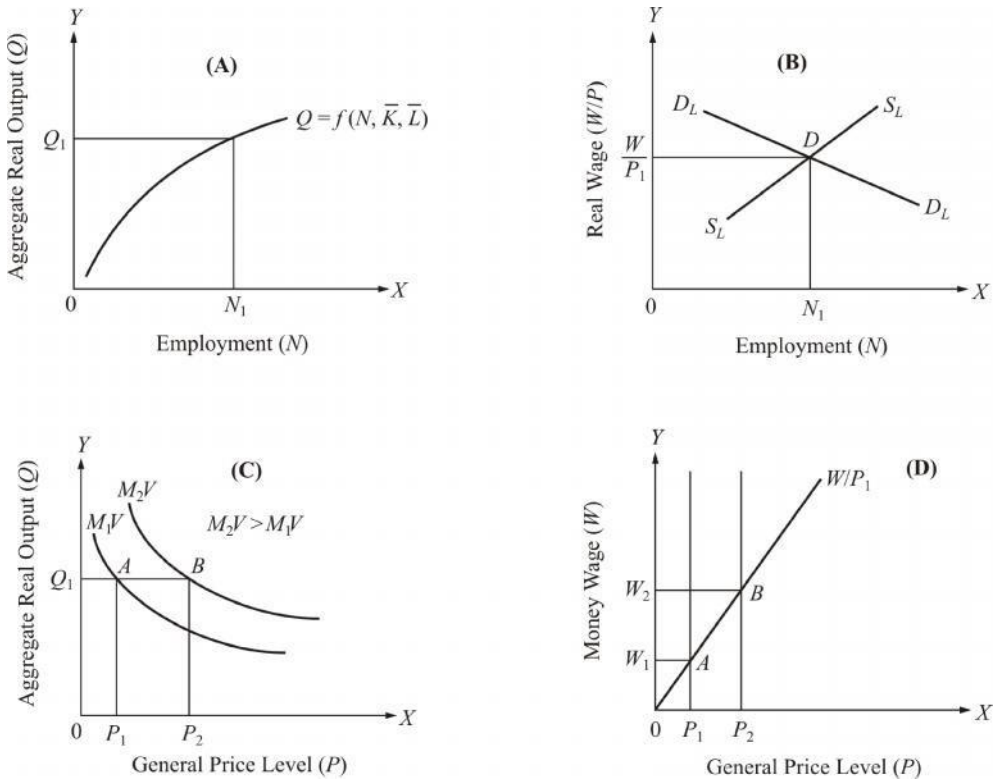

Fig. 5.5 *General Price Level and Aggregate Real Output*

In Figure 5.5(C), the general price level *P* has been shown on the horizontal axis and the aggregate real output *Q* has been shown on the vertical axis. With given *V*, a given increase in the total supply of money *M* would mean an equi-proportionate increase in *MV*. The identity equation $MV = PQ$ shows that a given increase in the total money supply *MV* should lead to a corresponding increase in the total money spending *PQ*. With constant velocity of money *V* and the full employment real output Q_1, changes in the aggregate demand caused by changes in the total money supply would cause corresponding proportionate changes in the general price level *P*. If the supply of money increases from M_1V to M_2V, as represented by the rightward shift in the money supply curve from M_1V to M_2V, the rise in the general price level *P* from $0P_1$ to $0P_2$ would be equi-proportionate to the increase in the total money supply *M*.

By using the tools of the Say's Law of Markets, the quantity theory of money and the flexible wage-price structure, the classical economists argued that the economy would always attain long-run equilibrium at full employment level. The important assumptions in this chain of causation are that people spend their total money earnings either wholly on consumption or spend a part of their money income on consumption and invest the unspent part of their income either directly in their own enterprises and earn

profit or indirectly in the riskless government bonds and earn interest income rather than hold it in the form of idle cash balances and suffer a zero or even a negative rate of return.

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3.5.3 Classical Theory without Saving and Investment

The level of equilibrium employment—and this is the full employment level—is determined in the competitive labour market by the supply of and the demand for labour while the level of equilibrium aggregate real output corresponding to the level of equilibrium employment is given by the aggregate production function. The general price level is determined by the total supply of money in circulation quite independently of the level of aggregate employment and aggregate real output in the economy. Figure 5.5 shows the relationship between the various variables in the classical macroeconomic Theory.

Figure 5.5(A) and Figure 5.5(B) are a repetition of Figure 5.4. Figure 5.4(B) shows that $0N_1$ is the full employment while Figure 5.5(A) shows that $0Q_1$ is the aggregate real output corresponding to the $0N_1$ full employment. What will be the general price level corresponding to this full employment aggregate real output? The general price level will be determined by the total money supply MV. The total money supply curve M_1V^{12} in Figure 5.5(C) shows some given total money supply M_1 with constant velocity V. From the quantity theory of money equation $MV = PQ$, after knowing the M, V and Q, the general price level P can be found. Since the total real output in the economy is constant at Q_1 and V is also constant, there will be only one unique general price level P_1 which will be consistent with the given money supply M_1. Figure 5.5(D) shows that the money wage which is consistent with the given real wage W/P_1 which is determined in Figure 5.5(B) once the general price level $0P_1$ is determined with the help of the total money supply M_1V and the total real output $0Q_1$ in Figure 5.5(C). In Figure 5.5(D) the wage price line W/P shows those different combinations of the money wage and the general price level which are consistent with the given real wage W/P_1 which is determined by the supply of and the demand for labour in the labour market.

Change in the Money Supply

In the classical theory, a change in the aggregate money supply will not affect the real wage, employment and output in the economy. The change in the money supply will affect only the general price level P and the money wage W. An increase in the money supply from M_1 to M_2 (with constant V) causes an upward shift in the MV curve from the position of M_1V M_2V as shown in Figure 5.5(C). Since no one in the economy hoards money, an increase in the total money supply from M_1 to M_2 will mean an effective increase in total money supply of $V\Delta M$ amount with no increase in the supply of goods available for purchase. Consequently, people can get rid of the additional unwanted money supply $V\Delta M$ $(=M_2 - M_1)$ by purchasing the same quantity of goods at the higher general price level $0P_2$. The increase in the general price level of $\Delta P(= 0P_2 - 0P_1)$ should be sufficient to make the additional aggregate money spending $Q\Delta P$ equal to the total effective increase in the aggregate money supply $V\Delta M$, i.e., $Q\Delta P = V\Delta M$ so that the stability condition $M_2V = 0P_2 - 0Q_1$ is satisfied.

This conclusion is reached on the assumption that people in the economy demand money only as the medium of exchange. In other words, there is only the transactional demand for money and the asset demand for money is zero. Looked at in this way, the changes in the total money supply do not affect the aggregate real output and employment in the economy. Consequently, there is dichotomy between the real and the monetary

sectors of the economy. John Maynard Keynes, Don Patinkin and others have criticized this classical dichotomy which exists between the real and the monetary sectors of the economy in the classical macroeconomic theory.

Figure 5.5(D) shows that when the general price level rises from $0P_1$ to $0P_2$ due to an increase in the aggregate money supply from M_1 to M_2, the money wage increases from $0W_1$ to $0W_2$ such that the real wage remains unchanged at the old W/P_1 level.

Change in the Labour Supply

What is the effect of an increase in the supply of labour shown by the rightward shift in the labour supply curve from S_LS_L *to* $S_L'S_L'$ in Figure 5.6(B). With the given aggregate production function in Figure 5.6A and the demand curve for labour D_LD_L remaining unchanged, the additional amount of labour hours offered for work by the workers as shown by the new supply curve $S_L'S_L'$ can be demanded by the employers only if the equilibrium real wage falls below the existing real wage W/P_1. The real wage will, therefore, fall from W/P_1 to W/P_2 corresponding to which the total demand for labour in the labour market equals its total supply. A fall in labour's real wage is forced upon the workers by the exigency of unemployment. Competition among the workers for jobs pushes down the money wage from W_1 to W_2 which when combined with a zero fall in the general price level P causes the real wage to fall.

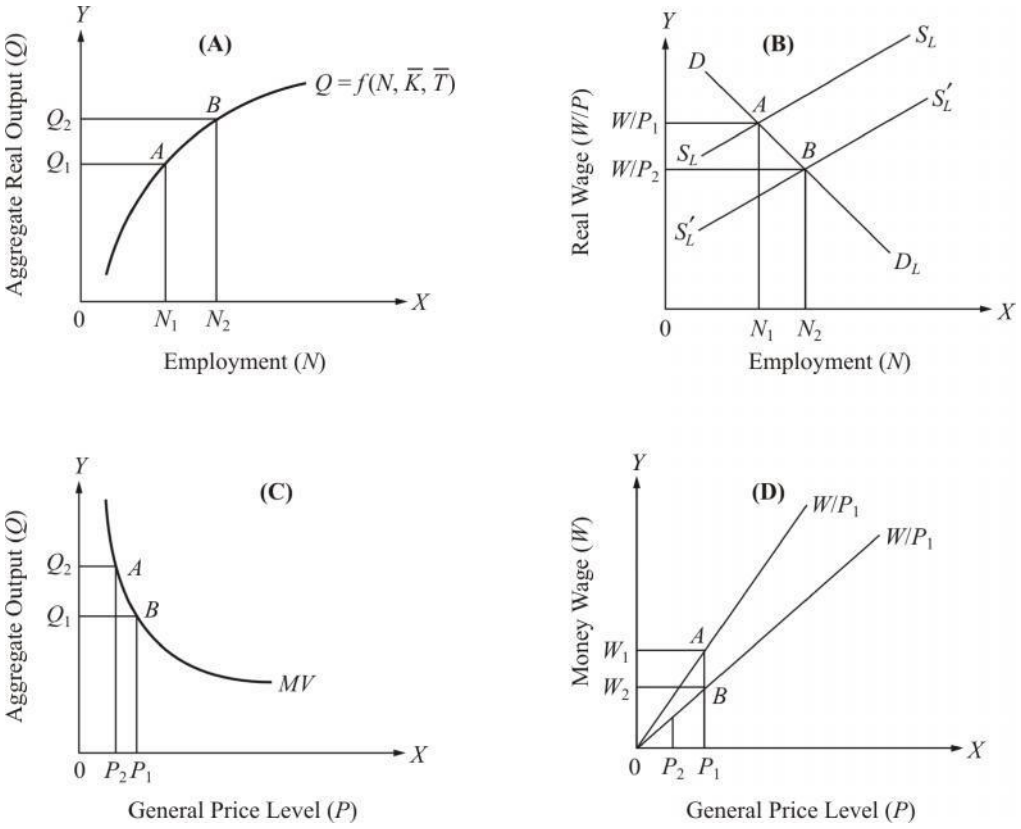

Fig 5.6 *The Effect of an Increase in the Supply of Labour*

But a fall in the money wage with a given money supply and constant velocity of money will cause the general price level P to fall. When the money wage falls below the old money wage W_1 to W_2, firms increase employment from N_1 to N_2. Consequently, the aggregate real output increases from $0Q_1$ to $0Q_2$ as shown by the aggregate production

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function corresponding to the $0N_2$ level of employment. With the constant money supply *MV*, equation $MV = PQ$ tells us that an aggregate real output larger than $0Q_1$ can be cleared from the market only if the general price level *P* was lower than $0P_1$. However, if the fall in the general price level equals the fall in the money wage, the real wage will not fall. Consequently, employers will have no incentive to increase employment and expand output. With no change in the aggregate output, there will be no reason for the general price level to fall in the first instance. Moreover, if the general price level fell by as much as did the money wage, with the aggregate output held constant, we would have a situation in which the aggregate money supply *MV* exceeded the aggregate demand for money *PQ* giving rise to a situation in which a part of the aggregate money supply becomes redundant.

This situation as well as the problem of increasing the employment can be solved only if the general price level also fell with the fall in the money wage and the fall in the general price level was less than the corresponding fall in the money wage so that the real wage fell. This has been shown in Figure 5.6(D) where the money wage falls from W_1 to W_2 and the general price level falls from $0P_1$ to $0P_2$. Since the fall in the money wage *W* is greater than the fall in the general price level *P*, the real wage falls from W/P_1 to W/P_2 as shown by the downward shift in the real wage-price line from W/P_1 to W/P_2. Thus, a smaller fall in the general price level compared with the larger fall in the money wage by reducing the workers' real wage induces the employers in the economy to increase the total employment in the economy from $0N_1$ to $0N_2$ and also enables the market to be cleared of the higher aggregate real output $0Q_2$ with the constant money supply *MV*.

In short, consequent upon an increase in the total supply of labour the old equilibrium is disturbed. The system, however, moves to a new equilibrium through the process of adjustment in the money wage and the general price level. Thus, unemployment in the classical macroeconomic theory, whether it comes about from an increase in the labour supply or from any other source is removed through the instrument of wage-price flexibility. As long as the money wage was downwardly flexible and was not prevented from falling and as long as the general price level fell due to an increase in the aggregate real output, full employment would always be achieved. So ran the thread of the classical analytical reasoning. In short, if the system was free from collective wage bargaining inflicted upon the employers by the strong trade unions and if the labour and product markets were perfectly competitive, full employment would prevail in the system.

Change in the Labour Demand

Consequent upon the growth in the economy's total capital stock or improvement in the production techniques in the long period, the aggregate production function will shift upward as shown in Figure 5.7(A). At each level of the aggregate employment, the slope of the new aggregate production function $Q = (N, \overline{K_2}, \overline{T_2})$ is greater than the slope of the old aggregate production function $Q = (N, \overline{K_1}, \overline{T_1})$ showing that the marginal physical product of labour (MPP_L) has increased. Consequently, the demand curve for labour will shift upward from $D_L D_L$ to $D_L' D_L'$ as shown in Figure 5.7(B). The new demand curve for labour $D_L' D_L'$ shows that for each level of labour employment, the marginal physical product of labour is higher, i.e., the MPP_L has increased. Since the MPP_L has increased, it is now profitable for the employers to hire more labour at each different level of the real wage. Consequent upon keen competition among the firms to

hire more labour, the equilibrium real wage rises from W/P_1 to W/P_2, the total employment increases from $0N_1$ to $0N_2$ and the total real output increases from $0Q_1$ to $0Q_2$. With the given total money supply MV, the market can, however, be cleared of the higher total real output $0Q_2$ only if the general price level falls sufficiently enough from $0P_1$ to $0P_2$ so that the higher aggregate real output $0Q_2$ multiplied by the lower general price level $0P_2$ equals the given money supply MV, i.e., $MV = 0P_2 \cdot 0Q_2$ (where $0P_2 < 0P_1$ and $0Q_2 > 0Q_1$). At the lower general price level $0P_2$, the money wage has to rise in order to correspond to the higher real wage W/P_2. The general price level and the money wage adjustments have been shown in Figures 5.7(C) and 5.7(D).

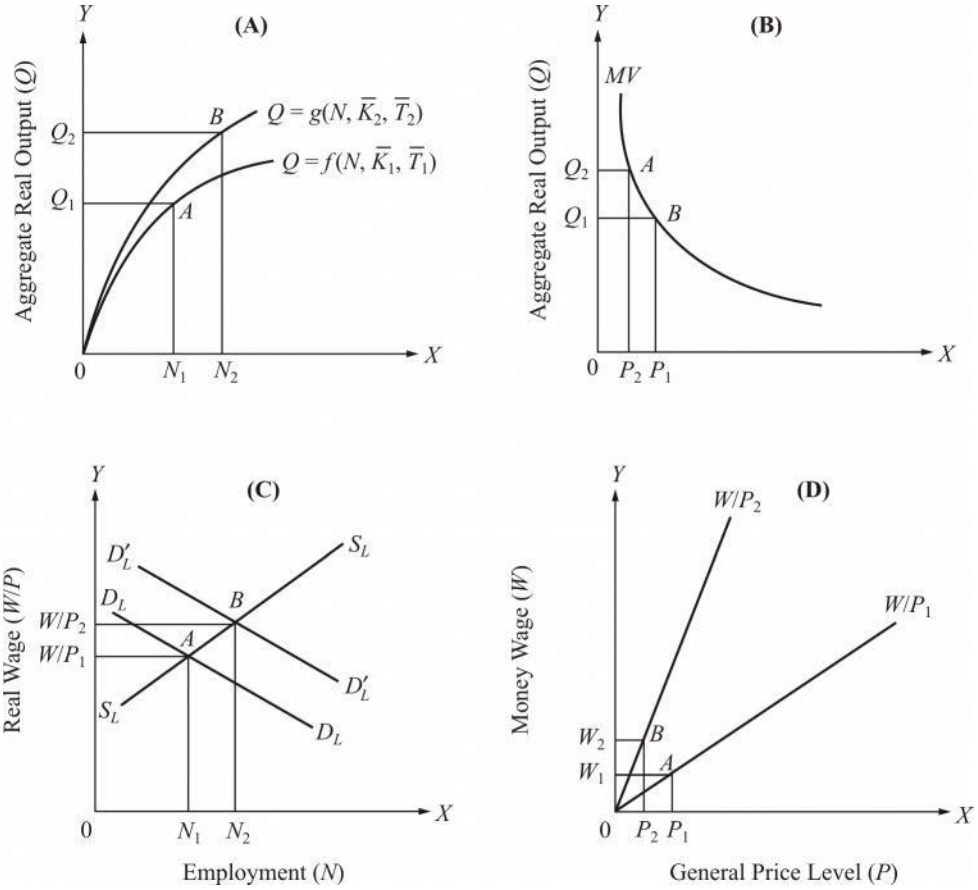

Fig. 5.7 *General Price Level and the Money Wage Adjustments*

This analysis shows that the gradual increase in the real wage—a rise in the standard of living of the workers—is possible through an upward shift in the aggregate production function made possible by the growth in economy's total capital stock and the use of improved technology in production over a long period provided the population growth is not high enough to absorb the entire increase in the total output. The second important proposition brought out by the analysis is that the long-run growth in the total real output will lead to a falling general price level unless the total money supply increases at a rate identical with the rate of growth of the economy's total real output.

3.5.4 Rigid Money Wage

The classical theory of output and employment assumes perfect competition in the product and factor markets in the economy. Consequently, if at any given real wage there is excess supply in the labour market, the real wage must fall in order to clear the market

of the excess supply and ensure full employment in the economy. Starting from equilibrium with the given total supply of money *MV*, an increase in the labour supply would require a fall in the money wage combined with a smaller fall in the general price level in order to establish a new full employment equilibrium at the lower real wage. Suppose, however, that the labour market is imperfect with the workers organized into strong trade unions which resist any move for the general money wage-cut. In this situation, the money wage will bedownwardly[13] rigid or sticky although it is still flexible in the upward direction because there is no opposition to any move for wage escalation on the part of the trade unions. While the money wage is free to rise when excess demand for labour appears in the market, it will not fall when there is excess supply of labour in the market. The wage-price flexibility, which is an important instrument of restoration of equilibrium in the classical macroeconomic theory through which the labour market is cleared of the excess supply, disappears altogether.

What will be the effect of a downwardly rigid money wage on the aggregate output, employment and prices in the economy? In Figure 5.8, there is full employment in the economy when the real wage is W/P_1. Corresponding to this real wage, the total employment, output, general price level and money wage in the economy are respectively $0N_1$, $0Q_1$, $0P_1$, and $0W_1$. Suppose that the money wage is pushed upward from $0W_1$ to $0W_2$. With the constant general price level P_1, this will mean a rise in the real wage equal to the proportionate rise in the money wage. But with the given supply of money (*MV*), the general price level has to rise because in the absence of an increase in the general price level *P*, the real wage will increase. Consequently, in the absence of an appropriate increase in the labour productivity, the total employment and output in the economy will fall.

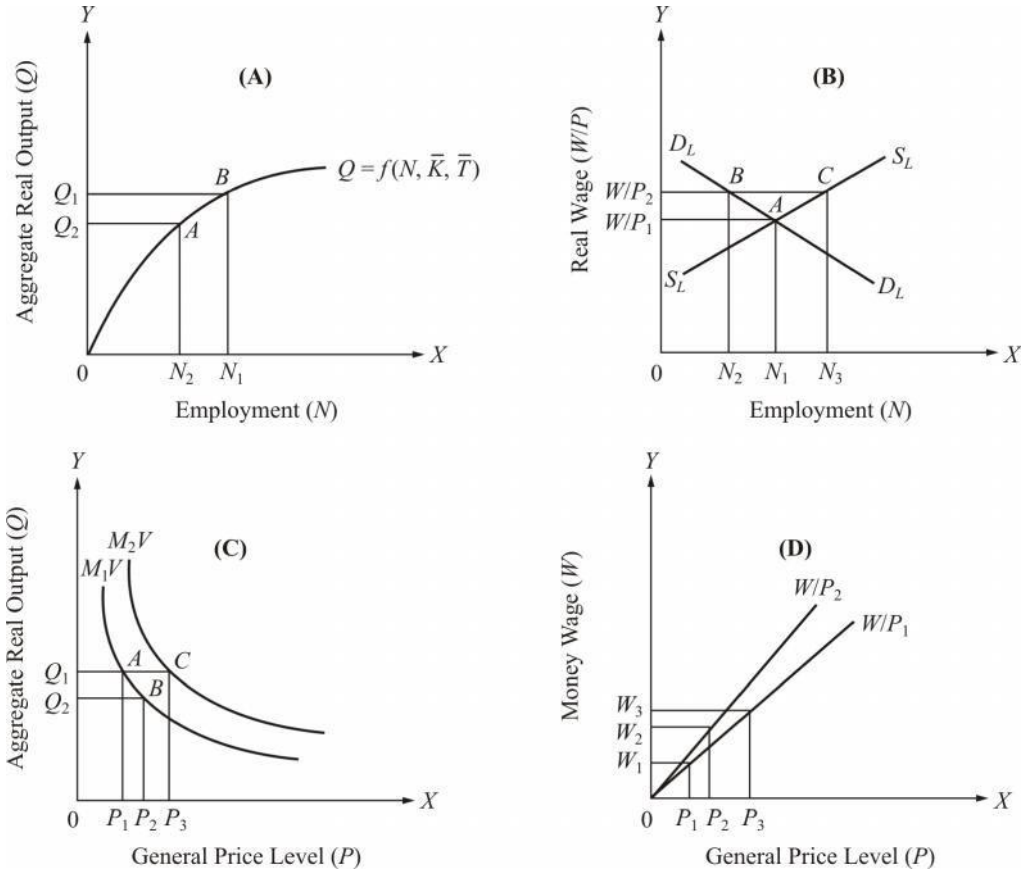

Fig. 5.8 *Full Employment in the Economy When the Real Wage is* W/P_1

With the given money supply *MV*, the lower total real output $0Q_1$ will require the higher general price level $0P_2$ to ensure the equilibrium condition $MV = PQ$. Thus, the general price level *P* must rise. It will, however, not rise by as much as the increase in the money wage *(W)* because if it rose equal to the rise in the money wage, there would be no change in the real wage and consequently no change in the total output. The original total real output $0Q_1$ with the given money supply *MV* cannot all be sold at the higher general price level. Consequently, the general price level *P* must rise equi-proportionately to the fall in the total real output.

The new equilibrium is reached through a rise in the general price level (*P*), fall in the aggregate employment (*N*) and the aggregate real output (*Q*) so as to adjust with the rigid money wage W_2. Compared with the initial equilibrium, in the new situation while the real wage W/P_2 and the general price level $0P_1$ are both higher, the aggregate real output $0Q_2$ is smaller. The higher real wage, which is the result of the higher money wage, pushes down the demand for labour from $0N_1$ to $0N_2$ while the total supply of labour offered for employment increases from $0N_1$ to $0N_3$. Consequently, there is unemployment of the N_2N_1 magnitude in the labour market in the economy. In other words, the excess supply phenomenon dominates the economy's labour market.

In the classical economic analysis, so long as the money wage is rigidly fixed above the full employment wage in the labour market, equilibrium is coupled with unemployment although the classicists denied the possibility of unemployment. It should, however, be remembered that wage rigidity is a denial of the assumptions of the classical macroeconomic theory. Consequently, under-employment equilibrium is consistent with the classical macroeconomic theory if the assumption of a flexible wage-price regime is removed from the theory.

Keynes criticized the classical assumption of flexible money wage and replaced it with the assumption of a rigid money wage which was in conformity with the facts. By assuming a rigid money wage ($W \leq \overline{W_0}$ below a certain level, Keynes suppressed the supply function of labour below this rigid money wage and concluded that under-employment equilibrium was possible in the economy. We, however, reach the same conclusion in the classical economic theory on the basis of rigid money wage which Keynes had reached in his book *The General Theory of Employment, Interest and Money* published in 1936. Keynes was mistaken in attacking the classical macroeconomic theory as logically incomplete and inconsistent. In fact, the truth is the exact opposite and the classical macroeconomic theory is perfectly logical. Its problems arise from its naive assumptions which are far removed from reality.

3.5.5 Monetary Policy and Full Employment

In the classical macroeconomic theory, if the money wage is fixed higher than the full employment real wage, the monetary policy will help in achieving full employment in the economy. By increasing the aggregate money supply, unemployment in the economy can be removed. Acheap money policy by increasing the liquidity and reducing the rate of interest in the system would encourage investment and raise the level of the aggregate output, employment and income in the economy. According to the quantity theory of money, given the constant velocity of money *V* and the aggregate output *Q*, an increase in the money supply *M* will raise the general price level *P* equi-proportionately. With rigid money wage ($W \leq \overline{W_0}$ the rise in the general price level *P* will reduce the real wage *W/P*. A fall in the real wage by offering profit incentive to the employers will cause the

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total employment and output to expand upto the level of full employment. Thus, by increasing the quantity of money enough to raise the general price level P to a level which reduces the real wage to the full employment real wage, full employment equilibrium can be achieved in the economy. In Figure 5.8(D), W/P_1 is the full employment real wage. With the rigid money wage W_2, the appropriate general price level which can ensure full employment in the economy is $0P_3$. This general price level requires the increase in the total money supply from M_1 to M_2 with the constant velocity of money V.

In the classical theory, monetary policy provides an effective remedy of unemployment created by the rigidity of money wage provided changes in the quantity of money are not offset by changes in its velocity. In other words, the increase in the money supply must increase the aggregate demand. Keynes denied that there was this kind of simple relationship between changes in the aggregate money supply and changes in the aggregate demand. As soon as we consider the asset or speculative demand for cash balances, either the entire or bulk of the increase in the total money supply may go to satisfy the public's demand for speculative cash balances rather than to increase the volume of cash transactions and consequently the aggregate demand in the economy.

3.5.6 Classical Theory with Saving and Investment

So far the classical theory of output and employment has been discussed on the assumption that the total money income earned in the process of production is spent on the purchase of consumption goods. In other words, no part of the national income generated in the act of undertaking economic activities in the economy is saved or withheld from consumption spending. The classical model which does not incorporate saving and investment is, however, over-simplified because it fails to recognize the fact that the aggregate demand is composed of the demand for consumption goods and the demand for investment goods.

In reality, the income recipients do not spend their entire current income on the purchase of consumption goods; they also save a part of their current earnings for future spending. Consequently, a part of the national income leaks out of the aggregate expenditure stream in the form of saving. Unless that part of the aggregate income which is saved is channelled back into the aggregate expenditure stream in the form of investment spending, the aggregate income and output will fall below the full employment level and Say's Law of Markets will be invalidated. Since saving is a normal process in any society, in the classical analysis *ex-ante* saving is brought into equilibrium with the *ex-ante* investment through the mechanism of interest rate changes. According to the classical economists, saving and investment were interest-elastic. While investment was a negative function of the rate of interest, saving was a positive function of the rate of interest, i.e.,

$$S = f(r); \text{ and } \frac{dS}{dr} > 0$$

$$I = g(r); \text{ and } \frac{dI}{dr} < 0$$

According to the classical theory, investment was interest-elastic so that a small percentage change in the rate of interest caused relatively a large percentage change in investment. Since investment demand was interest-elastic, a relatively small change in the interest rate was sufficient to keep the full employment planned saving and planned investment in equilibrium. Rejecting the classical assumption of the interest-elastic saving supply and investment demand functions, John Maynard Keynes argued that the

investment demand function was interest-inelastic. Keynes had witnessed that during the great depression of the 30s, even a large fall in the interest rate failed to raise investment in the economy.

Moreover, the saving-interest relationship was not so infallible as to justify our drawing the safe conclusion that more would always be saved at the higher rate of interest. In fact, people will dissave even though the rate of interest may be high if their income is below the break-even level of income. Consequently, relatively large changes in the rate of interest were necessary to bring about equality between the planned saving and planned investment.

According to Keynes, the investment demand curve was so situated that no equilibrium between the full employment saving and investment was possible at the minimum critical positive rate of interest while the rate of interest could not fall below this minimum rate due to the phenomenon of liquidity trap. Keynes denied that the rate of interest was downwardly flexible below a certain minimum positive rate called the liquidity trap interest rate. However, even if the presence of the Keynesian liquidity trap is denied, there is a built-in liquidity trap implicit in the classical assumption that the rate of interest could not fall below zero. It is possible to conceive of a situation in which both the investment demand and the saving supply curves are so highly interest-inelastic and are so situated that no intersection between these curves is possible at any positive or even at zero rate of interest. Since the rate of interest could not fall below zero, the result is an *impasse* where the rate of interest is completely helpless in bringing saving and investment into equilibrium corresponding to full employment. Consequently, unless the rate of interest can fall below zero, saving made out of the full employment income either at zero or any positive rate of interest would exceed investment at that rate of interest resulting in the deficiencyof the aggregate effective demand causing unemployment in the economy.

From the macroeconomic policy point of view, this is important in so far as it shows the failure of the monetary policy as an effective remedy for unemployment. In the Keynesian theory, the influence of fall in the rate of interest on raising the investment outlay in the economy is of minor importance. As regards saving, Keynes denied any reliable relationship between saving and the rate of interest. Keynes regarded saving more as a function of income rather than of the rate of interest although he admitted that more might, in certain cases, be saved out of any given income at the higher rate of interest.

In the classical theory, the rate of interest is a very powerful factor which influences the aggregate investment and aggregate saving. Since income in the classical theory is always assumed to be the full employment level of income it does not vary in the short period. Consequently, being a constant it cannot be treated as a saving-determining variable. In short, its influence on savings is ruled out. In the classical theory, at full employment, income saving varies directly with changes in the rate of interest—higher is the rate of interest greater is that part of full employment income which is not devoted to consumption or which is saved and *vice versa*. Figure 5.9 illustrates the classical theory of output, employment and the general price level with saving and investment.

Parts *A*, *B*, *C* and *D* of the figure have been repeated from Figure 5.5. Part *E* of the figure shows that the aggregate consumption spending is influenced by changes in the rate of interest in such a way that the larger part of the fixed aggregate output is withheld from consumption at a higher rate of interest. In other words, as the rate of interest rises, the total amount saved out of the full employment aggregate real income

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$0Q_1$ also increases. In Figure 5.9(E), *SS* saving-supply function has been derived by taking the vertical distance between the fixed aggregate real output $0Q_1$ and the *CC* aggregate consumption curve at the different rates of interest. The saving supply-function *SS* so derived is interest-elastic. Part *F* of the figure also shows the interest-elastic investment-demand function *II*. This curve shows the demand for the investible funds (savings) at different rates of interest. This curve is determined by the marginal efficiency of investment on the returns side and the rate of interest on the cost side. Equilibrium between the aggregate saving and the aggregate investment in the economy is achieved at the R_2 positive rate of interest. Thus, in the classical macroeconomic theory, the rate of interest by ensuring equilibrium between saving and investment at a fairly high positive rate of interest guarantees full employment in the economy.

Classical Theory Summarized

The classical theory of output and employment can be summarized in terms of the following basic propositions which have been illustrated in Figure 5.9.

- As shown in Figure 5.9(B), in the classical theory the supply curve of labour S_LS_L and the demand curve for labour D_LD_L are both the positive and negative functions of the real wage *W/P*, respectively. Due to the operation of the tendency to diminishing returns in production, the demand curve for labour is negatively sloping while due to the increasing irksomeness involved in working for longer hours, the supply curve of labour is positively sloping. The equilibrium real wage and full employment in the system are determined by the intersection of both the supply and demand curves of labour. The equilibrium level of employment in the classical theory represents the full employment. In Figure 5.9(B), the equilibrium real wage is $0W/P_1$ and the equilibrium employment which is also the full employment is $0N_1$.
- Figure 5.9(A) illustrates the short-run aggregate production function. It shows that with the given technique of production *T* and the fixed capital stock *K* , the aggregate real output *Q* in the economy depends on the level of employment which is determined in the labour market in Figure 5.9(B). In Figure 5.9(A), corresponding to the $0N_1$ level of total employment, the aggregate real output is $0Q_1$.
- Given the aggregate real output $0Q_1$, the general price level *P* in the economy is determined by the total supply of money *MV*. In Figure 5.9(C), the *MV* curve shows the relationship between the general price level (*P*), the aggregate output (*Q*) and the total money supply *MV*. This gives the equilibrium general price level $0P_1$ for the given aggregate real output $0Q_1$ which is exchanged against the given total money supply *M* with the constant velocity *V*.
- Figure 5.9(D) shows the money wage adjustments with changes in the general price level which are consistent with a given real wage. With the equilibrium real wage $0W/P_1$ determined in Figure 5.9(B) and the general price level $0P_1$ determined in Figure 5.9(C), the money wage which is consistent with this combination of the real wage and the general price level $0P_1$ is $0W_1$.
- Figure 5.9(E) shows that saving is a positive function of the rate of interest such that the total amount saved out of the full employment aggregate real income (output) $0Q_1$ increases as the rate of interest increases. Expressed differently, the figure shows that consumption is a negative function of the rate of interest

such that higher the rate of interest, lower will be the amount of income spent on consumption and *vice versa.* Note, that this classical view linking the consumption spending with the rate of interest is opposed to the Keynesian view according to which consumption is a stable function of the level of income. In the classical theory since income was not a variable but a full employment constant, consumption was not regarded as income's function.

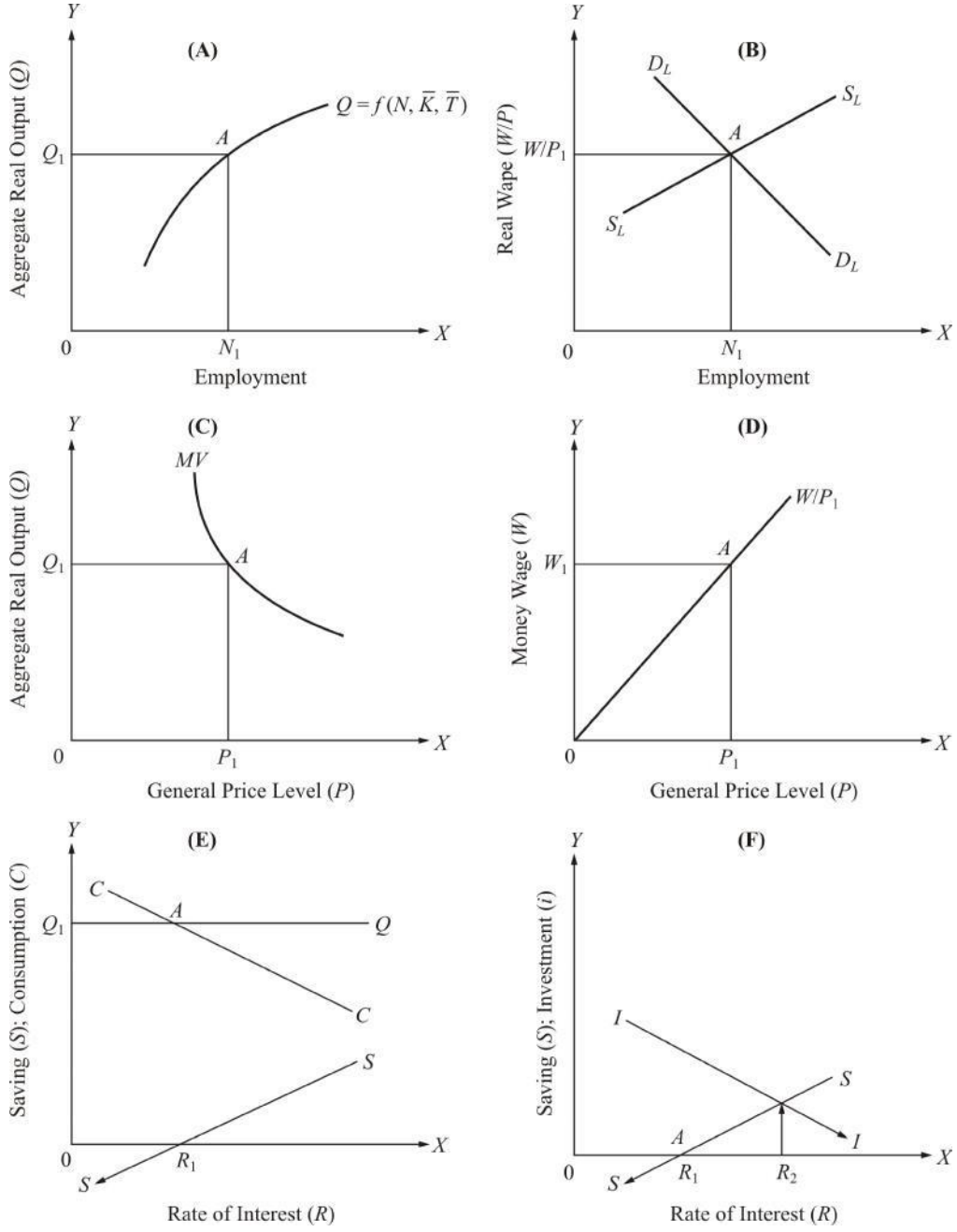

Fig. 5.9 *Classical Theory of Output, Employment and the General Price Level with Saving and Investment*

- Figure 5.9(F) illustrates the equilibrium between the aggregate saving and aggregate investment. The two are brought into equilibrium through the mechanism of interest rate changes. Thus, in the classical macroeconomic theory, the burden of

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guaranteeing full employment in those situations where people save falls on the rate of interest. Keynes denied that the rate of interest played an important role in bringing the aggregate saving and aggregate investment in equilibrium at the full employment level.

- In the classical theory of income, output and employment, the prices and wages are flexible. This means that the money wage will fall when unemployment appears in the economy and the general price level will fall when the market cannot be cleared of the existing output at current prices. Given this wage-price flexibility, the economy will automatically tend towards full employment, the aggregate real output will be that output which is produced by a fully employed labour force, the general price level will be that one which can purchase the full employment real output with the given money supply and the money wage will be consistent with the equilibrium real wage.

3.5.7 Limitations of the Theory

The classical macroeconomic theory which states that the free enterprise market economy automatically tends to move towards full employment equilibrium has been criticized by John Maynard Keynes and others on several grounds. The theory which at one time was held in high esteem among the economists lost its prestige during the great depression of the 30s on account of the following factors:

- The great depression of the 1930s gave a severe blow to the unrealistic assumptions on which the classical macroeconomics was based. In the midst of mass unemployment, people found it difficult to believe the faulty classical view that full employment was a normal situation. Many, in fact, sorely felt that if anything was normal in the economy it was mass unemployment.
- During the 20^{th} century, a theory based on the assumption of perfect competition was an anachronism in an age of oligopolistic and monopolistic markets. Deviations from the competitive market model resulted in the state assuming a stronger and positive role in the economy and consequently in invalidating the conclusions of the classical macroeconomic theory.
- Keynes made a devastating attack on the classical theory. The classical contention was that unemployment in the economy was caused by a downwardly rigid money wage that was fixed too high to guarantee full employment. As against this contention of the classicists, Keynes argued that unemployment was due to the deficiency of aggregate effective demand resulting from instability of investment spending and the persistence of high saving propensity in the affluent economies combined with inadequate investment opportunities. Moreover, even if wages were high it was not practical to reduce them in the changed situation of the 30s when workers were organized into strong trade unions. In place of the monetary policy which, according to the classical view, by raising the prices and lowering the real wage helps raise the level of employment in the economy, Keynes suggested the increasing use of fiscal policy to raise sufficiently the level of the aggregate effective demand to remove unemployment in the economy. The Keynesian liquidity trap caused complete emasculation of the monetary theory as an effective instrument of economic policy to cure the Depression.
- The classical economists had overlooked an important point in their argument according to which to remove unemployment in the system, real wage (i.e., firms' costs) should be reduced. They forgot that a general wage-cut while reducing the

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firms' marginal costs will also reduce the factor incomes and consequently the total market demand for the product. Thus, if as a result of a general wage-cut the aggregate supply curve shifts to the right, the aggregate output (and consequently employment) could increase only if the aggregate demand curve did not shift leftward. Unfortunately, the same general wage-cut which shifts the aggregate supply curve to the right will also shift the aggregate demand curve to the left leaving output and unemployment unchanged. Moreover, if the leftward shift in the demand curve was more than the rightward shift in the supply curve, the aggregate output and employment may even fall rather than rise consequent upon a general wage-cut.

The Keynesian criticism of this assumption of the classical theory is not altogether free from faults. In fact, it is difficult to see any direct relationship between the wage-cut and the aggregate demand. The demand for goods depends upon the level of income and even when the level of income falls due to a fall in the money wage, it cannot be said for certain that the aggregate demand will fall. It all depends on the income elasticity of demand. Moreover, by how much will the aggregate demand curve shift leftward due to a general wage-cut will depend upon, among other things, the proportion of wage-income in the total national income, the increase in the non-wage incomes when a general wage-cut takes place and the propensities to spend of the workers and employers.

There is, however, another argument for concluding that a general money wage-cut will increase employment and output in the economy even if it means the fall in prices. This is known in the literature as the 'Pigou' or the real-balance effect. With the general fall in prices, idle cash balances result. Under the classical assumptions, these cash balances will be spent shifting the market demand curve to the right and preventing the prices from falling in the same proportion as the fall in wages. Thus, there will be a net increase in the aggregate output and employment in the economy.[14]

Keynes seriously doubted that this would happen. He argued that under the expectation of persistently falling prices, wealth-holders would postpone spending indefinitely. He, however, conceded that a fall in wages and prices, by reducing the transactions demand for cash balances, would release some cash balances to cater to the speculative demand for cash balances which would lead to some fall in the rate of interest and consequently to an increase in the investment. But the important question is: by how much will the rate of interest fall and by how much will investment in the economy increase in response to the given fall in the rate of interest? It will depend upon the existing rate of interest, the interest-elasticity of the speculative demand for money at that rate of interest and the interest-elasticity of the investment demand. This reasoning in the literature is known as the Keynes-effect. Keynes did not think that the Keynes-effect was powerful enough to guarantee full employment through the wage-price deflation.

- Keynes also seriously doubted that the real wage actually determined the labour's supply function (within some considerable range any way). He doubted that workersentered and left the labour market as the real wage rose and fell. Keynes asserted that a situation in which labour stipulated for the money wage rather than the real wage was the normal case. According to Keynes, workers suffered from money illusion and the supply of labour was a function of the nominal money wage and not of the real wage. If the nominal money wage increased (regardless of what

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happened to the general price level and, therefore, to the real wage) the supply of labour in the market would increase and *vice versa.*

In Keynes' view, money wages moved more or less in line with the movement of the general price level and it was the aggregate effective demand, not the real wage, which determined the level of employment in the economy. Keynes argued that even if the classical theory demonstrating that a fall in the real wage would increase employment was correct, in real life wages and prices were generally sticky downward. Consequently, the solution prescribed by the classical theory was impracticable. Keynes argued that although the classical theory was logically neat and consistent, it was of no use in helping us to understand the real world.

- The classical macroeconomic theory has also been criticized for ignoring the speculative or asset demand for money. According to the classical economists, individuals and businessmen hold moneyonlyfor transactions purposes. Theywould never hold money as an asset since money as an asset was barren, yielding no return to its owners. Holding of idle cash balances indicates an irrational behaviour on the part of the wealth-holders because cash assets were barren since hoarded money earned no interest. Since a positive rate of interest could be earned by swapping money for some other assets such as the riskless government or the corporate bonds, people would willingly hold the fixed interest income yielding riskless government bonds rather than hold money and earn no interest.[15] In short, the asset or speculative demand for money was ruled out in the classical theory. Consequently, Say's Law of Markets and the quantity theory of money, which ignores the demand for the speculative cash balances, were the two basic pillars on which the entire edifice of the classical macroeconomic theory rested.

  Keynes argued that this was not always true. It was possible to envisage a situation in which an individual may choose to hold a part of his assets in the form of money although money was barren as it yielded no income. At some critically low rate of interest (around 2 per cent), people begin to expect that the interest rate will soon rise to a normal level. Since the interest rate and bond prices are inversely related, a rise in the rate of interest means capital losses for the bond-holders. Consequently, at some very low rate of interest, the prospective investors would weigh the probable low interest gains against the highly probable future capital losses and decide against making investment in bonds. This holding of money in the form of idle cash balances is termed as the speculative or asset demand for money. At some very low rate of interest which we may call the critical minimum or the liquidity trap[16] interest rate, the asset demand for money becomes perfectly interest-elastic or infinite because money becomes a perfect substitute for the credit risk-free, although not market risk-free government bonds at this extremely low rate of interest.

  Thus, the total demand for money depends on both the money value of the total real output (Y), which was recognized in the classical theory, and on the rate of interest, which was ignored in the classical theory. Money is demanded both for the transactions purpose and for the speculative purpose if the current rate of interest is very low to cause the strong expectations that it will rise in the future. Provided there exists a sufficiently low rate of interest which cannot fall any further, Keynes argued that the full employment investment demand and saving supply schedules would, under certain circumstances, not intersect each other at any interest rate either above this rate or even at this critically

low rate of interest. In other words, these schedules would intersect only at an interest rate below this irreducible minimum rate of interest. Consequently, there would be an unfilled gap between the full employment investment and the full employment savings at this critically minimum rate of interest. In other words, at this low rate of interest the aggregate effective demand ($C + I$) will be less than the aggregate output or supply ($C + S$) causing an excess of the aggregate saving over the aggregate investment in the system. For the equilibrium to occur between the two, the aggregate saving will have to fall which is possible only if the aggregate income falls below the full employment income. In short, the aggregate saving and the aggregate investment will be in equilibrium at less than full employment income. This has been illustrated in Figure 5.10 which shows that corresponding to the minimum possible interest rate of two per cent (liquidity trap rate of interest), the full employment investment falls short of the full employment saving by the *DE* amount. In other words,

$C_F + I_F < C_F + S_F$; or $I_F < S_F$

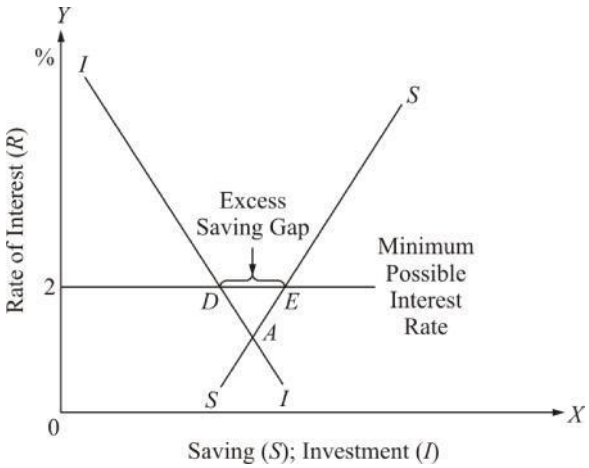

Fig. 5.10 *Falling of Full Employment Investment*

Consequently, the equilibrium aggregate income cannot be maintained at the full employment level of income and it must fall unless the rate of interest can fall further to equate the saving and investment corresponding to the full employment income. But having already touched the floor at the 2 per cent, it cannot fall any more. The stickiness of the rate of interest at this low level under the impact of liquidity trap denies the possibility of the economy achieving the full employment in an automatic manner unless either the investment demand schedule shifts sufficiently to the right such that at the different rates of interest, there is more investment outlay or the saving supply schedule shifts sufficiently to the left such that the people save less (consume more) at the different rates of interest or both the curves shift simultaneously in appropriate directions. Shifting of these schedules is not, however, possible because it involves the fundamental shifts in the psychological behaviour of the investors and consumers. This gap can be filled through the instrument of fiscal policy by increasing the autonomous expenditure incurred by the government on the public works programmes.

Thus, Keynes argued that the speculative demand for money[17] and its infinitely interest-elastic nature at some critically low rate of interest was really the crucial cause of unemployment in a free enterprise economy. The classical economists

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were guilty of ignoring this crucial factor. It was the speculative demand for money which, by preventing the interest rate from stabilizing the aggregate demand, threw a great burden on the wage-price flexibility which was imperfect and weak for the job. Moreover, since the speculative demand schedule for money was highly elastic no amount of deflation would work. Rigid money wage is not, therefore, the cause of unemployment; on the other hand, it prevents unemployment from creating a painful and unnecessary fathomless deflation.

The concept of liquidity trap has often been regarded as an article of faith and a bitter controversy has arisen about whether it constitutes the fundamental difference between the classical and the Keynesian economic analysis. In other words, the question is: will Keynes' criticism of the classical theory become meaningless in the absence of liquidity trap? The existence of the liquidity trap is not, however necessary to show that under-employment equilibrium in the economy may exist in certain circumstances. Keynes was somewhat over-anxious to criticize the classical theory by seeking resort in the liquidity trap. In fact, even in the classical analysis there is a built-in liquidity trap present at the zero rate of interest since the rate of interest cannot fall below zero. It may well be that under certain circumstances full employment investment demand and saving supply schedules will intersect only at a negative rate of interest. This is likely to be true if the investment demand and the saving supply schedules are highly interest-inelastic and the two are also so situated, as shown in Figure 5.11, that both the investment demand and the saving supply schedules intersect each other below the zero rate of interest, i.e., at the $-R_1$ negative rate of interest. The rate of interest in the classical system, however, cannot fall below zero.

Consequently, at the zero rate of interest saving exceeds investment by *AB* amount (shown as gap) and, therefore, the full employment aggregate supply exceeds the full employment aggregate demand by this amount. Consequently, the Say's Law of Markets is invalidated. In consequence of this disequilibrium between saving and investment, the aggregate income and employment must fall until *I* and *S* are in equilibrium at less than full employment. In this case, the crucial role of the liquidity trap disappears and the issue whether such a trap exists and the interest rate at which it occurs loses practical significance.

It should be noted that we cannot continue to use the aggregate saving and investment schedules of Figure 5.11 without making substantial modifications. The rate of interest must always be positive but the *ex-post* saving and investment are equal by definition. The problem can be solved only by shifting the investment and saving curves appropriately leftward so that they intersect at some positive rate of interest. In the Keynesian system, investment and saving are both functions of the aggregate income while in the classical system, the aggregate income having been regarded as fixed or given, these were regarded as functions of the rate of interest. In the Keynesian system, the investment and saving schedules shift every time the income changes. The amount by which both these two schedules will shift will depend on the marginal propensity in save (*MPS*) and the marginal propensity to invest (MP_1). In the simple Keynesian system, the stability condition requires that the marginal propensity to invest is less than the marginal propensity to save, i.e., $MPI < MPS$[18] or that the $MPC + MPI < 1$ or that the simple investment multiplier is finite.[19]

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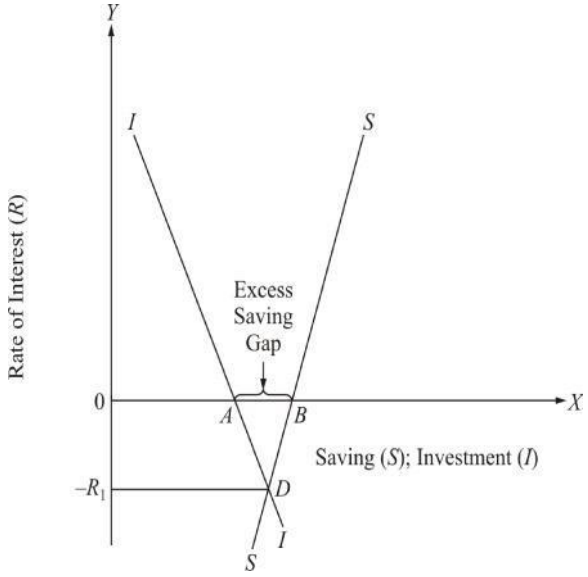

Fig. 5.11 *Intersection of the Investment Demand and the Saving Supply Schedules*

If the *ex-ante* aggregate investment is less than the *ex-ante* aggregate saving, the aggregate income will fall. Consequently, both the aggregate investment demand and the aggregate saving supply schedules will shift to the left.

Since we have assumed that the marginal propensity to save (*MPS*) is more than the marginal propensity to invest (*MPI*) i.e., *MPS* > *MPI*, for any given fall in the aggregate income, the leftward shift in the saving supply schedule will be more than the leftward shift in the investment demand schedule. Consequently, the two curves will approach nearer. With the fall in the aggregate income each time, the two curves come nearer until income falls sufficiently to make their intersection at some given positive interest rate possible. Figure 5.12 shows the process of fall in the aggregate income and the resulting leftward shift in the aggregate investment demand and the saving supply schedules. In Figure 5.12, when the aggregate income falls from Y_1 to Y_2 ($Y_1 > Y_2$), the aggregate saving supply schedule $S(Y_1)$ shifts leftward to the position of the dotted $S(Y_2)$ saving supply schedule. The aggregate investment demand schedule $I(Y_2)$ also shifts leftward to the position of the dotted investment demand schedule $I(Y_2)$. But in spite of both the curves shifting to the left, they intersect each other corresponding to the R_2 positive rate of interest because the saving suppy curve shifts more to the left than does the investment demand curve. Consequently, Y_2 is the equilibrium aggregate income which is less than the full employment income.

In short, the crucial argument in the invalidation of the classical theoretical economic system is that the *ex-ante* investment is not always equal to the *ex-ante* saving at some positive rate of interest. Once this follows, there will be idle cash balances, the velocity of money will fluctuate cyclically and the money stock will no longer be proportional to the money output even though the prices are flexible. Consequently, the quantity theory of money will be invalidated and the aggregate demand function depending on the level of income will be necessary to determine the equilibrium level of the national product.

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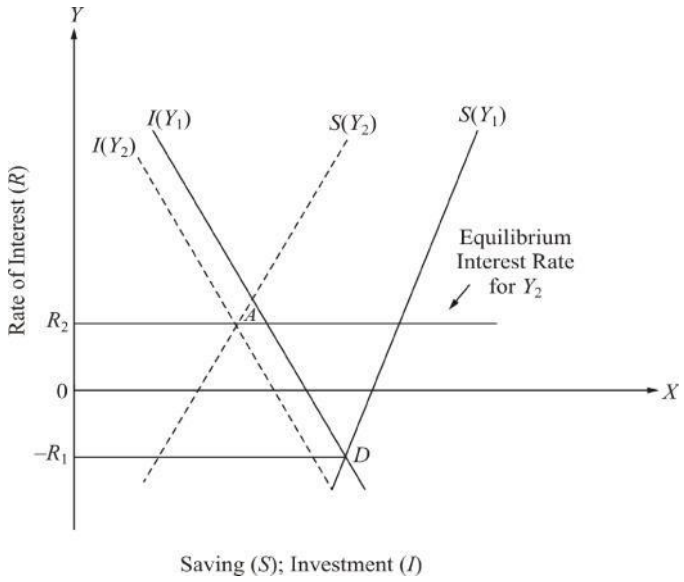

Fig. 5.12 *The Process of Fall in the Aggregate Income*

3.5 7.1 Keynes also criticized the classical dichotomy[20] between the real and the monetary sectors of the economy. According to the classical economists, money was neutral and changes in the supply of money and its velocity, i.e., monetary changes did not exert any influence whatsoever on the relative prices of commodities although such changes significantly affected the absolute or general price level in the economy. Consequently, changes in the quantity of money did not affect the aggregate real output and employment in the economy. In the classical macroeconomic theory, money was nothing more than a convenient measuring yard-stick in terms of which the relative values were stated and real flows were measured. In his *General Theory*, Keynes related money and the aggregate demand. He introduced the 'causal nexus' between the aggregate supply of money and the rate of interest. According to Keynes, by influencing the aggregate investment spending the rate of interest influenced the aggregate effective demand in the economy. Consequently, Keynes successfully integrated the monetary and real sectors of the economy which were treated mutually exclusive in the classical macroeconomic theory. While the classical theory was concerned with a world which was undisturbed by uncertainty regarding the future, Keynes was concerned with an uncertain world in which money served as an important link between the present and the future.

Evaluation

Notwithstanding the scathing attacks of John Maynard Keynes and others on the classical theory of output, employment and price level, it is not completely dead. The so-called 'Keynesian Revolution' has not been able to wipe out the 'old order' completely. The disputes between Keynes and the classicists have at times been overstated. For example, the interest rate controversy whether interest rate is a real or a purely monetary phenomenon has been blown out of all legitimate proportions. We still have the monetarists with their modern quantity theory of money based upon the foundation which has its links with and in general outline resembles the old quantity theory of money. As a result of the monetarists' persuasive arguments and the serious empirical studies undertaken supporting the view that 'money does matter', the monetary policy has regained its lost

position as an effective tool of economic policy both in depression and inflation. It has now regained parity with the fiscal policy as an area of concern and field of research.

Monetary policy has crept back towards the centre stage as an economic stabilization technique. It is not altogether correct to describe the classical theory of output, employment and price level as faulty and despite the great popularity and dramatic success of the Keynesian theory over the past seven decades, not few in positions of great responsibility, both in government and in business, have been raised on the teachings of the old theory. Alexander Gray has correctly stated that 'no point of view, once expressed, ever seems wholly to die; and in periods of transition like the present our ears are full of the whisperings of dead men.'[21] In short, for a proper understanding of the complete macroeconomic theory, it is essential on our part to understand and acquire a thorough grasp of the classical macroeconomic theory.

NOTES

3.6 SUMMARY

In this unit, you have learnt that,

- National income is the final outcome of all economic activities of a nation valued in terms of money. National income is the most important macroeconomic variable and determinant of the business level and economic status of a country.
- Conceptually, national income is the money value of all final goods and servicesproduced in a country during a period of one year.
- Economic activities generate a large number of goods and services and make net addition to the national stock of capital. These together constitute the national income of a 'closed economy'—an economy which has no economic transactionswith the rest of the world.
- In an 'open economy', national income includes also the net results of its transactions with the rest of the world (i.e., exports less imports).

  Of the various measures of national income used in national income analysis, GNP is the most important and widely used measure of national income. It is the most comprehensive measure of the nation's productive activities.
- The GNP is defined as the value of all final goods and services produced during a specific period, usually one year, plus incomes earned abroad by the nationalsminus incomes earned locally by the foreigners.
- The Gross Domestic Product (GDP) is defined as the market value of all final goods and services produced in the domestic economy during a period of one year, plus income earned locally by the foreigners minus incomes earned abroad by the nationals.
- Depreciation is that part of total productive assets which is used to replace the capital worn out in the process of creating GNP.
- Net Domestic Product is an annual measure of the economic output of a state that is adjusted to account for depreciation, calculated by subtracting depreciationfrom the gross domestic product (GDP).
- National income of a country is generated by its people participating in different kindsof economic activities and produce goods and services for measuring nationalincome.

Check Your Progress

9. Name the chief architects of the classical economic theory.
10. How are changes in the total employment, real wage and total output possible?
11. Till what time can equilibrium be coupled with unemployment in the classical economic analysis?
12. Name the event of the 1930s that gave a severe blow to the unrealistic assumptions on which the classical macroeconomics was based.

NOTES

- For measuring the gross value of domestic product, output is classified under various categories on the basis of the nature of activities from which they originate.
- Factor-income method is also known as income method and factor-share method. Under this method, the national income is calculated by adding up all the 'incomes accruing to the basic factors of production used in producing the national product'.
- The total factor-incomes are grouped under three categories; (i) labour incomes; (ii) capital incomes; and (iii) mixed incomes.
- An economy is a system of interrelated economic activities and economic transactions. Basic economic activities include production, exchange and consumption. The economic activities are carried out in an integrated system and lead to a continuous process of economic transactions.
- The goods flow consists of factor and product flows, i.e., flow of factors of production and of goods and services.
- Injections are the amount that is spent by the households and/or firms in addition to their current incomes generated within the regular economy.
- A three-sector model is created by adding the government sector to the two-sector model. The inclusion of the government into the model brings in the government's economic roles and the effect of its fiscal operations on the circular flows.
- Four-sector model is formed by adding foreign sector to the three-sector model.
- Following the publication of Adam Smith's classic entitled *An Inquiry into the Nature and Causes of the Wealth of Nations* in 1776, a body of economic theory was gradually developed during the following century and a half. The chief architects of this theory, known as the classical economic theory, were David Ricardo, John Stuart Mill, Jean Baptiste Say and Alfred Marshall.
- John Maynard Keynes successfully attacked the classical explanation of the determination of aggregate employment, output and general price level. It was the assumption of a given volume of total output, rather than its composition and technique of production, which was severely attacked by Keynes.
- The classical macroeconomic theory explains the determination of the equilibrium level of aggregate employment and output, real wage, saving and investment, rate of interest, general price level and money wage.
- The two basic pillars on which the elegant edifice of the classical macroeconomic theory stands are the Say's Law of Markets and the quantity theory of money.
- Say's Law of Markets states that supply creates its own demand. Consequently, whatever be the level of aggregate output in the economy, it will always be demanded for consumption and investment.
- Like the Say's Law of Markets, the quantity theory of money also assumes that money has no utility of its own apart from the utility of commodities which money buys.
- In the classical theory, a change in the aggregate money supply will not affect the real wage, employment and output in the economy.
- The classical theory of output and employment assumes perfect competition in the product and factor markets in the economy. Consequently, if at any given real wage there is excess supply in the labour market, the real wage must fall in order

to clear the market of the excess supply and ensure full employment in the economy.

- In the classical theory of income, output and employment, the prices and wages are flexible. This means that the money wage will fall when unemployment appears in the economy and the general price level will fall when the market cannot be cleared of the existing output at current prices.
- The great depression of the 1930s gave a severe blow to the unrealistic assumptions on which the classical macroeconomics was based.
- The classical macroeconomic theory has also been criticized for ignoring the speculative or asset demand for money. According to the classical economists, individuals and businessmen hold money only for transactions purposes. They would never hold money as an asset since money as an asset was barren, yielding no return to its owners.
- The concept of liquidity trap has often been regarded as an article of faith and a bitter controversy has arisen about whether it constitutes the fundamental difference between the classical and the Keynesian economic analysis.
- Keynes also criticized the classical dichotomy between the real and the monetary sectors of the economy. According to the classical economists, money was neutral and changes in the supply of money and its velocity, i.e., monetary changes did not exert any influence whatsoever on the relative prices of commodities although such changes significantly affected the absolute or general price level in the economy.

NOTES

3.7 KEY TERMS

- **National income:** It is the final outcome of all economic activities of a nation valued in terms of money.
- **Gross National Product (GNP):** It is defined as the value of all final goods and services produced during a specific period, usually one year, plus incomes earnedabroad by the nationals minus incomes earned locally by the foreigners.
- **Gross Domestic Product (GDP):** It is defined as the market value of all final goods and services produced in the domestic economy during a period of one year, plus income earned locally by the foreigners minus incomes earned abroad by the nationals.
- **Depreciation:** It is that part of total productive assets which is used to replace the capital worn out in the process of creating *GNP*.
- **Withdrawal:** It is an amount set aside by the households and/or by the firms, not to be spent on the goods and services over a period of time.
- **Injections:** They are the amount that is spent by the households and/or firms in addition to their current incomes generated within the regular economy.

3.8 ANSWERS TO 'CHECK YOUR PROGRESS'

1. National income is the final outcome of all economic activities of a nation valued in terms of money. National income is the most important macroeconomic variable and determinant of the business level and economic status of a country.

NOTES

2. The Gross Domestic Product (GDP) is defined as the market value of all final goods and services produced in the domestic economy during a period of one year, plus income earned locally by the foreigners minus incomes earned abroad by the nationals.
3. Net Domestic Product is an annual measure of the economic output of a state that is adjusted to account for depreciation, calculated by subtracting depreciation from the gross domestic product (GDP).
4. After the output is classified under the various categories, the value of gross output is computed in two alternative ways: (i) by multiplying the output of each category of sector by their respective market price and adding them together, or (ii) by collective data about the gross sales and changes in inventories from the account of the manufacturing enterprises and computing the value of GDP on the basis thereof.
5. (i) labour; capital.

   (ii) external transactions
6. Economic transactions generate two kinds of flows:
   (i) Product or goods flow
   (ii) Money flow
7. Injections are the amount that is spent by the households and/or firms in addition to their current incomes generated within the regular economy.
8. Foreign sector consists of two kinds of international economic transactions:
   (i) Foreign trade, i.e., export and import of goods and services
   (ii) Inflow and outflow of capital
9. The chief architects of this theory, known as the classical economic theory, were David Ricardo, John Stuart Mill, Jean Baptiste Say and Alfred Marshall.
10. According to the classical theory of output and employment, changes in the total employment, real wage and total output are possible only through changes in the supply of labour, economy's total capital stock and technology.
11. In the classical economic analysis, so long as the money wage is rigidly fixed above the full employment wage in the labour market, equilibrium is coupled with unemployment although the classicists denied the possibility of unemployment.
12. The great depression of the 1930s gave a severe blow to the unrealistic assumptions on which the classical macroeconomics was based.

3.9 QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is the relevance of national income statistics in business decisions? What kinds of business decisions are influenced by the change in national income?
2. Distinguish between net-product method and factor-income method. Which of these methods is followed in India?
3. Does the method of measuring national income of a 'closed economy' differ from one followed in an 'open economy'? How is foreign income treated in national income estimates?

4. What are the two main flows in an economy? How do they arise? What do they signify?
5. What is meant by withdrawals and injections? How do they affect the size of the circular flows of income and expenditure in an economy?
6. How does the addition of the government sector to the two-sector model change the structure of the model and of the circular flows?
7. 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?
8. How can unemployment be eliminated through the wage-price flexibility? Will the lower prices alone eliminate unemployment?
9. Can there be unemployment in the classical economic theory of output and employment?

Long-Answer Questions

1. Discuss the various measures of national income.
2. Describe the various methods of measuring national income. How is a method chosen for measuring national income?
3. Describe an economy as circular flows of income and expenditure. What determines the magnitude of the circular flows?
4. 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.
5. Examine critically the classical theory of income, output and employment.
6. Compare the classical and the Keynesian models of income determination and point out the crucial differences between these two models.
7. 'Say's Law of Markets and the quantity theory of money are the two basic pillars of the classical macroeconomics.' Discuss this statement fully.
8. Explain the classical theory of output and employment and discuss Keynes' criticisms of this theory.

3.10 FURTHER READING

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Endnotes

1. This is not to suggest that other economists had nothing to do with the important task of laying the sound foundations of the classical economic system. James Stuart Mill, father of the famous classical economist John Stuart Mill, James Ramsey McCulloch, Nassau William Senior and others had lent their valuable support to the propounding and development of the classical economic doctrines. Among the neo-classical economists, Arthur Cecil Pigou had very ably defended classical economics against John Maynard Keynes' scathing attack.
2. J. M Keynes. *The General Theory of Employment, Interest and Money,* 1936, p. 32.
3. Agreeing with the classical explanation of what is to be produced, how it is to be produced and for whom it is to be produced, Keynes had written: 'If we suppose the volume of output to be given, i.e., to be determined by forces outside the classical scheme of thought, then there is no objection to be raised against the classical analysis of the manner in which private self-interest will determine what in particular is produced, in what proportions the factors of production will be combined to produce it, and how the value of the final product will be distributed between them.' (*op.cit.,* p. 378–9.)
4. Under monopolistic competition, equations (5.2) and (5.3) will be altered although it will not affect the analysis fundamentally. Instead of multiplying labour's marginal physical product by the product price *P*, it will be multiplied by the marginal revenue *MR*. Since $MR = P(1 - 1/e)$, where e is the price elasticity of demand for a firm's product, the equilibrium condition will become $W = MPP_L \times P(1 - 1/e)$ instead of $W = MPP_L \times P$ stated in equation (5.2).
5. If the positive slope of the labour supply curve is increasing, it means that the marginal irksomeness or disutility of work is increasing. Consequently, in order to obtain each additional man-hour's supply, the real wage will have to be progressively increased.
6. Frictional unemployment arises from imperfections in the economic system. For example, the lack of knowledge on workers' part about the available job opportunities in the economy may result in workers remaining temporarily unemployed. Such unemployment is, however, short-lived and will disappear as the workers, in due course of time, will come to know about the job vacancies available in the economy.
7. A concise summary of Say's Law of Markets has been given in W S Vickrey, *Metastatics and Macroeconomics*, Harcourt Brace and World, 1964, p. 168–70. A detailed exposition of this Law has also been given in Joseph A Schumpeter, *History of Economic Analysis*, OUP, 1954, p. 615–25. A lucid discussion is also found in Alvin H Hansen, *A Guide to Keynes*, 1953, Chapter 1, p. 4–20. See also P M Taylor, *Principles of Economics*, 1921, 9th Edition, p. 196–205.

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8. J M Keynes, *op. cit.,* p. 19.
9. John Stuart Mill, *Principles of Political Economy,* 1848, Book III, Chapter 14, Section 2.
10. The classical economists did not specify the exact form of the saving supply and investment demand functions beyond stating that the investment demand function was interest elastic at low interest rates.
11. Even in its crude form, the quantity theory of money did not argue that Q and V were rigidly stable in the short period or that P was absolutely passive. These two extreme assumptions have been made, however, to facilitate the construction of a simplified classical model.
12. M_1V and M_2V curves are a rectangular hyperbola since all along the curves the quantity equation $MV = PQ$ holds. Since by assumption the aggregate real output Q is held constant there will be only one general price level P which will satisfy the equation $MV = PQ$.
13. The same effect can come about through the fixing of a minimum wage by the government in the economy.
14. This was seriously debated by Keynes who argued that if the fall in the general price level was expected to continue there will be no increase in the aggregate effective demand because wealth-holders would postpone spending, expecting the prices to fall further. Moreover, the strength of the real-balance effect would depend upon the composition of the total asset-portfolios of the wealth-holders. To the extent their assets consisted of the real assets, the real-balance effect of any given price fall would be reduced and in certain extreme cases it could even be negative. Even Pigou conceded that the Pigou-effect was of little practical importance and that the dynamic consequences of the falling wages and prices on the expectations made it impossible to advocate the general wage cutting as an effective remedy against depression.
15. In fact, the implicit rate of interest on holding the cash balances in the classical system could be negative if the wealth-holders spent something by way of the cost of storing money. The classical argument rules out the possibility of future changes in the rate of interest believing that the current interest rate would also prevail in future.
16. Liquidity trap, labelled by many Keynesians as one of Keynes most important contributions, is an extremely unusual and an extreme situation the actual occurrence of which is an extremely rare phenomenon because very seldom will interest rate touch the critically low level at which the wealth-holders will entertain the expectations necessary to produce the liquidity trap. Milton Friedman has questioned the existence of the liquidity trap situation by posing the question: has anybody ever seen it? It was a sheer myth. Even Keynes himself thought the occurrence of virtually absolute liquidity preference in the sense that almost everyone prefers cash to holding a bond which yields so low a rate of interest as a most unlikely happening. Writing in 1935, when the rate of interest in the United State of America on 90-day treasury bills was 0.137 per cent per annum, Keynes could still state that 'while this limiting case (the trap) might become practically important in the future, I know of no example of it hitherto.' (J M Keynes, *The General Theory of Employment, Interest and Money,* 1936, p. 207.)
17. 'Unemployment develops, that is to say, because people want the moon;—men cannot be employed when the object of desire, (i.e., money) is something which cannot be produced and the demand for which cannot be readily choked off. There is no remedy but to persuade the public that green cheese is practically the same thing and to have a green cheese factory (i.e., a central bank) under public control.' (J M Keynes, *op. cit.,* p. 235.)

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18. This means that the slope of the investment demand curve must be less than the slope of the saving supply curve. In terms of the curves, it means that the investment demand curve cuts the saving supply curve from above.
19. Since $MPC + MPS = 1$, the stipulation that the $MPI < MPS$ means that the $MPI < 1 - MPC$ or that the $MPC + MPI < 1$.
20. The classical distinction between the 'real' forces of demand and supply which determine the relative prices, and the supply of money which establishes the absolute price level in the economy has come to be known as the 'classical dichotomy'. Don Patinkin took a leading part in the debate regarding the validity of this dichotomy. The controversy has come to be known as the 'Patinkin Controversy' after Don Patinkin's name. In his magnum opus *Money, Interest and Prices: An Integration of Monetary and Value Theory*, Don Patinkin has criticized the classical dichotomy asserting that the existence of a real-balance effect in the real sector is what integrates the monetary and the real economic analyses or equivalently the monetary and value theory. According to Don Patinkin, the monetary analysis and the real analysis cannot be validly separated when the real-balance effect is present.
21. Alexander Gray, *The Development of Economy Doctrines*, 1931, p. 370.

UNIT IV KEYNESIAN MODEL ANDMACRO-POLICIES

NOTES

Structure

4.0 INTRODUCTION

In the preceding unit, we have discussed the basic concepts and measures of national income. In this unit, we will discuss a problem of theoretical nature, i.e., the problem of national income determination. The two major questions with which we shall be concerned here are: (i) What factors determine the level of national income, and (ii) How is the equilibrium level of national income determined? These questions were first answered by J. M. Keynes, in 1936, in his book *The General Theory of Employment, Interest and Money*. We will outline here the Keynesian theory of income determination and fiscal policy and its objectives and instruments.

Fiscal policy is defined as the government's programme of taxation, expenditure and other financial operations to achieve certain national goals. The objectives of fiscal policy, like those of other economic policies of the government, are derived from the 'aspirations and goals' of the society. As an instrument of macroeconomic policy, fiscal policy has been very popular with the modern governments to influence the size and composition of the national product, employment, industrial production and prices in the economy. The unit will further deal with fiscal policy as an instrument of macroeconomic policy.

4.1 UNIT OBJECTIVES

After going through this unit, you will be able to:

- Discuss the Keynesian theory of national income determination
- Describe the two-sector model in determining national income

- Explain the concepts of consumption function, saving function and multiplier
- Assess fiscal policy as an instrument of macroeconomic policy

NOTES

4.2 KEYNESIAN DETERMINATION OF INCOME

To explain the Keynesian theory of income determination, the entire economy is divided into four sectors, viz.,

1. Household sector
2. Firms or the business sector
3. Government sector
4. Foreign sector

The Keynesian theory of income determination is present in the following three models: (i) Two-sector model including only the household and the business sectors; (ii) Three-sector model including household, business and government sector; and (iii) Four-sector model including foreign sector with the three-sector model.

For the sake of simplicity and systematic exposition of the Keynesian theory of income determination, we will discuss in this unit income determination in a two sector model involving only the household and firm sectors.

4.2.1 Determination of National Income: Two-Sector Model

Assumptions

The following simplifying assumptions are made to specify the two-sector model of a hypothetical simple economy.

First, the hypothetical simple economy has only two sectors: households and firms. The households own the factors of production and sell factor services to the firms to earn their living in the form of factor payments—wages, rent, interest and profits. The households are the consumers of all final goods and services. The firms, on the other hand, hire factor services from the households and produce goods and services which they sell to the households.

Second, there is no government, or if it is there, it does not perform any economic function; it does not tax; it does not spend; and it does not consume.

Third, the economy is a closed one: there is no foreign trade. It implies that there is no outflow or inflow of goods and services to and from any foreign country.

Fourth, there are no corporate savings or undistributed (or retained) corporate profits, i.e., the total corporate profit is distributed as dividends.

Fifth, all prices remain constant.

Finally, supply of labour and capital and the state of technology remain constant.

According to Keynes, national income of a country is determined by two factors: (i) aggregate demand (*AD*), and (ii) aggregate supply (*AS*) of goods and services. And, the equilibrium level of national income is determined where *AD* equals *AS*. Before we illustrate graphically the determination of national income, let us explain the concepts of aggregate demand and aggregate supply.

NOTES

Aggregate Supply and Aggregate Demand

(i) Aggregate Supply

The *aggregate supply* (*AS*) refers to the total value of goods and services produced and supplied in an economy per unit of time. Aggregate supply includes both consumer goods and producer goods. The goods and services produced per time unit multiplied by their respective (constant) prices give the total value of the national output. This is the aggregate supply in terms of money value.

Aggregate Supply Schedule

If all that is produced is sold, then aggregate supply grows at a constant rate of increase in output. This is shown by a 45° line in Fig. 6.1. This line is also called *aggregate supply schedule*. In the Keynesian theory of income determination, aggregate income equals consumption (*C*) plus savings (*S*). Therefore, *AS* schedule is generally named as *C* + *S* schedule. The aggregate supply (AS) curve is also sometimes called 'aggregate expenditure' (AE) curve. The aggregate supply has a one-to-one relationship with aggregate income under the assumption that total income is spent.

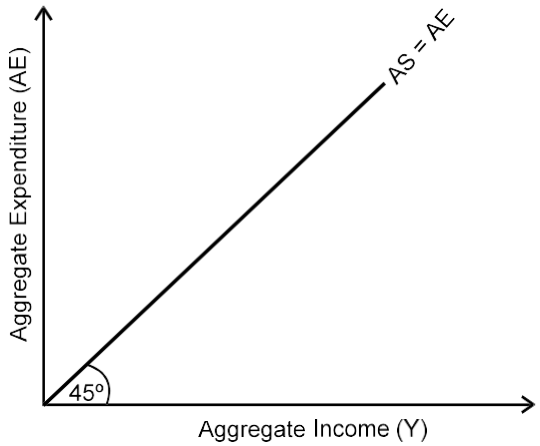

Fig. 6.1 *The Aggregate Supply Curve*

(ii) Aggregate Demand

The aggregate demand is an *ex-post* concept. It implies effective demand which equals actual expenditure. The aggregate effective demand means the aggregate expenditure made by the society per unit of time, usually, one year. Aggregate demand (*AD*) consists of two components:

(i) Aggregate demand for consumer goods (*C*)

(ii) Aggregate demand for capital goods (*I*)

Thus, $AD = C + I$ ...(6.1)

Aggregate Demand Schedule

The aggregate demand *AD* schedule is also called *C* + *I* schedule. In the Keynesian framework, investment (*I*) is assumed to remain constant in the short-run. But, consumption (*C*) is treated to be a function of income (Y). Pending detailed discussion on the consumption function till the next section, let us assume that the consumption function is given as:

$C = a + bY$ ...(6.2)

NOTES

where a is a constant denoting C when $Y = 0$ and b is the proportion of income consumed, i.e., $b = \Delta C / \Delta Y$.

By substituting Eq. (6.2) in Eq. (6.1), *AD* function can be expressed as:

$$AD = a + bY + I \quad ...(6.3)$$

Let us now illustrate the construction of the $C + I$ schedule by assuming:

(i) $C = 50 + 0.5Y$, and

(ii) $I =$ ` 50 billion

The *AD* function given in Eq. (6.3) can now be written as:

$$AD = 50 + 0.5Y + 50$$

An aggregate demand schedule based on the above assumptions is given in Table 6.1. The $C + I$ schedule is plotted in Fig. 6.2.

Table 6.1 *Aggregate Demand Schedule*

(` in billion)

Income (Y)	*C = 50 + 0.5Y*	*I = 50*	*C + I Schedule*
0	50 + 0 = 50	50	100
50	50 + 25 = 75	50	125
100	50 + 50 = 100	50	150
150	50 + 75 = 125	50	175
200	**50 + 100 = 150**	**50**	**200**
250	50 + 125 = 175	50	225
300	50 + 150 = 200	50	250
350	50 + 175 = 225	50	275
400	50 + 200 = 250	50	300

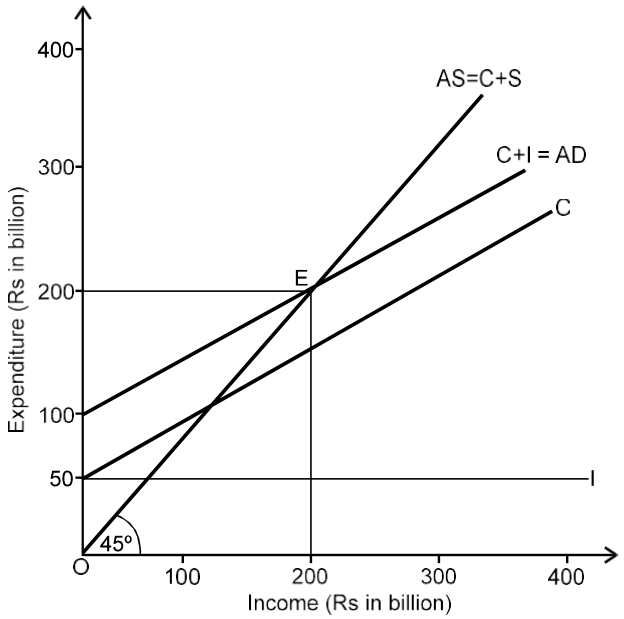

Fig. 6.2 *National Income Determination*

The data contained in Table 6.1 is presented graphically in Fig. 6.2. The *AS* schedule is drawn on the assumption that total income (Y) is always equal to total expenditure (E).

The *AS* schedule has, therefore, a constant slope of 1. The $C + I$ schedule is the vertical summation of the *C* and *I* schedules.

As Fig. 6.2 shows, $C + I$ and $C + S$ schedules intersect at point *E* determining the equilibrium level of income at ` 200 billion. Note that at point *E*,

$$AD = AS$$

$$C + I = C + S$$

$$150 + 50 = 200$$

Thus, the equilibrium level of national income is determined at ` 200 billion.

Why Not Equilibrium at Any Other Point?

Beyond the equilibrium level of national income, $(C + I) < (C + S)$. If firms produce goods and services worth more than ` 200 billion, they will find that they have produced in excess of demand and their inventories are piling up. For example, suppose firms produce goods and services worth ` 250 billion. This level of output (*AS*) exceeds the aggregate demand (*AD*). At output or $Y =$ ` 250 billion, *AD* equals ` 225 billion (see Table 6.1). Therefore, firms' unsold stock equals goods and services worth ` 25 billion. Hence, they reduce their production and cut down their expenditure on inputs. This reduces household incomes and their expenditure on goods and services. This process continues until the equilibrium level of income reaches at ` 200 billion.

Similarly, below ` 200 billion level of national income, aggregate demand exceeds aggregate supply. The firms, therefore, finds that their output is less than what society is willing to consume. They realize that they could make a greater income by producing and selling a larger output. For example, if firms produce goods worth only ` 150 billion, they find *AD* exceeding *AS* by ` 25 billion. That is, demand worth ` 25 billion remains unsupplied. They are, therefore, encouraged to produce more and generate more income to the society. The society in its turn spends more as its income increases. The process continues until the equilibrium level of national income is reached. Once the equilibrium level of national income is determined, it is supposed to remain stable.

Having described the theory of national income determination in two-sector model, let us now discuss in detail the relationship between *C* and *Y* and between *S* and *Y* with a view to understanding the process of national income determination. Let us first look into the relationship between income and consumption, generally expressed through the consumption function.

4.2.2 The Consumption Function

Having illustrated the theory of income determination in its simplest form, we now look at the consumption expenditure (aggregate) and aggregate consumption function.

The private demand for goods and services account for the largest proportion of the aggregate demand in an economy and play a crucial role in the determination of national income. The total volume of private expenditure in an economy depends, according to Keynes, on the total current disposable income of the people and the proportion of income which they decide to spend on the consumer goods and services. As mentioned above, this relationship between aggregate consumption demand and the aggregate disposable income is expressed through a 'consumption function' expressed as:

$$C = a + bY \qquad ...(6.4)$$

NOTES

where C = aggregate consumption expenditure; Y = total disposable income; a is a constant term; and b, consumption co-efficient (i.e., the proportion of income spent on consumption.

According to Keynes, the consumption function stems from a 'fundamental psychological law'. The law states that propensity to consume ($\Delta C/\Delta Y$) decreases with the increase in income in the short-run. This law implies that total consumption increases but not by an equal amount of increase in income. This Keynesian hypothesis of income-consumption relationship was later termed as the *absolute income hypothesis.* Some early empirical studies based on cross-section and time-series data have supported the hypothesis.

The *absolute income hypothesis* makes the following *propositions*.

First, consumption increases as disposable income increases, but not by the amount of absolute increase in income.

Second, as the absolute level of disposable income tends to rise, the proportion of income spent on consumption tends to decrease, i.e., *marginal propensity to consume* decreases as the absolute level of income rises.

Third, up to a certain level of Y, $C > Y$.

Finally, consumption is a fairly stable function of income.

Keynes's original consumption theory gives a non-linear consumption curve with decreasing slope ($\Delta C/\Delta Y$). However, the economists, have found empirically that Keynesian consumption function may be applicable to individual consumption behaviour but not for the aggregate consumption expenditure. It is now a convention to use a linear consumption function at the aggregate level, as given in Eq. (6.4).

The Propensity to Consume

The propensity to consume refers to the proportion of the total and the marginal incomes which people spend on consumer goods and services. The proportion of the marginal income consumed is called 'Marginal Propensity to Consume' (*MPC*), and the proportion of the total income consumed is called 'Average Propensity to Consume'(*APC*). Let us now discuss these concepts in detail.

(a) The Marginal Propensity to Consume (MPC)

The concept of *MPC* is related to the marginal consumption-income relationship. In other words, *MPC* refers to the relationship between change in consumption (ΔC) and the change in income (ΔY). Symbolically, $MPC = \Delta C/\Delta Y$.

As mentioned above, according to the consumption function envisaged by Keynes, marginal propensity to consume ($\Delta C/\Delta Y$) decreases with increase in income. In the theory of income determination, however, a ***constant*** marginal propensity to consume is assumed. For example, suppose that income increases from ` 200 to ` 300, and as a result, consumption increases from ` 250 to ` 325, as shown in Fig. 6.2. Thus, the change in income $\Delta Y = 300 - 200 = 100$, and change in consumption, $\Delta C = 325 - 250 = 75$. Thus,

$$MPC = \Delta C/\Delta Y = 75/100 = 0.75$$

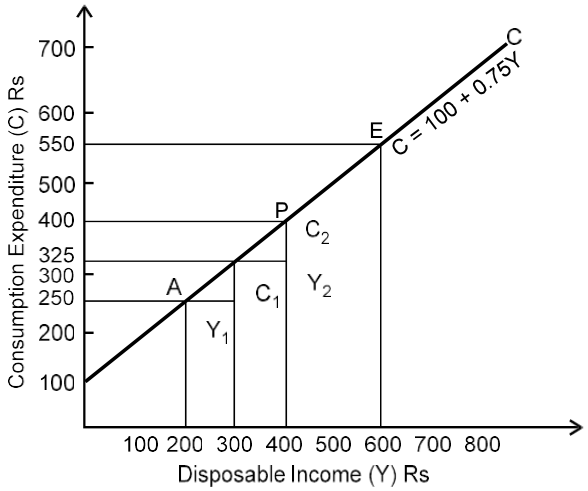

Fig. 6.3 *Income Consumption Relationship*

Similarly, if income increases from ` 300 to ` 400, and consumption expenditure rises from ` 325 to ` 400, the *MPC* = 75/100 = 0.75. This kind of relationship between income and consumption is expressed through a **linear consumption function**, as shown by the line marked *C* in Fig. 6.3.

The *MPC* can be derived from the consumption function as follows. Given the consumption function in Eq. (6.4),

$$C = a + bY,$$

Let Y increase by ΔY so that:

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

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

Since $C = a + bY$, by substituting $a + bY$ for C, we get:

$$\Delta C = -(a + bY) + a + bY + b\text{D}Y$$
$$\Delta C = b\Delta Y \qquad ...(6.5)$$

by dividing both sides of Eq. (6.5) by Y, we get:

$$\frac{\Delta C}{\Delta Y} = b$$

According to the Keynesian theory of consumption, $\Delta C/\Delta Y = b$ is always less than unity, but greater than zero, i.e., $O < b < 1$. This fundamental relationship between income and consumption plays a crucial role in the Keynesian theory of income determination.

(b) Average Propensity to Consume (APC)

Average Propensity to Consume is defined as the proportion of total income spent on consumer goods and services, i.e.,

$$APC = \frac{C}{Y}$$

NOTES

where C is total consumption expenditure and Y is total disposable income. Given the consumption function, $C = a + bY$, APC can be obtained as:

$$APC = \frac{C}{Y} = \frac{a + bY}{Y}$$

If consumption function is given as:

$$C = bY$$

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

Note that if consumption function is $C = bY$, (i.e., without constant term 'a'), then $APC = b = MPC$.

Properties of Consumption Function

The Keynesian consumption function has the following properties.

- It states the relationship between consumption expenditure and disposable income. If consumption function is empirically estimated for a country, total consumption expenditure can be predicted if growth rate of income is known and income distribution is given.
- It states that income-consumption relation is given by the MPC, while $O < b < 1$.
- Consumption function of the form, $C = a + bY$ or $C = bY$ implies a linear relationship between consumption and income, i.e., a constant MPC.
- Consumption function implies a saving function. That is, if consumption function is known, the saving function can easily be obtained.

4.2.3 Derivation of Saving Function

Having explained the Keynesian consumption function, we turn to derive the Keynesian saving function in this section. Like consumption, saving (S) is also the function of income (Y), i.e.,

$$S = f(Y)$$

Since $Y = C + S$, consumption and saving functions are counterparts of one another. Therefore, if one of these functions is known, the other can be easily obtained. For example, if consumption function is given as $C = a + bY$, then saving function can be derived as follows.

We know that $$S = Y - C \quad ...(6.6)$$

By substituting consumption function, $C = a + bY$ for C in Eq. (6.6), we get:

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

$$= -a + (1 - b)Y \quad ...(6.7)$$

Equation (6.7) gives the saving function in which '$1 - b$' is marginal propensity to save (MPS). It can be proved as follows:

Since $$Y = C + S$$

$$\therefore \quad \Delta Y = \Delta C + \Delta S$$

Dividing both sides by Y, we get:

$$1 = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$$

NOTES

or $\frac{\Delta S}{\Delta Y} = 1 - \frac{\Delta C}{\Delta Y}$

Since $\frac{\Delta C}{\Delta Y} = b$, by substitution, we get:

$$MPS = \frac{\Delta S}{\Delta Y}$$

or $MPS = 1 - b$

Numerical Example: Let us now show the derivation of saving function through a numerical example. Let consumption function be given as:

$$C = 100 + 0.75\ Y \qquad ...(6.8)$$

Given the Eq. (6.8), Eq. (6.6) can be written as:

$$S = Y - (100 + 0.75Y)$$
$$= Y - 100 - 0.75Y$$
$$= -100 + (1 - 0.75)Y$$
$$= -100 + 0.25Y \qquad ...(6.9)$$

The consumption and saving functions are graphed in Fig. 6.4. The 45° line shows income-consumption relation with $Y = C$ at all levels of income. In the analysis of national income determination, it also shows the total sale proceeds, i.e., the value of the total planned output. The schedule $C = 100 + 0.75Y$ gives the income-consumption relationship – consumption being a linear function of income. The schedule $S = -100 + 0.25Y$ is the saving schedule derived from the consumption schedule. The saving schedule shows the income-saving relationship.

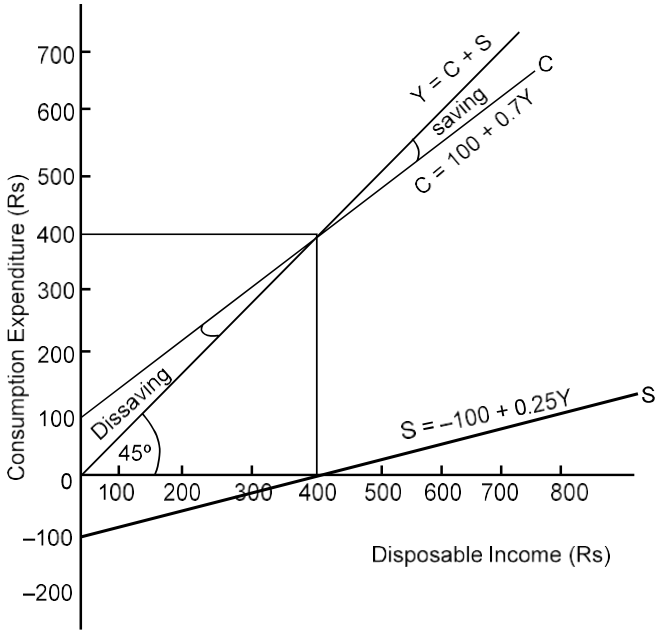

***Fig. 6.4** Income, Consumption and Savings Schedules*

4.2.4 A Formal Model of National Income Determination

In preceding sections, we have presented the Keynesian theory of income determination in its simplest form and have derived the consumption and saving functions. In this section, we present the two-sector model of income determination in its formal form.

NOTES

As stated above, equilibrium level of national income or national output is determined at a level where aggregate demand for output ($C + I$) is equal to aggregate supply of incomes ($C + S$). Thus, equilibrium condition of national income is given as:

Aggregate Demand = Aggregate Supply, or

$$C + I = C + S \quad ...(6.10)$$

Since C is common to both the sides, the equilibrium conditions can also be stated as:

$$I = S \quad ...(6.11)$$

Given these conditions of equilibrium, there are two alternative ways to show the determination of national income:

- By using aggregate demand ($C + I$) and aggregate supply ($C + S$) schedules
- By using only saving (S) and investment (I) schedules

The two approaches are known as **income-expenditure approach** and **saving-investment approach**, respectively. Let us now explain in detail the determination of national income by the two approaches.

Income-Expenditure Approach

According to the income-expenditure approach or, what is also called 'aggregate demand and aggregate supply approach', the equilibrium of national income is determined where:

$$C + I = C + S$$

Since $C + S = Y$, the national income equilibrium condition can also be restated as:

$$Y = C + I$$

Since at equilibrium, $C = a + bY$, by substitution, we get equilibrium of national income where:

$$Y = a + bY + I$$

or $$Y(1 - b) = a + I$$

Therefore, $$Y = \frac{I}{1-b}(a + I) \quad ...(6.12)$$

Suppose empirical consumption function is given as $C = 100 + 0.75Y$ and $I = 100$. Then:

$$Y = 100 + 0.75Y + 100$$
$$= \frac{I}{1 - 0.75}(100 + 100)$$
$$= \frac{I}{0.25}(200)$$
$$= 800$$

Thus, given the consumption function, as in Eq. (6.8) and investment at 100, the national income equilibrium is determined at ` 800.

Determination of equilibrium level of national income by aggregate demand and aggregate supply approach is also presented graphically in Fig. 6.5. The $C + S$ schedule represents the aggregate supply of income. The C and I schedules represent, respectively, consumption and investment function. The $C + I$ schedule, i.e., the aggregate demand schedule, is formed by vertical summation of C and I schedule. The $C + I$ and $C + S$ schedules intersect at point E which is the equilibrium point. At this point,

$$Y = C + I$$
$$800 = 700 + 100$$

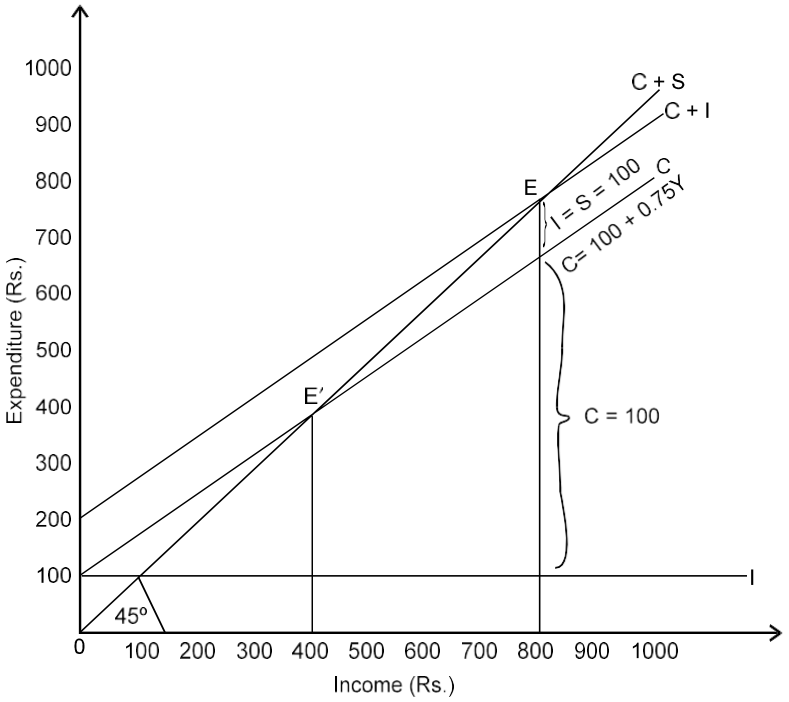

Fig. 6.5 *Determination of National Income: Income-Expenditure Approach*

Once national income is determined, it will remain stable in the short-run. Any production in excess of or below the equilibrium output will create conditions for the income and expenditure to return to the equilibrium position, *E*. For, the expectations of businessmen are realized only when aggregate expenditure equals aggregate income. While aggregate supply (*C* + *S*) represents the aggregate value (or price) expected by business firms, aggregate demand (*C* + *I*) represents their realized value. At equilibrium, *expected value* equals *realized value*. As mentioned above, production (or supply of incomes) in excess of equilibrium, output will result in undesired accumulation of inventories which reduces profits. For example, if goods and services worth ` 1,000 are produced, the unsold stock will equal ` 50, because, at this level of income society plans to spend only ` 950. This will force the business firm to cut down their output and, return to the point of equilibrium output through the process of *reverse multiplier*. Similarly, when production is below the equilibrium level, realized value exceeds the expected value. This gives incentive to produce more and make larger profit, and to reach the equilibrium level through the process of multiplier.

Saving-Investment Approach

The determination of national income can also be explained by saving-investment approach, i.e., by using only saving (*S*) and investment (*I*) schedules. We have noted that national income equilibrium is determined where $I = S$. Given our earlier assumptions that $I = 100$, and consumption function,

$$C = 100 + 0.75Y$$

saving function can be written as:

$$S = -100 + 0.25Y$$

Given the saving function and investment, equilibrium of national income will be determined where $I = S$, i.e., where:

$$100 = -100 + 0.25Y \qquad ...(6.13)$$

NOTES

Solving Eq. (6.13) for Y, we get national income equilibrium at:

$$Y = 800$$

Obviously, the saving-investment approach determines the same equilibrium level of national income (` 800) as the income-expenditure approach.

Determination of national income by saving-investment approach is illustrated in Fig. 6.6. *S*-schedule has been drawn by plotting the saving function, $S = -100 + 0.25Y$, and *I*-schedule by plotting the investment function, $I = 100$.

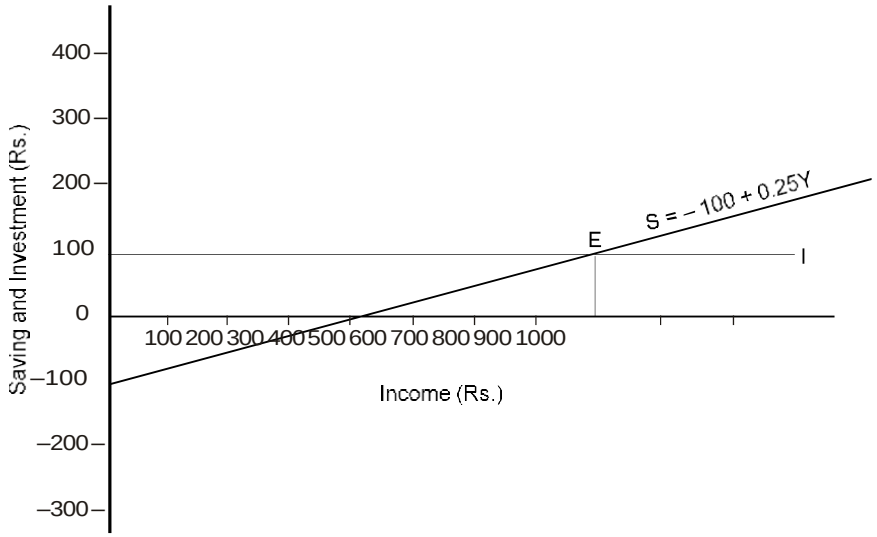

Fig. 6.6 *Determination of National Income: Saving and Investment Approach*

The *S* and *I* schedules intersect at point *E* where *planned saving* equals *planned investment* and equilibrium of national income is determined at ` 800 which is the same as one determined by income-expenditure approach.

4.2.5 Shift in Aggregate Demand Function and the Multiplier

We have explained in the preceding section the determination of national income equilibrium under the condition of a given aggregate demand schedule, $C + I$. In this section, we will explain the effect of shifts in the aggregate demand schedule on the equilibrium level of national income confining our analysis only to a *two-sector model*. A shift in the aggregate demand schedule, in a two-sector economy may be caused by a shift in consumption schedule or in investment schedule or both. Consumption expenditure is, however, found to be a more stable schedule of income than the investment expenditure. It is, therefore, generally assumed that the shift in the aggregate demand schedule takes place due to a shift in the investment schedule. Let us assume that aggregate demand schedule shifts upward due to a permanent upward shift in the investment schedule. The increase in investment may be the result of an *autonomous investment* in some adventure.

The economy being in equilibrium, an upward permanent shift in aggregate demand schedule causes and upward shift in the equilibrium of national income. That is, an upward permanent shift in the aggregate demand schedule leads to an increase in national income, as shown in Fig. 6.7. The initial aggregate demand schedule is shown by $C + I$ schedule. It intersects aggregate supply schedule ($C + S$) at point E_1 where the equilibrium level of national income is Y_1. Let us suppose now that I increases to $I + \Delta I$ causing an upward shift in investment schedule from I to $I + \Delta I$. This causes an upward shift in aggregate demand schedule as shown by the schedule $C + I + \Delta I$. With the shift in

aggregate demand schedule, the equilibrium point of national income shifts from E_1 to E_2 and national income increases from Y_1 to Y_2. The increase in national income (ΔY) may be obtained as:

$$\Delta Y = Y_2 - Y_1$$

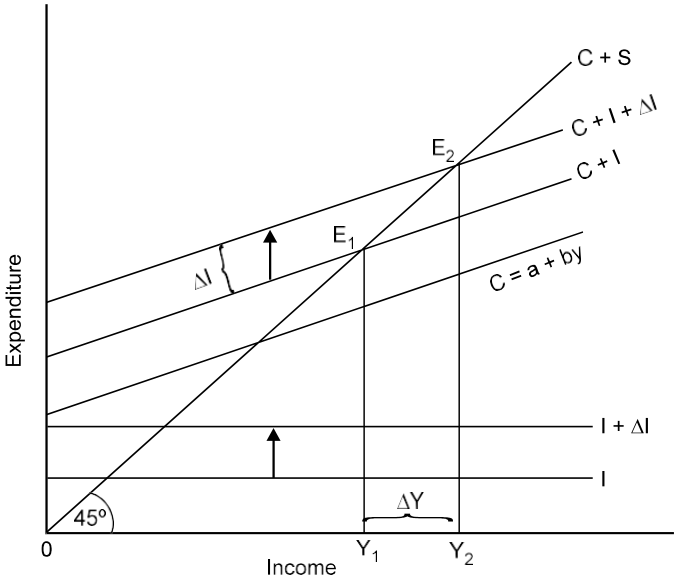

Fig. 6.7 *Shift in Aggregate Demand Function and Increase in National Income*

The increase in the national income, ΔY, is the result of ΔI. A question arises here: 'Is there any definite relationship between ΔY and ΔI?' If yes, what determines that relationship? These questions take us to the theory of *multiplier*.

The Theory of Multiplier

To understand the theory of multiplier, let us first look at the relationship between ΔY and ΔI. This can be done by comparing the two equilibrium levels of national income.

At equilibrium point E_1,

$$Y_1 = C + I$$

Since $C = a + bY$, by substitution,

$$Y_1 = a + bY_1 + I$$

$$= \frac{1}{1-b}(a + I) \quad ...(6.14)$$

Similarly, at equilibrium E_2,

$$Y_2 = C + I + \Delta I$$
$$= a + bY_2 + I + \Delta I$$
$$= \frac{1}{1-b}(a + I + \Delta I) \quad ...(6.15)$$

By subtracting Eq. (6.14) from Eq. (6.15), we get:

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

$$\Delta Y = \frac{1}{1-b}\Delta I \quad ...(6.16)$$

NOTES

NOTES

Equation (6.16) gives the relationship between ΔY and ΔI. It reveals that ΔY is $1/(1-b)$ times ΔI. Therefore, $1/(1-b)$ is the *multiplier* (m). The value of multiplier can be obtained by dividing both sides of Eq. (6.16) by ΔI. That is,

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-b} \quad ...(6.17)$$

$$\text{Thus, multiplier } (m) = \frac{1}{1-b} \quad ...(6.18)$$

The *multiplier* may thus be defined as *the ratio of the change in national income due to change in investment.* Since ΔY is the result of ΔI, the *multiplier* so defined is called *investment multiplier.*

The Determinant of the Multiplier: Note that in Eq. (6.18) '*b*' stands for the *MPC* (i.e., $b = MPC$). It may therefore be concluded that *MPC* is the determinant of the value of the multiplier. The higher the *MPC*, the greater the value of the multiplier. This relationship is illustrated in the following table.

MPC	*m*
0.00	1.00
0.10	1.11
0.50	2.00
0.75	4.00
0.80	5.00
0.90	10.0
1.00	∞

MPS and the Multiplier

The value of multiplier can also be obtained through the *marginal propensity to save MPS*. Equation (6.18), $1-b$ is the same as $1-MPC$. We know that $1-MPC = MPS$. Therefore,

$$m = \frac{1}{1-MPC} = \frac{1}{MPS} \quad ...(6.19)$$

Numerically, if $MPC = 0.75$, $MPS = 0.25$, Then multiplier,

$$m = \frac{1}{0.25} = 4$$

The multiplier may therefore also be defined as the reciprocal of *MPS.* If *MPS* is known, *m* can be easily obtained.

4.2.6 Static and Dynamic Multiplier

Sometimes, a distinction is made between *static multiplier* and *dynamic multiplier*. In this section, we explain the difference between the static and dynamic multipliers and also describe the process of dynamic multiplier.

Static multiplier is also known as 'comparative static multiplier', 'simultaneous multiplier', 'logical multiplier', 'timeless multiplier', or 'lagless multiplier'. The concept of static multiplier assumes that the change in investment and the resulting change in income are simultaneous. There is no time lag between the change in investment and the resulting change in income. In other words, the shift of national income equilibrium from

point E_1 (in Fig. 6.7) to point E_2 due to change in investment (ΔI) has no time-lag. Static multiplier also assumes that there is no change in *MPC* of the various recipients of incomes as the economy moves from one equilibrium position to another. It ignores the process by which changes in income and consumption expenditure lead to a new equilibrium. Also, static multiplier assumes income distribution and consumers' preferences to remain unchanged.

The concept **dynamic multiplier** is also known as period or 'sequence' multiplier. *Dynamic multiplier* does not make the assumptions of the static multiplier. Dynamic analysis of the multiplier traces the process by which equilibrium of national income shifts from one position to another. In real life, income level does not increase instantly when autonomous investment is made. In fact, there is a time-lag between increase in income and consumption expenditure.

The process of dynamic multiplier may be described as follows. Suppose that autonomous investment increases by ` 100, i.e., $\Delta I =$ ` 100. Assume also that *MPC* = 0.8, and there is no other expenditure than the consumption expenditure.

When autonomous investment increases by ` 100, it subsequently increases the income of the recipients by ` 100, i.e., in the *first* round of expenditure-income process, $\Delta I = 100 = y_1$. The recipients of ` 100 spend ` 80 (= 100 × 0.8) on consumer goods and services. In the *second* round, those who supply goods and services worth ` 80, receive an additional income of ` 80. Their $y_2 = 80$. Of this, they spend ` 64 (= 80 × 0.8). This results in an additional income ($\Delta y_3$) of ` 64 to those who supply consumer goods and services. This process continues till the value of $\Delta y \rightarrow 0$. Note that the value of Δy decreases in the subsequent rounds of income and expenditure, i.e., $\Delta y_1 > y_2 > y_3$.... The whole series of Δy generated by $\Delta I = 100$ may be written as:

$$\Delta Y = \Delta y_1 + \Delta y_2 + \Delta y_3 \ldots \Delta y_{n-1}$$

$$\Delta Y = 100 + 100(0.8) + 100(0.8)^2 + 100(0.8)^3 \ldots + 100(0.8)^{n-1}$$

$$= 100 + 80 + 64 + 51.20 \ldots\ldots \rightarrow 0$$

$$= 499.999 = 500$$

After having calculated the income (ΔY) generated over time, the value of multiplier (m) can be obtained as:

$$m = \frac{\Delta Y}{\Delta I} = \frac{500}{100} = 5$$

The process of dynamic multiplier may be generalized as follows. The whole series of additional incomes caused by ΔI over time may be written as:

$$\Delta Y = \Delta y + \Delta y(b) + \Delta y(b)^2 + \Delta y(b)^3 \ldots \Delta y(b)^{n-1}$$

$$= \Delta y(1 + b + b^2 + b^3 \ldots b^{n-1}) \ldots$$

$$= \Delta y\left[\frac{1}{1 - b}\right]^* \qquad \ldots(6.20)$$

Since $\Delta y = \Delta I$, we may rewrite Eq. (6.20) as:

$$\Delta Y = \Delta I \frac{1}{1 - b} \qquad \ldots(6.21)$$

From this equation, the multiplier (m) may be obtained as:

$$m = \frac{\Delta Y}{\Delta I} = \frac{1}{1 - b} \quad ...(6.22)$$

NOTES

Note that dynamic multiplier is the same as static multiplier.

Limitations of Multiplier

Despite its important uses in macroeconomic analysis, the concept of multiplier has certain *limitations* which should be borne in mind while using this concept.

The **first** limitation of the multiplier theory is related to the rate of *MPC*. If the rate of *MPC* is lower in an economy, the rate of multiplier will also be lower too. As a corollary of this, since *MPC* in a less developed country is comparatively higher, the multiplier there must be higher than in the developed countries. This may however not be true in real practice because of other limitations of multiplier.

Second, the working of multiplier assumes that those who earn income as a result of certain autonomous investment would continue to spend a certain percentage of their newly earned income on consumption. This assumption may not hold in real practice since people may like to spend a part or whole or their additional income on:

- Payment of past debts
- Purchase of existing durable goods and other assets, like old houses, second hand cars
- Shares and bonds from the shareholders and bond-holders
- Purchase of imported goods

These are known as **leakages** in the consumption flows, which reduce the rate of multiplier. For example, let us suppose that a building contractor earns ` 50,000 from a contract, which he pays to his creditor. His creditor buys an old house. The person who sells the house buys an imported car. The money thus keeps circulating but is never spent in the manner that can generate demand for new consumer goods. In this case, multiplier will be 1. The other leakages are holding idle cash, deposits in foreign banks, etc.

Third, the working of multiplier is based on the assumption that the goods and services are available in adequate supply. But, if goods and services are in scarcity, the actual consumption expenditure will be reduced whatever the rate of *MPC*. Consequently, the multiplier will be reduced. If expenditure continues to increase in the face of scarcity, it generates inflation, and not the real income.

Finally, under the condition of the full-employment, the theory of multiplier will not work because additional goods and services cannot be produced or additional real income generated.

Despite its limitations the concept of multiplier is an import tool in analysing the process and the forces of economic fluctuations in an economy. In addition, the concept of multiplier is useful in analysing the impact of public expenditure, taxation and foreign trade on the economy.

Check Your Progress

1. Name the two sectors of the hypothetical simple economy.
2. What is the propensity to consume?
3. Define Average Propensity to Consume.
4. State one limitation of the multiplier theory.

4.3 FISCAL POLICY: OBJECTIVES AND INSTRUMENTS

NOTES

As an instrument of macroeconomic policy, fiscal policy has been very popularwith the modern governments to influence the size and composition of the national product, employment, industrial production and prices in the economy. The deliberate use of fiscal policy as a means to achieve and maintain full employment and price stability in the economy has been a characteristic feature of the past seven decades after the publication of John Maynard Keynes' well-known book titled *The General Theory of Employment, Interest and Money* in 1936. The post-Keynesian popularity of fiscal policy has been largely due to the following three factors:

- Ineffectiveness of the monetary policy as a means of removing mass unemployment in the great depression of the 30s
- The development of 'new economics' by John Maynard Keynes with its stress on the role of aggregate effective demand
- The growing importance of government spending and taxation in relation to the national income and output

From its modest beginnings in the 40s, fiscal policy today has become a major macroeconomic policy instrument employed by the governments to achieve full employment, to prevent inflation and to promote rapid economic growth.

Following Keynes, economists have argued that substantial amount of spending and fund raising in the form of taxation by government are capable of changing the size of national product and the tempo of aggregate economic activity in the system. By determining what goods and services will be produced, the fiscal operations of the government affect significantly the direction of employment of the economy's resources.

Government expenditure and tax revenue are not, however, closely related to one another. In any given year, government's total expenditure and total tax receipts may be unequal in which case the budget will be either a deficit or a surplus budget. When the expenditure and income of the government are equal, the budget is said be a balanced budget. The use of budget deficit and surplus in order to affect the level of the aggregate economic activity or to maintain economic stability or to promote economic growth in the economy is the essence of fiscal policy. Both the Keynesian and the neo-Keynesian economists rely primarily on the fiscal policy to stabilize the economy. During a major recession, such as the one which occurred in the 1930s, even the monetarists believed that fiscal policy could be used more effectively to increase the level of aggregate demand in the economy.

Meaning of Fiscal Policy

In his epoch-making book *The General Theory of Employment, Interest and Money*, Keynes used fiscal policy when referring to the influence of taxation on savings and government investment spending financed through loans raised from the public. Keynes looked at it as a state policy which used public finance as a balancing factor in the economy's development. Ordinarily, by fiscal policy is meant a policy which affects the important macroeconomic variables—aggregate output, employment, saving, investment, etc., through the budgetary manipulation. Fiscal policy refers to the regulation of the level of government spending, taxation and public debt. According to Arthur Smithies,

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the term fiscal policy refers to 'a policy under which a government uses its expenditure and revenue programmes to produce desirable effects and avoid undesirable effects on the national income, production and employment.' According to Buehler, 'by fiscal policy is meant the use of public finance or expenditure, taxes, borrowing and financial administration to further our national economic objective.' According to Fred R. Glahe, by fiscal policy is meant the regulation of the level of government expenditure and taxation to achieve full employment in the economy. While referring to fiscal policy here we mean *pure* fiscal policy. A fiscal policy affects the level of government spending or taxation while the nominal money supply remains constant.

4.3.1 Fiscal Policy and Economic Activity

Government expenditure, tax income and public debt act as important levers to influence aggregate outlay, employment and prices in the economy. A given change—increase or decrease—in aggregate government expenditure causes a change—increase or decrease—in the aggregate demand thereby increasing or decreasing the factor incomes. Government expenditure incurred on wages and salaries of its employees, interest paid on government debt, social security and old age pension payments, all tend to increase the disposable personal income of people as a consequence of which the aggregate demand for consumer goods increases. Thus, an increase in the total expenditure of government tends to expand the aggregate economic activity in the economy. On the other hand, taxes levied on the people to finance government expenditure tend to reduce disposable personal and corporate incomes which could have been either spent on consumption or devoted to capital formation through saving. Thus, taxes tend to reduce the aggregate demand and income in the economy. These effects of government budget are equally valid for the central, state and local government budgets although the budget of the central government is much more powerful in affecting the level of aggregate economic activity in the economy than are the combined budgets of all the states and local bodies like the municipal and district boards.

Government expenditure and revenue can be combined in several ways in order to stimulate or depress the aggregate effective demand and economic activity in the economy. A surplus in the budget will exert a deflationary effect on national income because the inflow of aggregate government expenditure into the circular income flow will be less than the tax leakage from the circular income flow. Conversely, a deficit in the budget expands the net national product since the leakage from the aggregate income flow due to taxes is less than the additional inflow into the circular flow in the form of government expenditure. It follows, therefore, that in slump when there is need for expanding the aggregate demand deficit budget while in inflation when the problem is of preventing the aggregate demand from exceeding the aggregate supply, surplus budget should be prepared. This generalization should not, however, lead us to conclude that a balanced budget is neutral in its effects on the national income and economic activity in the system. Depending upon the particular circumstances, a balanced budget may be no less important than an unbalanced—deficit or surplus—budget.

For a correct appraisal of the effects of government's fiscal policy on the level of aggregate economic activity, apart from the magnitude of government expenditure and revenue, their composition or structure is also equally significant. A given amount of revenue can be realized by the government in several ways—by levying taxes, by increasing the area of and profits from commercial activities and by borrowing from the public. However, even though the revenue raised through these several alternative methods may be the same, each method of raising revenue will affect the economy

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differently. For example, the same amount of revenue may be raised either through taxing the people or through floating bonds in the market but the effect of each one of these two methods of raising the government revenue will be different. Even in the case of taxes, the effects will be different in the case of different tax levies like the income-tax and excise duty.

Similarly, the government can incur a given expenditure in several ways. It might, for example, spend upon building a hospital or slum clearance or on the construction of a sugar mill or on unemployment doles. The effect on the level of aggregate economic activity will be different although the total expenditure is the same in each case. An expenditure of ` 5 crore incurred on constructing a new national highway or on slum clearance will not affect the aggregate investment activity in the private sector adversely; if anything, it will affect private investment favourably by causing an increase in the demand for raw materials and equipment needed for road construction or for housing the slum dwellers. But if the same amount is spent for starting a new sugar factory, it might cause an offsetting fall in the aggregate private investment by depressing the marginal efficiency of capital in the private sector. Consequently, the beneficial effects of public expenditure on the level of aggregate economic activity will be partially lost. Thus, a balanced budget is not neutral in its effects on national income and economic activity unless it is assumed that the composition of expenditure and income remains unchanged from year to year. Although the level of aggregate economic activity in the economy can be affected by varying the size of a balanced budget, the stabilizing effect of the fiscal policy depends largely on the size of the surplus or deficit in the budget. The extent to which fiscal policy can prove effective as an instrument of economic stability depends on the extent to which the government can vary the difference between the income and expenditure rather than upon the balanced budget and the change in its size.

4.3.2 Objectives of Fiscal Policy

As an instrument of macroeconomic policy, the goals of fiscal policy are likely to be different in different countries and in the same country in different situations. For example, while in a developed economy operating either at the full or at near-full employment level the goal of fiscal policy should be the maintenance of full employment while in a developing economy the main concern of fiscal policy has to be the promotion of economic growth with stability and reduction in the economic inequalities.

Broadly speaking, overall fiscal policy involves two types of important decisions. While one of these two decisions is related to the goal of full employment, the other is concerned with determining the social priorities. The second policy decision is concerned with the issue of allocation of economy's productive resources as between their different rival uses—should more resources be allocated for education, health care, public housing, slum clearance and transport. The government expenditure on different items in any society will be determined by the prevailing social values.

Economists generally agree that fiscal policy should be employed to achieve full employment and economic stability in the economy. Before the great depression of the 30s, by economic stability was largely understood the stability of the general price level. The severity of the depression focussed attention on the need to remove unemployment and to employ fiscal policy for this purpose. The Employment Act of 1946 in the USA stated that it was the responsibility of the federal government to use all possible means, including fiscal policy, to promote maximum employment, production and purchasing power in the economy.

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After the Second World War, inflation has become a worldwide problem. Consequently, economic stabilization has come to be widely defined so as to include the elimination of inflationary pressures in the economy. This means that the achievement of full employment and price stability should be simultaneously attained through the instrument of fiscal policy. At times, however, both these goals may be difficult to achieve as these might be mutually inconsistent. An economy which wants to achieve full employment must accept moderate price rise unless it resorts to price control, rationing and wage freeze policies.

Contra-cyclical Fiscal Policy

If fiscal policy has to be employed as an instrument of economic stability, it has to be contra-cyclical in nature. The government can contribute to raise the levels of employment, income and economic activity by spending more than its current income. Conversely, it will exert a contractionary effect on employment, income and economic activity by collecting more revenue from the people in the form of taxes than it spends. To use its fiscal policy as an instrument of economic stability, the government should carefully regulate both the time and size of its spending and tax revenue operations. A deficit in the budget in inflation will further aggravate inflation and will, therefore, act as a destabilizing factor rather than act as a stabilizing factor in the economy. But the same policy if enforced in recession will promote economic stability in initiating recovery. Similarly, surplus budgeting in recession by aggravating the fall in the level of aggregate demand will convert a mild recession into a great depression. The same policy, however, if pursued during boom will promote economic stability in the system.

If fiscal policy is to be used as an instrument of economic stability, it is essential to abandon the current practice of balancing the budget annually in the face of fluctuating employment and income. The spending and revenue programmes of the government, which constitute the budget, must be flexible. Rather than balance its budget annually, the government should balance the budget over the period of a trade cycle. A fiscal policy that would contribute most to the economic stability must be such as to produce a surplus of revenue over spending in prosperity with comparatively full employment and a surplus of spending over revenue in a period of depression with abnormally high unemployment. This means that the annual budget should be kept unbalanced. Abalanced budget would only be desirable when the economy was operating at full employment level and showed no tendency either to expand or to contract. The fiscal policy of the government should have a feature of automatic stability so that needless delays pending the passage of new appropriation or tax laws may not hamper the smooth operation of fiscal policy. It should have built-in stabilizers which will function automatically and shall remove delays in the execution of the fiscal policy in the absence of built-in stabilizers. The Committee on Economic Development stated the principle of guidance for incorporating the built-in stabilizers in the fiscal policy in the following words:

> Set tax rates to balance the budget and provide a surplus for debt retirement at an agreed high level of employment and national income. Having set these rates, leave them alone unless there is some major change in national policy or condition of national life.

The merit of this policy is not difficult to see. With the fall in national income, government revenue falls relatively to government outlays leading to deficit budget and *vice versa.* As a built-in stabilizer, the fiscal policy cushion's the fluctuations bywithdrawing more purchasing power from the economy than it injects in the economy during a boom and *vice versa*.

Fiscal Policy in Inflation

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When resources are fully employed and the economy is tormented by inflation, the appropriate fiscal remedy is to create a budget surplus in order to reduce the aggregate spending. If the total tax collections exceed the total government expenditure, the reduction in private spending caused by tax collections is not fully offset by government expenditure. Consequently, total spending will be less than what it would have been had the budget been balanced. This policy will directly attack the cause of inflation—the rate of increase in the aggregate spending which exceeds the rate of increase in the volume of goods and services which are available for making the purchases in the economy.

A budget surplus will have the largest impact on total spending and, therefore, in checking inflation if the surplus is impounded by the government. *First*, in and of itself the surplus reduces total spending. But if the surplus is impounded, the quantity of money in circulation will fall causing aggregate spending to be reduced still further. Since the taxes which give rise to the surplus in government budget are paid with cheques drawn by the public on commercial banks, the net effect is to reduce the demand deposits in banks by the amount of the budget surplus. Further, as the cheques are deposited by the government in its account with the central bank, the commercial banks' deposits at the central bank are transferred from commercial banks to the government account. This reduces the commercial banks' cash reserves and to the extent it reduces these reserves below the required or desired level, it forces the commercial banks to contract their loans. All this will hold good only if the surplus is impounded by the government.

It is, however, possible that the government may use this surplus to pay off its debt, i.e., to retire or purchase the outstanding government bonds. If the surplus is utilized for retiring the outstanding debt, total spending may or may not be reduced depending upon who owns the bonds which are retired. There are three possibilities. The bonds might be held by the: (i) central bank; (ii) commercial banks; and (iii) public. If the budget surplus is used to retire the outstanding government bonds which are held by the individuals and business institutions who would hoard the money received for bonds, the reduction in the aggregate spending occasioned by the surplus in the budget would be the same as it would have been had the entire surplus been impounded by the government. Consequently, the total stock of money in the economy is not changed by the surplus accrual and the debt retirement; the velocity of money is, however, decreased. But the initial surplus and the fall in the velocity of circulation tend to reduce the aggregate spending. On the other hand, if the public spends the entire money received by it due to government retiring its debt, the aggregate spending will not be reduced.

If the budget surplus is used to retire the outstanding government securities held by the central bank, the effect is precisely the same as it is when the government impounds the surplus. If the government employs the budget surplus for purposes of retiring the government securities held by the commercial banks, i.e., if it uses its deposits held at the central bank to buy bonds from the commercial banks, then as result of this operation, the cash reserves of the commercial banks will increase, enabling them to expand credit. Since the commercial banks' cash reserves are increased by the full amount of the budget surplus, their reserves are raised to the same level at which they had stood before the budget surplus had accrued. As a consequence, the banks are able to expand their loans and demand deposits to the same old level at which these stood before the budget surplus was built up. Although the primary reduction in aggregate spending caused by the surplus is still effective yet there is no net fall in the money supply and the secondary reductions which would have been caused in spending from this source are eliminated.

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Fiscal Policy in Depression

In depression, the economysuffers from rising unemployment, falling income and shrinking economic activity. In slump, the private investment is very small. There is a large idle plant capacity awaiting utilization. Resources are there in the economy but there is no demand for them. The aggregate demand for current output falls very low. The economy faces the paradox of 'actual poverty amidst potential plenty'. In depression, when the existing aggregate private and government spending is too low to achieve full employment, the government must increase public spending by undertaking public works programmes on a massive scale and indirectly inducing people to spend more. The amount of government spending incurred on unemployment doles and payments made to veterans and the aged should be increased. The great merit of public works programmes is that they raise personal incomes and consumption by multiplier time of the original expenditure without depressing the marginal efficiency of investment in the private sector. Aggregate spending can be increased also by reducing the taxes. The effect of a tax-cut would be to increase the amount of disposable income of the individuals and business firms. Sales tax should be abolished and excise duties on consumer goods satisfying the community's basic needs must be reduced.

To relieve the economy of depression, it is not enough to increase the aggregate consumption; aggregate investment should also be simultaneously raised. Fiscal policy can induce changes in the aggregate investment demand by making appropriate changes in the tax structure. Since the marginal efficiency of capital of private investment should be raised, business and corporate taxes should be reduced. Firms engaged in the capital formation in depression should be allowed tax concessions. Government's debt policy should be so designed that public debt should be retired in depression so that the disposable income of the bond-holders may increase causing substantial increase in the aggregate spending in the economy. During depression, like the one of the 1930s, when the *LM* curve becomes almost flat at very low rate of interest, fiscal policy action in the form of increase in government expenditure is most effective in raising the level of aggregate effective demand and employment in the economy.

Fiscal Policy and Economic Growth

The use of fiscal policy for attaining full employment and stable price level in the economy is a development of the past six decades which began during the 1930s. It was due to: (i) the ineffectiveness of monetary policy as a means to remove unemployment during the great depression; (ii) the 'new economies' which was developed by Keynes; and (iii) the increasing importance of government spending and taxation in national income and output. As an instrument of growth with stability, fiscal policy should be so employed that while promoting consumption and investment to the level of optimum utilization of economy's resources it may check inflation. Accelerating the rate of growth requires the allocation of a higher proportion of the fully employed resources to those activities which increase the productive capacity of the economy. In other words, the fraction of the full employment real output devoted to consumption must decrease while that devoted to investment should increase. Fiscal policy, through its tax instruments, should encourage investment and discourage consumption so that the production may increase. It is also necessary to increase the rate of capital formation in the economy by reducing the high income-tax rates on personal income.

Fiscal Policy Lags

Like the lags in monetary policy, fiscal policy is also subject to inside and outside lags. So far as the inside recognition lag is concerned, it is more or less the same as in the case of monetary policy. So far as the inside action lag is concerned, this lag arises on account of delay on the part of the government to act in the matter. Due to the fact that all significant changes in tax and expenditure require the prior approval of parliament and state legislatures, the action lag for fiscal policy is long and variable. The actual legislative process surrounding the fiscal policy decisions is very cumbersome and time consuming and renders the fiscal policy a wholly inappropriate instrument of economic stabilization and growth. While the inside action lag for fiscal policy is longest, the outside lag in fiscal policy is shorter than the outside lag in monetary policy because the full effects of fiscal policy actions are felt by the economy significantly more quickly than the full effects of monetary policy actions are felt. According to Rasche and Shapiro, 75 per cent of the full effect of changes in federal defence expenditure is realized in 9 months and of changes in federal personal income tax in six months.

4.3.3 Monetary and Fiscal Policies are Complementary

As instruments of government's economic policy, monetary and fiscal policies are complementary. While the monetary policy influences the level of aggregate income and spending in the economy by influencing the total money supply and the cost of borrowing funds from the banks, fiscal policy affects income and spending through its effects on the size, composition and timing of the government spending and revenue. In inflation, economic stability can be achieved quickly and effectively by combining the policy of surplus budgeting with dear money policy. Conversely, in slump recovery can be started more quickly by reinforcing the policy of deficit budgeting with the cheap money policy. Thus, for achieving the economic stability quickly it is necessary to co• ordinate effectively the two macroeconomic stability instruments. The importance of the monetary and fiscal policies in achieving economic stability was stressed by Mr J. Cameron Thomson of the Committee on Economic Development in his testimony before the Douglas Sub-Committee in the following words:

> Fiscal, monetary, and debt policies are appropriate means for attacking the problem of instability in a free society. The problem of instability is essentially a problem of broad forces affecting the overall magnitudes of the economy. The problem arises when millions of workers are simultaneously unemployed, or when there is a general, although probably uneven, rise of most prices. The advantage of fiscal, monetary and debt policies is that they allow the government to influence the overall forces—especially the level of aggregate demand—that determine the stability of the economy without necessarily involving the government in detailed control of the particulars of the economy. These overall measures will, of course, affect different individuals and businesses differently. But the differences are determined by the market process, not by government decisions...

4.4 SUMMARY

In this unit, you have learnt that,

4.4.1 To explain the Keynesian theory of income determination, the entire economy isdivided into four sectors, viz.,

- Household sector

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Check Your Progress

5. List the factors leading to the popularity of post-Keynesian fiscal policy.
6. Name the important levers that influence aggregate outlay, employment and prices in the economy.
7. What should be done if fiscal policy is to be used as an instrument of economic stability?
8. Who stressed the importance of the monetary and fiscal policies in achieving economic stability?

- Firms or the business sector
- Government sector
- Foreign sector

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- The hypothetical simple economy has only two sectors: households and firms. The households own the factors of production and sell factor services to the firms to earn their living in the form of factor payments—wages, rent, interest and profits. The households are the consumers of all final goods and services. The firms, on the other hand, hire factor services from the households and produce goods and services which they sell to the households.
- According to Keynes, national income of a country is determined by two factors: (i) aggregate demand (*AD*), and (ii) aggregate supply (*AS*) of goods and services.
- The private demand for goods and services account for the largest proportion of the aggregate demand in an economy and play a crucial role in the determination of national income. The total volume of private expenditure in an economy depends, according to Keynes, on the total current disposable income of the people and the proportion of income which they decide to spend on the consumer goods and services.
- The propensity to consume refers to the proportion of the total and the marginal incomes which people spend on consumer goods and services.
- Average Propensity to Consume is defined as the proportion of total income spent on consumer goods and services.
- The Keynesian consumption function states the relationship between consumption expenditure and disposable income. If consumption function is empirically estimated for a country, total consumption expenditure can be predicted if growth rate of income is known and income distribution is given.
- The determination of national income can also be explained by saving-investment approach, i.e., by using only saving (*S*) and investment (*I*) schedules.
- A shift in the aggregate demand schedule, in a two-sector economy may be caused by a shift in consumption schedule or in investment schedule or both. Consumption expenditure is, however, found to be a more stable schedule of income than the investment expenditure. It is, therefore, generally assumed that the shift in the aggregate demand schedule takes place due to a shift in the investment schedule.
- The multiplier may be defined as the ratio of the change in national income due to change in investment.
- Static multiplier is also known as 'comparative static multiplier', 'simultaneous multiplier', 'logical multiplier', 'timeless multiplier', or 'lagless multiplier'. The concept of static multiplier assumes that the change in investment and the resulting change in income are simultaneous.
- The first limitation of the multiplier theoryis related to the rate of Marginal Propensity to Consume (MPC). If the rate of *MPC* is lower in an economy, the rate of multiplier will also be lower too.
- Despite its limitations the concept of multiplier is an import tool in analysing the process and the forces of economic fluctuations in an economy. In addition, the

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concept of multiplier is useful in analysing the impact of public expenditure, taxation and foreign trade on the economy.

- Fiscal policy is defined as the government's programme of taxation, expenditure and other financial operations to achieve certain national goals. The objectives of fiscal policy, like those of other economic policies of the government, are derived from the 'aspirations and goals' of the society.
- The two basic instruments that are used to achieve the social goals are taxation and public expenditure.
- As an instrument of macroeconomic policy, fiscal policy has been very popular with the modern governments to influence the size and composition of the national product, employment, industrial production and prices in the economy.
- The deliberate use of fiscal policy as a means to achieve and maintain full employment and price stability in the economy has been a characteristic feature of the past seven decades after the publication of John Maynard Keynes' well-known book titled *The General Theory of Employment, Interest and Money* in 1936.
- The use of budget deficit and surplus in order to affect the level of the aggregate economic activity or to maintain economic stability or to promote economic growth in the economy is the essence of fiscal policy.
- Fiscal policy refers to the regulation of the level of government spending, taxation and public debt.
- Government expenditure, tax income and public debt act as important levers to influence aggregate outlay, employment and prices in the economy.
- The extent to which fiscal policy can prove effective as an instrument of economic stability depends on the extent to which the government can vary the difference between the income and expenditure rather than upon the balanced budget and the change in its size.
- The overall fiscal policy involves two types of important decisions. While one of these two decisions is related to the goal of full employment, the other is concerned with determining the social priorities. The second policy decision is concerned with the issue of allocation of economy's productive resources as between their different rival uses—should more resources be allocated for education, health care, public housing, slum clearance, transport, etc.
- If fiscal policy has to be employed as an instrument of economic stability, it has to be contra-cyclical in nature. The government can contribute to raise the levels of employment, income and economic activity by spending more than its current income. Conversely, it will exert a contractionary effect on employment, income and economic activity by collecting more revenue from the people in the form of taxes than it spends.
- In depression, when the existing aggregate private and government spending is too low to achieve full employment, the government must increase public spending by undertaking public works programmes on a massive scale and indirectly inducing people to spend more.
- As instruments of government's economic policy, monetary and fiscal policies are complementary.

4.5 KEY TERMS

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4.5.1 **Aggregate supply (AS):** It refers to the total value of goods and servicesproduced and supplied in an economy per unit of time.

4.5.2 **Aggregate demand:** It is an *ex-post* concept. It implies effective demand whichequals actual expenditure.

4.5.3 **Aggregate effective demand:** It means the aggregate expenditure made bythe society per unit of time, usually, one year.

4.5.4 **Propensity to consume:** It refers to the proportion of the total and the marginalincomes which people spend on consumer goods and services.

4.5.5 **Average Propensity to Consume (APC):** It is defined as the proportion oftotal income spent on consumer goods and services.

4.5.6 **Multiplier:** It may be defined as the ratio of the change in national income due tochange in investment.

4.5.7 **Fiscal policy:** It refers to the regulation of the level of government spending,taxation and public debt.

4.6 ANSWERS TO 'CHECK YOUR PROGRESS'

Self-Instructional

1. The hypothetical simple economy has only two sectors: households and firms.
2. The propensity to consume refers to the proportion of the total and the marginal incomes which people spend on consumer goods and services.
3. Average Propensity to Consume is defined as the proportion of total incomespent on consumer goods and services.
4. The first limitation of the multiplier theoryis related to the rate of Marginal Propensity to Consume (MPC). If the rate of *MPC* is lower in an economy, the rate of multiplier will also be lower too.
5. The post-Keynesian popularity of fiscal policy has been largely due to the following three factors:
   - Ineffectiveness of the monetary policy as a means of removing mass unemployment in the great depression of the 30s
   - The development of 'new economics' by John Maynard Keynes with its stress on the role of aggregate effective demand
   - The growing importance of government spending and taxation in relation to the national income and output
6. Government expenditure, tax income and public debt act as important levers to influence aggregate outlay, employment and prices in the economy.
7. If fiscal policy is to be used as an instrument of economic stability, it is essential to abandon the current practice of balancing the budget annually in the face of fluctuating employment and income.
8. The importance of the monetary and fiscal policies in achieving economic stability was stressed by Mr J. Cameron Thomson of the Committee on Economic Development in his testimony before the Douglas Sub-Committee in the following words.

4.7 QUESTIONS AND EXERCISES

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Short-Answer Questions

1. How is the economy divided to explain the Keynesian theory of income?
2. What is the meaning of the consumption function? Suppose a consumption function is given as $C = a + bY$. How can you derive a saving function from this consumption function?
3. Suppose consumption function of an economy is given as $C = a + bY$. Derive saving function for the economy.
4. Consumption function is given as $C = 100 + 0.75Y$ and investment at ` 100 billion. State the aggregate demand function and present it graphically.
5. Suppose consumption function of a two-sector economy is given as $C = 200 + 0.8Y$ and $I = 100$. Find the equilibrium level of income, consumption and savings.
6. Suppose
   (a) $C = 50 + 0.75Y$
   (b) $I = 50$
   (c) $\Delta I = 10$
      (i) Derive saving function,
      (ii) Work out the multiplier, and
      (iii) Find ΔY.
7. What are the leakages from the economy 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.
8. 'Monetary and fiscal policies are complementary.' Describe.

Long-Answer Questions

1. Explain the concepts of aggregate demand and aggregate supply. Using aggregate demand and supply illustrate how equilibrium of national income is determined.
2. Show graphically that the equilibrium level of income and output once determined remains stable. Show also that if some extraneous factors disturb the equilibrium, the disequilibrium itself creates conditions for the system to return to the equilibrium.
3. What is multiplier? Explain how multiplier effect of an additional investment affect equilibrium income in a two-sector economy. Draw a diagram to show that $\Delta Y > \Delta I$ when $MPC > 0$.
4. Explain and distinguish between the concept of static multiplier and dynamic multiplier. Assuming a consumption function given as $C = a + bY$ and investment constant at I, show the working of static and dynamic multipliers.
5. Discuss the role which fiscal policy can play in promoting economic stability in the economic system.
6. 'If fiscal policy has to achieve the desired objective of economic stability, great care must be exercised with regard to its timing and size.' Discuss this statement fully.
7. Discuss the relative effectiveness of monetary policy and fiscal policy as instruments of economic stabilization under different situations.

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