

F.Y.B.A. Paper – I**Economic Theory (Micro Economics-I)****SECTION – I****Module 1 : Introduction**

Meaning, nature, scope, significance and limitations of micro economics. Ceteris Paribus – use and significance. Concept and types of equilibrium : stable, unstable, static and dynamic equilibrium – partial equilibrium and general equilibrium, positive economics and normative economics, managerial economics. Basic concepts – wealth, welfare and scarcity. Basic tools of economics analysis (equations and functions, graphs and diagrams, slope and intercepts)

Module 2 : Consumers Behaviour and Demand

Marshallian Approach : Equi-marginal utility, Law of demand – Determinants of demand. Elasticity of demand and its measurement. Price – Income – Cross and Promotional elasticity of demand. Consumer's Surplus.

Hicksian Approach : Indifference curves – properties of Indifference Curve, Consumer's Equilibrium, Price effect, Income effect and substitution effect – Derivation of demand from Price Consumption Curve (PCC) – Giffen's paradox.

Samuelson Approach : Revealed Preference Theory.

Module 3 : Production and Cost Analysis

Concept of production function : short run and long run – Cobb – Douglas production function. isoquants – iso-cost line – producer's equilibrium. Law of variable proportion and Law of returns to scale – Economies of scale – Economies of scope.

Concepts of costs : Money and real cost, Opportunity cost, Social cost, Private cost – Derivation of short run and long run cost curves– Learning curve.

SECTION –II**Module 4 : Theory of Firm :**

Concepts of revenue : Total Revenue, Average Revenue and Marginal Revenue – Relationship between TR, AR and MR under perfect and imperfect competition – AR, MR and elasticity. Objectives of a Firm – Analysis of Equilibrium of a firm : TC-TR Approach – MC-MR Approach – Break-Even Analysis.

Module 5 : Market Structure :

Perfect Competition : Features – Short – run Equilibrium of the Firm and Industry – Long Run Equilibrium of the Firm and Industry.
 Monopoly : Features – Short-run Equilibrium of the Monopolist under Different Cost Conditions and Long-run Equilibrium of the Monopolist – Discrimination Monopoly : Equilibrium under Discriminating Monopoly – Dumping.

Monopolistic Competition : Features, Equilibrium in the Short-run and Long-run – Wastages under Monopolistic Competition – Oligopoly : Features of Oligopoly.

Module 6 : Pricing Methods and Capital Budgeting :

Pricing Methods : Marginal Cost Pricing – Full Cost Pricing – Multi product pricing – Limit Pricing : Bain's Model.

Meaning and importance of Capital Budgeting : Methods of Capital Budgeting : Pay Back Period [PBP] – Net Present Value [NPV].

Reference :

1. Ahuja H. L. (2005), Advanced Economic Theory, S Chand and Company, New Delhi.
2. Dwivedi, D N. (2003), Micro Economics : Theory and Applications; Pearson Education (Singapore) Pvt. Ltd, Delhi.
3. Koustsoyiannis, A. (1980) Modern Economics, the Macmillan Press Ltd. London.
4. Lipsey and Chrystal (2004), Economics, Oxford University Press.
5. Masfield, E. (1997), Micro Economics, W. W. Norton and Company, New York.
6. Mankiw, N. G. (2002), Principles of Economics, Thomson Asia Pte. Ltd., Singapore.
7. Mehta P.L. (2006), Managerial Economics Analysis, Problems and Cases, Sultan Chand & Sons, New Delhi.
8. Samuelson P.A. & Nordhaus W. D. (1998), Economics, Tata McGraw Hill, New Delhi.
9. Salvatore, D. (2003), Micro Economics, Oxford University Press.
10. Stonier A. W. & Hague D. C. (2004), A Textbook of Economic Theory, Pearson Education, Delhi.



Module 1

INTRODUCTION TO MICROECONOMICS

Unit Structure :

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Meaning and Nature of Micro Economics
- 1.3 Scope of Micro Economics
- 1.4 Usefulness of Microeconomics
- 1.5 Limitations of Microeconomics
- 1.6 Macro Economics
 - 1.6.1 Distinguish between Micro and Macro Economics
- 1.7 Questions

1.0 OBJECTIVES

After having studied this unit, you should be able

- To Understand the fundamentals of Micro Economics
- To Know the nature of micro Economics
- To Study the concept of Macro economics
- To understand difference between Micro & Macro economics

1.1 INTRODUCTION

Economics is about economizing; that is, about choice among alternative uses of scarce resources. Choices are made by millions of individuals, businesses, and government units. Economics examines how these choices add up to an economic system, and how this system operates. (L.G. Reynolds) Scarcity is central to economic theory. Economic analysis is fundamentally about the maximization of something (leisure time, wealth, health, happiness—all commonly reduced to the concept of utility) subject to constraints. These constraints—or scarcity—inevitably define a tradeoff. For example, one can have more money by working harder, but less time (there are only so many hours in a day, so

time is scarce). One can have more apples only at the expense of, say, fewer grapes (you only have so much land on which to grow food—land is scarce). Adam Smith considered, for example, the trade-off between time, or convenience, and money. He discussed how a person could live near town, and pay more for rent of his home, or live farther away and pay less, “paying the difference out of his convenience”.

Economics as a subject came into being with the publication of very popular book in 1776, “An Enquiry into the Nature and Causes of Wealth of Nations”, written by Prof. Adam Smith. At that time it was called Political economy, which remained operational at least up to the middle part of the 19th century. It is since then that the economists developed tools and principles using inductive and deductive reasoning. In fact, the ‘Wealth of Nations’ is a landmark in the history of economic thought that separated economics from other social sciences.

The word ‘Economics’ was derived from the Greek words ‘Oikos’ (a house) and ‘Nemein’ (to manage), which meant managing a household, using the limited money or resources a household has.

Let us explain a few important definitions frequently referred to in the economic theory. In other words, economics is not a science of wealth but a science of man primarily. It may be called as the science which studies human welfare. Economics is concerned with those activities, which relates to wealth not for its own sake, but for the sake of human welfare that it promotes. According to Cannan, “The aim of political economy is the explanation of the general causes on which the material welfare of human beings depends.” Marshall in his book, “Principles of Economics”, published in 1890, describes economics as, “the study of mankind in the ordinary business of life; it examines that part of the individual and social action which is most closely connected with the attainment and with the use of the material requisites of well being”.

On examining the Marshall’s definition, we find that he has put emphasis on the following four points:

- (a) Economics is not only the study of wealth but also the study of human beings. Wealth is required for promoting human welfare.
- (b) Economics deals with ordinary men who are influenced by all natural instincts such as love, affection and fellow feelings and not merely motivated by the desire of acquiring maximum wealth for its own sake. Wealth in itself is meaningless unless it is utilized for obtaining material things of life.

(c) Economics is a social science. It does not study isolated individuals but all individuals living in a society. Its aim is to contribute solutions to many social problems.

(d) Economics only studies 'material requisites of well being'. That is, it studies the causes of material gain or welfare. It ignores non-material aspects of human life.

This definition has also been criticized on the ground that it only confines its study to the material welfare. Non-material aspects of human life are not taken into consideration. Further, as Robbins said the science of economics studies several activities, that hardly promotes welfare.

The activities of producing intoxicants, for instance, do not promote welfare; but it is an economic activity.

1.2 MEANING AND NATURE OF MICRO ECONOMICS

Microeconomics (from Greek prefix micro- meaning "small" + "economics") is a branch of economics that studies the behavior of individual households and firms in making decisions on the allocation of limited resources. Typically, it applies to markets where goods or services are bought and sold. Microeconomics examines how these decisions and behaviors affect the supply and demand for goods and services, which determines prices, and how prices, in turn, determine the quantity supplied and quantity demanded of goods and services.

This is in contrast to macroeconomics, which involves the "sum total of economic activity, dealing with the issues of growth, inflation and unemployment." Microeconomics also deals with the effects of national economic policies (such as changing taxation levels) on the aforementioned aspects of the economy. Particularly in the wake of the Lucas critique, much of modern macroeconomic theory has been built upon 'micro foundations' — i.e. based upon basic assumptions about micro-level behavior.

One of the goals of microeconomics is to analyze market mechanisms that establish relative prices amongst goods and services and allocation of limited resources amongst many alternative uses. Microeconomics analyzes market failure, where markets fail to produce efficient results, and describes the theoretical conditions needed for perfect competition. Significant fields of study in microeconomics include general equilibrium, markets under asymmetric information, choice under uncertainty

and economic applications of game theory. Also considered is the elasticity of products within the market system.

Applied microeconomics includes a range of specialized areas of study, many of which draw on methods from other fields. Industrial organization examines topics such as the entry and exit of firms, innovation, and the role of trademarks. Labour economics examines wages, employment, and labor market dynamics. Public economics examines the design of government tax and expenditure policies and economic effects of these policies (e.g., social insurance programs). Political economy examines the role of political institutions in determining policy outcomes. Health economics examines the organization of health care systems, including the role of the health care workforce and health insurance programs. Urban economics, which examines the challenges faced by cities, such as sprawl, air and water pollution, traffic congestion, and poverty, draws on the fields of urban geography and sociology. Financial economics examines topics such as the structure of optimal portfolios, the rate of return to capital, econometric analysis of security returns, and corporate financial behavior. Law and economics applies microeconomic principles to the selection and enforcement of competing legal regimes and their relative efficiencies. Economic history examines the evolution of the economy and economic institutions, using methods and techniques from the fields of economics, history, geography, sociology, psychology, and political science.

The term 'Micro' and 'Macro' economics have been coined by Prof. Ragnar Frisch of Oslo University during 1920's. The word micro means a millionth part. In Greek mickros means small.

Thus microeconomics deals with a small part of the whole economy. For example, if we study the price of a particular commodity instead of studying the general price level in the economy, we actually are studying microeconomics. Precisely, microeconomics studies the behaviour of individual units of an economy such as consumers, firms, and industry etc. Therefore, it is the study of a particular unit rather than all units combined together. Microeconomics is called Price theory, which explains the composition, or allocation of total production.

In short, microeconomics is the study of the economic behaviour of individual consumers, firms, and industries and the distribution of production and income among them. It considers individuals both as suppliers of labour and capital and as the ultimate consumers of the final product. On the other hand, it analyses firms both as suppliers of products and as consumers of labour and capital.

1.3 SCOPE OF MICRO ECONOMICS

Microeconomics seeks to analyze the market form or other types of mechanisms that establish relative prices amongst goods and services and/or allocates society's resources amongst their many alternative uses. In microeconomics, we study the following:

1. Theory of product pricing, which includes-

- (a) Theory of consumer behaviour.
- (b) Theory of production and costs.

2. Theory of factor pricing, which constitutes-

- (a) Theory of wages.
- (b) Theory of rent.
- (c) Theory of interest.
- (d) Theory of profits.

3. Theory of economic welfare.

Microeconomics has occupied a very important place in the study of economic theory. In fact, it is the stepping-stone to economic theory. It has both theoretical and practical implications.

1.4 USEFULNESS OF MICROECONOMICS

1. Determination of demand pattern: The study of microeconomics has several uses. It determines the pattern of demand in the economy, i.e., the amounts of the demand for the different goods and services in the economy, because the total demand for a good or service is the sum total of the demands of all the individuals. Thus, by determining the demand patterns of every individual or family, microeconomics determines the demand pattern in the country as a whole.

2. Determination of the pattern of supply: In a similar way, the pattern of supply in the country as a whole, can be obtained from the amounts of goods and services produced by the firms in the economy. Microeconomics, therefore, determines the pattern of supply as well.

3. Pricing: Probably the most important economic question is the one of price determination. The prices of the various goods and services determine the pattern of resource allocation in the economy. The prices, in turn, are determined by the interaction of the forces of demand and supply of the goods and services. By determining demand and supply, microeconomics helps us in understanding the process of price determination and, hence, the process of determination of resource allocation in a society.

4. Policies for improvement of resource allocation: As is well-known, economic development stresses the need for improving the pattern of resource allocation in the country. Development policies, therefore, can be formulated only if we understand how the pattern of resource allocation is determined. For instance, if we want to analyse how a tax or a subsidy will affect the use of the scarce resources in the economy, we have to know how these will affect their prices. By explaining prices and, hence, the pattern of resource allocation, microeconomics helps us to formulate appropriate development policies for an underdeveloped economy.

5. Solution to the problems of micro-units: Finally, it goes without saying that, since the study of microeconomics starts with the individual consumers and producers, policies for the correction of any wrong decisions at the micro-level are also facilitated by microeconomics. For example, if a firm has to know exactly what it should do in order to run efficiently, it has to know the optimal quantities of outputs produced and of inputs purchased. Only then can any deviation from these optimal levels be corrected. In this sense, microeconomics helps the formulation of policies at the micro-level. In every society, the economic problems faced by different economic agents (such as individual consumers, producers, etc.) can be analysed with the help of microeconomic theories. This shows that economics is a social science which aims at analysing the economic behavior of individuals in a social environment.

1.5 LIMITATIONS OF MICROECONOMICS

However, microeconomics has its limitations as well:

1. Monetary and fiscal policies: Although total demand and total supply in the economy is the sum of individual demands and individual supplies respectively, the total economic picture of the country cannot always be understood in this simplistic way. There are many factors affecting the total economic system, which are outside the scope microeconomics. For example, the role of monetary and fiscal policies in the determination of the economic variables cannot be analysed completely without going beyond microeconomics.

2. Income determination: Microeconomics also does not tell us anything about how the income of a country (i.e., national income) is determined.

3. Business cycles: A related point is that, it does not analyse the causes of fluctuations in national income. The ups-and-downs of national income over time are known as business cycles.

Microeconomics does not help us in understanding as to why these cycles occur and what the remedies are.

4. Unemployment: One of the main economic problems faced by an economy like India is the problem of unemployment. This, again, is one of the areas on which microeconomics does not shed much light. Because, if we are to find a solution to the unemployment problem, we must first understand the causes of this problem. For that, in turn, we must understand how the total employment level in the economy is determined. This is difficult to understand from within the confines of microeconomics.

Check your progress :

1. What is the subject matter of microeconomics?
2. What are the limitations of microeconomics?

1.6 MACRO-ECONOMICS

In Macro-economics, we are essentially concerned with the economic system as a whole. Macro-economics concerns itself with those aggregates which relate to the whole of the economy. According to Kenneth Boulding, "Macro-economics deals not with individual quantities but with aggregates of these quantities, not with individual incomes but with national income, not with individual prices but with general price-level, not with individual output but with the national output". We are here concerned with the aggregates and averages of the entire economy such as National Income, output, employment, total consumption, saving, investment, aggregate demand, aggregate supply and the general level of prices. It also refers to the study of trade cycles and business fluctuations, and the theory of economic growth. The hyper-inflation after the World War I and the Great Depression of the 1930s' were chiefly responsible for the development of Macro-economic approach.

1.6.1 DISTINCTION BETWEEN MICRO AND MACROECONOMICS

1. The dimensional difference Micro-economics, as seen earlier deals with the analysis of individual behaviour, whereas in macro-economics we are concerned with the study the economy as a whole.

Thus in Micro-economics we analyse the behaviour of an individual consumer or an individual producer, pricing of product or a factor whereas in Macro-economics we analyse the National output, general level of price etc.

2. The Methodological difference The methodology applied in the study of micro-economics is more 'individualistic' in nature; whereas in the study of macro-economics it is more 'aggregative' in nature. For instance in Micro-economics we apply the technique of 'slicing'. Whereas in Macro-economics we resort to the technique of 'lumping'.

3. Fields of Enquiry : Micro-economics is basically concerned with the theory of product and factor-pricing.

Whereas Macro-economics is primarily concerned with National Income, problems of growth and economic stability.

4. Derivation of Economic functions : The distinction between micro and macro-economics is based on how the economic functions are derived; if from aggregative data, we have macro-economic function and if the function has been built up from a careful study of individual units, then we have micro- economic function. Thus micro-economics is concerned with the micro variables such as individual demand, individual supply, price of a particular commodity or factor etc. Whereas Macro economics is concerned with macro variables; general price level, national output, aggregate saving, investments and the level of employment for the economy as a whole.

	Micro Economics	Macro Economics
1	Unit of Study: Individual	Aggregate
2	Method: Slicing	Lumping
3	Subject Matter : Study of product and factor pricing etc.	Study of National Income, general level of prices, trade cycle
4	Basis : Based on independence	Based on Interdependence
5	Core of study: Price Theory	Income Theory
6	Advocated by : Alfred Marshall	John Maynard Keynes
7	Vision : Worms eye view : study of a tree	Birds eye view Forest as a whole
8	Approach: Individualistic	Aggregative
9	Quality of Analysis : Simple and easy	Difficult and complicated.

Complementarity of two approaches:

However, these two approaches cannot be insulated from each other in water-tight compartments. The two approaches are essentially complementary in nature. Ignoring one and concentrating attention on the other alone may often lead not only to inadequate or wrong explanation but also to inappropriate or even disastrous remedial measures. The two approaches are, therefore, not in any way mutually exclusive and as such must be properly integrated to secure fruitful results. To quote Paul Samuelson; "There is really no opposition between Micro and Macro-economics. Both are absolutely vital. You are less than half educated if you understand the one while being ignorant of the other". Modern economic analysis is a combination of micro and macro approaches. Economics is both theoretical and empirical in nature. Micro and Macro-economics are complementary.

1.7 QUESTIONS

1. Explain the concept and meaning of Micro Economics.?
2. Explain the Nature & Scope of Micro Economics ?
3. Explain the Concept of Macro Economics and Distinguish between Micro and Macro Economics?



BASIC CONCEPTS IN MICROECONOMICS

Unit Structure :

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Meaning of Ceteris Paribus
- 2.3 Concept of Partial Equilibrium
- 2.4 Concept of General Equilibrium
- 2.5 Positive Economics
- 2.6 Normative Economics
- 2.7 Summary
- 2.8 Questions

2.0 OBJECTIVES

After having studied this unit, you should be able

- To Understand the assumption of Ceteris paribus in Micro Economics
- To Know the nature of Partial & General Equilibrium
- To Study the concept of Positive & Normative economics.

2.1 INTRODUCTION

Ceteris paribus or ***caeteris paribus*** is a [Latin](#) phrase, literally translated as "**with other things the same,**" or "**all other things being equal or held constant.**" It is an example of an [ablative absolute](#) and is commonly rendered in English as "all other things being equal." A prediction, or a statement about [causal](#) or logical connections between two states of affairs, is qualified by *ceteris paribus* in order to acknowledge, and to rule out, the possibility of other factors that could override the relationship between the [antecedent](#) and the [consequent](#).

2.2 CONCEPT OF CETERIS PARIBUS

A *ceteris paribus* assumption is often fundamental to the *predictive* purpose of scientific inquiry. In order to formulate scientific laws, it is usually necessary to rule out factors which interfere with examining a specific causal relationship. Under scientific experiments, the *ceteris paribus* assumption is realized when a scientist controls for all of the [independent variables](#) other than the one under study, so that the effect of a *single* independent variable on the [dependent variable](#) can be isolated. By holding all the other relevant factors constant, a scientist is able to focus on the unique effects of a given factor in a complex causal situation.

Such assumptions are also relevant to the *descriptive* purpose of [modeling](#) a theory. In such circumstances, analysts such as [physicists](#), [economists](#), and [behavioral psychologists](#) apply simplifying assumptions in order to devise or explain an analytical framework that does not necessarily prove cause and effect but is still useful for describing fundamental concepts within a realm of inquiry.

In Economics this phrase is used quite often to assume all other factors to remain the same, while analysing the relationship between any two variables. This assumption eliminates the influence of other factors which may negate the efforts to establish a scientific statement regarding the behaviour of economic variables. e.g. If we try to establish the relationship between demand and price, there may be other variables which may also influence demand besides price. The influence of the other factors may invalidate the hypotheses that quantity demanded of a commodity is inversely related to its price. If rise in price takes place along with an increase in income or a change in fashion, then the effect of price change may not be the same. A change in fashion may in fact raise the demand, despite the rise in price. Thus, we try to eliminate the disturbing influences of other variables by assuming them to remain constant.

2.2.1 Merits of 'Ceteris Paribus'

- i) This assumption helps us in making predictions about the future.
- ii) The assumption makes the analysis simple and easy.
- iii) It is applicable to solution of practical problems in the real world.
- iv) Such an assumption is very useful in analysis of behaviour of a firm or a consumer or a factor of production.
- v) It is easy to collect data when the field of inquiry is restricted by this assumption.

2.2.2 Limitations of 'Ceteris Paribus'

- i) Ceteris Paribus neglects the interdependence between the forces and makes the analysis over-simplified.
- ii) The assumption makes the analysis unrealistic. In the real world 'Other things never remain constant.' Everything is always changing.
- iii) This assumption makes the principles and theories restrictive in nature. Therefore the analysis has limited applicability.
- iv) The analysis is made static and less relevant to real world situation.
- v) Ceteris Paribus' makes the explanation incomplete because it analyses the functional relation between a few selected variables and neglects others.

However, once we understand the functional relation and sequences between different variables and events with the 'Ceteris Paribus' we can gradually release the forces one by one and analyse more and more complicated realities. 'Ceteris Paribus' is therefore a tool for model building.

'Ceteris Paribus' is an assumption which we are compelled to make due to complexities in the real world. It is necessary for the sake of convenience. The limitations of human intelligence and capacity compel us to make this assumption. Moreover, without this assumption we cannot make a detailed study of economic events and economic relations and sequences.

Without 'Ceteris Paribus' condition we may not be able to isolate causal relationships between the variables that we intend to study and arrive at logical conclusions. However, in reality there are large number of variables interacting simultaneously at a given time. If our analysis has to be accurate we may have to examine two variables at a time which makes it inevitable to assume other variables to remain constant.

Moreover, as a social science we deal with human behavior which is subject to variations. At no cost we can expect people to behave in the same manner at all time. This does not imply any sort of irrationality on the part of people. Likewise assuming ceteris paribus condition does not reduce the validity of the theory. If any conclusion regarding human behaviour is drawn with 'ceteris paribus' condition it does not invalidate its practicality. In fact, even scientists take the help of ceteris paribus condition. e.g. when gravitational force is calculated, the scientist would make allowances for air and wind force to be at a constant rate. Thus ceteris-paribus is not peculiar to Economic analysis alone.

2.3 PARTIAL AND GENERAL EQUILIBRIUM

2.3.1 Meaning and Definitions of Equilibrium

Concept of equilibrium, which forms the basis of various theories in different economic activities, is borrowed from Physics. Unlike its meaning in Physics i.e. an absence of activity, in economic sense it implies absence of tendency or urge to change. It thus means a state of balance.

“Equilibrium is a position from which there is no tendency to ‘move’”. - Prof. Stigler

“Equilibrium denotes absence of change in the movement and not the absence of movement itself”. - Prof. J.K. Mehta

“A market or an economy or any other group of persons and firms is in equilibrium, when none of its members feels impelled to change his behaviour”. — Scitovsky

All the above definitions bring home the point that equilibrium in economic sense implies a position of rest. It does not imply absence of movement but suggests absence of change in the movement. Number of examples of equilibrium can be mentioned e.g. a firm is in equilibrium when it is maximising its profits; the consumer is in equilibrium when he maximises his level of satisfaction, within given constraints of his income and prices.

2.3.2 Types of Equilibrium

1. Stable — Unstable - Neutral Equilibrium
2. Static and Dynamic Equilibrium
3. Single and Multiple Equilibrium
4. Short Term and Long Term Equilibrium
5. Partial and General Equilibrium.

All these varieties are important in their own ways. However the concepts of Partial and General Equilibrium are of particular significance. Hence we shall concentrate on them here,.

2.3.3 PARTIAL EQUILIBRIUM

Partial Equilibrium analyses the position of rest i.e. equilibrium of an individual unit such as a consumer, a firm, an industry etc. It is thus a microeconomic concept. In order to analyze the position of equilibrium of an individual unit, it becomes necessary to assume that all other variables are constant. Thus if we intend to establish the conditions of equilibrium of an individual consumer, we have to ignore (assume to be constant) other forces that affect the behaviour of the said individual. Hence we ignore the changes in tastes and preferences of consumers, prices of other goods etc. while discussing the individual equilibrium.

“A partial equilibrium is one which is based on only restricted range of data, a standard example is price of a single product; the prices of all other products being held fixed during the analysis’. It assumes ‘Ceteris Paribus’. Prof. Stigler

In short Partial Equilibrium implies:

- Equilibrium of an individual or a single unit
- It isolates an individual unit from others
- It ignores the interdependence and hence is based on independence of individual units.
- It excludes other variables and relies on a restricted data.
- It assumes, 'Other things remaining the same'.

Subject Matter of Partial Equilibrium:

As mentioned above partial equilibrium explains how an individual consumption or production unit attains the position of equilibrium. Naturally, it deals with issues such as the following:

Equilibrium of Consumer : On the basis of income, prices and preferences of individual it determines the manner in which a consumer derives maximum satisfaction i.e. equilibrium.

Equilibrium of a firm : This implies determination of level of output that yields maximum profit. It is reached when $MR = MC$. The position is arrived at on the basis of cost behaviour, prices, technique of production etc.

Industry Equilibrium : It occurs when number of firms in the industry remains constant i.e. there is neither entry nor exit of firms. This happens when all firms enjoy only normal profit i.e. $AR = AC$.

Factor Market : An individual factor reaches the position of equilibrium when it receives highest possible reward. Since the alternative reward is less he sticks to that employment.

2.3.4 Assumptions of Partial Equilibrium:

The Partial equilibrium isolates an individual unit from other influences. Naturally, it has to make a variety of assumptions many of which may be quite unrealistic.

Following are assumed to exist.

1. Constancy of price of the product and income, habits etc. of consumer.
2. Prices of other goods are constant. For a firm prices and availability of resources is given and constant.
3. Perfect factor mobility.
4. Existence of perfect competition etc.

2.3.5 Limitations of Partial Equilibrium

1. Narrow approach.
2. Limited applicability due to restrictive assumptions.
3. Neglect of interdependence among unit.
4. Inadequate
5. Inability to explain interdependence among units.

2.3.6 Significance of Partial Equilibrium

Although Partial equilibrium approach is exposed to number of limitations. Yet it has a considerable practical and theoretical significance.

1. Explanation of determination in product and factor prices.
2. Analysis of change in individual unit.
3. Explanation of consequences of change in behaviour of single unit
4. Description of effect of policy changes.
5. Help in solving economic problem.
6. Simplification of important issues.
7. Foundation of understanding interdependence.
8. Assistance in general equilibrium analysis.

2.4 GENERAL EQUILIBRIUM

“Theory of general equilibrium is the theory of inter relationship among all parts of economy.” - Prof. Stigler

Above definition is self explanatory and fully reveals the meaning and nature of general equilibrium. It is obvious that this approach concentrates on the entire economy i.e. whole as against partial equilibrium analysis which deals with ‘a part’ or an individual unit. It is a macro approach undertaking extensive and comprehensive study of the different variables, their interrelations and inter-dependence, etc. It primarily tries to arrive at equilibrium of the entire system. A general equilibrium occurs when every individual unit attains equilibrium simultaneously. Thus what general equilibrium does is to bring out the link between different individual units in a system.

2.4.1 Subject Matter of General Equilibrium:

Since general equilibrium deals with the whole economy it has to explain how total demand and total supply are brought into equality both in the factor and product markets. This implies an in depth study of the factors forming total demand (Buyers) and total supply (Sellers) in both product as well as factor markets. The state of general equilibrium will be reached when the decisions of buyers and sellers regarding demand and supply in product and factor

markets are in harmony.. Taking into account all these facts we can mention the subject matter of general equilibrium in the following manner.

Total Demand for product : Tastes, preferences, prices of complimentary and substitute products income i.e. rewards in factor market, etc.

Total Supply of product : Cost of different products, upon the reward of factors and their quantity prices of commodities in the product market, of production etc.

Total Demand for factor: Input productivity, the rewards of factors, quality and quantity of different factors of production etc.

Total Supply of factor : Rewards, availability, willingness to work, size and composition of population policy implications etc.

It is obvious that since general equilibrium approach deals with entire system in the context of equilibrium in product and factor markets, it has to properly analyze the interdependence among all the four aspects mentioned above. Study of consequences of change in one of the constituents on the different macro variables is also to be made.

It can be observed that in any market the general equilibrium occurs at equality between total demand and total supply. In the product market the consumers are on demand side and the firms on the supply. In the factor market these roles are reversed. Two sets of conditions have to be fulfilled to achieve general equilibrium.

1. Subjective factors : Maximization of gains (satisfaction/profits) by each individual unit.

2. Objective factors : Demand — Supply equality in all markets.

Walras points out that : “General equilibrium occurs through the mutual interdependence between different markets and their constituents”. In his opinion, the trade in perfectly competitive market is similar to auction. The prices are raised when demand exceeds supply and lowered in the opposite situation. Raising and lowering continues till demand and supply become equal when we have the position of equilibrium.

2.4.2 Assumptions of General Equilibrium

Following are the basic assumptions of general equilibrium analysis.

1. Existence of perfect competition in product and factor markets.

2. Perfect factor mobility
3. Identical cost conditions for all firms.
4. Homogeneity of productive resources.
5. Given and constant state of technology
6. Full employment of resources.
7. Constant Returns to scale.

Not all assumptions are true but are essential as they provide the framework for general equilibrium analysis.

2.4.3 Limitations of General Equilibrium

1. Unrealistic Assumptions of this approach weaken its importance. The assumptions like perfect competition, full employment, perfect mobility etc. can hardly be experienced in practice.

2. Neglect of changing conditions is yet another defect of this approach. It assumes the constancy of most of the variables which in reality are frequently changing. Such a static model cannot effectively analyse the real dynamic scenerio. It is aptly remarked, "Since the given Wairasian conditions are continuously changing, the movement towards general equilibrium is ever thwarted and its attainment has ever remained wishful ideal'.

3. Limited Validity is the fate of Walrasian general equilibrium model. They are applicable only when conditions are fulfilled i.e. assumptions are valid. This is true only in restricted situations. The validity depends upon proper solutions to various simultaneous equations.

2.4.4 Significance of General Equilibrium

The general equilibrium model of Walras has great utility in enhancing our understanding of the functioning of the whole system and in solving various problems faced by the entire economy. It rightly reveals the fact of inter-dependence between individual units and highlights the dangers in isolating them. The practical importance of this approach can be explained with reference to following

1. It provides a wide and comprehensive explanation of the inevitable mutual interdependence in a free enterprise economy.
2. This approach provides a thorough explanation of the functioning of the entire economy.
3. General equilibrium analysis simplifies the market complexities by revealing the inter-relations between individual units.

4. The approach clearly explains the role and functions of the market mechanism and reveals how economic decisions are arrived at.
5. The Input-Output analysis of Prof. Leontif is developed on the basis of general equilibrium analysis.
6. The Walrasian model provides the starting point for almost all economic theories. In almost every field of economic enquiry such as money, trade, welfare etc. the approach proves very useful.

In brief General equilibrium model of Prof. Walras is useful in understanding the real issues of the economy as a whole.

Thus Partial Equilibrium approach is based on the assumption, 'other things remaining the same'. i.e. 'ceteris paribus': whereas the General Equilibrium approach assumes 'everything depends on everything else'. Both the approaches, as we have seen, have their respective limitations and significance.

Check your progress :

1. What do you understand by Ceteris Paribus assumption?
2. Distinguish between Partial Equilibrium approach and General Equilibrium Approach.

2.5 POSITIVE ECONOMICS

Positive economics is the study of what and why an economy operates as it does. It is [also](#) known as Descriptive economics and is based on facts which can be subjected to [scientific](#) analysis in order for them to be accepted.

It is based on factual [information](#) and uses statistical data, and scientific formula in determining how an economy should be. It deals with the relationship between cause and effect and can be tested.

Positive economic statements are always based on what is actually going on in the economy and they can either be accepted or rejected depending on the facts presented.

2.6 NORMATIVE ECONOMICS

Normative economics is the study of how the economy should be. It is also known as Policy economics wherein normative statements like opinions and judgments are used. It determines the ideal economy by discussion of ideas and judgments.

In normative economics, people state their opinions and judgments without considering the facts. They make distinctions between good and bad policies and the right and wrong courses of action by using their judgments.

Normative economic statements cannot be tested and proved right or wrong through direct experience or observation because they are based on an individual's opinion.

Although these two are distinct from each other, they complement each other because one must first know about economic facts before he can pass judgment or opinion on whether an economic policy is good or bad.

2.7 SUMMARY

1. Positive economics deals with what is while normative economics deals with what should be.
2. Positive economics deals with facts while normative economics deals with opinions on what a desirable economy should be.
3. Positive economics is also called descriptive economics while normative economics is called policy economics.
4. Positive economic statements can be tested using scientific methods while normative economics cannot be tested.

2.8 QUESTIONS

1. Explain the concept of 'Ceteris Paribus' in detail. Mention its assumption and importance in economics.
2. What do you mean by Partial Equilibrium? What is the subject matter of partial equilibrium?
3. Explain the importance of Partial equilibrium?
4. Explain the concept of General equilibrium? Discuss its assumptions & limitations?
5. Explain the importance of General equilibrium?
6. Distinguish between Positive and Normative economics.



MANAGERIAL ECONOMICS & BASIC TOOLS OF ECONOMIC ANALYSIS

Unit Structure :

- 3.0 Objectives
- 3.1 Introduction
- 3.2 Meaning of Managerial Economics
- 3.3 Scope of managerial economics
- 3.4 Importance of managerial economics
- 3.5 Stages of Developing Economics as a Subject
- 3.6 Basic tools of economic analysis
- 3.7 Questions

3.0 OBJECTIVES

After having studied this unit, you should be able

- To Understand the concept of Managerial Economics
- To Know the nature & scope of managerial economics
- To Study the Importance of managerial economics
- To Study the basic tools of economic analysis

3.1 INTRODUCTION

The discipline of managerial economics deals with aspects of economics and tools of analysis, which are employed by business enterprises for decision-making. Business and industrial enterprises have to undertake varied decisions that entail managerial issues and decisions. Decision-making can be delineated as a process where a particular course of action is chosen from a number of alternatives. This demands an unclouded perception of the technical and environmental conditions, which are integral to decision making. The decision maker must possess a thorough knowledge of aspects of economic theory and its tools of analysis. The basic concepts of decision-making theory have been culled from microeconomic theory and have been furnished with new tools of analysis. Statistical methods, for example, are pivotal

in estimating current and future demand for products. The methods of operations research and programming proffer scientific criteria for maximising profit, minimising cost and determining a viable combination of products. 4 Decision-making theory and game theory, which recognise the conditions of uncertainty and imperfect knowledge under which business managers operate, have contributed to systematic methods of assessing investment opportunities.

Almost any business decision can be analysed with managerial economics techniques. However, the most frequent applications of these techniques are as follows:

- **Risk analysis:** Various models are used to quantify risk and asymmetric information and to employ them in decision rules to manage risk.
- **Production analysis:** Microeconomic techniques are used to analyse production efficiency, optimum factor allocation, costs and economies of scale. They are also utilised to estimate the firm's cost function.
- **Pricing analysis:** Microeconomic techniques are employed to examine various pricing decisions. This involves transfer pricing, joint product pricing, price discrimination, price elasticity estimations and choice of the optimal pricing method.
- **Capital budgeting:** Investment theory is used to scrutinise a firm's capital purchasing decisions.

3.2 MEANING OF MANAGERIAL ECONOMICS

Managerial economics, used synonymously with business economics, is a branch of economics that deals with the application of microeconomic analysis to decision-making techniques of businesses and management units. It acts as the via media between economic theory and pragmatic economics. Managerial economics bridges the gap between 'theoria' and 'praxis'. The tenets of managerial economics have been derived from quantitative techniques such as regression analysis, correlation and Lagrangian calculus (linear). An omniscient and unifying theme found in managerial economics is the attempt to achieve optimal results from business decisions, while taking into account the firm's objectives, constraints imposed by scarcity and so on. A paradigm of such optimisation is the use of operations research and programming.

Managerial economics is thereby a study of application of managerial skills in economics. It helps in anticipating, determining and resolving potential problems or obstacles. These problems may pertain to costs, prices, forecasting future market, human resource management, profits and so on.

3.2.1 DEFINITIONS OF MANAGERIAL ECONOMICS

McGutgan and Moyer: “Managerial economics is the application of economic theory and methodology to decision-making problems faced by both public and private institutions”.

McNair and Meriam: “Managerial economics consists of the use of economic modes of thought to analyse business situations”.

Spencer and Siegelman: Managerial economics is “the integration of economic theory with business practice for the purpose of facilitating decision-making and forward planning by management”.

Haynes, Mote and Paul: “Managerial economics refers to those aspects of economics and its tools of analysis most relevant to the firm’s decision-making process”.

By definition, therefore, its scope does not extend to macroeconomic theory and the economics of public policy, an understanding of which is also essential for the manager.

Managerial economics studies the application of the principles, techniques and concepts of economics to managerial problems of business and industrial enterprises. The term is used interchangeably with business economics, microeconomics, economics of enterprise, applied economics, managerial analysis and so on. Managerial economics lies at the junction of economics and business management and traverses the hiatus between the two disciplines.

3.2.2 CHARACTERISTICS OF MANAGERIAL ECONOMICS

1. Microeconomics: It studies the problems and principles of an individual business firm or an individual industry. It aids the management in forecasting and evaluating the trends of the market.

2. Normative economics: It is concerned with varied corrective measures that a management undertakes under various circumstances. It deals with goal determination, goal development and achievement of these goals. Future planning, policy-making, decision-making and optimal utilisation of available resources, come under the banner of managerial economics.

3. Pragmatic: Managerial economics is pragmatic. In pure micro-economic theory, analysis is performed, based on certain exceptions, which are far from reality. However, in managerial economics, managerial issues are resolved daily and difficult issues of economic theory are kept at bay.

4. Uses theory of firm: Managerial economics employs economic concepts and principles, which are known as the theory of Firm or 'Economics of the Firm'. Thus, its scope is narrower than that of pure economic theory.

5. Takes the help of macroeconomics: Managerial economics incorporates certain aspects of macroeconomic theory. These are essential to comprehending the circumstances and environments that envelop the working conditions of an individual firm or an industry. Knowledge of macroeconomic issues such as business cycles, taxation policies, industrial policy of the government, price and distribution policies, wage policies and antimonopoly policies and so on, is integral to the successful functioning of a business enterprise.

6. Aims at helping the management: Managerial economics aims at supporting the management in taking corrective decisions and charting plans and policies for future.

7. A scientific art: Science is a system of rules and principles engendered for attaining given ends. Scientific methods have been credited as the optimal path to achieving one's goals. Managerial economics has been called a scientific art because it helps the management in the best and efficient utilisation of scarce economic resources. It considers production costs, demand, price, profit, risk etc. It assists the management in singling out the most feasible alternative. Managerial economics facilitates good and result oriented decisions under conditions of uncertainty.

8. Prescriptive rather than descriptive: Managerial economics is a normative and applied discipline. It suggests the application of economic principles with regard to policy formulation, decision-making and future planning. It not only describes the goals of an organisation but also prescribes the means of achieving these goals.

3.3 SCOPE OF MANAGERIAL ECONOMICS

The scope of managerial economics includes following subjects:

1. Theory of demand
2. Theory of production
3. Theory of exchange or price theory
4. Theory of profit
5. Theory of capital and investment

3.4 IMPORTANCE OF MANAGERIAL ECONOMICS

Business and industrial enterprises aim at earning maximum proceeds. In order to achieve this objective, a managerial executive has to take recourse in decision-making, which is the process of selecting a specified course of action from a number of alternatives. A sound decision requires fair knowledge of the aspects of economic theory and the tools of economic analysis, which are directly involved in the process of decision-making. Since managerial economics is concerned with such aspects and tools of analysis, it is pertinent to the decision-making process.

Spencer and Siegelman have described the importance of managerial economics in a business and industrial enterprise as follows:

1. Accommodating traditional theoretical concepts to the actual business behaviour and conditions: Managerial economics amalgamates tools, techniques, models and theories of traditional economics with actual business practices and with the environment in which a firm has to operate. According to Edwin Mansfield, "Managerial Economics attempts to bridge the gap between purely analytical problems that intrigue many economic theories and the problems of policies that management must face".

2. Estimating economic relationships: Managerial economics estimates economic relationships between different business factors such as income, elasticity of demand, cost volume, profit analysis etc.

3. Predicting relevant economic quantities: Managerial economics assists the management in predicting various economic quantities such as cost, profit, demand, capital, production, price etc. As a business manager has to function in an environment of uncertainty, it is imperative to anticipate the future working environment in terms of the said quantities.

4. Understanding significant external forces: The management has to identify all the important factors that influence a firm. These factors can broadly be divided into two categories. Managerial economics plays an important role by assisting management in understanding these factors.

• **External factors:** A firm cannot exercise any control over these factors. The plans, policies and programmes of the firm should be formulated in the light of these factors. Significant external factors impinging on the decision-making process of a firm are economic system of the country, business cycles, fluctuations in national

income and national production, industrial policy of the government, trade and fiscal policy of the government, taxation policy, licensing policy, trends in foreign trade of the country, general industrial relation in the country and so on.

• **Internal factors:** These factors fall under the control of a firm. These factors are associated with business operation. Knowledge of these factors aids the management in making sound business decisions.

5. Basis of business policies: Managerial economics is the founding principle of business policies. Business policies are prepared based on studies and findings of managerial economics, which cautions the management against potential upheavals in national as well as international economy.

Thus, managerial economics is helpful to the management in its decision-making process.

Check your progress :

1. What are the characteristics of managerial economics?
2. Name the subjects included in managerial economics.

3.5 STAGES OF DEVELOPING ECONOMICS AS A SUBJECT

Economics as a subject has developed in the following stages :

1. Wealth concept
2. Welfare concept
3. Scarcity concept
4. Development concept

3.5.1. Wealth Concept

During the eighteenth and the early part of nineteenth century, classical economists, such as Adam Smith, J.B. Say and Walkar defined Economics as the science of wealth. Adam Smith systematised the concept in the form the book which was entitled as "An enquiry into the nature and cause of the wealth of nations." These economists stated that Economics is related to and concerned with wealth.

Excessive emphasis on wealth enabled the businessmen and industrialists to amass wealth by any means, whether fair or foul. Social reformers like Thomas, Carlyle, John Ruskin, Charles Dickens and William Morris reacted sharply to the wealth concept of Economics. They branded Economics as a dismal science, gospel of Mammon and science of bread and butter etc. Wealth concept of Economics was bitterly criticized, because it assumed wealth as an end of human activities. If it is accepted in life, there will be no place for love, affection, sympathy and patriotism. Absence of these values will make our real life a hell.

3.5.2 Welfare Concept

According to this concept, Economics is not the science of wealth but it is concerned with human welfare. It studies and emphasizes wealth as a means of satisfying human wants, not as an end of human activities. Marshall was the pioneer of welfare thought. According to him, "Political Economy or Economics is the study of mankind in the ordinary business of life..... Thus it is on the one side a study of wealth and on the other, and more important side a part of the study of man." The important features of this welfare concept are as under :

- (i) Economics is the science of human welfare.
- (ii) Economics is the study of mankind in the ordinary business of life.
- (iii) Economics is a social science.
- (iv) Economics is the study of only economic activities.

Welfare concept was also criticized by the pioneers of 'Scarcity Concept'. According to these economists, it will be an injustice to the subject, if it is restricted to ordinary business of life, concerned with economic activities and related to human welfare only.

3.5.3 Scarcity Concept

The profounder of this concept was 'Lionel Robbins'. According to him, "Economics is the science, which studies human behaviour as a relationship between ends and scarce means which have alternative uses." The important features of this concept are :

- (i) Economics is a positive science.
- (ii) Economics is the study of human behaviour.
- (iii) Our wants are unlimited.
- (iv) Our resources are limited/scarce.
- (v) Resources can be put to alternative uses.

According to this approach certain universal truth are regarded as the basis of economic problems. Every individual and economy has unlimited wants and scarce means to satisfy these wants. Inability to satisfy unlimited wants with limited resources

creates the problems of choice making i.e., fixing priority of wants to be satisfied. As resources can be put to alternative uses, we will have to take decision as to which specific want should be satisfied with particular means. In this way, choice making or decision making is the means of tackling all these economic problems.

3.5.4 Development Concept

Scarcity concept explains the presence of economic problems. It is concerned with the positive aspect of the subject. Modern economists feel that economist should also suggest, how the scarce means should be further increased to satisfy more wants and attain good living. The profounder of this concept is Professor Samuelson, who presented the growth-oriented definition of Economics. According to him, "Economics is the study of how man and society choose, with or without the use of money to employ scarce productive resources, which could have alternative uses, to produce various commodities over time and distribute them for consumption now and in the future among various people and groups of society. The important features of this concept may be summarized as under :

- (i) Problem of choice making arises due to unlimited wants and scarce means. We have to decide which wants are to be satisfied and which of them are to be deferred.
- (ii) Wants have tendency to increase in the modern dynamic economic system, so the available resources should be judiciously used. Best possible efforts should also be made to increase the resources, so that increasing wants can be satisfied.
- (iii) Economics is not concerned with the identification of economic problems but it should also suggest ways and means to solve the problems of unemployment, production, inflation etc.
- (iv) Economists should also suggest how the resources of the economy should be distributed among various individuals and groups.
- (v) Economists should also point out the plus and minus points of different economic systems.

3.6 BASIC TOOLS OF ECONOMICS ANALYSIS

Economic theories are formulated to explain different phenomenon. They try to explain the relationship between two or more variables. While formulating theories a number of tools are used by experts in this field. The tools of economic analysis are found in the realm of Mathematics. Mathematics is being profusely

used in modern economic analysis. Mathematics is regarded as the **second language** for the students of economics. Geometry is being increasingly resorted to in order to provide pictorial presentation of economic behavior. Diagrams and Graphs provide visual impact and help to grasp and learn economics with interest and ease. A Chinese proverb says “A picture is worth a thousand words”.

Modern economists have turned to Calculus, Matrix, Algebra and Derivatives to use them as fundamental tools to express complicated aspects of economic theories and models more precisely and accurately. All these applications of mathematics are significant as a tools and techniques to impart conciseness, precision and rigour to economic analysis.

In brief, get acquainted with the terms such as Variables, Ceteris Paribus, Functions, Equations, Identities, Graphs and Diagrams, Lines and Curves, Slopes, Limits and Derivatives, Time Series and so on. These are the basic tools of economic analysis.

3.6.1 VARIABLES

Variables play an important role in economic theories and models. A variable is a magnitude of interest can be defined and measured. In other words a variable is something whose magnitude can change. It assumes different values at different times or places. Variables that are used in economics are income, expenditure, saving, interest, profit, investment, consumption, imports, exports, cost and so on. It is represented by a symbol.

Variables can be endogenous and exogenous. An endogenous variable is a variable that is explained within a theory. An exogenous variable influences endogenous variables, but the exogenous variable itself is determined by factors outside the theory.

3.6.2 CETERIS PARIBUS

Ceteris paribus is a Latin phrase meanings, “all other things remaining the same” or all relevant factors being equal. In Economics the term “Ceteris Paribus” is used quite often to assume all other factors to remain the same, while analyzing the relationship between any two variables.

Ceteris Paribus is an assumption which we are compelled to make due to complexities in the reality. It is necessary for the sake of convenience. The limitations of human intelligence and capacity compel us to make this assumption. Besides, without the assumption we cannot reach on economic relations, sequences and conclusions. In fact, there are large number of variables interacting simultaneously at a given time. If our analysis has to be

accurate we may have to examine two variables at a time which makes it inevitable to assume other variables to remain unchanged.

For instance, if we try to establish the relationship between demand and price, there may be other variables which may also influence demand besides price. The influence of other factors may invalidate the hypothesis that quantity demanded of a commodity is inversely related to its price. If rise in price takes place along with an increasing in income or a change technology, then the effect of price change may not be the same. However, we try to eliminate the interrupting influences of other variables by assuming them to remain unchanged.

The assumption of *Ceteris Paribus* thus eliminates the influence of other factors which may get in the way of establishing a scientific statement regarding the behavior of economic variables. *Ceteris Paribus* is an assumption which we are compelled to make due to complexities in the reality. It is necessary for the sake of convenience. The limitations of human intelligence and capacity compel us to make this assumption. Besides, without the assumption we cannot reach on economic relations, sequences and conclusions. In fact, there are large number of variables interacting simultaneously at a given time. If our analysis has to be accurate we may have to examine two variables at a time which makes it inevitable to assume other variables to remain unchanged.

3.6.3 FUNCTION

A '**function**' explains the relationship between two or more economic variables. A simple technical term is used to analyze and symbolizes a relationship between variables. It is called a function. It indicates how the value of dependent variable depends on the value of independent or other variables. It also explains how the value of one variable can be found by specifying the value of other variable.

For instance, economist generally links demand for good depends upon its price. It is expressed as $D = f(P)$. Where D = Demand, P = Price and f = Functional relationship.

Functions are classified into two type namely explicit function and implicit function. Explicit function is one in which the value of one variable depends on the other in a definite form. For instance, the relationships between demand and price Implicit function is one in which the variables are interdependent.

3.6.4 EQUATIONS

Economic theory is a verbal expression of the functional relationships between economic variables. When the verbal expressions are transformed into algebraic form we get Equations.

The term equation is a statement of equality of two expressions or variables. The two expressions of an equation are called the sides of the equation. Equations are used to calculate the value of an unknown variable. An equation specifies the relationship between the dependent and independent variables. Each equation is a concise statement of a particular relation.

For example, the functional relationship between consumption (C) and income (Y) can take different forms. The most simple equation; $C = a(Y)$ states that consumption (C) is related to income (Y). It says nothing about the form that this relation takes.

Here 'a' is constant and it has a value greater than zero but less than one ($0 < a < 1$). Thus the equation shows that C is a constant proportion of income. For instance, if 'a' is $1/2$ then the consumer would always spend 50% of the income on consumption. The equation shows that if income is zero, consumption will also be zero.

$C = a + bY$ is yet another form of consumption function. Here value of a is positive and b is $0 < b < 1$.

3.6.5 IDENTITIES

An identity explains an equilibrium condition or a definitional condition. A definitional identity explains that two alternative expressions have exactly the same meaning. For example, total profit is defined as the excess of total revenue over total cost, and we can denote as:

$$\pi \equiv TR - TC$$

Where π is total profit, TR is total revenue and TC is total cost. Similarly, saving is defined as the difference between income and consumption expenditure and we can say;

$$S \equiv Y - C$$

You are required to note that an identity is denoted by a three - bar sign (\equiv).

The distinction between an identity and an equation is very subtle and important. An identity is a relation that is true for all values of the variables; no values can be found that will contradict it. For instance, $(x + y)^2 = x^2 + 2xy + y^2$ is an expression which is true for any numerical value of x and y. Identities are statements that are compatible with any state of the universe. In case of National Income accounting we have an important identity between National Income (Y) \equiv National Output (O) \equiv National Expenditure (E)

$$\text{Hence; } Y \equiv O \equiv E$$

Identities are mere "truisms", they cannot form the basis of any theory.

3.6.6 GRAPHS AND DIAGRAMS

A graph or a diagram presents the relationship between two or more sets of data or variables that are related to one another. Graph is most commonly used tool in modern economics. Graph depicts the functional relationship between two or more economic variables. The use of graph provides a better understanding of the economic generalizations. Graph presents a visual picture of an abstract idea. Also it is useful for accuracy and precision.

Graph can be drawn only two dimensional figures on a plain paper. It represents the values of only two variables at a time. The common method of constructing a graph or a diagram is described below:

A graph has a horizontal line termed as X axis and a vertical line termed as Y axis. The point of intersection between X and Y axis is termed as 'origin' point.

The surface is divided into four parts, each part is called a quadrant. The four quadrants are numbered in anticlockwise direction as depicts in following diagram.

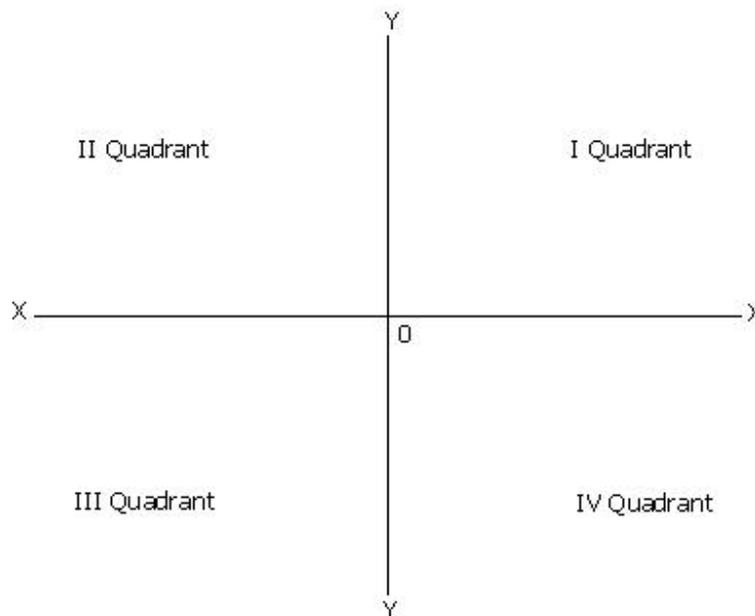


Fig. 3.1

The first quadrant depicts the positive values of both X and Y. It is called positive quadrant. Generally, economic theories are deals with the positive quadrants.

At times the terms “Graph” and “Diagram” are used interchangeably. Diagrams, like graphs, are pictorial presentations. Diagrams may be in the form of figures *such* as explaining the circular flow of national income. Graphs are quite meticulous

whereas diagrams can be based on abstraction. For instance, Pie diagram is a best example of a diagram that indicates through slicing the percentage-wise composition of a phenomenon, such as how much percentage of national income is generated from which sector of the economy.

3.6.7 LINES AND CURVES

The functional relationship between the variables may be linear or non-linear. A **line** or a **curve** is nothing but the locus of various points. A line depicts the relationship between the variables. For example, the relationship between consumption and income as shown in the following diagram:

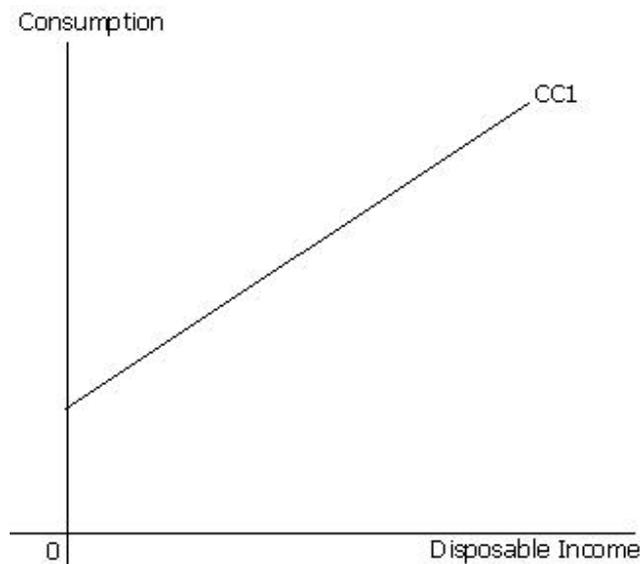


Fig. 3.2

Line CC_1 is a straight line and has a positive slope. It depicts that aggregate consumption is positively related to aggregate disposable income. It explains that, an increase in disposable income will promote to an increase in consumption. Many economists try to set up the relationship between economic variables in different ways. One of the most popular and easy method is through curves. A non linear function of graph is depicted in terms of curve. Let us consider the following curves.

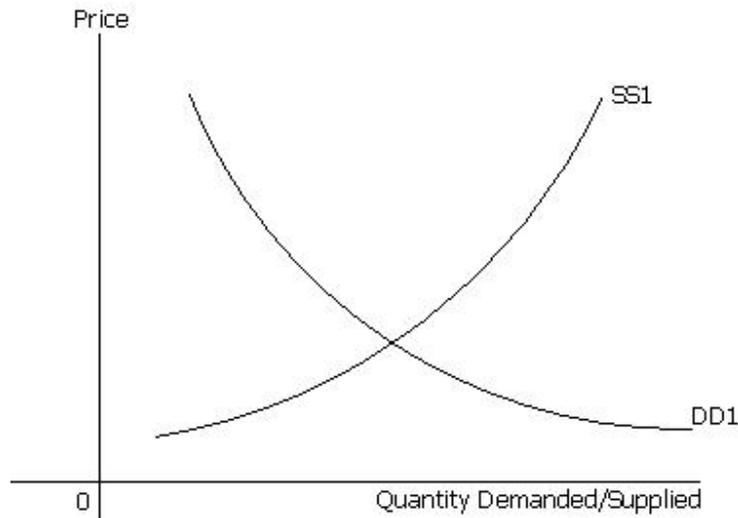


Fig. 3.3

In the following diagram, DD_1 is a smooth downward sloping non linear demand curve. It explains the relationship between quantity demanded of good X at various prices. Moreover, SS_1 is an upward sloping supply curve. It is also a non-linear curve and shows relationship between quantity supplied of good X at various prices.

3.6.8 SLOPE

Slope is an important term in modern economic analysis. The slope indicates change in one variable due to a change in other variable. Slope is defined as the amount of change in the variable measured on the vertical or Y axis per unit change in the variable measured on the horizontal or X axis. It is expressed as $\Delta Y/\Delta X$, where delta (Δ) stands for a change in the variable. The slope of a curve is an exact numerical measure of the relationship between the change in the variable Y to change the variable X.

Slope is also popularly termed as 'the rise over the run'. Here rise is the vertical distance while run is the horizontal distance. The measurement of slope can be shown as follows:

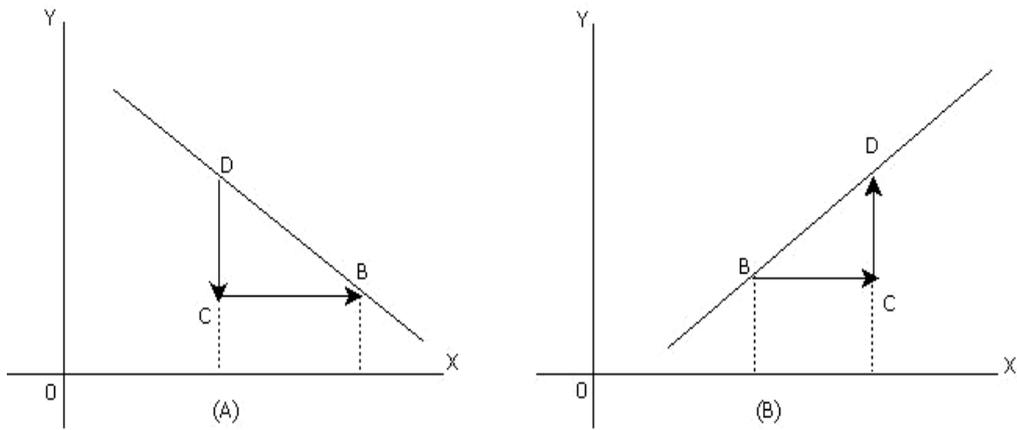


Fig. 3.4

In both the diagrams (A) and (B) slope = vertical distance/horizontal distance. i. e. CD / BC . However, in diagram (A), slope is negative as the relationship between X and Y is inverse. Here units of Y decrease with increase in the units of X. In Diagram (B) the curve is sloping upwards, indicating a positive relationship between X and Y. Here units of Y increase with increase in the units of X.

If the curve is non-linear, then its slope changes at various points. Slope on a non-linear curve is measured at a given point by drawing a tangent at the given point and is then measured as the vertical distance/horizontal distance. This is shown in the following diagram with a non-linear curve. We measure slope at point 'a' by drawing a tangent at point 'a'. Y_1X_1 is the tangent drawn at point 'a'. Slope of the curve at point 'a' is given as $0Y_1/0X_1$

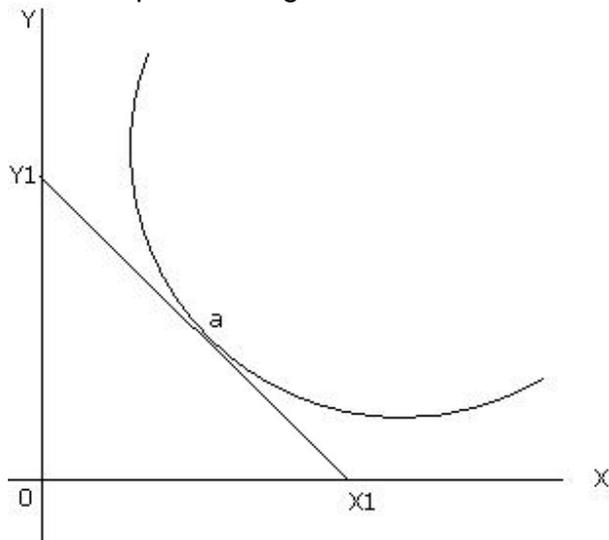


Fig. 3.5

The main properties of slope are:

- i) It can be numerically measured.
- ii) In case of a straight line, the slope is constant through out the curve.
- iii) In case of a non-linear curve, the slope changes through out the curve.
- iv) The nature of the relationship between two variables can be indicated with the help of slope. If the slope is negative then it indicates inverse relationship between the two variables and if the slope is positive, it indicates direct relationship.

3.6.9 Slope of Linear Functions

The concept of slope is important in economics because it is used to measure the rate at which changes are taking place. Economists often look at how things change and about how one item changes in response to a change in another item.

It may show for example how demand changes when price changes or how consumption changes when income changes or how quickly sales are growing.

Slope measures the rate of change in the dependent variable as the independent variable changes. The greater the slope the steeper the line.

Consider the linear function:

$$y = a + bx$$

b is the slope of the line. Slope means that a unit change in x , the independent variable will result in a change in y by the amount of b .
slope = change in y /change in x = rise/run

Slope shows both steepness and direction. With **positive** slope the line moves upward when going from left to right. With **negative** slope the line moves down when going from left to right.

If two linear functions have the same slope they are parallel.

Slopes of linear functions

The slope of a linear function is the same no matter where on the line it is measured. (This is not true for non-linear functions.)

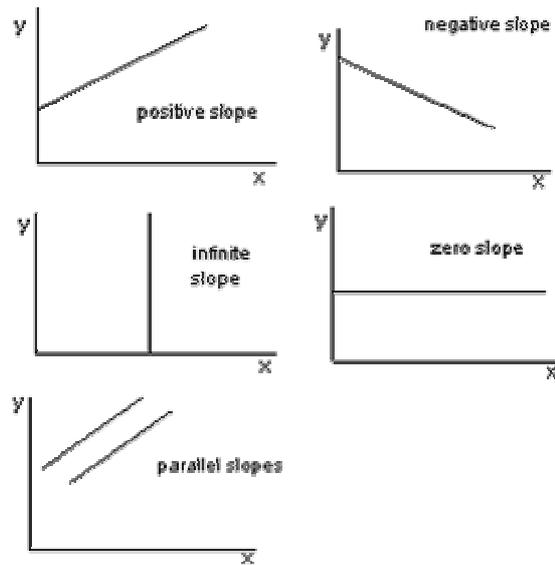


Fig. 3.6

An example of the use of slope in economics

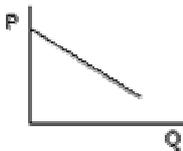
Demand might be represented by a linear demand function such as

$$Q(d) = a - bP$$

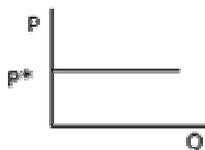
$Q(d)$ represents the demand for a good

P represents the price of that good.

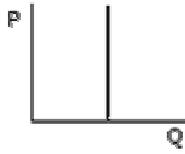
Economists might consider how sensitive demand is to a change in price.



This is a typical downward sloping demand curve which says that demand declines as price rises.



This is a special case of a horizontal demand curve which says at any price above P^* demand drops to zero. An example might be a competitor's product which is considered just as good.



This is a special case of a vertical demand curve which says that regardless of the price quantity demanded is the same. An example might be medicine as long as the price does not exceed what the consumer can afford.

Supply might be represented by a linear supply function such as

$$Q(s) = a + bP$$

$Q(s)$ represents the supply for a good

P represents the price of that good.

Economists might consider how sensitive supply is to a change in price.

This is a typical upward sloping supply curve which says that supply rises as price rises

An example of the use of slope in economics

The demand for a breakfast cereal can be represented by the following equation where p is the price per box in dollars:

$$d = 12,000 - 1,500 p$$

This means that for every increase of \$1 in the price per box, demand decreases by 1,500 boxes.

Calculating the slope of a linear function

Slope measures the rate of change in the dependent variable as the independent variable changes. Mathematicians and economists often use the Greek capital letter Δ or \square as the symbol for change. Slope shows the change in y or the change on the vertical axis versus the change in x or the change on the horizontal axis. It can be measured as the ratio of any two values of y versus any two values of x .

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{\Delta Y}{\Delta X} = \frac{Y_1 - Y_2}{x_1 - x_2} = \frac{Y_2 - Y_1}{x_2 - x_1}$$

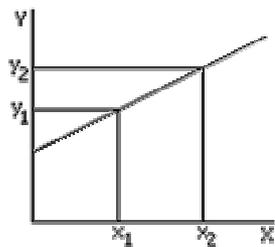


Fig. 3.8

Example 1

Find the slope of the line segment connecting the following points:
(1,1) and (2,4)

$$\begin{aligned}x_1 &= 1 & y_1 &= 1 \\x_2 &= 2 & y_2 &= 4 \\ \frac{y_1 - y_2}{x_1 - x_2} &= \frac{1 - 4}{1 - 2} = \frac{-3}{-1} = 3 \\ \frac{y_2 - y_1}{x_2 - x_1} &= \frac{4 - 1}{2 - 1} = \frac{3}{1} = 3\end{aligned}$$

Example 2

Find the slope of the line segment connecting the following points:
(-1,-2) and (1,6)

$$\begin{aligned}x_1 &= -1 & y_1 &= -2 \\x_2 &= 1 & y_2 &= 6 \\ \frac{y_1 - y_2}{x_1 - x_2} &= \frac{-2 - 6}{-1 - 1} = \frac{-8}{-2} = 4 \\ \frac{y_2 - y_1}{x_2 - x_1} &= \frac{6 - (-2)}{1 - (-1)} = \frac{8}{2} = 4\end{aligned}$$

Example 3

Find the slope of the line segment connecting the following points:
(-1,3) and (8,0)

$$\begin{aligned}x_1 &= -1 & y_1 &= 3 \\x_2 &= 8 & y_2 &= 0 \\ \frac{y_1 - y_2}{x_1 - x_2} &= \frac{3 - 0}{-1 - 8} = \frac{3}{-9} = -\frac{1}{3} \\ \frac{y_2 - y_1}{x_2 - x_1} &= \frac{0 - 3}{8 - (-1)} = \frac{-3}{9} = -\frac{1}{3}\end{aligned}$$

3.7 QUESTIONS

1. What do you mean by Managerial Economics? Explain the characteristics of managerial economics?
2. What are the practical significance of managerial economics?
3. Explain the various concepts in managerial economics?
4. Describe the various basic tools in economics?



Module 2

CONSUMER BEHAVIOUR AND DEMAND

Unit Structure :

- 4.0 Objectives
- 4.0 Marshaallian Utility Analysis
- 4.2 Law of Equi-marginal utility
- 4.3 Elasticity of Demand and its Measurement
- 4.4 Determinants of Demand
- 4.5 Consumer's Surplus
- 4.6 Summary
- 4.7 Questions

4.0 OBJECTIVES

- To understand the various laws of demand.
- To understand the different determinants of demand.
- To understand the different concepts of elasticity of demand, its measurement and its practical use.
- To understand the concept of consumer's surplus and its uses.

4.1 MARSHALLIAN UTILITY ANALYSIS

Alfred Marshall introduced a system of defining and measuring utility objectively. This is known as the cardinal approach to utility. According to Marshall, 'utility is the want satisfying ability of a good'. Thus, when a consumer uses a good, he derives utility. Further, it is possible to measure utility objectively and so, we can clearly find out the satisfaction derived by the consumption of a given commodity. Following are the main features of the cardinal utility analysis:

a. Objective measurement of Utility: A consumer expresses the utility derived from the use of a good in absolute numbers. Like,

consumption of good A gives 10 units of utility, B gives 12 units, C gives 15 units and so on. Marshall argued that money can be used a measure of utility. The price that a consumer is willing to pay rather than go without buying a good is the marginal utility of that good and hence money is the measuring rod of utility.

b. Independent Utilities: According to cardinal utility approach, the utility that a consumer derives from a good is a function of the quantity of that good only. In other words, utility of a good is not linked to the quantities of other goods that the consumer consumes. Thus, the total utility that a consumer derives from the use of a given basket of goods is nothing else but the total of individual utilities. Therefore, utility is “additive”.

c. Constant Marginal Utility of Money: An important assumption of cardinal utility analysis is the assumption that the marginal utility of money is constant. Since the marginal utility of money is constant, it can measure the utility. This is because, for any consumer money spent on any particular commodity will be a small portion of his/her total expenditure. We can ignore any change in real income due to a change in the price of any one particular commodity.

d. Method of Introspection: The Marshallian utility analysis is based on observing one’s own experiences and then extending the logic to the behaviour of the consumer. The law of diminishing marginal utility is based on this particular observation.

4.2 LAW OF EQUI-MARGINAL UTILITY

A) Law of Equi-marginal Utility:

An important step in the cardinal utility analysis is the law of equi-marginal utility. Marshall uses this law to explain the consumer’s equilibrium when he/she purchases more than one commodity. For equilibrium,

$$MU_A/P_A = MU_B/P_B = MU_m$$

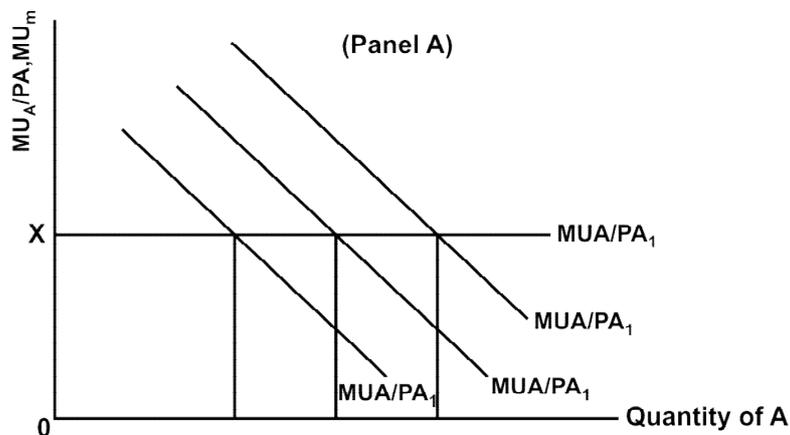
Let the income of the consumer be Rs. 100 and the consumer buys to goods, A and B. The prices of which are given as: Rs. 20 and Rs. 10 respectively. If the marginal utilities of these two goods are given, we can derive the consumer equilibrium as under:

Units	Marginal Utility of A	Marginal Utility of B
1	120	90
2	100	80
3	80	70
4	40	60
5	20	50
6	15	40
7	18	30
8	20	20
9	21	10

From the above table if we compare the ratios of the marginal utilities and the prices, we see that when the consumer buys 3 units of A and 4 units of B, the ratios are equal (4 each) hence at this point, $(80/20) = (40/10) = 4$ or $MU_A/P_A = MU_B/P_B = MU_m$. The consumer spends Rs. 60 on A and Rs. 40 on B. Thus, the law of equi-marginal utility allows us to explain the consumer's equilibrium when he is purchasing more than one good.

B) Law of Demand and the Derivation of the Demand Curve:

Using the principle of additive utility, Marshall derived the law of demand and the demand curve. Assuming that the income of the consumer, his preferences and the price of one good remain the same, we can derive that as the price of a good falls, the demand for it will increase. When the price of good A falls, other things being the same, the MU_A/P_A will be greater than MU_B/P_B and MU_m . In such a case, marginal utility of A must be reduced. Therefore, the consumer has to buy more units of the good whose price has decreased. The proportionality rule requires that as the price of a goods falls, the quantity demanded of that good has to increase. In figure 4.1 we show the derivation of the demand curve.



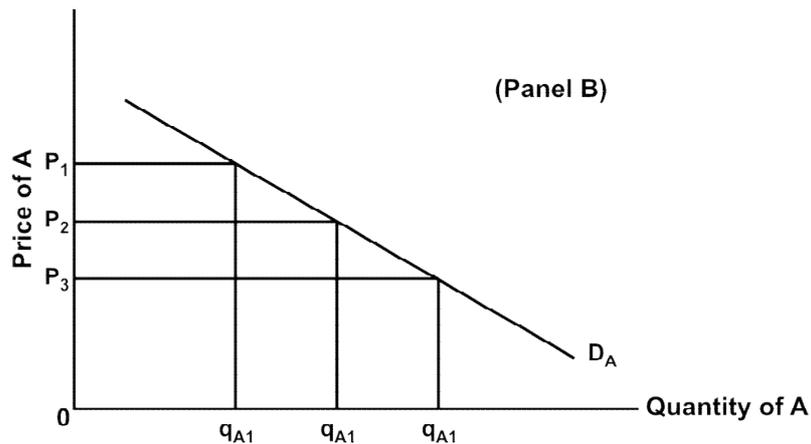


Figure 4.1

The upper plane (Panel A) shows the equilibrium of the consumer. Given his money income, OX is the marginal utility of money, MU_m . As the price of A falls, the MU_A/P_A will shift from MU_A/P_{A1} to MU_A/P_{A2} and to MU_A/P_{A3} . The consumer will increase his purchase of good A to maintain a constant marginal utility of money. The lower panel (Panel B) shows the derivation of the demand curve. As the price of A falls from P_1 to P_2 and to P_3 , the consumer increases his purchases from q_{A1} to q_{A2} and q_{A3} . Thus, a fall in the price of a good, results in larger demand, *ceteris paribus*.

C) Limitations of Cardinal Utility Analysis:

Following are some of the limitations of the Marshall's cardinal approach to utility:

1. As utility is a psychological concept and hence subjective, it is not possible to measure utility objectively in quantitative terms. A consumer can only say whether the satisfaction derived from the consumption of different goods gave more or less satisfaction and will never be able to quantify the utility.
2. Marshall assumed that the utility is independent of the utility of other goods consumed. However, given the money income, utility of any one goods is linked to the utility of other goods that are used by the consumers. Moreover, some goods are complementary while others are substitutes. Hence, the utility derived from any one good is invariably linked to the utility of other goods consumed.
3. The assumption of constant marginal utility of money is also not valid. As the consumer spends money on one good, the money left with him/her reduces. Therefore, the marginal utility of the remaining money income increases instead of remaining constant. Further, as the price of a good changes the real income of the consumer also changes. With the change in real income, the marginal utility of money also changes. This would have an effect

on the demand for the good that is being studied as well as on the demand for other goods as well. Therefore, the assumption of constant marginal utility of money is both conceptually and practically untenable. If the marginal utility of money changes we cannot use it to measure utility objectively.

4. The Marshallian analysis cannot explain the Giffen's paradox. This is a case when the price of a product falls the consumer purchases more units of the cheaper good.

5. The cardinal utility analysis can be used only in case of a single commodity. If there are more than one good, the consumer can substitute his purchase of one good with that of another. In case of more than one good the assumption of constant marginal utility of money would be incompatible with utility analysis.

6. The most important limitation of cardinal utility analysis is its failure to distinguish between the income and substitution effects of a price change. When the price of a good changes, the real income of the consumer changes. At the same time, the relative price of the other good also changes. As a result, the consumer will change his/her purchases of both the goods. This situation cannot be explained using the case of single good.

Check your progress:

1. What is utility?
2. What is the law of Equi-marginal utility?

4.3 ELASTICITY OF DEMAND AND ITS MEASUREMENT

Elasticity of demand refers to the rate of change in demand when one of its determinants changes. Generally, since price is considered to be the most important determinant of demand, we use the concept of price elasticity of demand. Price elasticity of demand is defined as 'the proportionate change in quantity demanded for a given proportionate change in its price'. Alternatively, 'it is the percentage change in quantity demanded for a percentage change in the price of a commodity'. Symbolically:

$$e_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} \quad \text{where, } p \text{ and } q \text{ are price and quantity demanded}$$

respectively and Δ is the proportionate change. Elasticity of demand helps us to see how a given change in the price of a good causes the changes in its demand. Since we postulate a negative relationship between the two, the elasticity has a negative sign.

Measurement of Elasticity of Demand:

We can measure the elasticity of demand using any one of the following methods. A particular method is selected depending upon the given situation.

II.I.E. a) Total Outlay Method: In this method we compare the total expenditure or outlay of the consumer on a given commodity to arrive at the elasticity of demand for that good.

If the demand for a good is elastic ($e_p > 1$), a decrease in the price will result in demand increasing more than proportionately and hence the total outlay on the good will increase. If the elasticity is less than one, as price falls, the outlay on the good also falls. When the elasticity is equal to one, the total outlay on the product remains the same. Figure 4.2 shows the outlay method of estimating the elasticity of demand.

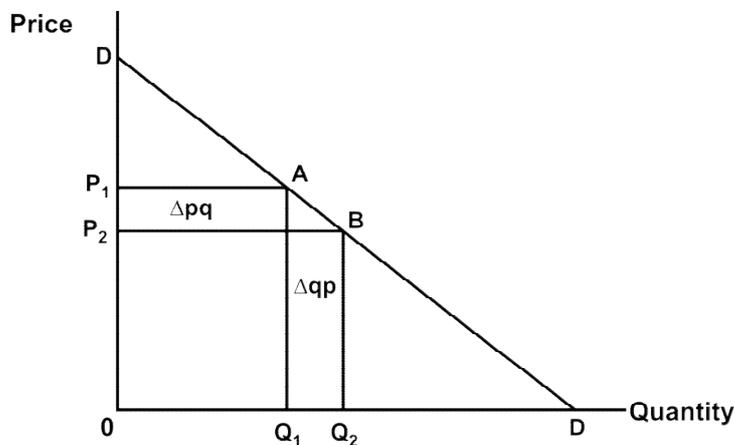


Figure 4.2

In the above diagram we measure quantity demanded on the x-axis and the price on the y-axis. DD is the demand curve. As the price falls from OP_1 to OP_2 , the quantity demanded increases from OQ_1 to OQ_2 . The total outlay in the first case is OP_1AQ_1 . OP_2BQ_2 is the outlay after the change in the price. Since elasticity is given as:

$$e_p = \frac{\Delta q}{\Delta p} \times \frac{p}{q} \quad \text{we can see that } \frac{\Delta qp}{\Delta pq} > 1. \quad \text{Therefore, in the above case,}$$

using the outlay method, the elasticity of demand is greater than one.

II.I.E. b) Point Method of Elasticity of Demand: In this case we take a point on the given demand curve and measure the elasticity.

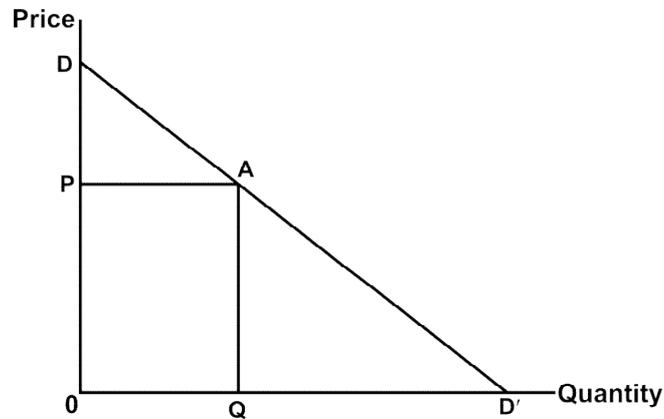


Figure 4.3

Figure 4.3 shows the use of point method of measuring elasticity. In this figure, x-axis shows the quantity and y-axis shows the price. DD^1 is the demand curve. We can see that the original price is OP and original quantity is OQ , elasticity at point A will be equal to

$$ep = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \frac{1}{\text{slope}} \times \frac{p}{q} \quad (\text{slope is equal to } \frac{\Delta p}{\Delta q}).$$

Therefore, elasticity at A is equal to

$$ep = \frac{1}{\frac{PA}{PD}} \times \frac{OP}{OQ} = \frac{PD}{PA} \times \frac{OP}{OQ} = \frac{OP}{PD}$$

Further, in the above diagram, in a right-angled triangle ODD^1 PA is parallel to OD^1 . Therefore, $ep = \frac{OP}{PD} = \frac{AD^1}{AD} = \frac{\text{lower segment}}{\text{upper segment}}$. This

method is also called 'the vertical axis formula' and is a popular method of estimating the elasticity.

c) Arc Elasticity: This method is used to measure the elasticity of demand along a non-linear demand curve. The method is essentially the same as that of the point method. If we have a demand curve, we then measure the elasticity at different points on the demand curve. But on a non-linear demand curve the elasticity of demand varies from point to point. Figure 4.4 shows the arc method of measuring the elasticity.

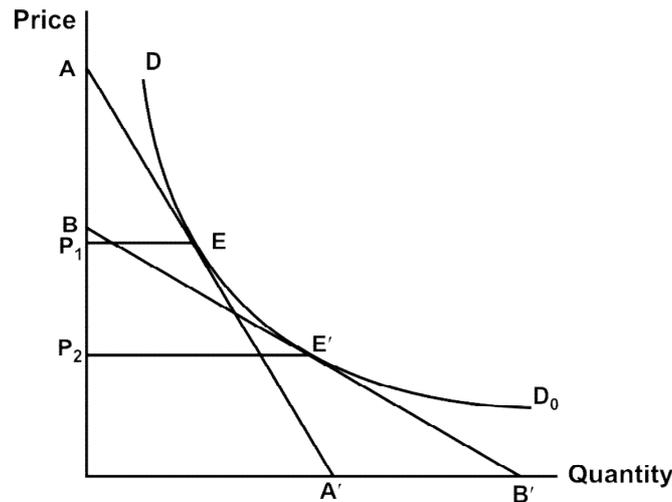


Figure 4.4

In the above figure, x-axis measures the quantity demanded and y-axis measures the price. DD_0 is the demand curve. To measure the elasticity of demand at point E we draw a parallel to the demand curve AA_1 . Then applying the point method, the elasticity of demand at E is given as: $\frac{EA1}{EA}$.

Now to measure the elasticity at point E_1 , we draw another parallel to the demand curve, BB_1 . The elasticity at E_1 is therefore, $\frac{E1B1}{E1B}$.

We can also see that in the above case, the elasticity of demand at E is greater than at E_1 .

II.I.E. d) Mid-point Method: This method is used when there are large changes in the prices and/or the quantities. We can see this with the help of a numerical example. Let us say the price increased from Rs. 250 to Rs. 400 and the quantity demanded fell from 150 units to 125 units. In this case the price decreased by 60 percent and the quantity demanded fell by 16.7 percent. The elasticity of demand would be measured as $ep = \frac{60}{16.7} = 3.59$.

If we reverse the direction of change in the price, that is price falls from Rs. 400 to Rs. 250, the quantity demanded would increase from 125 units to 150 units. The percentage change in price would be 37.5 and for quantity it would be 20 percent. This will give us an elasticity of 0.53. We see that for the same absolute changes in the quantity and price we would obtain different elasticities. To solve this problem the mid-point method is used. We write elasticity of demand as:

$$ep = \frac{\frac{q1 - q2}{(q1 + q2)} \div \frac{p1 - p2}{(p2 + p1)}}{\frac{\Delta q}{\Delta p} \times \left(\frac{p2 + p1}{q2 + q1} \right)} \text{ where, } q1 \text{ and } p1 \text{ are the}$$

original quantity and price, q_2 and p_2 are the new quantity and price after the change in price.

Using the above formula, the elasticity of demand in the above example would be:

$$ep = \frac{125 - 150}{\left(\frac{125 + 150}{2}\right)} \div \frac{400 - 250}{\left(\frac{400 + 250}{2}\right)} = 0.39.$$

Check your progress:

1. How will you define the elasticity of demand?
2. State the methods of measurement of elasticity of demand.

4.4 DETERMINANTS OF DEMAND

Let us now examine the various determinants of demand for a particular good. Economists agree that while the demand for a product is affected by a number of variables, it is possible to identify the most important of them. Following are the determinants of demand for a given product or good.

- a) **Price of the Good:** Price of the given good is the most important determinant of its demand. The economic theory postulates a negative relationship between the price of a good and its demand.
- b) **Income of the Consumer:** Income of the consumer has a positive effect on the demand for a good. As income increases, the consumer would prefer to buy larger units of a given good. Only in case of Giffen goods, we see a negative relationship between the income and the demand for a good.
- c) **Prices of Other Goods:** the relationship between the demand for a good and the prices of other goods is postulated in the following manner:
 - i) In case of substitutes, the relationship is positive. That is, if we have two goods A and B, the demand for A is positively related to the price of B and *vice versa* if they are substitutes.
 - ii) In case of complementaries, the relationship is negative. That is, if the price of A increases, the demand for B decreases.
 - iii) In case of unrelated goods, the relationship is zero. In other words, changes in the price of A will not cause any changes in the demand for B.

d) Tastes and Preferences: Demand for a good depends upon the consumer's preference for that good. If consumer prefers to buy more units, the demand will be higher for at a given price.

e) Size of the Population: Demand for an given good is determined by the number of consumers in the market. Larger the number of consumers, higher would be the demand for a given good.

f) Expected Prices: It is important to note that not only the current price, but the expected future price will also determine the demand for a given good. If the consumer expects the future price to fall, he/she would prefer to postpone the purchase of the good and wait for the price to fall. Similarly, if the future price is expected to rise, the consumer would buy larger units presently.

g) Advertising: It is possible to influence the demand for a product by advertising about it in different media like new papers, radio and TV. As a firm advertises its products, consumers will be attracted to it and demand would increase.

Demand Function:

A demand function is a mathematical expression of the determinants of demand for a product. We write this symbolically as,

$$D_i = f (P_i, Y, P_r, T, N, P^e, A)$$

where D_i = Demand for a given good, i ,

P_i = price of the given good,

Y = income of the consumer,

P_r = prices of related goods,

T = tastes and preferences of the consumer,

N = number of consumers

P^e = expected price of the good,

A = advertising.

While estimating the above equation, we test whether the observed relationship is according to the theory or not.

Concepts of Elasticity of Demand:

Economic theory uses different concepts of elasticity. In other words, these are the relationship between the changes in the determinants and demand and the corresponding changes in the demand for a given good. We shall examine each of these concepts.

1. Income elasticity: This refers to the 'proportionate change in quantity demanded for a given proportionate change in the income of the consumer. Symbolically,

$$\varepsilon = \frac{\text{proportionate change in income}}{\text{proportionate change in the quantity demanded}} = \frac{\Delta y}{\Delta q} \times \frac{y}{q}$$

y and q are income and quantity demanded. ϵ is the income elasticity of demand. The value of ϵ indicates the nature of the product. For normal goods it is positive, indicating that as the income of the consumer increases, he/she will increase the purchase of the good and vice versa for a Giffen good.

2. Cross Elasticity: Indicates, as noted earlier, the relationship between two goods. It is defined as the proportionate change in the demand for X for a given change in the price of Y. Thus, we have:

$$\xi = \frac{\text{proportionate change in quantity demanded of } X}{\text{proportionate change in the price of } Y} = \frac{\Delta X}{\Delta P_y} \times \frac{P_y}{X}$$

where, ΔX is change in the quantity of good X, ΔP_y is the change in price of Y, X is the original quantity of X and P_y is the original price of Y. If $\xi > 1$ the two goods are substitutes. If it is less than one, they are complementariness and unrelated if ξ is zero.

3. Promotional Elasticity: In modern capitalist economies, advertising plays an important part of the strategy to increase sales. The promotional elasticity studies the impact of advertising on the quantity demanded. Symbolically we have,

$$\eta = \frac{\text{proportionate change in quantity demanded}}{\text{proportionate change in advertising expenditure}} = \frac{\Delta Q}{\Delta A} \times \frac{A}{Q}$$

A firm will be successful in its efforts to improve sales only when $\eta > 1$.

4.5 CONSUMER'S SURPLUS

Marshall introduced the concept of consumer's surplus to explain the welfare aspects of pricing. It is defined as 'the excess of price which a consumer would be willing to pay rather than go without a thing over that which he actually does pay is the economic measure of this surplus satisfaction'. Since the amount of money which the consumer is willing to pay indicates his utility, we can use the price the consumer is ready to pay as a measure of his surplus. Thus, we have:

Consumer's Surplus = Σ Marginal Utility – Total Outlay. We can show the consumer's surplus with the help of an example.

Units of the Good	1	2	3	4	5	6	7	8	9	10
Price	30	28	25	22	19	15	12	10	8	5
Marginal Utility	50	45	40	30	20	15	8	0	-5	-10

In the above table we see that as the price falls the marginal utility also declines. At a price of 8, the marginal utility is zero and turns negative. At a price of 15, the marginal utility equals the price and

the consumer buys six units of the good. The consumer's surplus would be: $200 - 90 = 110$.

The following figure explains the concept of consumer's surplus.

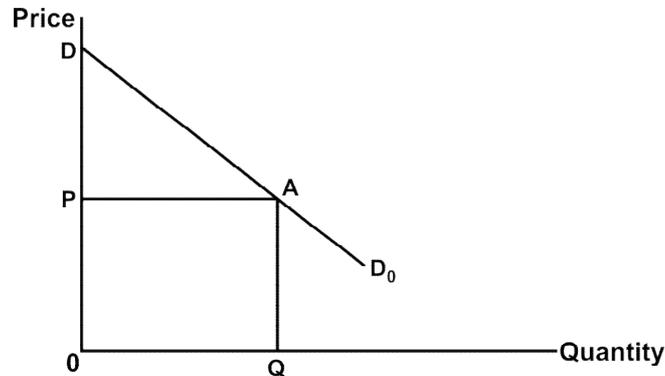


Figure 4.5

In the above figure, x-axis shows the quantity demanded and y-axis shows the price. DD is the demand curve. When the price is OP, the consumer buys OQ units. The consumer is willing to pay ODAQ and he pays only OPAQ. Therefore, ΔPDA is the consumer's surplus.

Merits and Demerits of Consumer's Surplus:

1. Governments use extensive use of the concept of consumer's surplus in pricing public utilities, educational and health facilities. It highlights the significance of value-in-use rather than the value-in-exchange.
2. Firms use this concept to fix their prices. They will fix the prices in such a way that they can squeeze the maximum consumer's surplus without forcing the consumer to give up buying the product.
3. As we often see, some of the residential areas are provided with special and exclusive access to amenities. This will add to the consumer's surplus of the residents of these localities. Though they may carry higher prices, the utility of these services is higher than the prices.
4. The concept of consumer's surplus helps us to understand the adverse effects of indirect taxes. Economic theory recommends the use of direct taxes since they do not cause a direct loss of consumer's surplus.
5. The concept of consumer's surplus is based on the cardinal utility and hence all the limitations of that analysis are applicable to this. Since utility cannot be objectively measured, we cannot talk of measurable utility derived from the consumption of a given commodity.

6. The assumption that different units of the given good provide different amounts of satisfaction is central to this concept. However, in reality the consumer may derive the same marginal utility from each additional unit of the good consumed by him/her. In such a situation it may not be possible to measure the consumer's surplus.

7. This concept is based on the assumption that the consumer has control on the price. However, in reality the consumer often may not have the ability to influence the price and he/she has to buy the given good. In such a case, we can never measure the consumer's surplus.

Despite its many limitations, this concept has important implications for policy and is often used in determination of prices. The drug pricing policy in India is one example where the government uses this concept to protect the interests of the consumers.

Check your progress:

1. What is a demand function?
2. How Consumer surplus can be measured

4.6 SUMMARY

1. Cardinal utility is the measurement of utility in an objective manner.
2. Marshall assumes the consumer of the income, tastes and preferences and income of the consumer to be constant to explain cardinal utility.
3. Law of equi-marginal utility requires the marginal utility of money to be constant.
4. Law of demand states that the demand for a product is inversely related to its price, other things being the same.
5. Cardinal utility cannot explain Giffen's paradox.
6. In outlay method we compare the change in the consumer's spending on the good before and after the change in the price.

7. Point method measures the elasticity of demand at a particular price.
8. Arc elasticity is useful when the demand curve is not a straight line.
9. Mid-point method is useful when the changes in demand and price are large.
10. Elasticity of demand measures the relationship between changes in the price and demand of a given good.
11. Income elasticity depends upon the nature of the good.
12. Cross elasticity helps us to understand the relation between any two goods.
13. Consumer's surplus is the relationship between the price and utility of a good.

4.7 QUESTIONS

1. Explain the concept of cardinal utility analysis. What are its main limitations?
2. Explain the law of equi-marginal utility.
3. Derive the demand curve using the law of demand.
4. Explain the different determinants of demand.
5. Explain the concepts of price, income, cross and promotional elasticity of demand.
6. Explain the concept of consumer's surplus and its uses.



INDIFFERENCE CURVE ANALYSIS

Unit Structure :

- 5.0 Objectives
- 5.1 Introduction
 - 5.1.1 Scale of Preferences
 - 5.1.2 Indifference Curve
 - 5.1.3 Properties of Indifference Curves
 - 5.1.4 Budget Line of Price Line
 - 5.1.5 Consumer's Equilibrium
- 5.2 A Income, Substitution and Price effects
 - 5.2.1 Income Effect
 - 5.2.2 Substitution Effect
 - 5.2.3 Price Effect
- 5.3 Breaking-up of the Price Effect
 - 5.3.1 Price Effect of a Normal Good
 - 5.3.2 Price Effect of a Giffen Good
- 5.4 Derivation of the Demand Curve
- 5.5 The Revealed Preference Theory
- 5.6 Summary
- 5.7 Questions

5.0 OBJECTIVES

1. To understand the concept of indifference curves
2. To understand the derivation of consumer's equilibrium
3. To understand different effects of changes in prices and income
4. To understand the derivation of the demand curve
5. To understand the concept of revealed preference

5.1 INTRODUCTION: INDIFFERENCE CURVE ANALYSIS

Sir John Hicks introduced the concept of indifference curve analysis to explain the consumer behaviour. The starting point of

the indifference curve analysis is the understanding that it is not possible to objectively measure utility. Since utility depends on the thinking of the consumer, we can only say whether the utility of the consumer is more or less. No precise measurement of utility is possible. This is known as the '*ordinal utility analysis*'. This analysis is based on the premise that unlike in the Marshallian analysis, the consumer in real life purchases two or more goods at any given time. The indifference curves help to understand the consumer's equilibrium in a situation where it is not possible to objectively measure utility. Hicks developed a few concepts to facilitate the analysis. We shall now examine them.

5.1.1 Scale of Preferences:

A scale of preferences is a mental construct where the consumer ranks the different combinations of two goods that give equal level of satisfaction. The following table shows the concept of a scale of preference.

Combination	Units of Good X	Units of Good Y	Marginal Rate of Substitution (MRS)
1	25	50	--
2	27	43	-7
3	29	37	-6
4	31	32	-5
5	33	28	-4

In the above table we show five different combinations of the two goods X and Y that give equal level of satisfaction. As the consumer moves from combination 1 to 2, he gets two extra units of good X and is ready to give up seven units of good Y. As he moves on to combination 3, he gets another two additional units of X, but is ready to give up only seven units of Y. As he moves to combination 4 he is willing to give up five units of good Y to get two additional units of good X. In the last combination, he is willing to sacrifice only four units of good Y to obtain two additional units of X. In other words, when a consumer is offered equal increases in one of the two goods, he would prefer to sacrifice lesser and lesser units of the other good. The rate at which the consumer prefers to substitute one good for another is known as the marginal rate of substitution. In order to keep the level of satisfaction at the same level, we have to have a situation where the consumer gives up lesser additional units of one good. This is because as the units of one good available increase the marginal utility of the other good increases and so the consumer would not be willing to sacrifice more units of this good. Therefore, the marginal rate of substitution is also the ratio of the marginal utilities of the two goods.

$$\text{Symbolically } MRS_{X,Y} = \frac{\text{Marginal utility of Good X}}{\text{Marginal utility of Good Y}} = \frac{\Delta X}{\Delta Y}$$

5.1.2 Indifference Curve:

An indifference curve is a graphic representation of the scale of preferences. Therefore, it is also the graphic representation of the ratios of the marginal utilities of the two goods. Following the diminishing marginal utility, the indifference curve is a downward sloping, curve that is convex to the origin. Figure 5.1 shows an indifference curve. We see that as the consumer moves from combination A to B to C, his level of satisfaction remains the same as indicated by the given indifference curve, IC_0 .

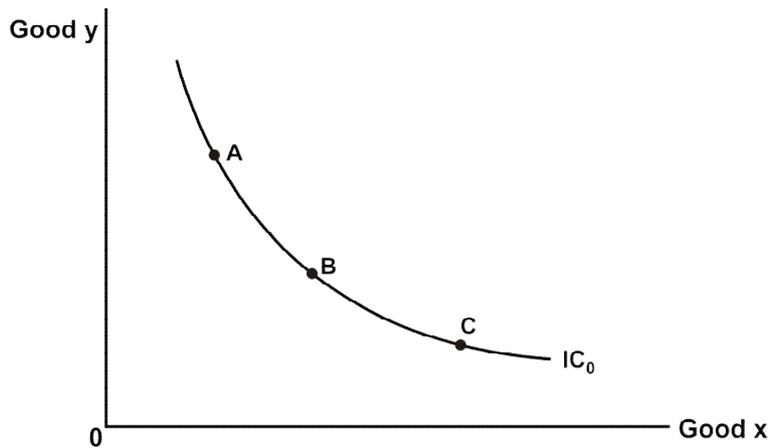


Figure 5.1

In the above diagram x-axis measures the units of good X and y-axis measures the units of Y. IC_0 is the indifference curve. A, B, and C are the various points on the indifference curve each indicating the same level of satisfaction.

5.1.3 Properties of Indifference Curves:

Let us now examine the properties of indifference curves.

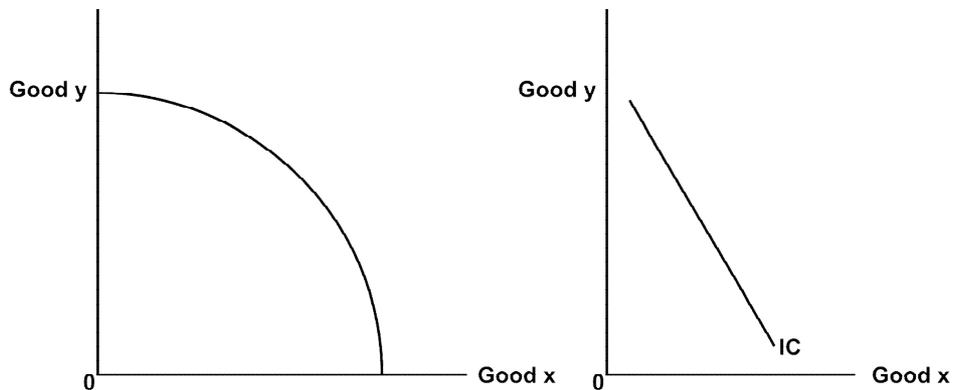


Figure 5.2

1. An Indifference Curve is Convex to the origin:

Since an indifference curve indicates the diminishing marginal rate of substitution between the two goods, it is convex to the origin. If it is concave to the origin as in figure 5.2 a), it indicates increasing marginal rate of substitution. That is the consumer will be ready to give up more and more units of one commodity in order to get equal increases in the other good. Since this is contrary to the law of diminishing marginal rate of substitution, an indifference curve cannot be concave to the origin. At the same time, an indifference curve cannot be a straight line as in figure 5.2 b). This is because in this case the marginal rate of substitution remains the same along the indifference curve. This is contrary to the assumption of diminishing marginal utility. Therefore, an indifference curve is convex to the origin.

2. Two Indifference Curves cannot intersect:

This property implies that when two indifference curves intersect each other at that point the level of satisfaction is same along the two indifference curves. In figure 5.3 we explain this property.

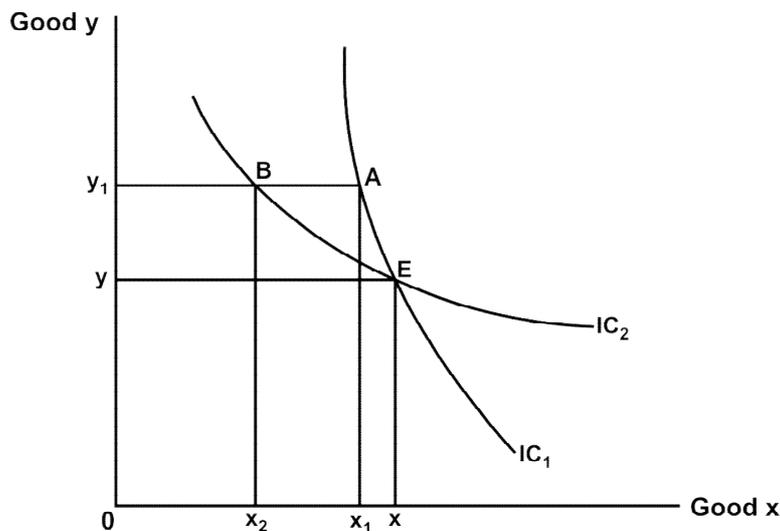


Figure 5.3

At point E the two indifference curves IC_1 and IC_2 intersect. At this point the level of satisfaction on the two indifference curves is the same (consumer gets Ox units of X and Oy units of Y). If we move to another point say A on IC_1 , the consumer has Ox_1 units of X and Oy_1 units of Y. But at this point on IC_2 the consumer has Oy_1 units of Y and Ox_2 units of X. Point to be noted is the level of satisfaction at point A and B and E are the same following the definition that an indifference curve indicates the same level of satisfaction. Thus, no two indifference curves can intersect each other.

3. Higher indifference curve indicates higher level of satisfaction:

Since a higher indifference curve is away from the origin, it indicates larger units of both the goods which in turn indicate higher levels of satisfaction. Therefore, higher indifference curve indicates higher level of satisfaction. We show this in figure 5.4.

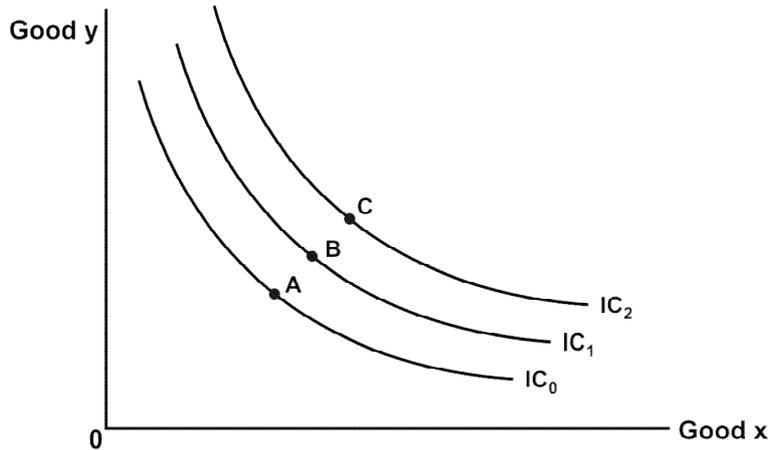


Figure 5.4

In the above figure, as the consumer moves from point A to B to C along the different indifference curves, he/she obtains larger amounts of both X and Y. Therefore, higher the indifference curve, higher will be the level satisfaction.

5.1.4 Budget Line or Price Line:

This is the graphical representation of the various combinations of two goods that an individual consumer can buy with his given income at the given prices of the two goods. For example, if the income of the consumer is 100 and price of X and Y are 5 and 10 respectively the consumer can buy 20 units of X or 10 units of Y or any combination of in between. The budget line indicates all these combinations. Therefore, the slope of the budget line is the ratio of the prices of the two goods. Figure 5.5 shows the budget line.

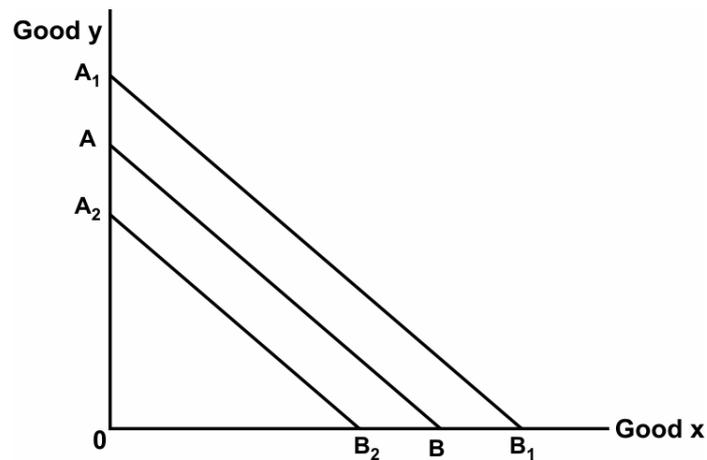


Figure 5.5

In the above figure AB is the Budget line. The consumer can buy OA units of good Y or OB units of good X. If the income of the consumer increases and/or the prices of the goods fall the consumer can buy larger units of the two goods. The budget line will in that case shift outwards (A_1B_1). Conversely if the income falls and/or prices increase, the budget line shifts inwards (A_2B_2) and the consumer will be able to buy lesser units.

5.1.5 Consumer's Equilibrium

Using the concepts of indifference curves and the budget line J.R. Hicks derived the consumer's equilibrium within the ordinal utility framework. We make certain simplifying assumptions to arrive at the consumer's equilibrium:

1. The consumer is rational and tries to maximize the utility or satisfaction.
2. The income of the consumer is given and remains the same.
3. The prices of the two goods X and Y are given and remain the same.

Given the above assumptions, we say that the consumer maximizes his/her satisfaction when the following conditions are met:

- a. The price ratio is equal to the marginal rate of substitution.
- b. At that point the indifference curve is convex to the origin.

The first condition is known as the necessary condition and is

given as $MRS_{x,y} = \frac{\Delta X}{\Delta Y} = \frac{P_x}{P_y}$ where $MRS_{x,y}$ is the marginal

rate of substitution between X and Y, P_x , and P_y are the price of X and Y respectively. This condition is known as 'the tangency solution'. The second condition indicates that at the point of tangency the indifference curve is convex to the origin. We can

write this as: $MRS_{x,y} = -\frac{\Delta X}{\Delta Y} = \frac{P_x}{P_y}$. This condition implies that

at the point of tangency the diminishing marginal rate of substitution is in operation. As we have seen in the properties of indifference curves, without this assumption it is not possible to arrive at the concept of same level of satisfaction along the indifference curve. Figure 5.6 shows the consumer's equilibrium.

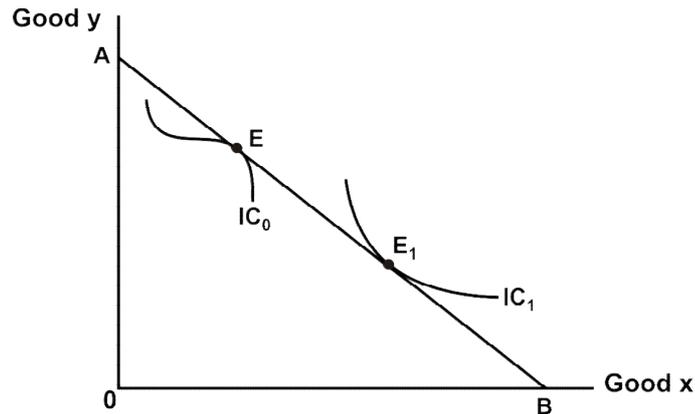


Figure 5.6

In the above figure x-axis shows units of good X and y-axis shows units of good Y. AB is the budget line. At point E and E₁ the budget line is tangent to the indifference curves IC₀ and IC₁. At E

the $MRS_{x,y} = \frac{P_x}{P_y}$. It satisfies the necessary condition. But at this

point the indifference curve is concave to the origin and indicates a positive marginal rate of substitution which is incompatible with the assumption of equal level of satisfaction. Therefore, point E is not the equilibrium point. Only at point E₁ the condition of diminishing marginal rate of substitution is satisfied at this point. Or at E₁:

$$-\frac{\Delta X}{\Delta Y} = \frac{P_x}{P_y}$$

Check your progress:

1. Ordinal utility measures utility objectively. Explain
2. What is a scale of preferences?

5.2 INCOME, SUBSTITUTION AND PRICE EFFECTS

The most important contribution of the indifference curve analysis is in terms of its ability to distinguish between the income and the substitution effects. When the income of a consumer changes his/her demand will change. The changes in demand due to changes in income it is called 'income effect'. The real income of the consumer also changes when the price of a good changes, other things being the same. This change in the real income causes changes in the demand. This is the 'income effect' of a price change. At the same time, the psychology of a consumer is to substitute the costlier good with the cheaper one. That is he/she will buy more of the cheaper good. This is the 'substitution effect'. We will examine each of them.

5.2.1 Income Effect:

As noted above, if the prices of the two goods X and Y are the same, if the money income of the consumer changes, he can buy more of the two goods. In this case, his budget line will shift outwards. This we have seen earlier while explaining the concept of budget line. The income effect can be positive or negative. Positive income effect implies that when the income of the consumer increases, he tends to buy more of a particular good. This happens in the case of normal goods. Negative income effect is seen when the consumer buys lesser of the good when his/her income increases. This happens in case of inferior goods and Giffen goods. The income effect is based on the assumptions that the consumer is rational and the prices of the two goods are given. Hicks introduced the concept of the Income Consumption Curve (ICC) to explain the nature of effect of a change in income on the demand for a good. The ICC starts from the origin since demand is zero when there is no income. Figure 5.7 shows the impact of a change in income on the demand for different goods.

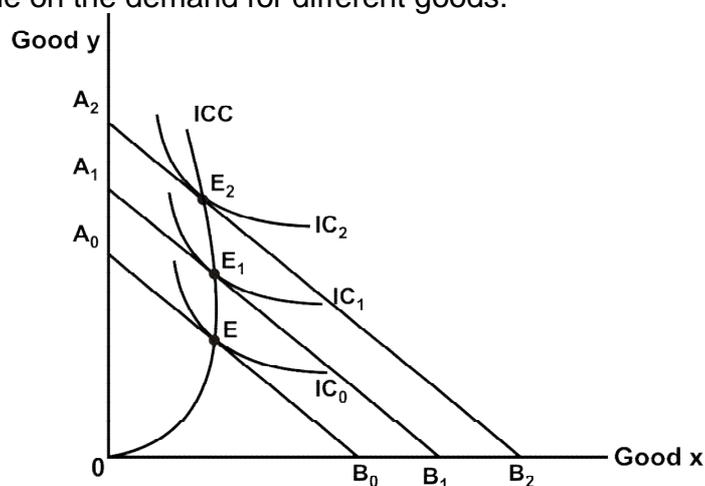


Figure 5.7 (a)

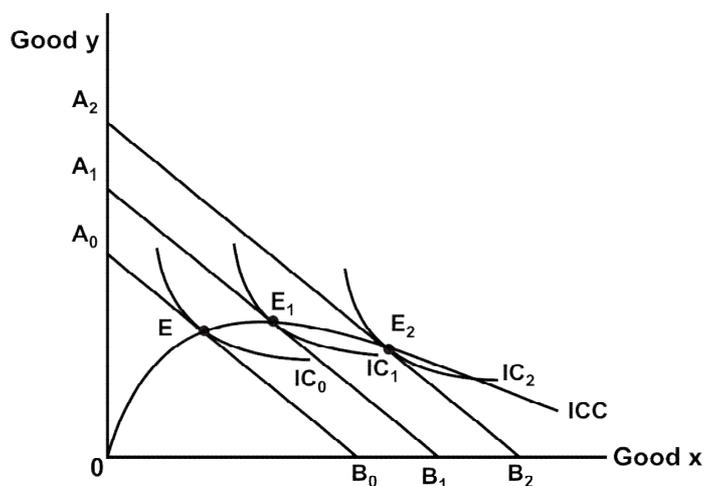


Figure 5.7 (b)

In Figure 5.7 (a) we show the changes in consumer's equilibrium when his income increases. A_0B_0 is the initial budget line. The consumer is in equilibrium at E_0 . As his income increases, his budget line shifts from A_0B_0 to A_1B_1 and further to A_2B_2 . As his income increases, the consumer moves from E_0 to E_1 to E_2 . In this process, his purchase of good X decreases and that of Y increases. So good X is inferior and this is reflected in the slope of ICC which moves away from good X. Figure 5.7 (b) shows the changes in the consumer's equilibrium when good X is normal and good Y is inferior. A_0B_0 is the initial budget line. The consumer is in equilibrium at E_0 . As his income increases, his budget line shifts from A_0B_0 to A_1B_1 and further to A_2B_2 . As his income increases, the consumer moves from E_0 to E_1 to E_2 . In this process, he purchases more units of good X and lesser units of good Y. Therefore, good X is normal and good Y is inferior. The ICC in this case moves away from good Y. Figure 5.8 shows the different possible combinations of ICC depending upon the nature of the two goods.

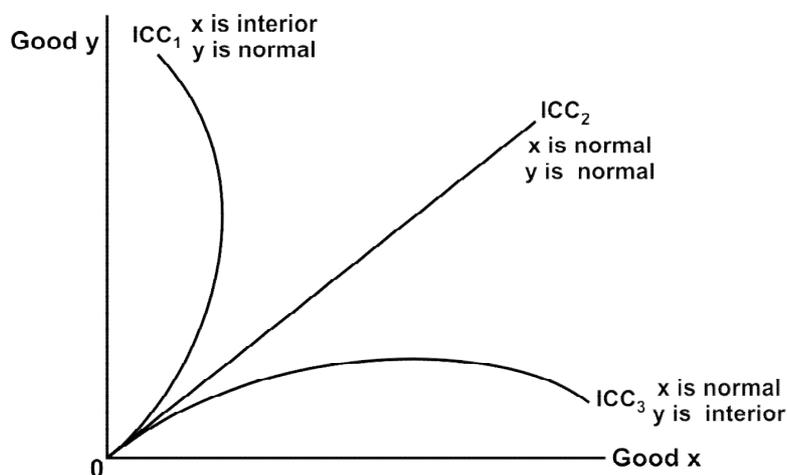


Figure 5.8

In the above figure the three ICCs show the nature of each of the two goods.

5.2.2 Substitution Effect:

Hicks explained the substitution effect in terms of changes in the money income of the consumer. Thus, when the price of one good changes the money income of the consumer is also changed in such a way that the consumer has the same level of satisfaction. This is known as 'compensating variation'. It is defined as 'the amount by which the money income of the consumer is changed so that the consumer is neither better off nor worse off than before'. That is, the consumer remains on the same indifference curve. Figure 3.9 shows the substitution effect.

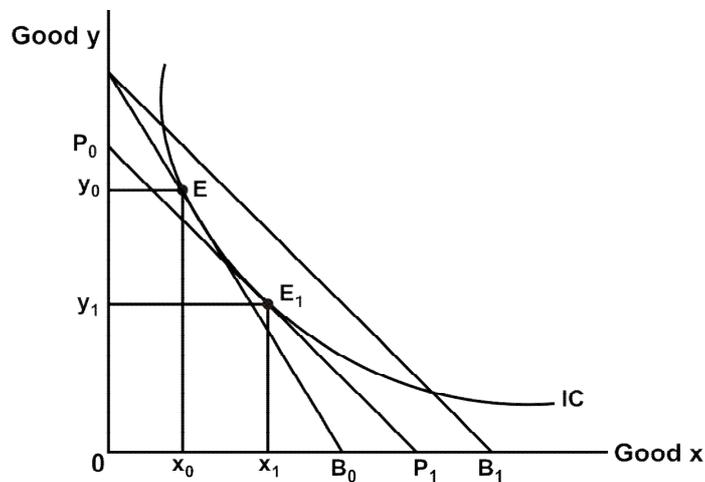


Figure 5.9

In the above figure A_0B_0 is the original price line. The consumer is in equilibrium at E . He purchases Oy_0 units of Y and Ox_0 units of X . As the price of X falls while that of Y remains the same, the budget line shifts to A_0B_1 . Using the compensating variation, the new budget line is P_0P_1 . This line is parallel to the budget line A_0B_1 indicating that the relative prices are the same. At point E_1 the indifference curve IC is tangent to the budget line. The consumer now purchases Ox_1 units of X and Oy_1 units of Y . The consumer would always prefer to buy more of the cheaper good. The substitution effect is always positive.

5.2.3 Price Effect:

The price effect shows the behaviour of the consumer to changes in the price of one good while his money income, tastes and preferences and prices of other goods remain the same. When the price of a good falls, other things being the same, the consumer would move be able to buy more of the good and *vice versa* when the price increases. Figure 5.10 explains the price effect.

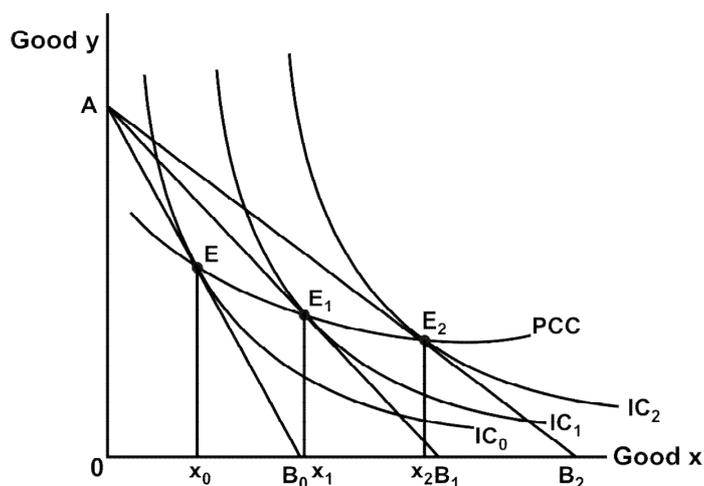


Figure 5.10

In the above diagram x-axis shows good X and y-axis shows good Y. We assume that the price of good Y and the money income of the consumer remain the same. AB_0 is the original price line. The consumer is in equilibrium at E. He purchases Ox_0 units of X and Ex_0 units of Y. As the price of X falls, the price line shifts to AB_1 . As a result the consumer moves from point E to E_1 and he purchases more units of X (x_0x_1). Further as the price of X falls, he moves on to E_2 and purchases Ox_2 units of X. the movement from E to E_1 to E_2 is traced along the Price Consumption Curve (PCC). PCC is 'the locus of all equilibrium points when the price of one good and the money income of the consumer remain the same and only the price of the other good changes'. Figure 5.11 shows the possible slopes of the PCC.

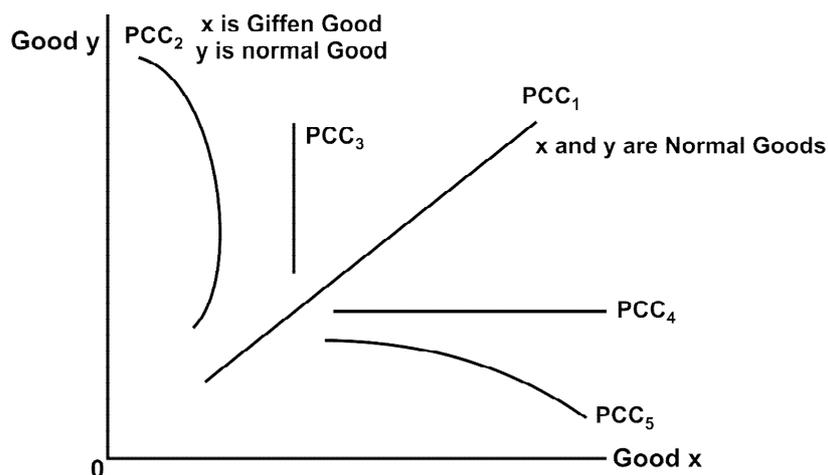


Figure 5.11

In the above figure PCC_1 shows changes in consumer equilibrium when both the goods are normal and the price of one good changes while the price of the other good and income are the

same. PCC_2 shows the changes in consumer equilibrium when good X is a Giffen good and good Y is normal. The consumer will buy lesser units of X when the price of X falls. PCC_3 shows the case when good X is neutral and good Y is normal. In this case when the price of X falls the consumer will continue to buy the same units. PCC_4 shows the case when good Y is neutral and good X is normal. PCC_5 shows the case when good Y is a Giffen good and good X is a normal good.

5.3 BREAKING-UP OF THE PRICE EFFECT

We can show that the price effect is a total of the income and substitution effects. We assume that the consumer is rational, his/her income is given, price of Y remains the same, price of X falls. We shall examine the price effect of a normal good first and then examine the price effect of a Giffen good.

5.3.1 Price Effect of a Normal Good:

In case of a normal good a fall in the price results in a rise in the demand and a rise in the price causes the demand to fall. Figure 5.12 shows the price effect of a normal good.

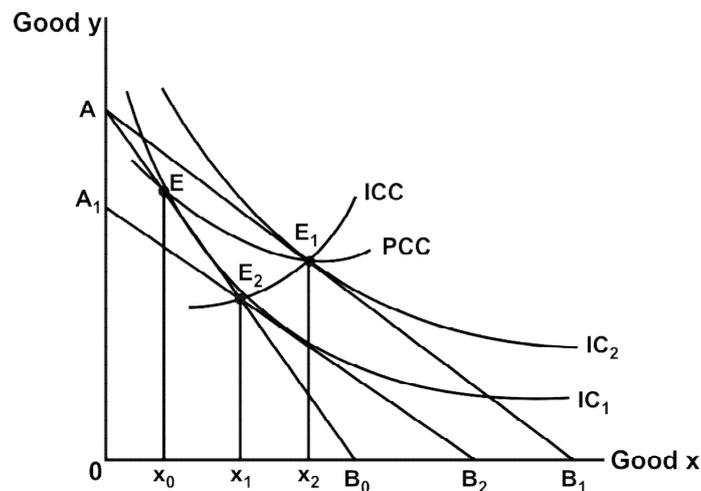


Figure 5.12

In the above figure x-axis shows good X and y-axis shows good Y. A_0B_0 is the original price line. The consumer is in equilibrium at point E where the price line is tangent to the indifference curve IC_1 . He/she purchases Ox_0 units of good X. As the price of X falls, the budget line shifts to A_0B_1 . The consumer moves to point E_1 on indifference curve IC_2 . The consumer buys Ox_2 units of X. By the principle of compensating variation, if we reduce the income of the consumer to retain him at the original level of satisfaction, the budget line will shift downwards to A_1B_2 .

The consumer reaches equilibrium at E_2 and buys Ox_1 units of X. The movement from E to E_1 is the total price effect (change in demand due to a change in the price of the good, x_0x_2). Of this, movement from E to E_2 is the substitution effect (x_0x_1) and movement from E_2 to E_1 is the income effect (x_1x_2). Thus price effect = income effect + substitution effect

$$x_0x_2 = x_1x_2 + x_0x_1$$

5.3.2 Price Effect of a Giffen Good:

In case of a Giffen good a fall in the price results in a rise in demand and a rise in price causes the demand to fall. Figure 5.13 explains the price effect of a Giffen good.

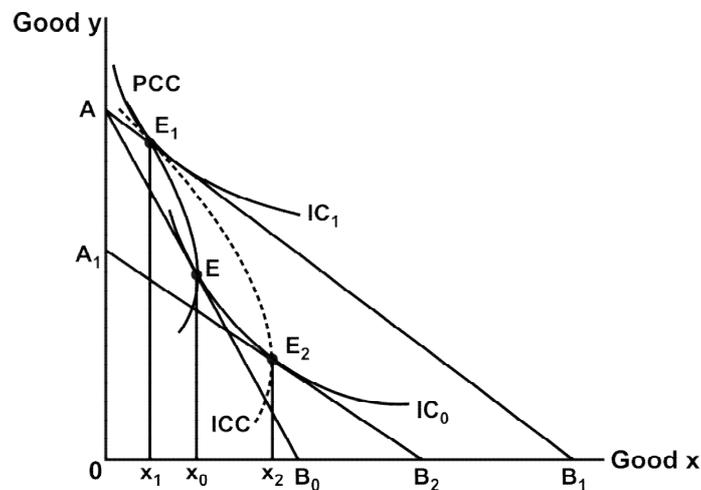


Figure 5.13

In the above figure x-axis shows units of good X and y-axis shows units of good Y. A_0B_0 is the original price line and the consumer is in equilibrium at E on IC_0 and purchases Ox_0 units of X. As the price of X falls, the budget line shifts to A_0B_1 and the consumer moves to E_1 on IC_1 . The units of X purchased reduces to Ox_1 . If we compensate for the fall in price of X, the budget line will shift to A_1B_2 and the consumer moves to E_2 on the original indifference curve. Movement from E to E_1 is the price effect. Movement from E to E_2 is due to the substitution effect while movement from x_2 to x_1 is due to the negative income effect. Thus, in case of Giffen goods the negative income effect outweighs the positive substitution effect and the consumer will buy lesser units of the good whose price has fallen.

Thus price effect = income effect + substitution effect

$$-x_0x_1 = x_1x_2 - x_0x_2$$

The following table shows the break-up of price effect of different goods depending upon their nature:

Nature of the Good	Price effect	Income Effect	Substitution Effect
1. Normal Goods	Positive	Positive	Positive
2. Inferior Good	Positive	Negative	Positive
3. Giffen Good	Negative	Negative	Positive

5.4 DERIVATION OF THE DEMAND CURVE

The most important use of the indifference curve analysis is to derive the consumer demand curve. We show this with the help of the following figure. We assume that the consumer is rational, his money income and price of Y remain the same and only the price of X falls.

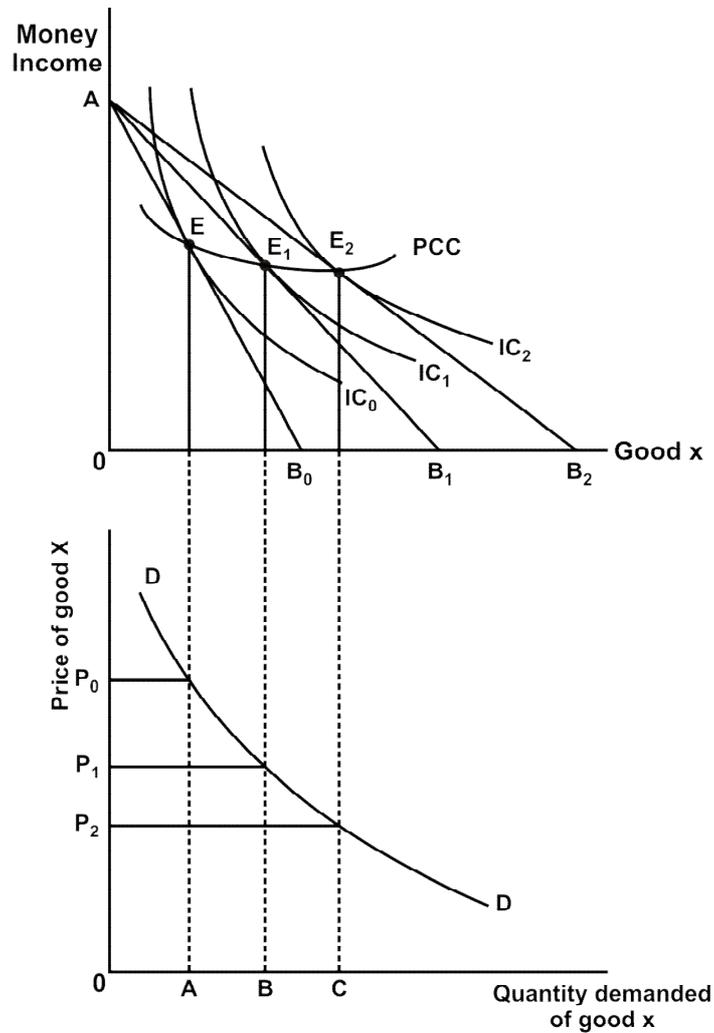


Figure 5.14

In the above the upper panel shows the price effect of the fall in price of good of X while the money income of the consumer remains the same. He moves from point E to E_1 to E_2 as the price of X falls and his budget line shifts from AB_0 to AB_1 to AB_2 . PCC is the price consumption curve. The lower panel shows the various quantities purchased and the corresponding prices. As the price falls from P_0 to P_1 and to P_2 , the consumer increases his purchases from OA to OB to OC. Thus, we see the inverse relationship between the price and the quantity demanded, 'other things being the same'.

Check your Progress:

1. Write notes on :
 - a) Income effect
 - b) Substitution effect
 - c) Price effect

5.5 THE REVEALED PREFERENCE THEORY

One of the most important developments in the area of consumer's choice is "the revealed preference theory". This approach was developed by P. A. Samuelson to overcome the shortcomings of both the Marshallian and Hicksian approaches. This approach is based on the 'observed behaviour of the consumer' and not on 'contemplations based on psychological constructs'. Thus, Samuelson observed 'choice reveals preference'. When a consumer chooses a particular good or a combination of goods, he/she revealed the preference for that over all other available alternatives. In other words, the consumer is not indifferent to the choices available. This approach is also known as the 'behaviourist ordinalist approach' since it is based on the actual behaviour of the individual consumer. Following are the main arguments of the revealed preference theory. When the consumer chooses a particular combination of goods, for him all others are 'revealed inferior', that is he rejected all other combinations from his choice. Figure 5.15 shows this.

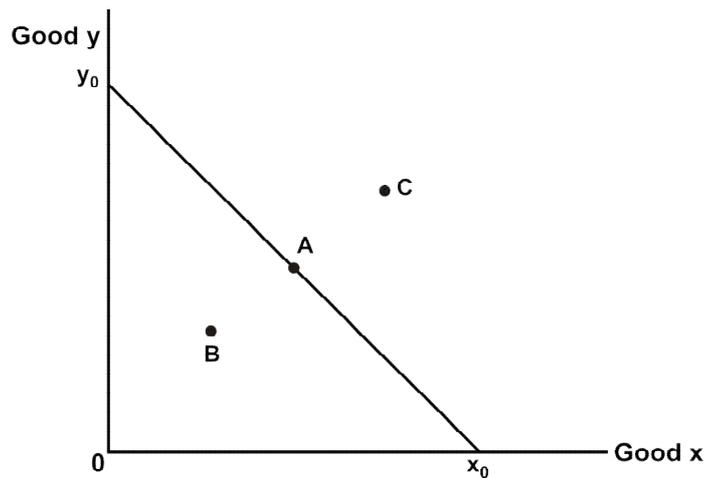


Figure 5.15

In the above figure given the price line y_0x_0 the consumer chooses combination A. Combination B is 'revealed inferior' since it lies below the budget line. Combination C is 'revealed superior' since it falls outside the budget line and is not within the reach of the consumer. Hence, given the price-income situation, A is the optimum combination. The revealed preference theory is based on certain assumptions. They are: 1) the income of the consumer is given. 2) There is consistency in the choice of the consumer. Varian defines this as 'if combination A is directly revealed preferred to another combination B, then in any other situation, the combination B cannot be revealed preferred to combination A by the consumer when combination A is available'. This is also known as the weak axiom of revealed preference (WARP). 3) The revealed choices are transitive. This implies that if the consumer chooses combination A over B and C over B, then transitivity condition requires that he chooses A over C: If $A > B$ and $B > C$, then $A > C$. Given the above, Samuelson states the "Fundamental Theorem of Consumer Theory" as under: 'any good (simple or composite) that is known always to rise in demand when money income alone rises must definitely shrink in demand when its price alone rises'. We prove this theorem with the help of two figures.

a) Price Rises:

The following figure explains the effect of a price rise on the consumer's demand.

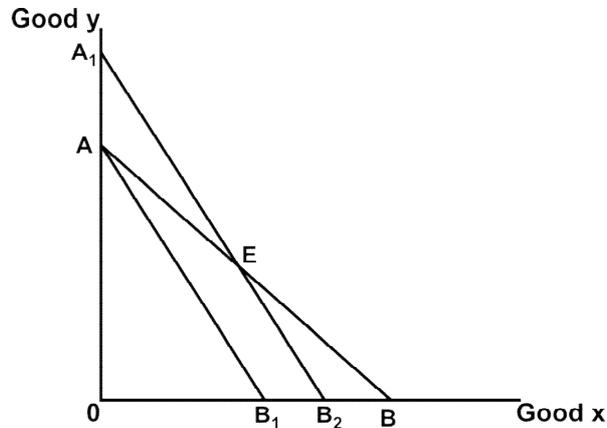


Figure 5.16

In the above figure x-axis shows units of good X and y-axis shows units of good Y. AB is the original price line and point E is consumer's choice. If the price of X rises, the budget line will shift inwards to AB₁. That means on the new price line the consumer cannot buy combination E. If we compensate the consumer by giving extra money income that would enable him/her to buy the original combination, the budget line will shift to A₁B₂. The consumer will not choose a point on EB₂ portion of the new budget line since he will have lesser units than before. So the choice of the consumer will be within the A₁E portion of the budget line after compensation. In this portion of the price line he/she is buying lesser units of X than before. Thus, the Fundamental Theorem is validated.

b) Price Falls:

We show the effect of a fall in the price in figure 3.17.

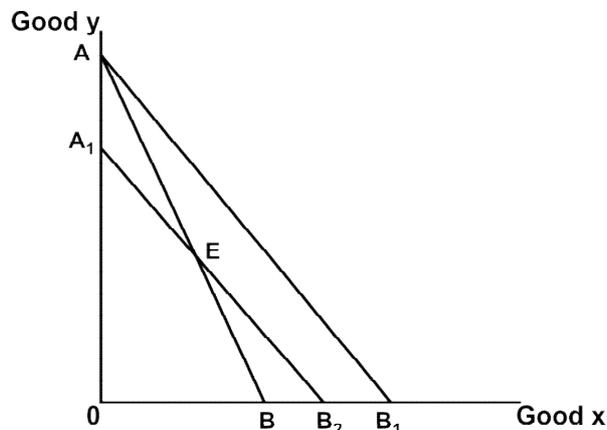


Figure 5.17

In this case the consumer is having AB as the original price line and he chooses combination E. As the price of X falls, the budget line shifts to AB_1 . At this stage, if we take away the additional income, the new budget line would be A_1B_2 . On this budget line the consumer will not choose in the A_1E portion since it implies he has lesser units of X than before. Therefore, he will choose in the area BEB_2 which indicates that he is purchasing more units of X than before the change in the price. Thus, the theorem is proved that when price falls and income increases demand for that good also increases.

Appraisal of the Revealed Preference Theory:

1. As noted earlier, the revealed preference theory is based on actual observed behaviour of the consumer. It does not involve psychological constructs like the indifference between different combinations.
2. It provides a scientific basis for explaining the consumer behaviour by focusing on the consumer's reactions.
3. The theory is concerned only with positive income effect. It cannot explain the Giffen's paradox.
4. It has been observed that though the consumers are consistent in their choices, they will be indifferent to certain combinations.

Check your Progress:

1. What do you understand by 'choice reveals preference'?
2. What is meaning of 'consistency in choice'?
3. What is 'transitivity' in consumer choice?

5.6 SUMMARY

1. An indifference curve is a graphic representation of the scale of preferences.
2. An indifference curve shows equal level of satisfaction at all points.
3. Marginal rate of substitution is the rate at which the consumer substitutes one good for another.

4. A concave indifference curve shows the same level of satisfaction.
5. Price line shows the amounts of two goods that an individual can buy with the given income.
6. Budget line and indifference curve are tangent at the point of equilibrium.
7. Income effect measures changes in consumer's equilibrium due to changes in income.
8. Substitution effect is always positive.
9. Compensating variation helps the consumer to maintain the same level of satisfaction.
10. Price effect shows the changes in consumer's equilibrium when the price of one good changes.
11. Price effect is the total of income and substitution effects.
12. For a Giffen good the price effect is negative because the negative income effect is stronger than the positive substitution effect.
13. Fundamental Theorem of Consumption Theory explains the effect of changes in price on the demand.

5.7 QUESTIONS

1. Explain the concept of utility. What are the features of cardinal utility analysis?
2. Explain the law of equi-marginal utility. What are its limitations?
3. Explain the derivation of the law of demand in the cardinal utility analysis.
4. Explain the properties of indifference curves.
5. Examine the necessary and sufficient conditions for consumer's equilibrium.
6. Explain the income effect and substitution effect.
7. Show that the price effect is the total of income and substitution effects.
8. Explain the price effect of a Giffen good.
9. Derive the demand curve with the help of the PCC.
10. What do you understand by revealed preference? Explain the law of demand with the help of revealed preference theory.



Module 3

THEORY OF PRODUCTION

Unit Structure :

- 6.0 Objectives
- 6.1 Concept of Production and Production Function
- 6.2 Short-run Production Function or the Law of variable Proportions
- 6.3 Long-run Production Function or the Laws of Returns to Scale
- 6.4 Cobb-Douglas Production Function
- 6.5 Producer's Equilibrium
 - 6.5.1 The concept of an iso-quant
 - 6.5.2 Iso-cost Line or Budget Line
- 6.6 Economies of Scale
- 6.7 Economies of Scope
- 6.8 Summary
- 6.9 Questions

6.0 OBJECTIVES

- To understand the concept of production and production function
- To understand the nature of short-run and long-run production functions
- To understand the concept of Cobb-Douglas production function
- To understand the concept of producer's equilibrium
- To understand the laws of production
- To understand the concepts of economies of scale and scope

6.1 CONCEPT OF PRODUCTION AND PRODUCTION FUNCTION

Production in economics refers to the process of transforming inputs into output or creation of value. Thus by production we mean not only goods but also services. Economics deals with the efficient use of inputs or factors of production to produce goods and services. The concept of production function is central to the theory of production. Production function is defined as “the technological relation which connects factor inputs and outputs”. It helps us to understand the relationship between the use of inputs and the resulting output. ‘The production function is related to a particular period of time. It expresses a flow of inputs resulting in a flow of output in a specified time’. The production function is written as under:

$$Q = f(L, K, R, S, \lambda, v) \quad (1)$$

Q = physical output, L = units of labour, K = units of capital, R = raw materials, S = land input, v = returns to scale, λ = efficiency parameter. We shall now examine the short-run and long-run production functions.

6.2 SHORT-RUN PRODUCTION FUNCTION OR THE LAW OF VARIABLE PROPORTIONS

In the short-run certain factors of production like the capital stock, plant and equipment, land are held constant and the variable factor labour is changed to bring about changes in the output. We write such a production function as under:

$$Q = f(L, R, S) \quad (2)$$

This is the short-run production function. Here capital and land inputs are held constant, while units of labour are variable. Thus, it is also described as the law of variable proportions. Marshall defined the ‘law of variable proportions as “if, given the state of arts, successive units of a variable input are combined with a fixed input (or fixed inputs), the returns, after a point, will be less than proportionate”. G. J. Stigler defined this law as “as equal increments of one input are added, the inputs of other productive services being held constant, beyond a certain point the resulting increments of product will decrease, i.e., the products will diminish”. P. A. Samuelson defined “increases in some inputs relative to other fixed inputs will, in a given state of technology, cause output to increase; but after a point the extra output resulting from the same additions of extra inputs will become less and less”. J. M. Cassels stated the law as “if, with the same methods of production, successive physical units of an input are added to a constant

physical quantity of another input (or fixed combinations of other inputs), the total physical output obtained would vary in magnitude through three distinct phases". The law of variable proportions is based on the following assumptions:

1. The state of technology is given.
2. Factors of production are clearly classified as fixed and variable. Labor is the variable factor, and capital and land are fixed inputs (as given in (2) above).
3. It is possible to combine the factors of production in variable proportions. The production function is not of fixed proportions type.
4. Both inputs are required to produce the given output.
5. There are constant returns to scale.

Following Cassels definition we can delineate the three phases of change in the output due to changes in variable input(s) as under:

Phase I: During this phase the total product would be increasing. There would be two stages in this increase. In the first stage there would be an absolute increase in the output, i.e., the marginal product of the variable input would be increasing. In the second, the marginal product would be increasing at a decreasing rate. The marginal product would be greater than the average product of the variable input. During this phase, the relative rate of increase in the output would be greater than the relative rate of increase in the variable input. At the end of this phase, the two rates would be the same. At this point the marginal product equals the average product of the variable input. This point represents the *extensive margin* of production. Elasticity of output is used to explain the choice of a rational producer. It is defined as:

$$e_v = \frac{dQ}{Q} \div \frac{dv}{v} = \frac{dQ}{dv} \times \frac{v}{Q} = \frac{\text{Marginal Product of } v}{\text{Average Product of } v}$$

e_v = elasticity of output of variable input, v . dQ = the change in output, Q = output, dv = the change in variable input, v = units of variable input. In this phase the elasticity of output is greater than 1. Phase II: In the phase, though the total product is still increasing, it would be at a decreasing absolute rate that is the marginal product of the variable input would be decreasing. The relative increase in output would be less than the relative increase in the quantity of the input. The marginal product would be less than the average product of the variable input. At the end of this phase, the total product reaches its maximum, i.e., the marginal product is zero. This point is known as the *intensive margin* of production. In this phase the elasticity of output is less than one.

Phase III: in this phase the total product starts decreasing as the marginal product of the variable input is negative. This is the 'uneconomic' or 'irrational' zone of production. The elasticity of

output would be less than one or negative in this phase. Table 4.1 shows the law with the help of a numerical example.

Table 6.1: Law of Variable Proportions:

Units of Variable Input (Labour)	Total Product (TP)	Average Product (AP)	Marginal Product (MP)	Output Elasticity of Labour
1	10	10	-	-
2	25	12.5	15	1.2
3	45	15	20	1.33
4	63	15.75	18	1.14
5	73	14.6	10	0.68
6	79	13.17	6	0.45
7	79	11.29	0	0
8	74	9.25	-5	-0.54

Figure 6.1 shows the law of variable proportions.

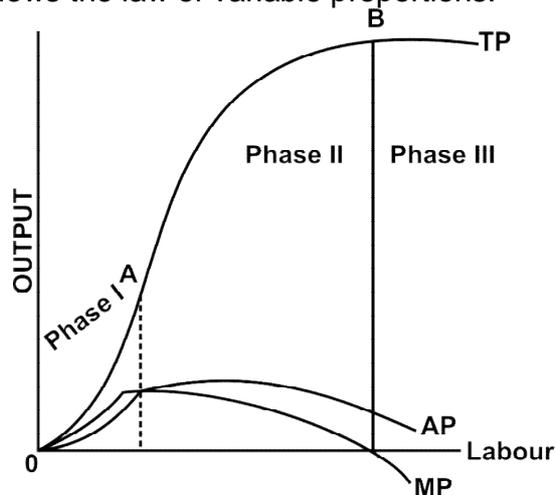


Figure 6.1

In the above figure TP is the total product curve. This curve increases at increasing rate in the OA portion indicating the increasing returns. In this phase both the MP and AP are rising with MP reaching its maximum and then declining. At the end of this phase MP equals AP at its maximum and continues to decline. This is at point A. Phase II is shown in the AB portion of the total product curve. In the AB portion of the TP curve, the output would be increasing at a decreasing rate since the MP is falling while the AP also continues to decline. At point B, the TP curve reaches its maximum and the MP cuts through the x-axis at point E. The marks the end of phase II. After point B the total product is falling and the marginal product turns negative. This is the uneconomic zone.

6.3 LONG-RUN PRODUCTION FUNCTION OR THE LAWS OF RETURNS TO SCALE

Long-run refers to a period where the firm can alter all its inputs. In other words, there are no fixed inputs in the long-run. Therefore, the returns to scale studies the impact of proportionate change in all inputs on the resulting changes in the output. It is important to note that the returns to scale occur not only in case of different production functions, but they do occur even when the production function is the same. We write the returns to scale as:

$$r = \frac{\text{Pr oportionate change in output}}{\text{Pr oportionate change in all inputs}}$$

We can write the returns to scale as:

$$hQ = f(\lambda K, \lambda L) \quad (3)$$

The different possibilities are:

- 1) if $h = \lambda$ the production function exhibits constant returns to scale.
- 2) If $h > \lambda$ the production function exhibits increasing returns.
- 3) If $h < \lambda$ the production function exhibits decreasing returns.

Like the variable proportions, there are three distinct returns to scale. They are as under:

A) Increasing Returns to Scale:

In the initial stages of production, as a firm increases all its inputs in equal proportions, the resulting output will be increasing at an increasing rate. This is the phase of increasing returns to scale. Following are some of the causes of the increasing returns to scale:

i) According to Joan Robinson, Lerner and Knight, some of the inputs like machinery are indivisible. Therefore, when output increases from a small scale to a large scale, these factors are utilized better resulting in increasing returns.

ii) Chamberlin did not agree with the views on indivisibilities. He argued that as the level of output increases, it becomes increasingly possible to introduce specialization and this allows increasing returns even if the factors are perfectly divisible. This is the case with some sophisticated machinery which can be effectively used only when the production is large.

iii) At times, inputs can be more efficiently used when the output is large enough. For example, some of the latest locomotives can pull up to 45 wagons and are less efficient when the number of wagons is less than this.

B) Constant Returns to Scale:

In this case a proportionate increase in inputs will result in an equally proportionate increase in the output. For example if all the inputs are doubled, the output will also be double. This type of production function is called 'production function of first degree'. According to E. A. G. Robinson, a firm might be able to utilize its resources better. He argues that the technical, financial, marketing, and 'forces of risk and fluctuations' are responsible for firms experiencing constant returns to scale.

C) Decreasing Returns to Scale:

When a firm expands beyond a particular scale it starts experiencing that the increase in output is less than the proportionate change in its inputs- this is the decreasing returns to scale. These occur because the firm will find it difficult to co-ordinate the production activities when the size is too large.

The concept of returns to scale is explained with the help of the 'expansion path'. In Figure 4.2 x-axis shows labour input and y-axis shows capital input. OR is the expansion path. This line shows us the returns to scale when the firm uses the same production process and still experiences the returns to scale.

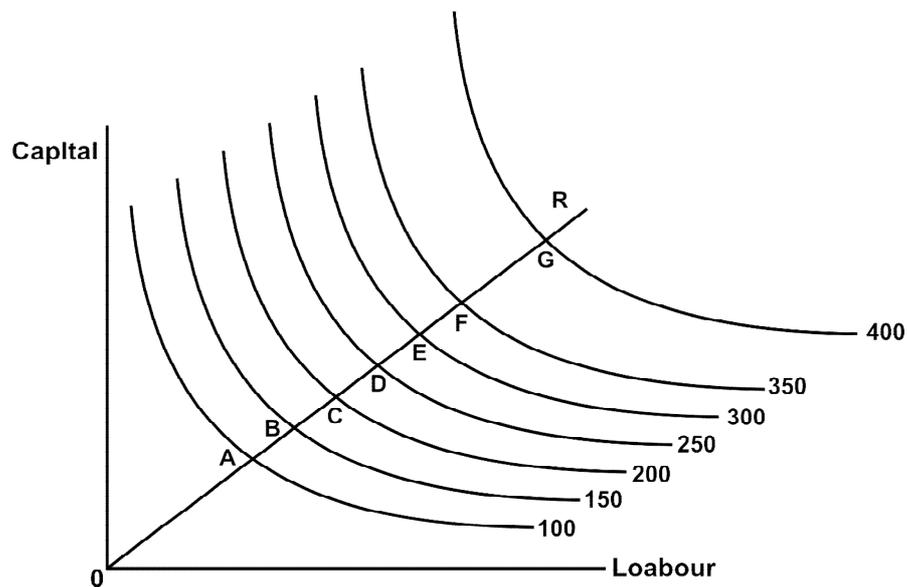


Figure 6.2

In the above figure A, B and C indicate increasing returns to scale (output increasing more than the increase in inputs). As inputs are increased, output increases more than proportionately. Points D, and E, indicate constant returns (output increasing in the same proportion as inputs). Points F and G indicate decreasing returns since a given proportionate change in output requires more than proportionate change in the inputs.

Check your Progress:

1. What do you understand by production function?
2. Distinguish between short run and long run production function.

6.4 COBB-DOUGLAS PRODUCTION FUNCTION

One of the most frequently estimated production functions is the Cobb-Douglas production function. This studies the behaviour of output in the entire manufacturing sector of an economy. It considers output as depending upon the quantities of labour and capital units at a given state of technology. This function is based on the observation that the wage bill is constant proportion of the national income. Formally, the Cobb-Douglas production function is written as under:

$$Q = AL^\alpha K^\beta \quad (4)$$

Q is manufacturing output, L is quantity of labour employed, K is quantity of capital employed, A a constant is the efficiency parameter, α and β are the elasticity of output with respect to labour and capital. It is based on the implicit assumption that both capital and labour units are required to produce output. The isoquant based on this function will be convex to the origin with the marginal product of capital decreasing as K increases and increasing as L increases. If we assume $\alpha + \beta = 1$, the function indicates constant returns to scale (in formal terms the production function is said to be 'linearly homogeneous in capital and labour inputs').

The Cobb-Douglas production function is most widely used both with time-series and cross-section data of industrial sectors. The function is estimated with the condition that $\alpha + \beta = 1$ as well as without this condition. There is uniformity of findings in both the specifications. It returned fairly accurate estimates with the values of α at 0.75 and β at 0.25. The exponents are found to be fairly stable over time and nor different industrial sectors of the economy. Further, the values of co-efficient were fairly close to the shares of labour and capital in the national income. However, the Cobb-Douglas production function is criticised for ignoring the changes in the quality of capital assets and their utilization. It does not consider the changes in the working hours of labour which has

welfare implications. It is not possible to obtain an aggregate Cobb-Douglas production function by aggregating the micro production functions. Though the estimates give results similar to the ones based on the conditions of perfect competition and constant returns to scale it is well known that they are not real life conditions. Capital and labour are not perfect substitutes and the function neglects the inter-industry differences in production functions. It is argued that the Cobb-Douglas production function comes to the constant returns to scale via *a priori* reasoning. Though the function contains the term on technological conditions, it fails to estimate the role of technical progress in output growth. It is shown that the function actually estimates the changes in factor shares when there are no large variations in the factor prices between industries.

6.5 PRODUCER'S EQUILIBRIUM

The concept of producer's equilibrium is analogous to the consumer's equilibrium. Producer's equilibrium refers to the situation where the producer maximizes his/her output for a given set of inputs or produces a given output with the minimum possible inputs. Thus, it is also known as the 'least cost combination'. It is based on the concepts of a) iso-quant and b) factor price line. We shall now examine each of them.

6.5.1 The concept of an iso-quant :

The concept of an iso-quant was introduced by Edgeworth. This concept shows the various combinations of two inputs that give the same level of output. Each iso-quant shows a particular level of output measured in physical terms. An iso-quant measures the physical output that can be obtained by combining the two inputs in various proportions. For example, $Q = (5K, 3L)$ and $Q = (3K, 6L)$ indicates that to produce a given level of output, Q , we can use 5 units of capital and 3 units of capital or alternatively 3 units of capital and 6 units of labour. In other words, the two factors are considered to be perfect substitutes and each unit of factor is homogeneous. Figure 4.3 a) shows such a production function. The production function can be of fixed proportions or of variable proportions. In case of fixed proportions, it is not possible to combine the factor inputs in any other way except one. This production function will be L-shaped. Figure 4.3 b) shows this function. The Marginal Rate of Technical Substitution (MRTS) shows the factor combinations. In case of variable proportions production function, it is less than one and in case of fixed proportions production function it is zero.

An iso-quant never touches either of the two axes. This is because, when the iso-quant touches one of the axes, it indicates that at that point it is possible to produce the given output with only

one factor. Since this contrary to the assumption that both the factors are required to produce a given level of output, an iso-quant cannot touch either of the axes. Figure 4.4 a) and b) shows this. In case of the former, the iso-quant touches y-axis indicating that at point E, no labour units are required to produce the given level of output. In the later case it indicates that output can be produced without any units of capital at point R. Both cases are ruled out.

Further, two iso-quant do not intersect. This is shown in Figure in 4.5. At the point A, both the iso-quant intersect. At this stage the two different levels of output (100 and 120 units) can be produced using the same combination of inputs. This is inconsistent with the property of each iso-quant measuring a particular level of output.

6.5.2 Iso-cost Line or Budget Line :

This is analogous to the price line of the indifference curve. In this case, we measure the different units of the two inputs that can be obtained by the producer for a given outlay. The slope of the iso-cost line is the ratio of the prices of the two factors. Given the factor prices, outlay and a family of iso-quant, we can determine the equilibrium of the producer or the optimum output that can be produced. Figure 6.6 shows the producer's equilibrium.

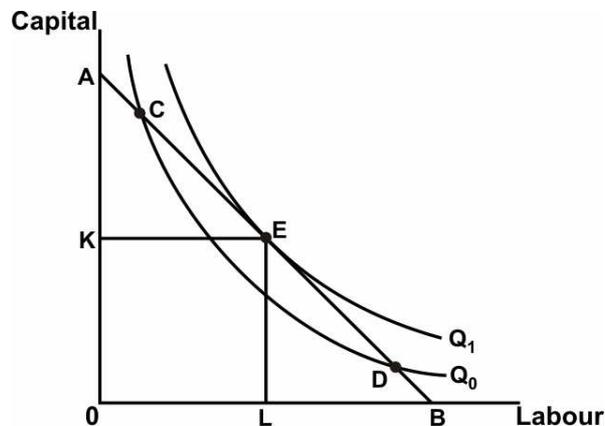


Figure 6.6

At point E the slope of the iso-quant equals the slope of the iso-cost line (AB) at this point the $MRTS_{K,L}$ equals the ratio of factor prices:

$$\frac{MP_L}{w} = \frac{MP_K}{r} = \frac{MP_L}{MP_K} = \frac{w}{r} \quad (5)$$

Therefore at E the firm produces maximum output with minimum cost (using ol units of labour and ok units of capital). At any other point, the ratios of marginal products and factors will not be the same (as at points C and D). The following example explains the producer's equilibrium.

Let the production function be $Q = 50L^{0.75}K^{0.25}$; Capital employed is 150 units; price of output is Rs. 150; wage rate is Rs. 50, and cost of capital is Rs. 60. $MP_L = 25L^{-0.75}K^{0.25}$; and $MP_K = 25L^{0.75}K^{-0.25}$;

$$\text{Therefore, } \frac{MP_L}{MP_K} = \frac{25L^{-0.75}K^{0.25}}{25L^{0.75}K^{-0.25}} = \frac{K}{L} = \frac{w}{r} \quad (6)$$

$$\text{Or } L = K \cdot \frac{r}{w} \quad (7)$$

$$L = \frac{150 \cdot 60}{50} \quad (8)$$

$$L = 180 \quad (9)$$

$$Q = 50 \times (150^{0.75}) \times (180^{0.25}) = 7849.47$$

$$TR = 7849.47 \times 150 = 1,177,420.40$$

$$TC = 9000 + 9000 = 18,000$$

$$\text{Total Profit} = 1177420.47 - 18000 = 1,168,420.47$$

Given the data, by producing 7849.47 units of output by employing 150 units of capital and 180 units of labour the firm makes a total profit of 1,168,420.47. This combination of factors is 'the least cost' or 'profit maximising' output.

Check your Progress:

1. Explain the following concepts :
 - a) Iso quant curve
 - b) Iso cost line

6.6 ECONOMIES OF SCALE

As the output increases, the average cost of production of a firm declines up to a point. As the firm changes its input proportions, the returns to scale concept is not applicable. Economies to scale refer to the situation when the firm doubles its output for less than twice the cost. Beyond a particular level of output, the cost increases more than the output. In such a case the firm is said to be experiencing diseconomies of scale. The returns to scale reflect in the 'U'-shaped long-run average cost curve. In the

initial stages the firm experiences economies of scale resulting in a fall in the average cost. As the firm continues to increase its scale, it will start experiencing diseconomies which result in increasing average cost. Economies of scale are measured in terms of cost-output elasticity, E_C . It is defined as the percentage change in the cost of production resulting from a 1-percent increase in output. We have:

$$E_C = (\Delta C/C)/(\Delta Q/Q) \text{ or } (\Delta C/\Delta Q)/(Q/C) = MC/AC \quad (10)$$

We can see that the economies of scale are given by the ratio of marginal to average cost of production. When the marginal cost is falling the firm will enjoy economies of scale and when the marginal cost is increasing the firm will experience diseconomies. We examine the various economies and diseconomies of scale in turn.

A) Economies of Scale:

1. As the scale of operations increase, the firm may be able to introduce specialisation that helps to improve labour efficiency. The firm can vary the combination of inputs that allow better management of production process.
2. Large firms enjoy the benefit of discounts and suppliers' credit which are not available at lower levels of output. Large firms will have easy access to banks and financial institutions that will reduce the cost of credit.
3. Large firms can afford research and development (R&D) that helps them to introduce new processes and products that are more cost-effective.
4. Large scale production allows the use of by-products.
5. Since there are indivisibilities in the use of capital equipment, large firms will be able to realize them better than when the scale is small.
6. Large firms will be able to diversify in to new areas of production and thus enjoy risk-diversification.
7. Large scale production allows the advantage of hiring specialists to supervise the operations. The production, procurement and marketing can be assigned to trained managers which will improve the efficiency of the firm and reduce the costs.

B) Diseconomies of Scale:

It is important to note that there is an optimum scale beyond which an expansion in size results in output increasing lower than the cost. The main reasons for this are as under:

1. Supervision of operations becomes difficult beyond a particular scale. Co-ordinating the activities of different departments becomes difficult and inter-departmental rivalries are common in large firms.
2. In large firms the personal element in operations is lost. This can result in alienation and indifference to work.
3. Large firms will inevitably depend on external markets for their sales. This makes them open to the vagaries of the economic and political uncertainties in other countries.

6.7 ECONOMIES OF SCOPE

The concept of economies of scope was introduced by J. C. Panzar and R. D. Wiling. It was further developed by E. E. Bailey and A. F. Friedlaender. This concept explains the economies that a firm can enjoy when it is producing two or more goods that are related. For example, a poultry farm can sell eggs as well. Similarly, an automobile company, which is producing cars, can also produce mini-trucks using the same machinery. In both cases, a firm enjoys cost advantages when it produces two or more products since the firm is making joint use of inputs or production, marketing and administrative facilities. Also, in some cases, the production of one product provides an automatic or unavoidable by-product(s) that can be used for the production of another product. This can be explained with the help of the following example. Let us say a firm is producing trucks and tractors. Even if the plants are not located at the same place, the firm can make use of management resources. The managers of the firm must choose how much of each product is to be produced. Figure 6.7 explains the concept of economies of scope:

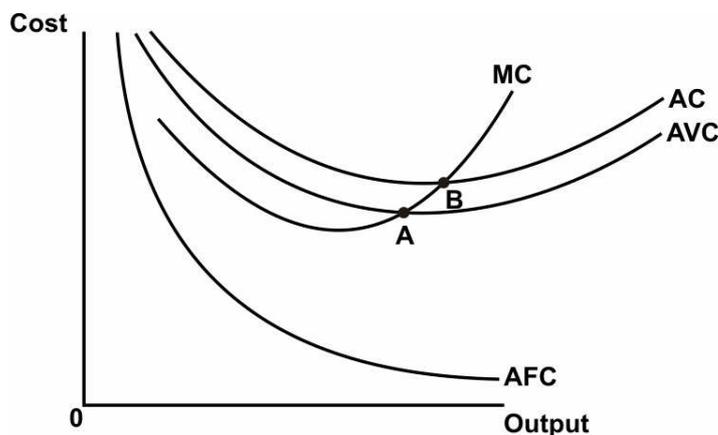


Figure 6.7

In the above diagram, O_1 is the product transformation curve of the firm producing trucks and cars. When the firm is experiencing

constant returns to scale, when inputs are increased, the transformation curve shifts parallel to O_2 . In such a case, joint production will help a single company to produce more of both the products with the same resources than would two plants producing each product separately. This is possible because of the joint use of inputs. A single management is often able to schedule and organize production and to handle accounting and financial aspects better than when separate managements are operating. If, on the other hand, the firm faces a straight line transformation curve, there will be no gains (or losses).

Economies of scope are present when the joint output of a single firm is greater than the output that could be achieved by two different firms each producing a single product. The firm will face diseconomies of scope when the joint output is less than that which could be achieved by separate firms. It is important to note that, a firm enjoying economies to scope may as well be experiencing diseconomies to scale. This happens when producing, from our above example, producing cars and trucks together is cheaper than producing both cars and trucks separately. It is also possible to enjoy increasing returns to scale and diseconomies of scope when different plants are administered separately.

The following formula gives the degree of economies of scope (SC):

$$SC = \frac{C(Q_1) + C(Q_2) - C(Q_1Q_2)}{C(Q_1Q_2)} \quad (11)$$

where, $C(Q_1)$ = the cost of producing output of the first product,
 $C(Q_2)$ = the cost of producing output of the second product,
 $C(Q_1Q_2)$ = the joint cost of producing both outputs.

When the firms is enjoying economies of scope, $SC > 0$, if it is facing diseconomies of scale, $SC < 0$.

6.8 SUMMARY

1. Production refers to the creation of utility.
2. In short-run certain factors of production remain constant.
3. In long-run all factors of production are variable.
4. Variable proportions are changes in output due to changes in the variable factor.
5. Returns to scale are due to proportionate change in all the factors of production.
6. Increasing returns to scale are due to factor indivisibilities and improvements in efficiency.

7. Cobb-Douglas production function allows for estimation of output given the factor inputs and technology.
8. Cobb-Douglas production function shows that industrial sector experiences constant returns.
9. Isoquant shows the level of output that can be produced using a given set of inputs.
10. Isoquant can be convex to the origin or L-shaped.
11. Iso-cost line shows the ratio of factor prices.
12. Minimum cost of production ensures profit maximisation.
13. Economies to scale arise due to better use of inputs.
14. Diseconomies are due to managerial inefficiencies.
15. Economies of scope involve changes in production processes.

6.9 SUGGESTED QUESTIONS

1. Explain the concept of production function.
2. How do you distinguish between short-run and long-run production functions?
3. What do you understand by 'returns to factor'? Explain the law of variable proportions.
4. Write a note on returns to scale.
5. Explain the main features of Cobb-Douglas production function.
6. What is least cost combination? Discuss the conditions for producer's equilibrium.
7. Explain the various economies of scale.
8. Write a note on economies of scope.



THEORY OF COSTS

Unit Structure :

- 7.0 Objectives
- 7.1 Concepts of Costs of Production
- 7.2 Short Run Costs
- 7.3 Learning Curve
- 7.4 Summary
- 7.5 Questions

7.0 OBJECTIVES

- To understand the concepts of costs of production
- To understand the nature of short-run and long-run costs of production
- To understand the concept of learning curve

7.1 CONCEPTS OF COSTS OF PRODUCTION

Cost of production refers to the resources- financial or real required to produce a given quantity of output. This concept is central to economics since resources are scarce, and they have alternative uses, a firm has to ensure a proper use of its available resources. The idea of cost is different in economics from the daily use of the term. We shall now examine the different concepts of costs used in economics.

1. Money Costs: They refer to the money spent on procuring the various factors of production that are required to obtain a given output. For example, the wages paid to labour, the cost of raw materials, rent on premises, and so on. This cost is considered for pricing decisions.

2. Real Costs: This refers to the sacrifices, physical and mental privations that the entrepreneur and labour undergo in the process of production. Marshall considered them to be important. However, given the nature of these costs, they are subjective and hence not easy to measure.

3. Implicit Costs: They refer to the imputed value of factors of production that are owned by the entrepreneur and are used in production. There is no money payment for them. A popular example for this is the capital invested by the producer. If he lends his funds instead of using them for production, he would earn interest. The interest sacrificed is the implicit cost of the capital. An important component of implicit cost is the 'normal profit'. This refers to the minimum profit that the entrepreneur must obtain to continue in production. This is the salary he will earn as a manager instead of being an entrepreneur. Similarly the time spent by the family members in the production process is also an implicit cost. It is to be noted that they are only imputed.

4. Explicit Costs: These are the payments made in cash to the various factors of production. These are also known as 'accounting costs' since they are the once considered in the balance sheets of the firms.

5. Economic Costs: These refer to the total cost of production measured as in terms of the resources expended. Thus, economic costs are inclusive of explicit and implicit costs. Thus the economic cost of production is higher than the accounting cost of production. We write: $\text{Economic Cost} = \text{Implicit Cost} + \text{Explicit Cost}$.

6. Opportunity Cost: As noted above, the resources being scarce it is important to note that if they are employed for one use, they are not available for another. Economics focuses on this aspect of cost of production. Heberler defined opportunity cost as 'the next best use sacrificed'. We can see it both at the micro and macro level. If a household spends more income on food, it will have lesser income for other purposes. At the macro level, if the government decides to spend more on defence, it will have lesser money for education or family welfare. It is this opportunity cost that must be minimised by employing the resources in a thoughtful way.

7. Private Costs: These refer to the cost of a product to an individual producer. The money spent on inputs is one example for this. The private cost is paid by the user of the particular factor and thus is inclusive.

8. Social Costs: These are the costs that the society or economy as a whole has to bear for the particular use of resources. For example, using a private car may be convenient for an individual but the pollution caused by this is a social cost- the consequences of a particular resource use will have to be borne by the entire society. Industrial pollution is an important social cost. In recent years, the cost-benefit analysis techniques are developed to assess the social cost of production and consumption as well.

Check your Progress :

1. What is money cost of production?
2. Distinguish between Implicit cost and Explicit cost.

7.2 SHORT-RUN COSTS

In the short-run certain inputs remain the same and certain inputs can be changed according to the needs of the firm. The firm holds its fixed inputs as constant and uses the changes in the variable costs to bring about changes in the output. Following are the different concepts of short-run costs of production.

1. Fixed Costs or Sunk Costs: These are the costs incurred on fixed factors of production. They remain the same irrespective of the level of production. Plant and equipment, permanent staff, interest liabilities are some of the fixed costs. According to Marshall, firms do not pay much attention to these costs while considering production decisions in the short-run.

2. Variable Costs or Prime Costs: These are the costs incurred on the variable factors of production. Thus, they change with the level of production. Expenditure on labour, fuel and electricity, raw materials and transport costs are some of the important variable costs.

3. Total Cost of Production: This refers to the total of fixed and variable costs. We write: $TC = TFC + TVC$. Where TC is the total cost of production; TFC is the total fixed cost and TVC is the total variable cost.

3. Average Cost: This is the cost of production per unit of output.

$$\text{Thus } AC = TC/Q = (TFC+TVC)/Q$$

4. Average Fixed Cost: This is the fixed cost per unit of output. $AFC = TFC/Q$.

5. Average Variable Cost: This is the variable cost per unit of output: $AVC = TVC/Q$

6. Marginal Cost: This is the additional cost per unit of output. $MC = \partial TC / \partial Q$ or alternatively,

$MC = TC_n - TC_{n-1}$. In other words, marginal cost is change in the cost when the firm increases its output by one extra unit. The following table shows the relationship between different concepts of short-run costs.

Table III.1 Short-run Costs:

Output	Fixed Cost (TFC)	Variable Cost (TVC)	Total Cost (TC)	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Cost (AC)	Marginal Cost (MC)
10	100	75	175	10.0	7.5	17.5	--
20	100	100	200	5.0	5.0	10.0	25
30	100	145	245	3.3	2.1	8.2	45
40	100	205	305	2.5	5.25	7.6	60
50	100	275	375	2.0	5.5	7.5	70
60	100	380	480	1.7	6.3	8	105
70	100	490	590	1.4	7	8.4	110
80	100	600	700	1.3	7.5	8.8	110
90	100	735	835	1.1	8.2	9.2	135
100	100	890	990	1.0	8.9	9.9	155

From the above table we can infer the relationship between the various short-run cost curves. The total fixed cost remains the same at all levels of output. The total variable cost increases with the increase in the level of output. Since the total cost is the total of these two, it also keeps increasing as the level of output increases. Figure III.1 shows the relationship between these three costs.

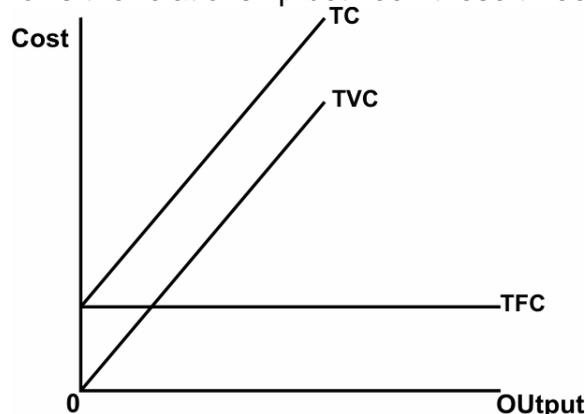


Figure 7.1

In the above figure x-axis shows the level of output and y-axis shows the cost. TFC is the total fixed cost. TVC is the total variable cost. TC is the total cost. The vertical distance between TVC and TC measures the fixed cost.

We can show the behaviour of the average and marginal costs of production also. Figure III.2 shows this relationship.

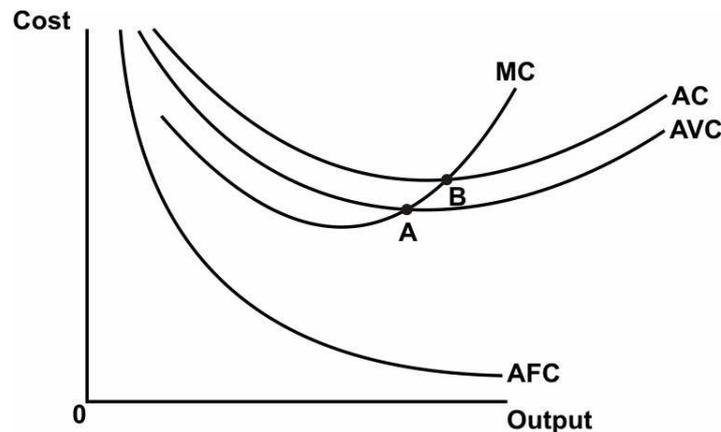


Figure 7.2

In the above figure x-axis shows the level of output and y-axis shows the different costs. AFC is the average fixed cost. As the level of output increases, this keeps falling but never reaches zero since there is fixed cost at all levels of output. AVC is the average variable cost. It decreases initially as production increases and starts increasing after a certain level of production. It moves asymptotically towards AC, but never touches it (since $AFC > 0$ at all levels of production). AC the average cost of production. AC starts increasing after the AVC. This is because; part of the increase in AVC is offset by the falling AFC. The MC curve falls faster than the AVC and AC and intersects both the curves from below at their minimum point. MC increases faster than the AVC and AC after their minimum points.

III.2.1 C Long-Run Costs:

The long-run is a series of short-run. In the long-run the firm can change all its factors of production in any given way. Hence in the long-run all factors are variable and there are no fixed factors of production. The firm can alter the way in which it combines its inputs. It can also decide on the size of the plant. We can explain this with the help of an illustration. In Figure III.3 we show the cost and size of a firm.

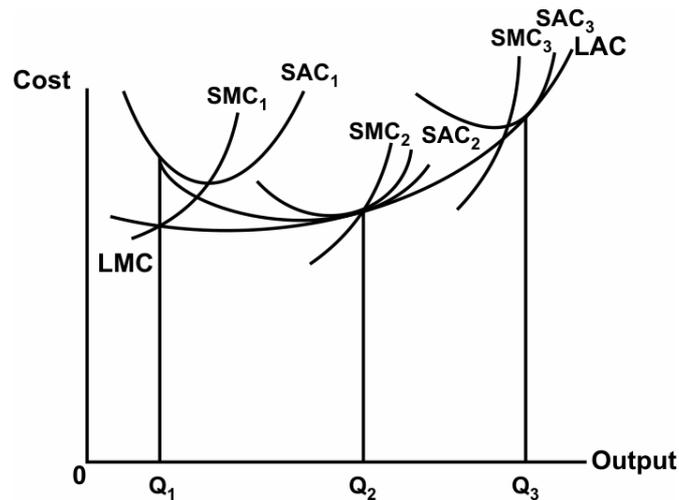


Figure 7.3

If the firm expects to produce say, Q_1 of output, it should operate on its SAC_1 which corresponds to this output. If it is planning to sell Q_2 of output it should have a plant size corresponding to SAC_2 . If on the other hand it is planning to sell Q_3 of output, its plant size should be corresponding to SAC_3 . The different sizes of the plants that correspond to different levels of production give us the long-run average cost curve (LAC). Thus, LAC is the envelope of the short-run average cost curves. Due to the economies and diseconomies of scale, the minimum points on the SACs will not lie on the LAC. The minimum point of only one SAC will be the same as of the minimum point of the LAC and this particular size was termed as “the optimum firm” by E. A. G. Robinson. As noted above the long-run average cost curve reflects the economies and diseconomies of scale. When the firm is experiencing the economies of scale, its costs will be decreasing and hence the average cost will be declining. As the firm reaches the most efficient size, the average cost reaches its minimum. Beyond this level of output the cost of production increases due to diseconomies of scale. If the firm selects a size that is too small it will find it difficult to keep the cost low. Therefore, the firm would prefer to have a larger size.

The long-run marginal cost curve (LMC) is not the envelope of the short-run marginal cost curves (SMC). This is because the SMC applies to a particular plant while the LMC applies to all possible plant sizes. Each point on the LMC is the SMC associated with the most cost-efficient plant. SMC_1 therefore, intersects LMC at the output level Q_1 at which the SAC_1 is tangent to the LAC.

Check your Progress:

1. Distinguish between Fixed Cost and Variable Cost

7.3 LEARNING CURVE

The concept of learning curve was based on the experience in aircraft maintenance. It is also known as improvement/progress curve or learning-by-doing. It is based on the experience that each time the task is repeated; decreasing amounts of labour input is required. It was developed by W. Z. Hirsch to explain the process through which firms enjoy falling long-run average cost, though there may not be increasing returns to scale. This is possible when workers and managers with experience, are able to absorb new technological information. This happens due to the following reasons: 1) workers often taken longer to accomplish a given task the first few times they do it. As they become more adept, their speed increases. 2) Managers learn to schedule the production process more effectively, from the flow of materials to the organisation of the manufacturing itself. 3) Engineers, with experience, will be able to produce designs that save costs without increasing defects. 4) Over the time, the suppliers will be able to provide materials at lower costs and pass on this advantage to the firm. The learning curve shows the reduction in labour units required to produce the cumulative output. The learning curve is based on the following relationship:

$$L = A + BN^{-\beta} \quad (1).$$

where, N = cumulative units of output produced,

L = labour input per unit of output,

A, B are constants, with A showing the minimum labour input per unit of output after all learning has taken place. In the equation, when β is positive, as output gets larger and larger, L becomes arbitrarily close to A, so that A represents the minimum labour per unit of output after all learning has taken place.

Alternatively, the learning curve can be shown as a liner function, i.e., as output increases, the labour input requirement decreases at a uniform rate. In such a case, the learning curve will be:

$$Y = a X^b \quad (2).$$

where, Y = man hour per unit of output,

X = units of output,

a = intercept, theoretical labour requirement for the first unit of output,

b = slope of the curve/ the rate of reduction in labour requirement.

Figure 7.4 shows the learning curve:

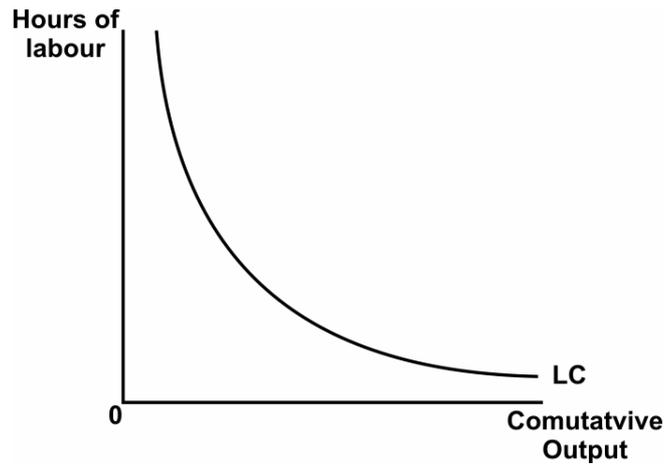


Figure 7.4

In the above figure LC is the learning curve. It shows that as the production increases the cost falls as lesser labour hours are required to produce equivalent increases in output. This is because as managers and workers become more experienced and more effective at using the available plant and machinery, they will be able to turn out larger output. The learning curve shows the extent to which hours of labour needed per unit of output fall as the cumulative output increases. Learning curve helps to predict the labour requirement when output is doubled. The following table explains the concept of learning.

Cumulative Output (N)	Per-Unit Labour Requirement for each 10 units of Output (L)	Total Labour Requirement	Learning Percentage
10	1.00	10.0	--
20	0.80	18.0 (10.0+8.0)	80
30	0.70	25.0 (18.0+7.0)	38.9
40	0.64	31.4 (25.0+6.4)	25.6
50	0.60	37.4 (31.4+6.0)	19.1
60	0.56	43.0 (37.4+5.6)	14.9

It can be seen from the above table that the percentage of learning, or the additional labour input required to double the output goes on increasing, i.e., learning curve is downward sloping.

Learning curve is used in forecasting the future labour requirements. It is also used in measuring the improved proficiency of the operator as output is increased in estimating reductions in manufacturing losses. It is also used in stabilizing the designs and increasing the lots sizes. It is used in improving the special tooling needed for production and shifting from manual to automation as additional production is required.

It is important to distinguish learning effects from the returns to scale. Returns to scale implies, producing larger quantities for a given increase in inputs. Whereas, learning curve results in lowering of the average cost curve itself. Figure III.5 helps to understand the two.

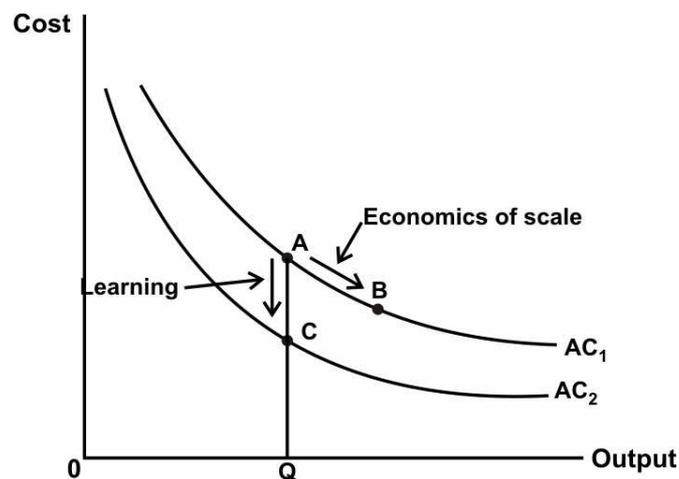


Figure 7.5

In the above diagram, x-axis shows the output and y-axis shows the cost (per unit of output). The movement from A to B on AC_1 (initial average cost) indicates economies to scale and movement from A to C depicts the learning effects which result in the average cost curve from AC_1 to AC_2 . The learning curve concept is useful when the firm has to calculate the cost of producing a new product. If a firm is enjoying learning effects, the total labour requirement for producing larger quantities of output increases in smaller increments. Therefore, this concept is useful for a firm deciding whether it would be profitable to enter an industry or not.

7.4 SUMMARY

1. Real cost refers to the sacrifices made in the process of production.
2. Implicit costs measure the imputed value of inputs owned by the entrepreneur and used in production.
3. Economic costs are broader than the accounting costs.
4. Total Fixed Cost remains the same at all levels of output.
5. AFC never becomes zero.
6. MC is 'U'-shaped.
7. MC intersects AC and AVC at their minimum points.
8. In long-run all factors of production are variable.
9. LAC is a locus of all the short-run average cost curves.
10. LMC shows the most efficient output of each size of the firm
11. Learning curve shows the fall in labour requirement as output increases.
12. Learning curve causes the AC to shift downwards.
13. Firms need information on learning effects to plan long-run output.

7.5 QUESTIONS

1. Explain the concepts of money costs and real costs of production.
2. Distinguish between social costs and private costs.
3. The economic concept of costs is broader than the accounting costs.
4. The short-run cost curves are 'U'-shaped.
5. Explain the derivation of the long-run average cost curve.
6. Explain the concept of learning curve.



Module 4

THEORY OF FIRM

Unit Structure :

- 8.0 Objectives
- 8.1 Concepts of Revenue
- 8.2 The relationship between TR, AR and MR under Perfect Competition
- 8.3 The relationship between TR, AR and MR under Monopoly
- 8.4 Relationship between AR and MR curves
- 8.5 Objectives of a firm
 - 8.5.1 Profit Maximization
 - 8.5.2 Sales Maximization
 - 8.5.3 Satisfaction Maximization
 - 8.5.4 Growth Maximization
- 8.6 Questions

8.0 OBJECTIVES

- To study various concepts of revenue
- To study the relationship between TR, AR and MR under perfect competition
- To study the relationship between TR, AR and MR under monopoly
- To understand different objectives of a firm

8.1 CONCEPTS OF REVENUE

The term revenue refers to the sales receipts obtained by a seller or a firm by selling certain amount of a commodity. There are three concepts of revenue used in economics.

A firm's revenue is classified as under-

1. Total Revenue: - "Total revenue refers to the total amount of sales receipts received by a seller or a firm by selling certain amount of a commodity over a period of time." The total revenue is obtained by multiplying the total quantity of a commodity sold by the price. Therefore, symbolically expressed as **TR = Q × P**.

Where, TR= total revenue, Q = total quantity of a commodity sold and P = price per unit of a commodity.

Total revenue depends upon two important factors i.e. total quantity of a commodity sold and price per unit of a commodity. For example, a firm sells 10 units of a commodity at a price of ₹ 10 per unit. Thus $10 \times 10 = 100$ is the total revenue. TR of a firm initially goes on increasing up to a certain limit then after it starts falling.

2. Average Revenue: - "It refers to the price or revenue per unit of a commodity sold." It can be obtained by dividing the TR by the total number of units of a commodity sold (Q). It can be symbolically expressed as **AR = TR / Q**.

Where, AR stands for Average Revenue. With the example, $100 / 10 = 10$ is the average revenue.

3. Marginal Revenue – It may be defined as, "Net addition made to the total revenue by selling one more additional unit of a commodity is called as marginal revenue." In other words net increase in total revenue is called as marginal revenue. It can be symbolically expressed as **MR = $\Delta TR / \Delta Q$** . Where MR stands for Marginal Revenue, ΔTR = change in total revenue and ΔQ = change in total quantity of a commodity sold.

For e.g. a seller obtains the total revenue of ₹ 90 from the sell of 9 units at price of ₹ 10 per unit. If he increases his sales by one more additional unit (9 to 10) his total revenue increases from ₹ 90 to ₹ 100 the net change in TR or MR = ₹ 10.

The relationship between TR, AR and MR are different under different market condition.

8.2 THE RELATIONSHIP BETWEEN TR, AR AND MR UNDER PERFECT COMPETITION

Under perfect competition an individual firm can not influence a given market price. So a firm is a price-taker. Hence, the price remains constant as more and more units are sold. Therefore, an addition made to the total revenue by selling every

additional unit of a commodity will always be equal to the given market price. Hence the marginal revenue of a firm is always equal to its average revenue.

Firms Demand Curve:

Under the condition of perfect competition, a firm’s demand curve is perfectly elastic i.e. horizontal to ‘X’ axis at the height of the given market price. So the average revenue of a firm is the same as the price, whatever be the quantity sold. Hence a perfectly elastic demand curve i.e. average revenue curve is also called as marginal revenue curve. This is shown in the following figure.

An Industry’s Demand Curve:

Under perfect competition an industry can sell more and more units of a commodity only at a lower price. Hence, the demand curve slopes downward from left to right towards ‘X’ axis. This is shown in the following figure.

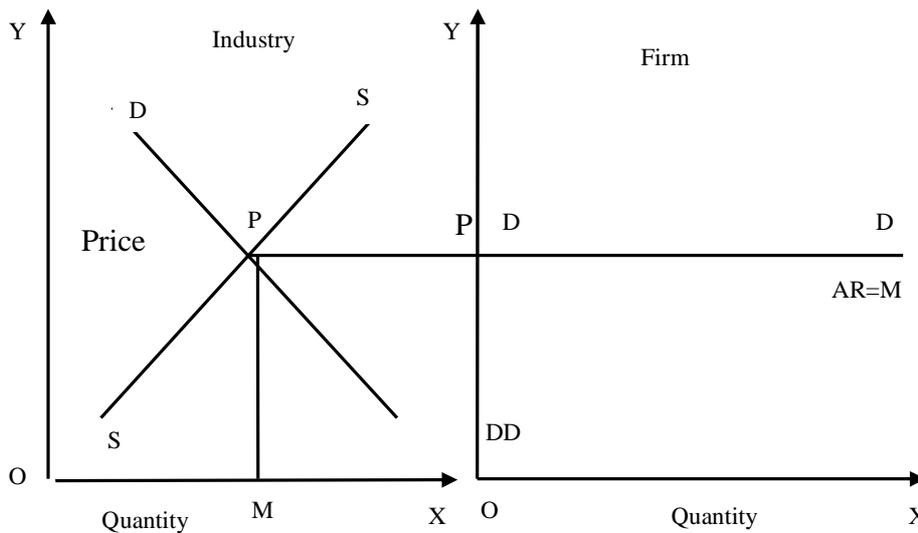


Figure 8.1

Figure 8.

The downward sloping demand curve DD is the demand curve of an industry as shown in the above figure 8.1 and the horizontal DD curve is a firm’s demand curve shows that demand for a commodity is perfectly elastic at the given market price OP as shown in the figure No. 8.2.

The market price is determined by the total demand for and total supply of the commodity in the market as a whole. This is shown in figure 8.1. The demand curve slopes downward it shows that the market demand for a commodity increases when its price is reduced and vice-versa.

The relationship between TR, AR and MR under perfect competition:

Let us assume that the price per unit of a commodity is ₹ 10. Hence the AR is constant. The relationship between TR, AR and MR is shown in the following table.

Revenue Schedule of a firm

No. of units of a commodity	Price ₹	TR $Q \times P$	AR TR / Q	MR $\Delta TR / \Delta Q$
1	10	10	10	10
2	10	20	10	10
3	10	30	10	10
4	10	40	10	10
5	10	50	10	10
6	10	60	10	10
7	10	70	10	10

The above table shows that TR increases at a constant rate as more and more units are sold. It also shows that the MR of a firm is always equal to AR or price under perfect competition. We can show graphically the TR, AR and MR in the following figure.

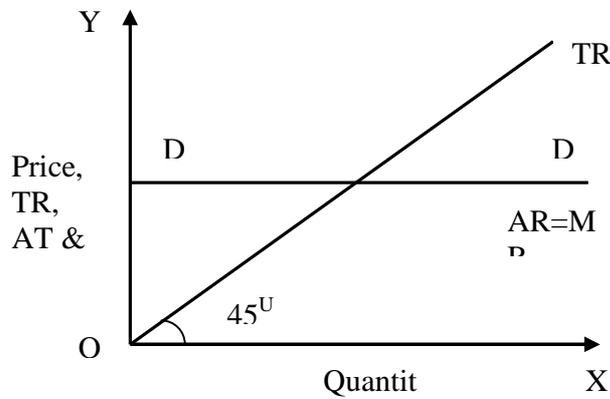


Figure 8.3

In this figure TR is the total revenue slopes upward to the right. The horizontal DD curve is the AR as well as MR curve. This is because the MR curve coincides with the AR curve. It is parallel to the 'X' axis.

8.3 THE RELATIONSHIP BETWEEN TR, AR AND MR UNDER MONOPOLY

Under monopoly the demand curve of a firm for its product slopes downward from left to right. It shows that, such a monopoly firm can sell more only at a lower price. Hence, its total revenue increases at diminishing rate.

A monopoly firm can influence the price. It is a price-maker. A monopolist can charge a high price only by reducing his market supply. A monopolist can fix a high price of his product and sell whatever amount of his product i.e. demanded by consumers.

A monopolist can sell more only by reducing the price of his product. The price is also called AR. So as price is reduced to sell more the AR falls.

When the AR or price declines the MR also falls. So the net addition made to the TR will be less than the price of AR. Hence, TR of a monopoly firm increases at a diminishing rate. For example, suppose a monopoly firm sells 3 units of a commodity at ₹ 8 per unit. Its total revenue will be ₹ 24. If now it wants to sell 4th unit it will have to reduce the price to say ₹ 7 with this price its total revenue will be ₹ 28. Hence, the MR will be only ₹ 4 which is less than the price ₹ 7. This is shown in the following table.

Revenue Schedule of a Firm under Monopoly

No. of units of a commodity	Price ₹	TR $Q \times P$	AR TR / Q	MR $\Delta TR / \Delta Q$
1	10	10	10	10
2	9	18	9	8
3	8	24	8	6
4	7	28	7	4
5	6	30	6	2
6	5	30	5	0
7	4	28	4	-2

It can be seen in the above table that as more and more units of a commodity are sold the TR increases at a diminishing rate. It also shows that as price is reduced the MR is less than AR. With the fall in MR the gape between AR and MR goes on widening. This is because in order to sell one more unit of a commodity the price per unit will have to be reduced.

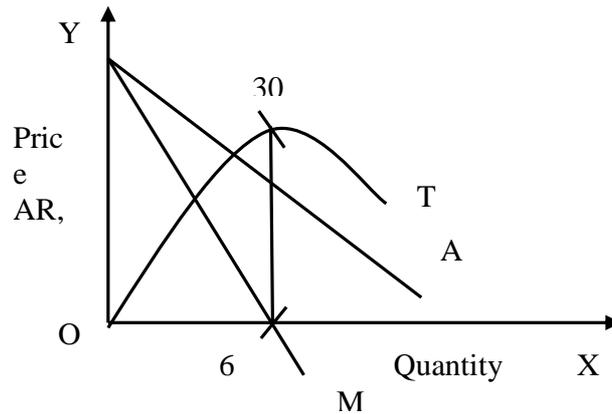


Figure 8.4

When the demand curve AR is sloping downward towards 'X' axis the MR curve also slopes downward and is always below the AR curve. The gap between AR and MR curve goes on widening as the price is reduced. This is shown in the figure.

8.4 RELATIONSHIP BETWEEN AR AND MR CURVES

There is some geometrical relationship between AR and MR curves. The important ones are as follows.

- Under Perfect Competition: - MR is always equal to AR from an individual firm's point of view. In this case the AR curve is horizontal to the 'X' axis and the MR curve coincides with AR curve.

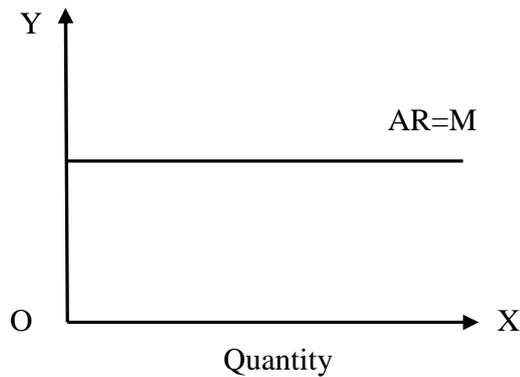


Figure 8.5

- Under Monopoly: - The AR curve has a negative slope. Hence, MR curve lies below it. MR curve can cut the 'X' axis and enter the negative quadrant. So MR can be zero or negative, but the AR curve can not intersect the 'X' axis and enter the negative quadrant. This is because price or AR can never be zero or negative. See figure No. 6

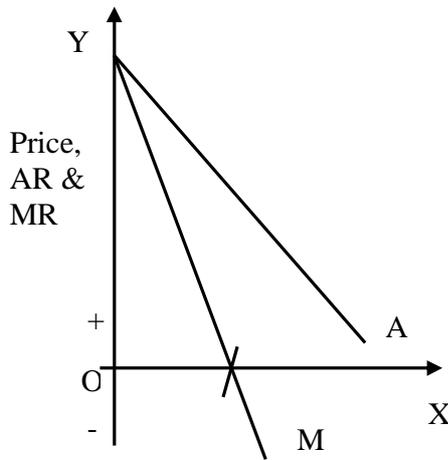


Figure 8.6

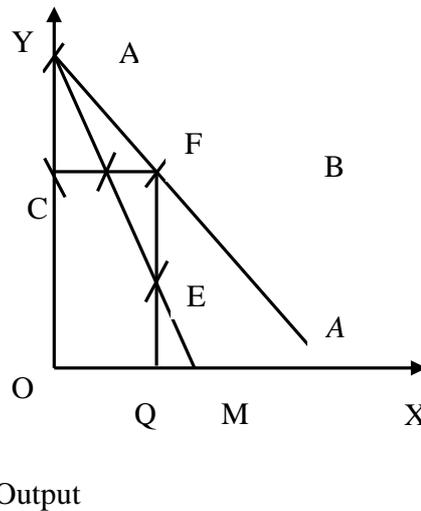


Figure 8.7

- AR is a straight line or linear demand curve sloping downward under monopoly: - MR curve is also a straight line sloping downward from left to right. See figure No. 7. The MR curve is below the AR curve it shows that under monopoly MR is less than price or AR. In such a situation MR curve is exactly half a way between AR curve and 'Y' axis. This is because the MR falls twice than the fall in price at each level of output.

At OC price OQ amount is demanded thus we get F point on AR curve. The line CF is drawn. The MR curve cuts the line CF at point B. CF is the distance between 'Y' axis and AR curve. To prove this we have to prove that $CB = BF$. It can be prove that triangle ACB and EFB are equal in area and are also similar. So $CB = BF$. This indicates that point B is exactly in the middle of the line CF since MR curve passes through the point B which lies exactly half a way between AR curve and Y axis.

- If the AR curve is convex: - The MR curve which is below the AR curve is close to the Y axis i.e. the MR curve is less than half way between the Y axis and AR curve. This is shown in the figure No.8.

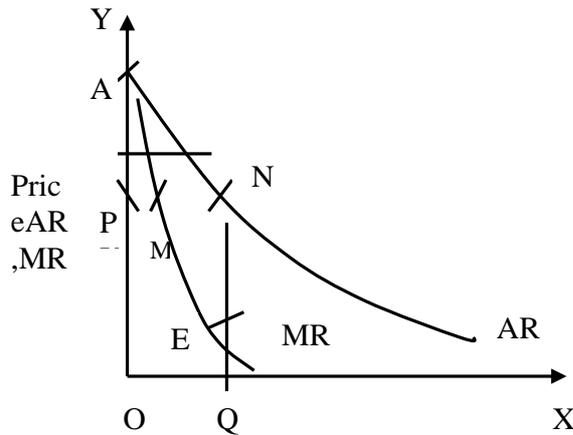


Figure 8.8

Quantity

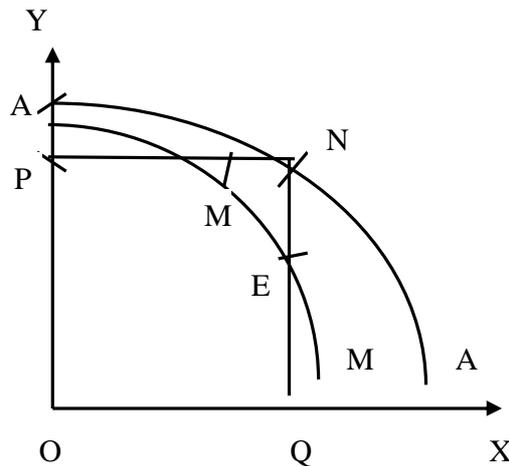


Figure 8.9

In the above diagram the distance between Y axis and MR curve is less than half way between the Y axis and AR curve i.e. PM is less than MN or the triangle APM is smaller than the triangle EMN.

- If AR curve is concave: - The MR curve which is below the AR curve is closer to AR curve i.e. MR curve is more than half way between the Y axis and AR curve. This is shown in the above figure No. 9.

In the diagram the distance between Y axis and MR curve is more than the distance between MR curve and AR curve i.e. PM is more than MN or the triangle APM is larger than EMN.

8.5 OBJECTIVES OF A FIRM

In order to achieve various objectives firm undertakes production. Maximization of profit is one of the important objectives of a firm. But in real practice it is not the only objective of a firm. In reality modern firms may have different objectives such as sales maximization, maximization of satisfaction, growth maximization etc. Some of the important objectives of a modern firm are as follows.

8.5.1 Profit Maximization:

The traditional objective of a firm is to maximize profit. The price and output of a firm under perfect competition are determined with the sole objective of profit maximization. Profits depend on the cost and revenue of the firm. Profit is the excess of total revenue over total cost. Firm aims at maximizing the difference between revenue and cost. Maximum profits refer to pure profits which are surplus above the average cost of production. But normal profit is a necessary payment for an entrepreneur to stay in the business.

When profits are above normal profits they are called as supernormal profits and when profits fall below normal profits, they are called subnormal profits. Firm has to fulfill two conditions for profit maximization. They are

- (1) MR of a firm must be equal to its MC and
- (2) MC curve of a firm must cut MR curve from below.

The equilibrium or profit maximization of a firm can be explained with the help of total revenue and total cost curves. The firm maximizes its profit at that level of output where the difference between TR and TC is maximum.

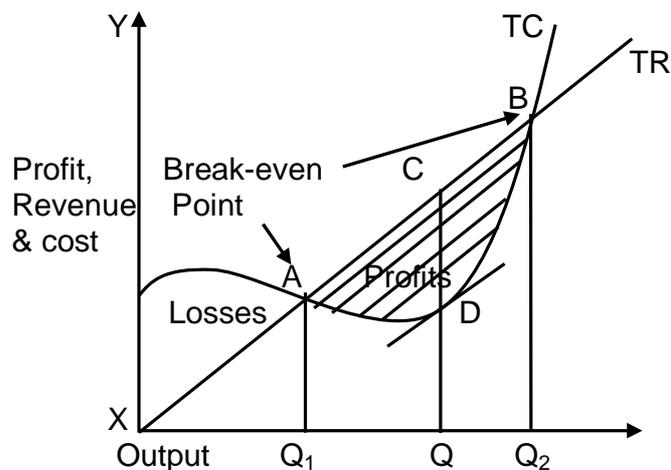


Figure 8.10

In the above diagram X axis represent level of output and Y axis profit, revenue and cost. It is clear from the above diagram that till OQ_1 level of output TC remains more than TR. Hence initially firm has to bear a loss. At point A TC becomes equal to TR. This point is called as break-even point. Beyond point A TR increases more than TC with an increase in the level of output. At OQ level of output the difference between TR and TC is maximum. Therefore, firm enjoys maximum profits shown by the shaded area i.e. CD.

8.5.2 Sales Maximization:

This objective is introduced by Prof. Baumol. According to him revenue or sales maximization rather than profit maximization is more consistent with the actual behavior of the firms. Sales maximization means revenue maximization by the firm. The firm maximizes its sales subject to minimum profit constraint. Following fig. explains Baumol's sales maximization objective.

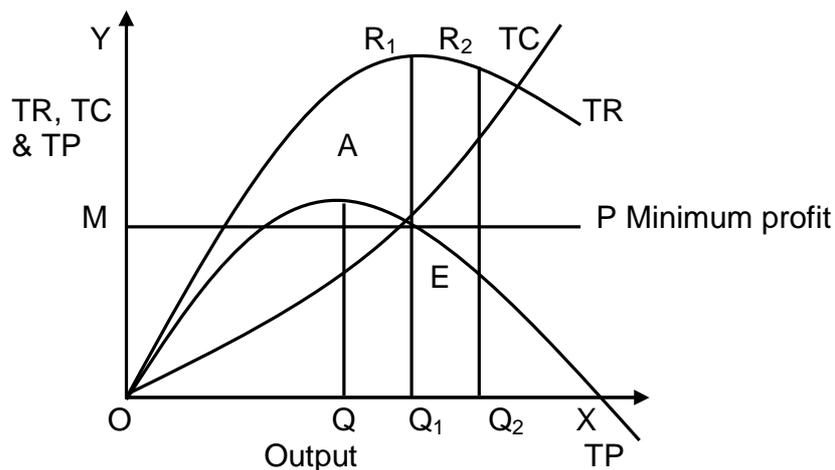


Figure 8.11

The above figure shows how a firm maximizes its sales with minimum profit. OQ is profit maximizing output. At that level profits are high at AQ . MP is minimum profit constraint. Sales maximization output is OQ_1 at which total revenue TR is maximum at RQ . When MP is the minimum profit line, OQ_2 is not the consistent level of output. At this level profit EQ_2 is less than minimum profit. In reality, the objective is sales maximization with minimum profit. Hence OQ_1 is the maximum sales output.

However, the critics point out that it is difficult to combine sales maximization objective with profit. In spite of this short coming, maximization of sales is an important objective which is pursued by firms.

8.5.3 Satisfaction Maximization:

According to economist, 'Scitovsky and Haggins, the objective of satisfaction maximization of a firm has greater significance than profit maximization.' An entrepreneur wants to maximize satisfaction. But as income increases, he prefers leisure to more work. The top management tries to attain a satisfactory level of production, a satisfactory share of the market, a satisfactory level of profit, and so on. The following fig. 03 explains the objective of satisfaction maximization.

In the Fig. 03 output & leisure are measured on X axis and profits on Y axis. IC_1 and IC_2 show entrepreneur's scale of preference between profit and leisure. MN is the net profit (income) curve, i.e. the difference between TR and TC.

At point N, output is zero. Leisure is also measured on the same axis starting from O toward X. As we move left side from N to L no doubt output increases but leisure decreases.

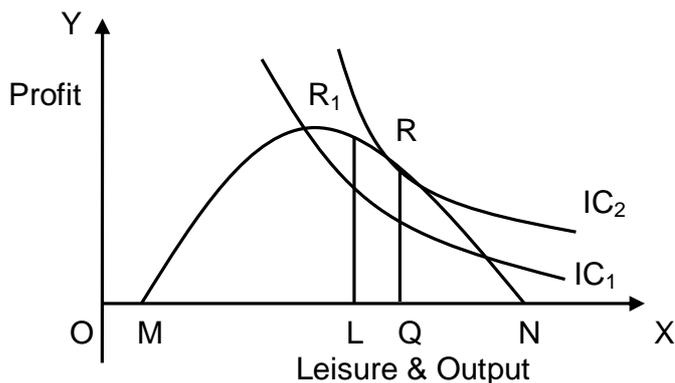


Figure 8.12

It is clear from the figure that maximum satisfaction is at R when IC_2 is tangential to net profit curve MN and the output is NQ. This output is less than the profit maximization output NL. The profit RQ at NQ output level are also less than the maximum profits R_1L at output NL.

Thus the producer maximizes his satisfaction at RQ level of profit because he enjoys OQ leisure.

8.5.4 Growth Maximization:

Prof. Penrose considered growth maximization rather than profit maximization to be a primary goal of managers of modern firms. A systematic growth maximizing theory of a firm was developed by Prof. Morris. According to him, the managers of a large firm aim at

promoting the growth and security of his business firm. Incentives are provided to the manager to expand the size of the firm. For achieving this objective he may expand new market through the creation of new products and new demands. Morris introduced a steady- state growth model. Under this managers chose constant rate of growth. This helps its sales, profit assets etc. to grow.

Robin Marris presents a growth maximizing model of the firm considering two basic relationship linking profitability and growth.

1. The supply growth relationship i.e. $g = f(p)$ and
2. The demand –growth relationship i.e. $p = h(g)$

Here, p denotes profitability

g denotes growth

f and h denotes functional relationship.

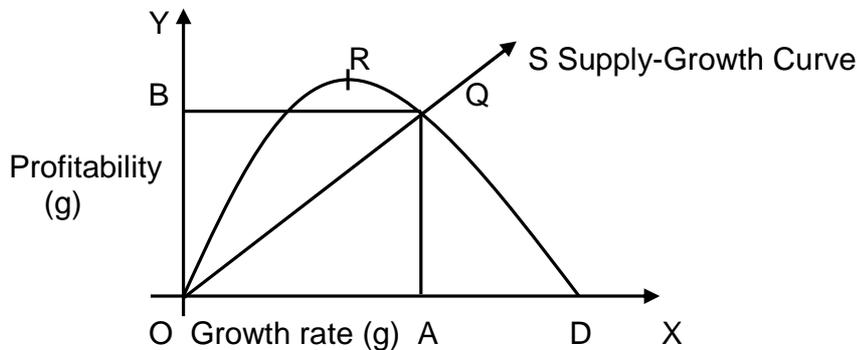


Figure 8.13

The supply growth relationship is positive as shown by the OS curve. There is a positive relationship between profitability and growth.

OD is the demand growth curve. It shows positive relationship between the initial stage and higher rates of growth. The two curves intersect each other at point Q. The firm will therefore operate at the growth rate OA and profitability rate OB.

8.6 QUESTIONS

1. Explain the different concepts of Revenue.
2. Discuss the relationship between TR, AR & MR under perfect competition.
3. Discuss the relationship between TR, AR & MR under monopoly.
4. What are the different objectives of a firm?



BREAK-EVEN ANALYSIS AND EQUILIBRIUM OF A FIRM

Unit Structure :

- 9.0 Objectives
- 9.1 Introduction of Break-Even analysis
- 9.2 Analysis of Equilibrium of a firm
- 9.3 Conditions of Equilibrium of a firm : Marginal cost and Marginal Revenue Approach
 - 9.3.1 Conditions for the equilibrium or profit maximization of a firm under perfect competition
 - 9.3.2 Conditions for the equilibrium or profit maximization of a firm under monopoly
- 9.4 Questions

9.0 OBJECTIVES

- To study the meaning and the concept of break-even analysis.
- To study the conditions of equilibrium of a firm.

9.1 INTRODUCTION OF BREAK-EVEN ANALYSIS

The break-even analysis (BEA) has considerable significance for economic research, business decision-making, company management, investment analysis and public policy.

The break even analysis is an important technique to explain the relationship between cost, revenue and profits at the varying levels of output or sales.

The maximization of profit is one of the traditional objectives of a firm. Maximum profit and minimum cost can not be achieved at the same time. Similarly, profit maximization output can not be known in advance. If it is known it can not be achieved at the beginning. Thus often in practice the firms start their production

even experiencing a loss so as to earn the anticipated profit in the future. In the process of production firm has to incur cost in the form of fixed cost even before the production starts. Even when output is zero total fixed cost is there. But when no unit of output is sold then total revenue is zero. Thus in the initial stage of production cost remains higher than the revenue. Therefore, a firm has to bear a loss. But as more and more units of output are sold total revenue starts increasing and it reaches to the point where total revenue will cover total cost i.e. $TR = TC$.

Break-even point is the point at which the total revenue is exactly equal to the total cost. In other words, the Break-even point is defined as, 'the point where the level of output is so reached that $TR = TC$ and hence the net income is equal to zero. Hence break-even point is no-profit-no-loss zone.

Break-even point may be calculated either in the terms of units of output which is called as break-even volume or in the terms of total rupee sales. We can explain the break-even point concept with the help of the following diagram.

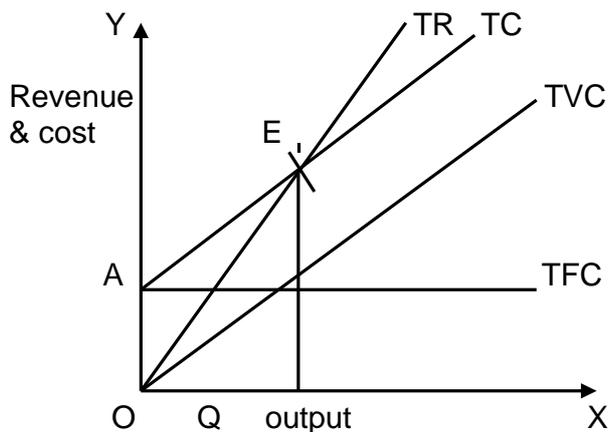


Figure 9.1

In the diagram X axis represents level of output and Y axis represent revenue & cost. TFC is the total fixed cost curve which is an intercept on Y axis at point 'A'. TVC is the total variable cost, TC is the total cost which is the sum of TFC & TVC and TR is the total revenue which starts from origin and slopes positively upward from left to right shows that TR increases with an increase in sales. Till OQ output the total cost is more than total revenue and therefore the area AOE indicates the area of losses. But as output increases to OQ level, $TR = TC$ at point E. If the output is increased beyond the OQ level TR increases much faster than TC and hence total profit goes on increasing. Thus the point 'E' is called as Break-even point.

- **BEP in terms of total number of units of output/ break even volume –**

Algebraically, the break even volume is measured by the following formula.

$$\text{Break-even volume} = \frac{\text{Total Fixed Cost}}{\text{Price} - \text{Variable Cost}}$$

Let us explain with the help of following example.

Suppose the FC of a firm is ₹ 7,000.

Variable cost per unit of output is ₹ 15/-.

Price per unit is ₹ 50/-.

We can find out the break even level of output with the help of above formula.

$$\text{BEV} = \frac{7,000}{50 - 15}$$

$$= \frac{7,000}{35}$$

$$= 200 \text{ units}$$

- **BEP in terms of total rupee sales-**

$$\begin{aligned} \text{Total sales value or Total Revenue} &= P \times Q \\ &= 50 \times 200 \\ &= 10,000. \end{aligned}$$

$$\text{Total Cost} = \text{FC} + \text{VC}$$

$$\text{TFC} = 7,000$$

$$\text{TVC} = \text{VC per unit} \times \text{Total number}$$

of units of output.

$$= 15 \times 200$$

$$= 3,000$$

$$\text{TFC} + \text{TVC} = \text{TC}$$

$$7,000 + 3,000 = 10,000$$

$$\text{TR} - \text{TC} = \text{Net income is equal to}$$

zero.

$$\text{TR ₹ } 10,000 - \text{TC ₹ } 10,000 = 0$$

Hence, total profit is zero and thus 200 units is the break-even level output.

Assumptions- Break-even analysis is based on the following assumptions.

1. The cost function and revenue function are linear.
2. The total cost is divided into fixed and variable costs.
3. The selling price is fixed.
4. The volume of sales and production are identical.
5. Prices of factors are remaining constant.
6. Productivity and efficiency remains unchanged.

Limitations- Break-even analysis has following limitations.

1. Break-even analysis is based on certain assumptions which are assumed to be constant. This implies a static in nature. It is not applicable to the dynamic situation.
2. Break-even analysis is unrealistic because it is based on many assumptions. Linear cost and revenue functions are true only for a limited range of output.
3. It fails to explain the impact of technological change, better management, division of labour, improved productivity and other factors which influence profits.
4. It assumes horizontal demand curve with the constant price. It is possible only in case of perfect competition. But it is not true in case of monopoly.
5. The scope of break even analysis is limited to the short run only.
6. The break even analysis does not consider elements of uncertainty due to tax structure.

Usefulness of BEA-

1. BEA is useful for decision-making in regards to pricing, cost control, product- mix, channels of distribution etc.
2. It is a useful tool of managerial planning.
3. It can be used for determining the safety margin.
4. It provides a microscopic view of the profit structure of the firm.
5. It is useful for determining the quantity of output and level of sales of a firm.
6. We can compare the profit margin of different firms with the help of BEA.
7. BEA is useful to understand the relationship between firm's cost, revenue, production, loss and profit.

9.2 ANALYSIS OF EQUILIBRIUM OF A FIRM

Introduction -

A firm is said to be in equilibrium when it has no tendency either to increase or to decrease its output. In this chapter we shall explain general conditions for the equilibrium of the firm under all types of market.

There are two approaches regarding the equilibrium or profit maximization of a firm firstly, is total revenue and total cost approach and secondly, marginal revenue and marginal cost approach.

Conditions of Equilibrium of a Firm: Total Revenue and Total Cost Approach-

The firm is in equilibrium when it maximizes its total profits (π). Total profit is the difference between total revenue (TR) and total cost (TC). Symbolically,

$$\pi = TR - TC$$

Max. π = Max. the positive difference (TR- TC).

Graphically, maximization of total profits is illustrated in the following diagram.

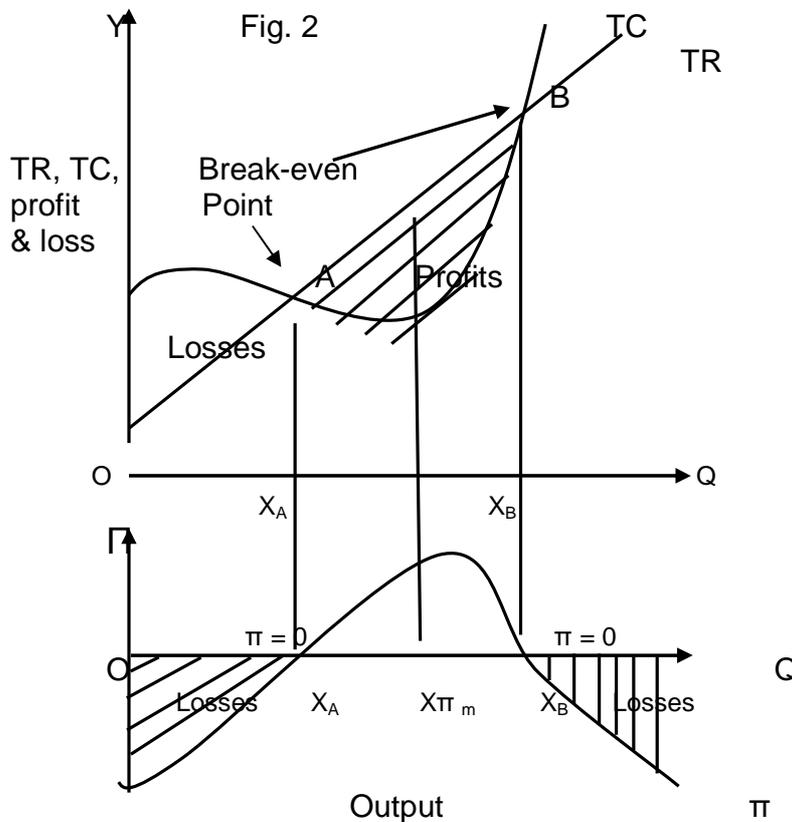


Figure 9.2

Where,

TR = Total revenue curve is a straight positively sloping line from the origin increasing in the same proportion as sales. It shows that the firm is a price-taker and can sell any amount of output at the going market price

TC = Total cost curve which is inverse- S shaped starting from the level of fixed cost, reflecting the law of variable proportions.

π = Total profit curve. It is obtained by subtracting TC from TR at each level of output.

$X\pi_m$ = Output showing maximum profit. At this level of output, the vertical distance between TR and TC curves is maximum. In other words, both TR and TC curves have same slope at this output level.

Points A & B = At these points TR = TC and the firm break even i.e. profit is zero.

Losses = The firm incurs losses from origin till XA level of output and beyond XB level of output because TC is more than TR. It is shown by shaded areas.

9.3 CONDITIONS OF EQUILIBRIUM OF A FIRM: MARGINAL COST AND MARGINAL REVENUE APPROACH-

9.3.1 Conditions for the equilibrium or profit maximization of a firm under perfect competition-

A firm is in equilibrium when its MR is equal to MC. This approach is called as MR-MC equality approach. A firm attains equilibrium i.e. it maximizes its profit and minimizes its losses when its MR is equal to its MC.

So long as MR is greater than MC, the residual profits would be less than maximum. In such a situation, every additional unit of output will add to the total revenue of the firm than to its total cost. Hence, the total profit would go on rising or losses would go on falling, with an increase in its output and sale. When MR is equal to MC no more units will be produced.

If the output is increased beyond this point, MC will be greater than MR i.e. it would add more to the total cost of the firm than to its total revenue. In such a case its residual profits will be less than maximum or its losses would rise. When MR is equal to MC the difference between TR and TC would be maximum. Hence, a firm will be in equilibrium when MR is equal to MC.

Under the condition of perfect competition the demand curve of a firm is perfectly elastic i.e. horizontal straight line to the 'X' axis at the height of the given market price. Hence, under perfect competition the price or AR is always equal to MR. A perfectly elastic demand curve is called as AR as well as MR curve.

There are two conditions for the equilibrium or profit maximization of a firm.

1. MR of a firm must be equal to its MC.
2. MC curve must cut MR curve from below not from above.
The conditions for the equilibrium or profit maximization of a firm under perfect competition can be explained with the help of following diagram.

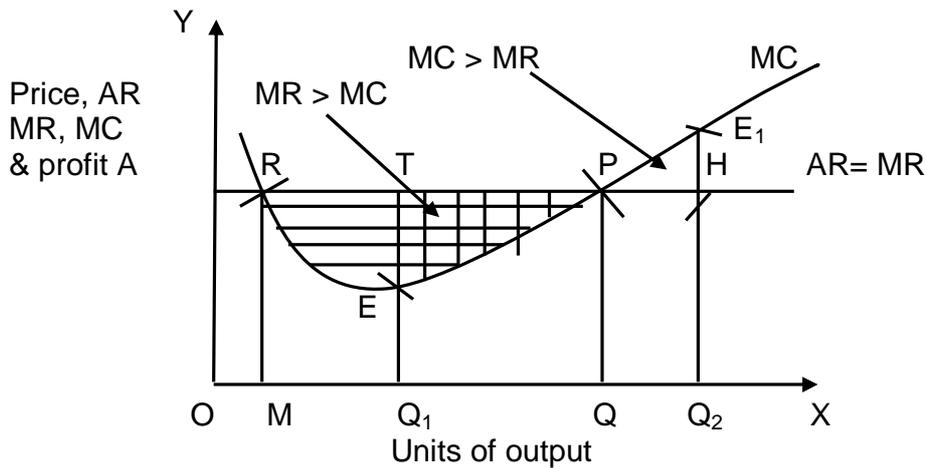


Figure 9.3

In the diagram the horizontal line AH is the demand curve. It represents AR and MR. Suppose that MC is the marginal cost curve. It intersects the MR curve from above at point 'R' and from below at point 'P'. When MC curve intersect MR curve from above at point 'R' MR is equal to MC with an output of OM units. But point 'R' is not point of stable equilibrium. This is because by increasing the output beyond OM units it can add more to its TR than to its TC. So its residual profit will increase.

It is only at point 'E' where the MC curve intersects the MR curve from below that the firm attains a stable equilibrium. This is because the last unit produced adds to the TR which is equal to the cost of producing that unit. Here, the firm gets maximum profits.

So at the output of OQ units MR is equal to MC and MC curve rises and intersects the MR curve from below at point 'P'. The output of OQ units is a profit maximization output. The area REP is the maximum profit area.

If it produces less than OQ units, say OQ₁ units MC will be less than MR. So the profit will increase by an area of TEP when the output is increased up to OQ units. On the other hand any output beyond OQ units say OQ₂ units, will reduce profits by an area of 'PHE' for MC is greater than MR. Hence, the profits will increase until the output is contracted to OQ unit. At point 'E' there

is a stable equilibrium. This is because at point 'P' MR is equal to MC and MC curve intersect the MR curve from below OQ is the equilibrium output. Prof. Samuelson calls the point 'P' as the best profit point.

9.3.2 Conditions for the equilibrium or profit maximization of a firm under monopoly-

A monopoly firm will also be in equilibrium when it maximizes its profits or minimizes its losses. A monopoly firm is in equilibrium when MR is equal to MC. This approach is called as MR- MC equality approach.

A firm is in equilibrium when MR is equal to MC. When MR is equal to MC, the firm would enjoy maximum total profit. Here the difference between TR and TC is maximum. This is shown in the following figure.

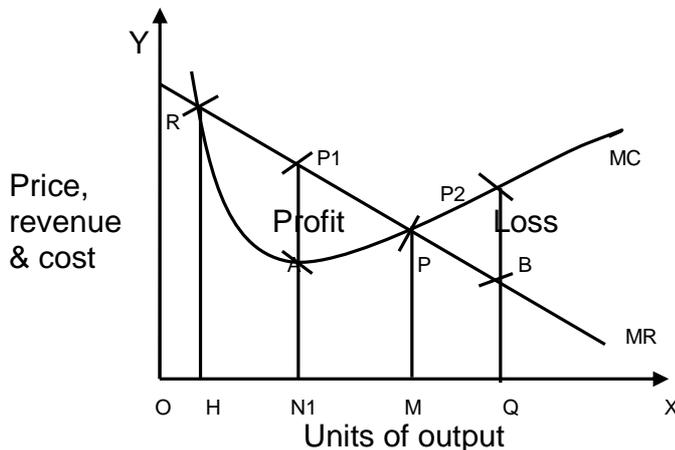


Figure 9.4

In this figure MR is marginal revenue curve slopes downward from left to right. MC is the marginal cost curve falls in the beginning and then rises. At first, the MC curve intersects the MR curve from above at point 'R' when MR is equal to MC. It would produce OH units. But it can not maximize its profit at this point. This point 'R' is the breakdown point. When the output is increased beyond OH units MC becomes less than MR and there are residual profits. It would increase its output until the MC curve intersects the MR curve from below at point 'P' where MR is equal to MC and the monopoly firm attains equilibrium and enjoys maximum profits. OM is the equilibrium output.

It shows that up to the OM units of output MR is more than MC and thus, each unit provides profit.

If it produces less than OM units say ON1, MR is greater than MC by AP1. This is because while MC is AN, MR is P1N. So the profit would be less than maximum. The profits can still be increased. They are increased by expanding the production so long as MR is greater than MC but with OM unit MR is equal to MC and profits are increased by PAP1 Here the total profits are maximized. RAP is the maximum profit area. Thus, with output OM it would maximize its profits.

IF the output is increased beyond OM units MC is greater than MR, so its profit would be reduced, if OQ units are produced the MC is P2Q while MR is BQ. Thus, the net loss is BP2 and the total loss is PBP2. So the output must be decrease until the output OM is reached at which MR is equal to MC. Hence, the equality between MR and MC is a necessary condition for the equilibrium of a monopoly firm, but it is not sufficient condition. The sufficient condition is that the MC curve must intersect the MR curve from below, at point 'P' where the stable equilibrium is attained.

9.4 QUESTIONS

1. Explain fully the concept of Break-even analysis.
2. Explain the condition of Total Revenue and Total Cost approach to attain equilibrium of a firm.
3. Discuss the profit maximization condition of a firm under perfect competition.
4. Discuss conditions for the equilibrium of a firm under monopoly



Module 5

PERFECT COMPETITION

Unit Structure :

- 10.0 Objectives
- 10.1 Introduction of perfect competition
- 10.2 Equilibrium
- 10.3 Equilibrium of a firm in the short run and long run
 - 10.3.1 Short run equilibrium of a firm
 - 10.3.2 Long run equilibrium of a firm
- 10.4 Equilibrium of an industry
 - 10.4.1 Short run equilibrium
 - 10.4.2 Long run equilibrium
- 10.5 Questions

10.0 OBJECTIVES

- To study the features of perfect competition.
- To study the meaning and determination of equilibrium price under perfect competition.
- To study how a firm attains an equilibrium in the short run and long run under perfect competition.
- To study the short run and long run equilibrium of an industry under perfect competition.

10.1 INTRODUCTION OF PERFECT COMPETITION

A firm is an individual production unit which produces particular type of a commodity. Under perfect competition the term industry refers to a group of firms which produce a homogeneous or identical product. So all firms producing a particular identical commodity are together called industry.

Perfect competition is one type of market structure. Perfect competition may be defined as, 'that market situation, in which

there are large number of firms producing homogeneous product, there is free entry and free exit, perfect knowledge on the part of buyer, perfect mobility of factors of production and no transportation cost at all.'

Features: -

The main features of perfect competition are as follows.

1 Large number of buyers and sellers: There are so many buyers and sellers that no individual buyer or seller can influence the price of a commodity in the market. Any change in output supplied by a single firm will not affect the total output of an industry. A producer can sell whatever output he produces at the given price. So a firm is a price taker. Similarly, no individual buyer can influence the price of the commodity by his decision to vary the amount that he would like to buy.

2 Homogenous product: Firms in the market produce homogeneous products. Homogeneity of a product implies that one unit of the product is a perfect substitute for another. The products are identical in quality, shape, size, colour, design, packing etc. There cross elasticity is infinity. Since the products are identical buyers make no difference between sellers.

3 Free entry and free exit: Industry is characterized by freedom of free entry and exit of firms, In a perfectly competitive market, there are no barriers to movement in and out of an industry.

4. Perfect knowledge: All buyers and sellers have a complete knowledge of the market conditions; viz; prevailing market prices, quality of the product sold, availability of factors of production etc. Information is free and costless. Under these conditions there are no uncertainty about future development in the market. Advertising has no role to play in the perfectly competitive market.

5. Perfect mobility of factors of production: The factors of production can move easily from one firm to another. Workers can move between jobs and between places.

6. Absence of transportation cost: All goods are produced locally. Therefore, transportation costs are zero.

As already mentioned above when the first three assumptions are satisfied, there exists pure competition.

The competition becomes perfect when three additional assumptions are satisfied.

10.2 EQUILIBRIUM

Equilibrium literally means a state of balance or a state of rest or position of no change. In economics, the term equilibrium means the state in which there is no tendency on the part of consumers and producers to change.

It may be defined as, 'when two opposite forces balanced each other on a particular object, that object is said to be in a state of equilibrium.' Two factors determining equilibrium price- are demand and supply.

Thus, equilibrium price is the price at which demand and supply are equal to each other. At this price, there are no incentives to change.

Determination of Equilibrium Price:

Equilibrium price is determined by the equality between demand and supply. At this price, Quantity demanded = Quantity supplied.

Prof. Marshall compared demand and supply to the two blades of a pair of scissors. It shows that it is not blade that cuts the cloth. Both the blades together, do it. Similarly, it is not demand or supply alone that determines the price of a commodity. Together through interaction they determine the equilibrium price of a commodity.

The process of determination of equilibrium price can be explained under three heads.

1 Demand- A commodity is demanded because it has utility and satisfies human want. The law of demand states that there is an inverse relationship between price and quantity demanded of a commodity. Higher the price, lower is the demand and vice versa. The aim of the consumer is to maximize his satisfaction.

2. Supply- The law of supply states that there is a direct relationship between the price and quantity supplied of a commodity. More the price, more will be the supply and vice versa. The aim of the producer is to maximize profits.

3. Equilibrium between demand and supply- The forces of demand and supply determine the price of a commodity. There is a conflict in the aim of producers and consumers. Producers want to sell the goods at the highest price to maximize profit and consumer want to buy the goods at the lowest price to maximize satisfaction.

Equilibrium price will be determined where quantity demanded is equal to quantity supplied. This is called market price. A demand and supply schedule and curve will show the determination of equilibrium price.

Price ₹ (per k.g.)	Demand (k.g./month)	Supply (k.g./month)
10	1	5
9	2	4
8	3	3
7	4	2
6	5	1

Table No. 10.1 Demand- supply schedule of Salt

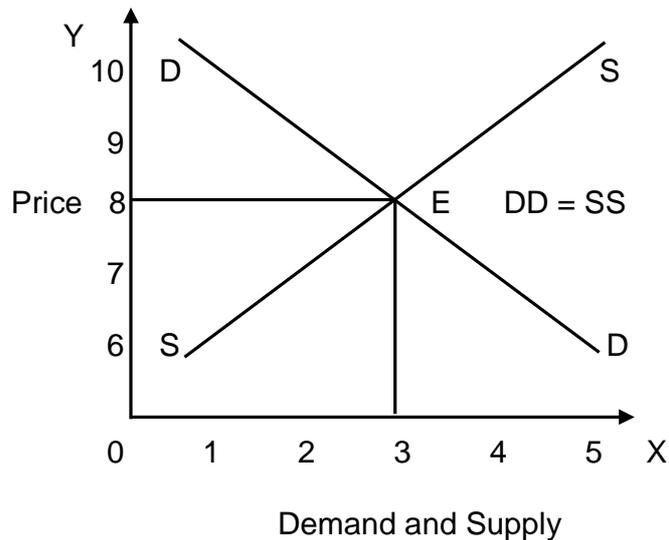


Figure No. 10.1 Equilibrium Price

In the above table demand and supply of salt at different prices are shown. Equilibrium price is fixed at ₹ 3 where quantity demanded and the quantity supplied are equal i.e. equal to 3 units.

In Fig. 01 quantity demanded and supplied are measured on the X axis and price on the Y axis. DD is the downward sloping demand curve and SS is the upward sloping supply curve. Both these curves intersect each other at point 'E' which is the equilibrium point and it implies that at price of ₹ 6, demand is 3 units and supply is also 3 units. Thus equilibrium price is ₹6.

Effects of Changes in Demand and Supply on Equilibrium Price:-

Equilibrium price is derived by that point where quantity demanded is equal to quantity supplied. Therefore, if either demand

changes or supply changes or both change, equilibrium price and output will change. The effect of changes in demand and supply on equilibrium price and output can be explained as follows.

Changes in Demand: -

Changes in demand take place due to changes in prices of related goods, income, fashion, tastes and habits of the consumers etc. When demand changes, demand curve shifts. Due to changes or shifts in demand curve, supply curve remaining the same, there is a change in the equilibrium price and output. Demand may (a) increase or (b) decrease.

(a) Increase in demand: - When demand of a commodity increases, while supply remains constant, equilibrium price will increase. At the same time, quantity sold and purchased will also increase. This is shown in Fig. No. 02

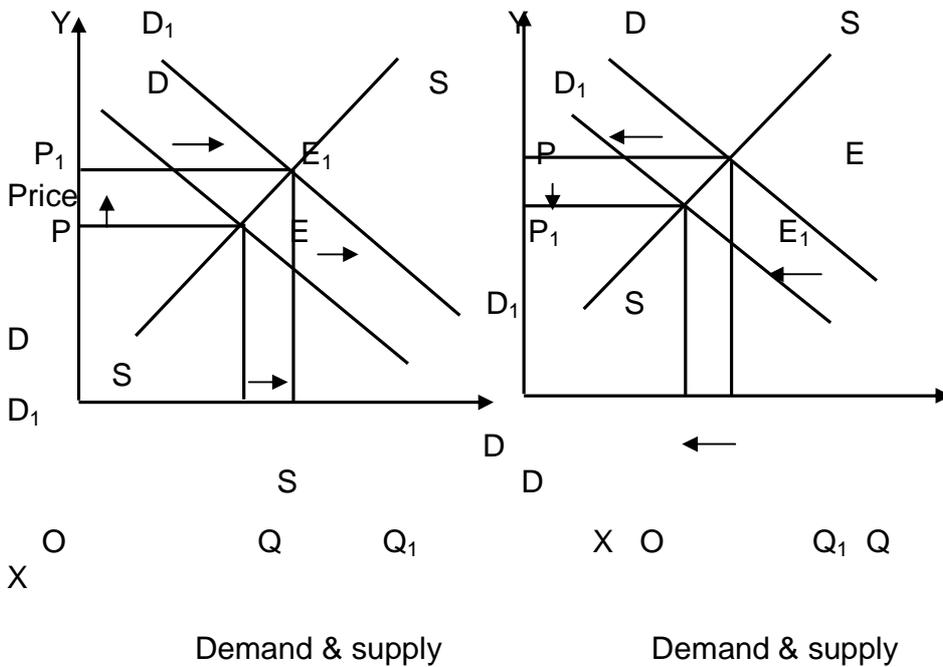


Figure No.10. 2 Increase in Demand Figure No. 10.3 Decrease in Demand

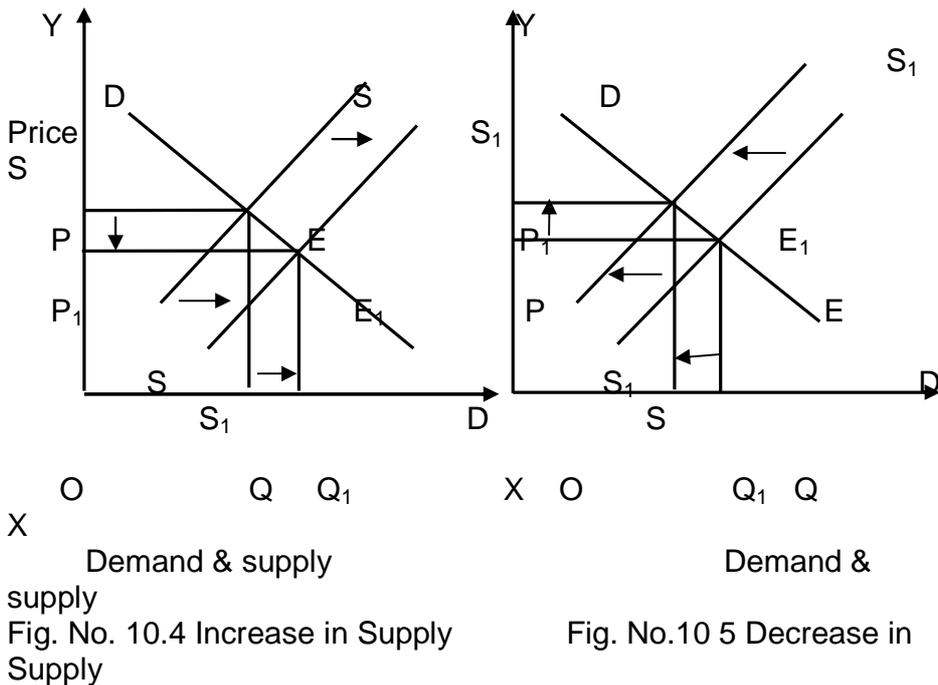
In the original situation, the DD and SS curves intersect at point E at this equilibrium point the equilibrium price is OP and output is OQ . While supply remain constant, if the demand increases the demand curve shifts from DD to D_1D_1 . The new equilibrium is established at point E_1 . The equilibrium price goes up from OP to OP_1 and output from OQ to OQ_1 . Therefore, when demand curve shifts upwards, equilibrium price and output increases.

(b) Decrease in demand: If the demand of a commodity decreases, while supply remains constant, the equilibrium price and output will fall. This is shown in the Fig. No. 3.

In Fig. 3 quantity demanded and supplied are shown on the X axis and price of commodity on the Y axis. DD is the original demand curve. SS is the original supply curve, E is the equilibrium point. Decrease in demand is shown by downward shift of DD curve to D_1D_1 . New demand curve intersects the supply curve at point E_1 . Equilibrium price falls from OP to OP_1 and output falls from OQ to OQ_1 . Therefore, when demand curve shifts downwards both equilibrium price and output falls.

Changes in Supply: -

Like demand, supply of a commodity also changes. Changes in supply take place due to changes in the cost of production, production techniques, etc. Due to changes in supply, supply curve shifts. It may (a) Increase of (b) Decrease.



(a) Increase in Supply: - If the supply of a commodity increases, while demand remains constant, equilibrium price will fall. This is shown in Fig. 4. In the figure, quantity demanded and supplied is shown on the X axis and price on Y axis. DD is the original demand curve. SS is the original supply curve. E is the original equilibrium point. SS increase to S_1S_1 . New supply curve cuts demand curve DD at point E_1 , which is the new equilibrium point. At this equilibrium point, price falls from OP to OP_1 and quantity demanded

and supplied rises from OQ to OQ₁. Thus, if supply increases, while demand is constant, equilibrium price will decrease and quantity supplied will increase.

(b) Decrease in Supply: - If the supply of a commodity decreases, while demand remain constant, equilibrium price will increase. It is shown in Fig. 5. In the figure, quantity demanded and supplied are shown on the X axis and price of a commodity on the Y axis. DD is the original demand curve. SS is the original supply curve. E is the original equilibrium point. Supply decreases to S₁S₁. New supply curve cuts the demand curve DD at E₁, which is the new equilibrium point. Equilibrium price has gone up form OP to OP₁ and the quantity supplied decreased from OQ to OQ₁. Thus, if supply decreases, while demand remains constant, equilibrium price will rise and output will fall.

10.3 EQUILIBRIUM OF A FIRM IN THE SHORT RUN AND LONG RUN

Under perfect competition a firm has to fulfill two conditions for the short run and long run equilibrium of a firm.

1. MR is equal to MC.
2. MC curve should cut MR curve from below.

For the purpose of the study equilibrium of a firm or price-output determination by a firm can be studied under two heads- short run equilibrium and long run equilibrium. Let us first study the short run equilibrium.

10.3.1 Short run equilibrium of a firm :

A short run equilibrium of a firm under homogenous and heterogynous cost conditions is reached as under. There are three possibilities of short run equilibrium of a firm.

1. *Excess profit*
2. *Normal profit and*
3. *Loss.*

A firm has to fulfill two conditions for the short run equilibrium of a firm. We can explain the above three possibilities and two conditions with the help of following figure.

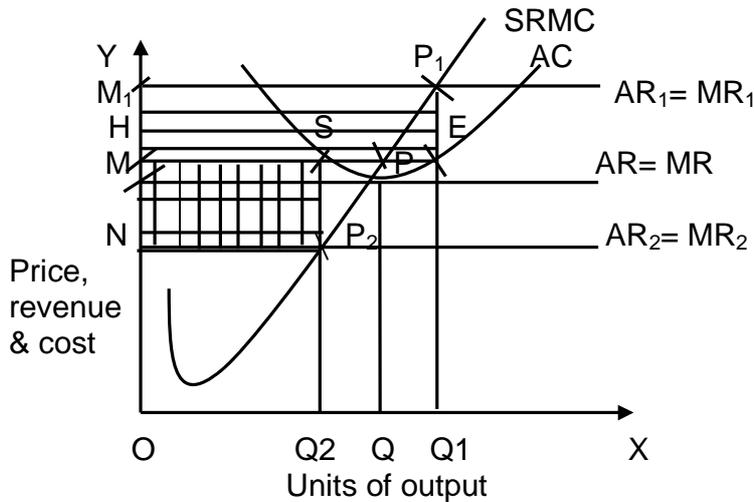


Figure No. 10.6

In the above diagram 'X' axis represent units of output and 'Y' axis represent price, revenue and cost. There are horizontal AR and MR curves. 'SRMC' curve intersects MR curve at three points P, P₁ and P₂. OQ commodities are produced at OM price. OQ₁ commodities are produced at OM₁ price and OQ₂ commodities are produced at ON price.

* At point 'P' - SRMC = MR & AR = AC.

At this point AR = AC, so at this equilibrium point OQ commodities are produced at OM price. Hence, the firm is in short run equilibrium and enjoys only normal profit.

* At point 'P₁' - MR = MC and AR > AC.

The excess profit and loss is determined by the difference between AR and AC. At this equilibrium point OQ₁ commodities are produced at OM₁ price. Hence, some firms in the industry enjoy excess profit shown by the area 'M₁P₁EH'.

* At point 'P₂' - MR = MC and AR < AC.

At this equilibrium point OQ₂ commodities are produced at ON price. Hence firm would suffer a loss at a price which is less than AC shown by the area 'MSP₂N'.

In short there are three possibilities depending upon AR and AC.

10.3.2 Long run equilibrium of a firm :

In the long run the equilibrium of a firm under homogenous and heterogeneous cost condition is explained as under.

In the long run all the factors of production can be changed. In the short run some loss making firms would leave the industry in the long run. The excess profit is divided among the firms in a same proportion. Hence, in the long run no one firm would enjoy excess profit or suffer a loss.

The long run equilibrium of a firm is attained by the equality between $MR = MC$ and $AR = AC$. This is explained with the help of the following diagram.

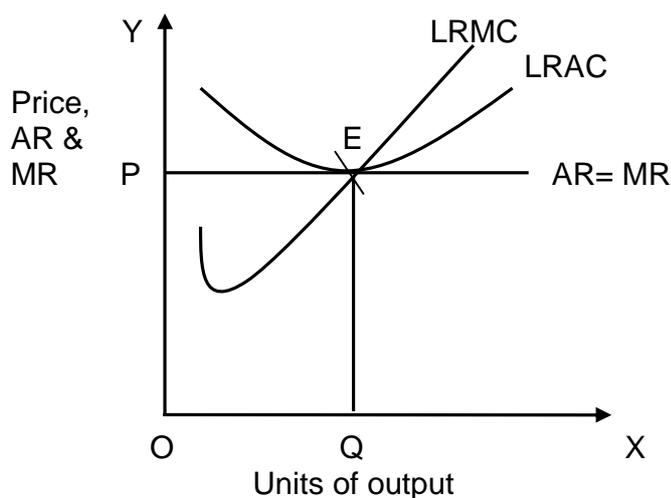


Figure10. 7

In the above diagram 'X' axis represent units of output and 'Y' axis represent price, revenue and cost. LRMC curve intersect $AR = MR$ curve at point 'E' from below. This equilibrium point shows that both the $AR = AC$ and $MR = MC$. This equilibrium point also shows that no one firm would earn excess profit or suffer a loss. Here each and every firm in the long run enjoys only normal profit. Hence the firm will be in a stable equilibrium.

10.4 EQUILIBRIUM OF AN INDUSTRY

Industry simply means a group of firms producing a particular type of a commodity.

The equilibrium of an industry in the short run and in the long run can be explained as follows.

10.4.1 Short run equilibrium :

An industry which consists of large number of firms producing identical product is to be in equilibrium. Under perfect competition in order to attain an equilibrium three conditions must be fulfilled by the industry. The conditions are-

1. Every firm must be in equilibrium i.e. MR of every firm must be equal to its MC. The MC curve of every firm must cut its MR curve from below.
2. Industry as a whole must be in equilibrium i.e. the AR of every firm should be equal to its AC. However, in the short run industry may not be in a stable equilibrium because, the AR of every firm may not necessarily be equal to its AC.
3. The short run sub normal price in the industry is in equilibrium, when the short run demand and short run industry's supply are equal.

10.4.2 Long run equilibrium :

In the long run an industry would be in a stable equilibrium when every firm enjoys only normal profit. In the long run an industry has to fulfill three conditions. They are-

1. MR of every firm must be equal to its MC. The MC curve of every firm must cut its MR curve from below.
2. The AR of every firm must be equal to its AC.
When $AR = AC$ the number of firms in the long run industry would remain constant and the industry would attain a stable equilibrium.

In the case the AR is more or less than AC the industry would not be in a stable equilibrium. When AR is greater than AC the existing firms would enjoy excess profit. This would induce new firms to enter the industry. The output would increase and the price would come down until it is equal to AC. On the other hand, when AR is less than AC some existing firms would suffer losses. This would force some of them to leave the industry. Hence the output would decrease and the price would rise until it becomes equal to AC.

When AR is equal to AC the industry as well as every firm will be in a stable equilibrium. In such a situation the number of firms in the industry and its output would remain constant.

3. The long run normal price in the industry is in equilibrium when the long run demand and long run industry's supply are equal.

10.5 QUESTIONS

1. Explain the features of perfect competition.
2. Discuss how equilibrium price is determined under perfect competition.
3. Explain how a firm under perfect competition attains an equilibrium in the short run.
4. How a firm under perfect competition attains an equilibrium in the long run. Discuss
5. Describe the equilibrium condition of the industry in the short run and long run under perfect competition.



MONOPOLY MARKET

Unit Structure :

- 11.0 Objectives
- 11.1 Introduction of monopoly
- 11.2 Types of Monopoly
- 11.3 Equilibrium of a firm
 - 11.3.1 Short run equilibrium
 - 11.3.2 Long run equilibrium
- 11.4 Discriminating Monopoly
 - 11.4.1 Types / Methods of price discrimination
- 11.5 Equilibrium under discriminating monopoly
- 11.6 Dumping
 - 11.6.1 Equilibrium under the conditions of dumping
- 11.7 Questions

11.0 OBJECTIVES

- To study the meaning and types of monopoly.
- To study the equilibrium of a monopoly firm in the short run and long run.
- To understand the meaning of discriminating monopoly and conditions essential for price discrimination.
- To study the equilibrium of a monopoly firm under discriminating monopoly.
- To study the equilibrium of a monopoly firm under conditions of dumping.

11.1 INTRODUCTION OF MONOPOLY

The term 'Monopoly' consist of two words 'Mono' and 'poly'. Mono means single, poly means seller. Thus, when there is only one seller of a commodity in the market can be called as monopoly market. There is various definition of 'monopoly' given by various

economists. Prof. Lerner defines it as, 'any seller who is confronted with a falling demand curve for his product.'

The Monopoly refers to, 'that market situation in which there is only one firm (seller) in the market, that has a control over the supply of a commodity and which has no close substitutes for its product in the market.'

It is to be noted here that in practice we rarely come across the pure monopoly (single seller) except in case of government monopolies. When we refer to monopoly, normally we have 'lesser degree of competition' in our mind rather than complete absence of competition.

Features of Monopoly-

The above definitions help us in determining certain broad features of monopoly market.

1. Single Seller – There is only one producer/firm/seller of the product in the market. Obviously, he has complete control over the supply of the commodity.
2. Absence of perfect substitutes – In a monopoly market the product of a monopolist does not have perfect or close substitutes.
3. Price Maker – A monopolist is a price maker and not a price taker. It means that monopolist himself is in a position to decide the price. He does not have to accept the price in the market.
4. Profit Maximization – Unlike a competitor seller, the monopolist necessarily aims at earning maximum profits. As Marshall puts it the price setting by a monopolist is not just for covering the cost of production but is essentially for earning maximum net revenues.
5. Firm and Industry – As pointed out earlier in a monopoly market, there is no distinction between a firm and an industry. The monopolist firm is itself the industry.
6. Falling Demand Curve – As Prof. Lerner points out that a monopolist is always confronted by a falling demand curve which means that he gets a fairly inelastic demand curve for his product.

Thus, a market characterized by all the above features is a monopoly market.

11.2 TYPES OF MONOPOLY

Monopoly may be classified into various types. These types of monopoly are based on various criteria. The main types can be described in the following manner.

1. Pure monopoly and Imperfect monopoly: The classification of monopoly into pure and imperfect is based on degree of competition in the market. Pure monopoly is said to exist when there is no competition at all in the market. It is possible only if there are no substitutes for the monopolist's product. On the other hand, imperfect monopoly implies a market where the monopolist may have a few substitutes though the substitutes may not be absolute or perfect substitutes.
2. Private and Public Monopolies: This classification is made on the basis of the ownership of monopoly firm. Private monopoly refers to a monopoly firm owned by a private individual. Public monopoly, on the other hand is a firm owned, managed and controlled by Govt. There are certain types of activity which are exclusively meant for public undertaking. Indian Railway or Post can be cited as examples of such public monopolies.
3. Natural, legal, technological and joint monopolies: This classification is based on the sources of getting monopoly power by firms.

Natural monopolies refer to a situation where, by advantageous location, age-old reputation etc. the firm derives a monopoly power.

Legal monopolies arise out of legal sanctions for patents trademarks etc. The other firms are forbidden to make use of patents and trade- marks already given to certain firms.

Technological monopolies refer to the monopoly power gained by certain firms because of their technological expertise.

Joint monopolies are enjoyed by certain firms who come together with a definite objective and form combinations like cartels, trusts etc.

4. Simple Monopoly and Discriminating Monopoly: Such a classification is made on the basis of the pricing policies adopted by the monopoly firms. Simple monopoly has a uniform price policy for all customers while the discriminating monopoly firms charges different prices from different customers for the same product.

11.3 EQUILIBRIUM OF A FIRM

In order to understand the price output determination or equilibrium of a firm in a monopoly market in the short run and in the long run we shall make some basic assumptions.

1. Monopoly of a seller.
2. Perfect competition among the buyer.
3. No close substitutes.
4. Profit maximization.

With the above assumption we shall now first deal with the short run equilibrium of a firm under monopoly.

11.3.1 SHORT RUN EQUILIBRIUM

It may be recalled here that in the monopoly market AR and MR differs from each other. This is on account of price variations. It should also be noted here that for a monopoly firm AR curve represents the demand curve. The AR curve also denotes the price under any market situation as AR is equal to price. The equilibrium condition is equality of MR and MC. The monopoly price may be greater than, equal to or less than AC which may lead to excess profits, no profit no loss and loss respectively. This means there are three possibilities in the short run equilibrium. The figure No. 11.1, 11.2, and 11.3 will make it clear.

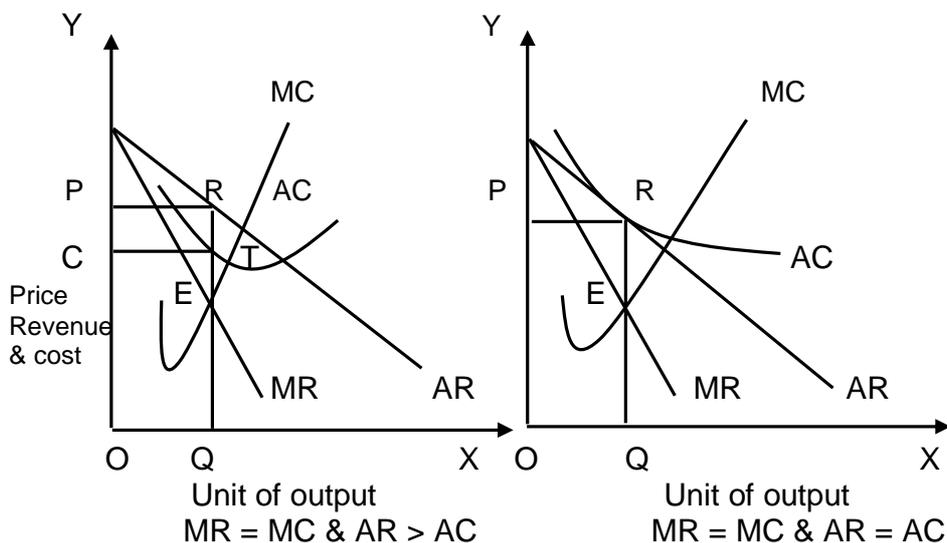


Figure 11.1

Figure 11.2

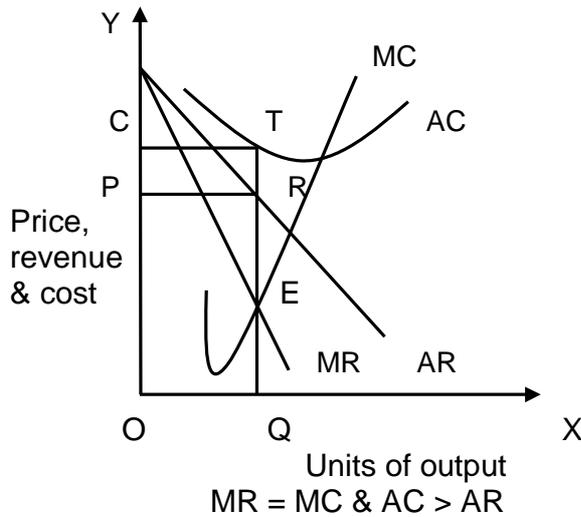


Figure No.11. 3

The above figure No. 11.1 shows that X axis represent units of output and Y axis represent price, revenue and cost. MC is the marginal cost curve which intersects MR curve at point 'E'. At this equilibrium point AR average revenue is more than AC average cost. At point 'E' OQ units are produced and sold at OP price. The average cost of OQ units of output is OC which is less than average revenue or price OP. The average revenue curve AR lies above the AC average cost curve. This enables the monopolist to earn excess profits shown be the area PRTC.

The figure No. 11.2 shows that MC curve intersects MR curve at point 'E'. Point 'E' is the equilibrium point. At this equilibrium level AC average cost curve is tangent to AR average revenue curve. This shows that at point 'E' not only $MR = MC$ but also $AR = AC$, OQ units are produced at OP price. The average cost of OQ units is equal to average revenue or price OP. Hence at this output the monopolist is able to earn only normal profit i.e. no loss no profit.

The above figure No. 11.3 shows that at point 'E' the monopoly firm attains equilibrium. At this equilibrium point the average cost curve AC lies above the AR average revenue curve which shows that average cost is greater than average revenue. At point 'E' OQ units are produced and sold at OP price. The average cost at OQ units is OC which is more than the average revenue or price OP. Hence, firm has to bear a loss shown by the area PCTR.

11.3.2 Long run equilibrium :

The long run equilibrium of the monopoly firm is attained at point 'E' where LMR and LMC curves intersects each other. In the long run the firm can change the variable as well as fixed

factors of production. The monopolist will try to maximize profits to the extent possible.

In the long run the monopolist will earn supernormal or excess profits. In any case he will not earn normal profit or bear the losses. The following figure shows the condition of excess profit earning and long run equilibrium.

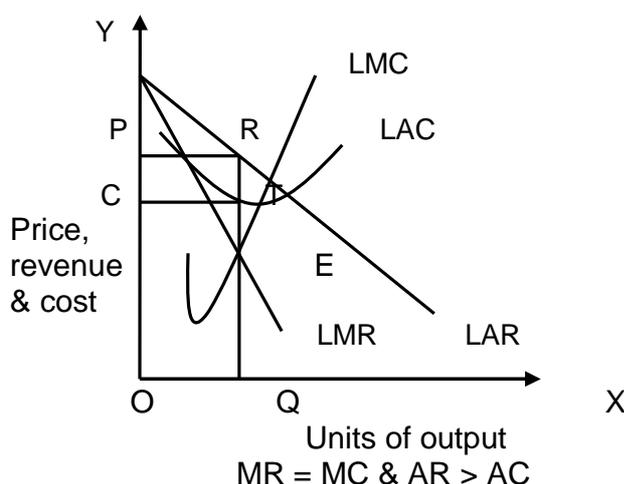


Figure No. 11.4

The above figure No. 11.4 shows that units of output is measured on X axis and price, revenue and cost are measured on Y axis. LMC is the marginal cost curve which intersects LMR curve at point 'E'. At this equilibrium point AR average revenue is more than LAC average cost. At point 'E' OQ units are produced and sold at OP price. The average cost of OQ units of output is OC which is less than average revenue or price OP. The average revenue curve AR lies above the AC average cost curve. This enables the monopolist to earn excess profit shown by the area PRTC. It should be remembered that the elasticity of demand decides the price. If the demand is elastic lower price will be set and if the demand is more inelastic the price would be higher.

11.4 DISCRIMINATING MONOPOLY

Discriminating monopoly is one of the important features of the monopoly market. When a monopoly firm charges different prices from different customer for the same product at the same time is known as price discrimination. A monopoly under which this type of price discrimination is practiced is known as Discriminating Monopoly. In actual practice when we use the term 'Price Discrimination', we refer to discrimination between groups of buyers rather than discrimination between units of a homogeneous product.

Essential Conditions for Price Discrimination –

There are three basic conditions which must be fulfilled for Price discrimination. The conditions are as follows.

1. **Monopoly Firm:** Price discrimination is possible only for a monopoly firm. It means that a firm under perfect competition can not go for price discrimination, obviously as the customer may go to seller other than the discriminating one.
2. **Two or more markets:** The monopolist should have two or more markets for the same commodity with different elasticities of demand at a monopoly price. This enables the monopolist to charge higher price in the market having more inelastic demand and relatively lower price in the market having lesser inelastic demand for his product. This condition of different elasticities of demand in different markets is the most important condition because; if the elasticities are equal/ same the monopolist can not increase his profits simply by distribution of his total output in different markets.
3. **No possibility of resale:** This condition is also important since, the possibility of resale of the commodity would deny the possibility of discrimination. If a consumer is in a position to purchase the commodity from the market where the price is low and resell it in the market where the price is higher, the monopolist will not be able to continue with the price discrimination. The two market should be totally separated from each other, other wise the exchange of goods would take place between the customers. Thus there should be no communication between the customers of the two different markets. The markets for services can be easily separated from each other. The doctor can therefore charge different fees from different patients for the same type of services.

Thus, if the above conditions are fulfilled the monopolist is able to follow the policy of price discrimination.

11.4.1 Types/ Methods of price discrimination :

There are various types or methods of price discrimination which are determined on the basis of the strategy or the policy adopted by the monopolist. Following are the main methods or types.

1. **Discrimination according to markets:** The monopolist may discriminate between the whole sale and retail market. Thus a commodity may be sold at a lower price in the wholesale market and at a higher price in the retail market.
2. **Discrimination according to income:** Discrimination can also be made on the basis of incomes of various customers. The

financial consultant may charge higher fees from a big businessman while lower fees from a small businessman.

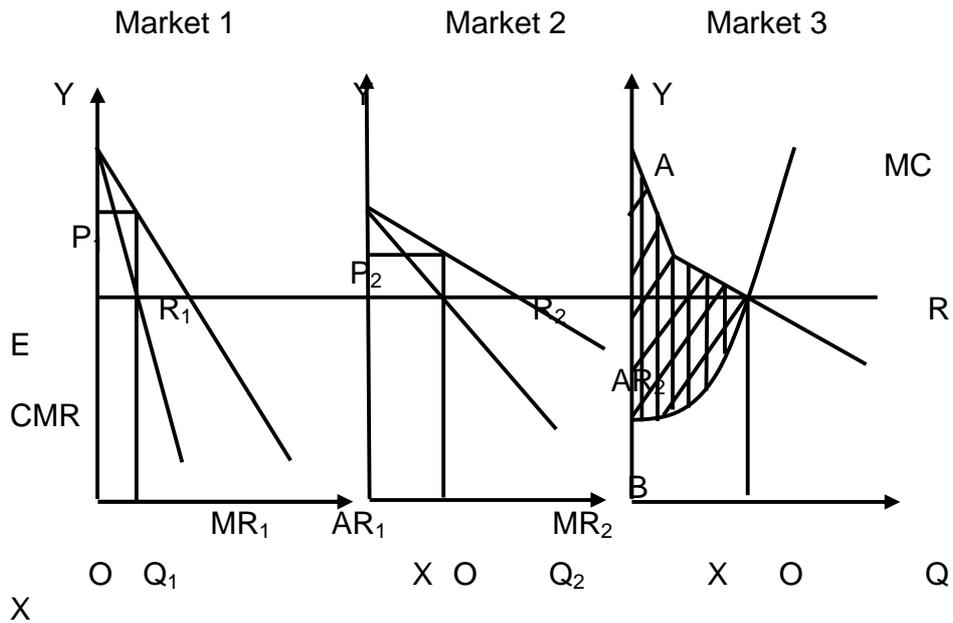
3. Discrimination according to time: The time when a commodity or service is bought may also constitute the basis for price discrimination. The rickshaw service hired during the night hours costs more fare. Doctors may charge higher fees for the night visits.
4. Discrimination according to national boundaries: A monopolist may charge higher price in the protected domestic market but a lower price across the national boundary. This in other words called as 'dumping'.
5. Discrimination according to utility: Sometimes, different prices are charged from different customers according to the utilities conferred on them. Discrimination in first class and second class fares by railways is an example of this kind. The passenger travelling by first class gets more comforts for which he pays more.
6. Discrimination according to places: The place where the commodity is sold is also responsible for price discrimination. The set of 'playing cards' sold at railway station shop may cost more than elsewhere.
7. Discrimination according to uses: Sometimes the monopolist may charge different price for the same service or commodity if used for different purposes. The electricity charges for example, are more for domestic use than for industrial use.

The above mentioned types or methods are the major types of price discrimination.

11.5 EQUILIBRIUM UNDER DISCRIMINATING MONOPOLY

The equilibrium under discriminating monopoly is also governed by the same principle of $MR = MC$. However, since the monopolist will have two or more markets with different elasticities of demand, he will have to be in equilibrium in each market separately as well as in all the markets jointly. The supply of his product will have to be distributed accordingly.

The monopolist will be able to charge higher price and will bring less number of units in the market where the demand for his product is more inelastic but he will charge lower price and bring more units in the market where the demand is less inelastic. This will be clear from the following diagram.



Equilibrium under the conditions of dumping
Figure 11.5

In the above diagram fig. 11.5 represent market (1) with more inelastic demand, market (2) with less inelastic demand and the combined situation for the firm in fig. (3). It can be seen that OP_1 price is charged in market '1' while OP_2 price is charged in market '2'. The CMR in fig. '3' is combined marginal revenue curve of the two markets derived by adding the MR curves in the two markets sideways. Thus, by maintaining the same level of MR in two markets, the monopolist distributes the total output (OQ in fig. 3) in the two markets as OQ_1 and OQ_2 . It can be seen that, he brings less output where the price is higher and more output is brought where the price is lower. By doing so, he can maximize his profits. The total profits earned by him are shown by the shaded area ARB in fig. '3'.

Thus, price discrimination helps the monopolist in maximizing his profits.

11.6 DUMPING

Selling a product at a higher price at home and at a lower price in the foreign countries is called as dumping. In other word, 'selling goods abroad at a lower price than that of the domestic price is called dumping.'

According to Haberler, 'the sale of good abroad at a price which is lower than the selling price of the same good at the same time and in the same circumstance at home taking account of

differences in transport costs is called as dumping.' Dumping is a special type of price discrimination. It may be persistent or temporary.

Motives for dumping:

1. To remove rivals in foreign markets.
2. To dispose of surplus output.
3. To take the advantage of falling cost conditions.
4. To create new demand
5. Differences in the price elasticities of demand.

11.6.1 Equilibrium under the conditions of dumping:

We can explain the equilibrium of a firm under the conditions of dumping based on the following assumptions.

1. The monopolist sells his product in the home market and in foreign markets.
2. He attempts to maximize his profits.
3. There are many buyers on the demand side.
4. He is a monopolist at home and a competitor in foreign countries.
5. It should not be possible for foreign buyers to re-sell the good in the domestic market of the exporting country.
6. In the home market, the demand for his product is relatively inelastic and in foreign markets, it is perfectly elastic.

The conditions for the maximization of his total profits are as follows.

- i) Profits are maximized when MR in both the markets are equal.
- ii) The marginal revenue in each market is equal to the marginal cost of the total output.

This can be explained with the help of the following diagram. In figure No.8 AR_H is a downward sloping demand curve at home and MR_H curve is the corresponding downward sloping marginal revenue curve at home.

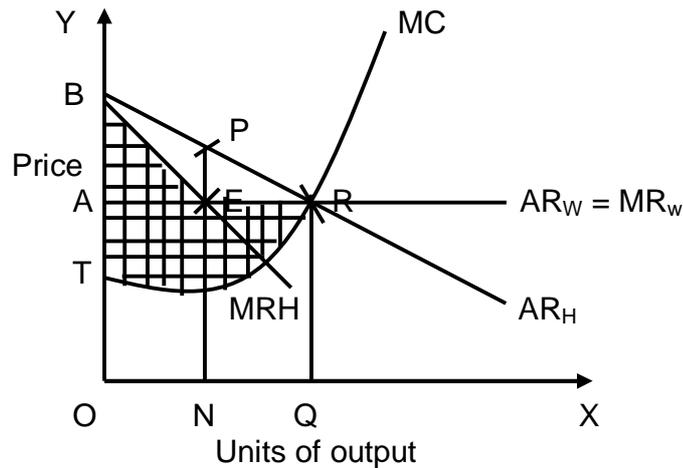


Figure No. 11.6

Since, the monopolist is a competitor in the foreign market; we shall assume that the demand curve for his product in foreign countries is perfectly elastic under the condition of perfect competition.

Hence, he faces a horizontal demand curve represented by AR_W in the foreign market. Since it is horizontal, the marginal revenue, MR_W coincides with the AR_W . Hence, $AR_W = MR_W$.

BE is the MR curve in the home market and ERD is the MR curve in the foreign market. When both are added, we get the combined marginal revenue curve $BERD$ at point 'R' at which $CMR = MC$. Here firm attains equilibrium. The equilibrium output is OQ . The output is distributed in the two markets- the home market and the foreign market in such a way that the marginal revenues are equal in each market, and the marginal revenue in each market is equated to marginal cost of the entire output. In the home market MR_H curve at point E where $MR_H = MC$. So ON amount is sold in the home market at PN price and remaining output NQ is sold in the foreign market at OA or RQ price because in the foreign market $MR_W = MC$. It may be noted that with this distribution, $MR_H = MR_W = MC$ for $EN = RQ$. Hence, $MR_H = MR_W = CMR = MC$. Naturally the profits are maximized. These profits are $BERT$.

It shows that the price charged at home is higher (PN) and the amount sold is lower (ON) than in the foreign market where the price charged is lower (OA or RQ) and the amount sold is higher (NQ).

11.7 QUESTIONS

1. Explain the features of monopoly.
2. What are the various types of monopoly.
3. Explain how a monopolist attains an equilibrium in the short run.
4. What is discriminating monopoly? Describe the essential conditions for price discrimination.
5. How monopolist attains an equilibrium under discriminating monopoly?
6. Explain in detail the concept of dumping.



MONOPOLISTIC COMPETITION

Unit Structure :

- 12.0 Objectives
- 12.1 Introduction of monopolistic competition
 - 12.1.1 Features / Characteristics
- 12.2 Equilibrium or Price-output determination of the firm under monopolistic competition
 - 12.2.1 Short run equilibrium
 - 12.2.2 Long run equilibrium
- 12.3 Product differentiation
- 12.4 Selling Costs
- 12.5 Wastes of Monopolistic Competition
- 12.6 Introduction : Oligopoly market
 - 12.6.1 Classification / Types
- 12.7 Features or characteristics of Oligopoly
 - 12.7.1 Price rigidity or Stability
 - 12.7.2 Kinky (Kinked) Demand Curve
- 12.8 Questions

12.0 OBJECTIVES

- To study the meaning and features of monopolistic competition.
- To understand the equilibrium of a firm in the short run and long run under monopolistic competition.
- To study the concepts of product differentiation and selling cost.
- To study the wastes of monopolistic competition.
- To study the meaning and types of oligopoly.
- To study various features of oligopoly market.

12.1 INTRODUCTION OF MONOPOLISTIC COMPETITION

The term 'monopolistic competition' is used interchangeable with the term 'imperfect competition'.

The concept of 'Monopolistic Competition' was introduced by Prof. E. H. Chamberlin in his book, 'Theory of Monopolistic Competition'. Monopolistic Competition refers to that market situation, 'where there is large number of sellers producing a commodity with their own peculiarities.' This means the commodity is not identical or homogeneous. There is product differentiation. Each producer is producing a different type of a commodity than the others.

Monopolistic Competition strictly means a market with competitive monopoly of a large number of sellers.

12.1.1 Features/ Characteristics:

1. Large Number of Firms: Monopolistic competition is characterized by a large number of firms producing a similar product. Each firm will have a definite group of customers and enjoys a some sort of monopoly in respect of the particular group of customer. Each firm has to face competition from the other firms. Therefore, each firm has to make efforts for maintaining and increasing its market share. As the number of firms is large, each firm produces a relatively smaller share of the total market supply.
2. Product differentiation: The large number of firms under monopolistic competition produces differentiated products which are relatively close substitutes for each other but not perfectly substitutes. Each firm, in order to attract maximum buyers will have its own peculiarities of the product which distinguishes its product from other similar products in the market. This is called as product differentiation.

Product differentiation may occur in many ways. The firm may have its own quality, Brand- name, material used, packing, appearance, fragrance, shape, technology etc. of the commodity.

3. Easy entry and exit: The entry in and exit from such a market is not very difficult. There are no such restrictions on the entry and exit of firms. Though each faces competition, is independent in case of price and output decisions.

4. Selling costs: The market is characterized by selling costs. In order to attract and better known to the customers the firm has to go for sales promotion activities like advertising, free service and buy one and get one more free etc. For this each firm requires to be incurred huge amount of money. These expenses are called as selling costs.
5. Sloping demand curve: Each firm under this type of market has a downward sloping demand curve because the demand for a commodity of a monopolistic competitive firm is more elastic. The demand curve is less steep than the demand curve of a monopoly firm.
6. Concept of Group: Professor Chamberlin used the word group instead of industry. Under monopolistic competition, there is heterogeneity and therefore he has used the concept of group to imply a collection of firms producing closely related but not homogeneous goods. Under monopolistic competition, due to qualitative differences and buyers' preferences, there are wide divergences in the curves of cost of production and a variety of demand curves. The result is heterogeneity of prices and variations over a wide range of output and in profits.

12.2 EQUILIBRIUM OR PRICE-OUTPUT DETERMINATION OF THE FIRM UNDER MONOPOLISTIC COMPETITION

The monopolistic competition pricing can be divided into two broad categories, short run equilibrium of a firm and long run equilibrium of a firm. We deal each of them separately.

12.2.1 Short run equilibrium :

Like any other type of market the equilibrium of a firm under monopolistic competition will be established where the MR is equal to MC. In the short run period, the firm may make profits, incur losses or may have no profit no loss situation.

The demand curve of a firm under monopolistic competition may differ in its elasticity from firm to firm. However, it will neither be perfectly elastic nor perfectly inelastic. The slope of AR curve may therefore vary accordingly. We can understand the three possibilities of short run equilibrium with the help of following diagrams.

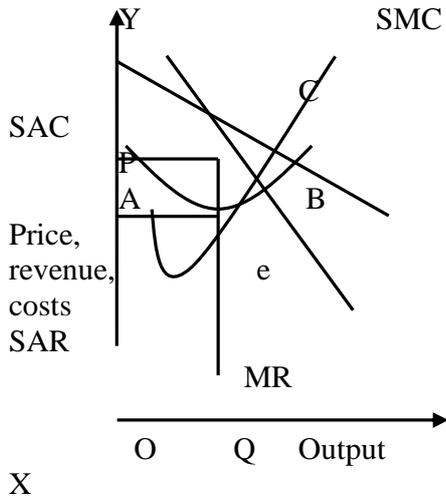


Figure 12.1

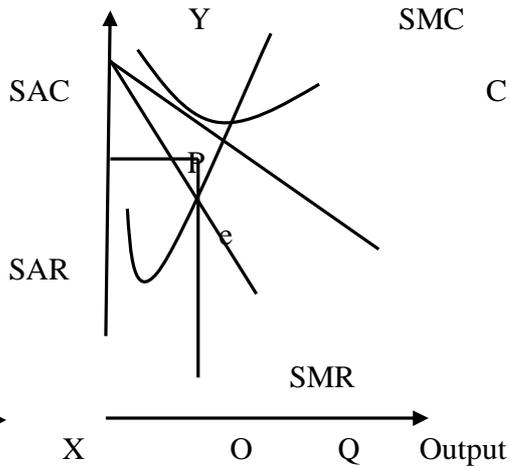


Figure 12.2

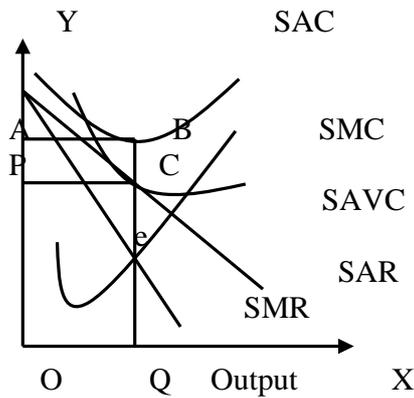


Figure 12.3

The above three diagrams shows that there are three possibilities of short run equilibrium of a firm in the monopolistic competition.

Fig. 12.1 shows that, SMC curve cuts the SMR curve at point 'e' when the average cost is OA or QB and the price or average revenue is OP. The price or average revenue is more than the average cost and hence the firm enjoys profits as shown by the area PCBA.

In Fig. 12.2 the SMR = SMC and SAC curve is tangent to SAR curve and hence the firm earns only normal profit. It means the firm neither earns excess profits nor does it incur any losses.

In Fig. 12.3 the SMR = SMC, SAVC curve is tangent to SAR curve and SAC lies above the SAR. It means that average cost is more than the average revenue hence the firm has to incur losses

shown by the area ABCP but its price or average revenue is just sufficient to take care of the average variable costs.

Thus, the short run equilibrium may enable this firm in monopolistic competition to earn profits, to sustain losses and with no profit no loss situation.

12.2.2 Long run equilibrium :

If the firm is earning supernormal profits, more firms will enter the 'group' in the long-run. If the firm is incurring losses, firms will leave the group in the long-run. If the firm is making no loss no profit in the short run, it will continue to remain in the same position in the long-run.

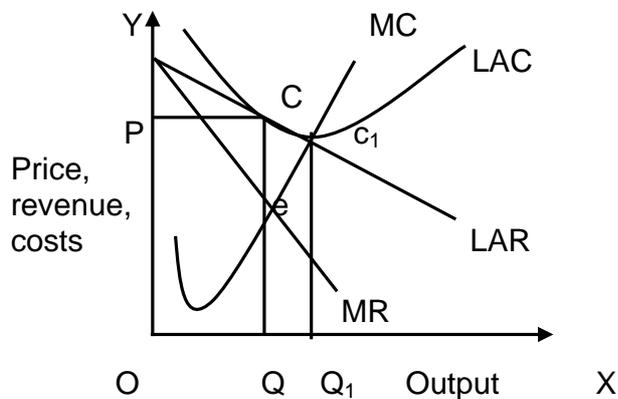


Figure 12.4

In the long-run, at point 'e' the LAC long run average cost curve become tangential to the LAR long run average revenue curve or the demand curve. Since at this point, the slope of the AR and AC curves is equal to the MR and MC curves will intersect vertically below it. This is shown by point 'e' in the following diagram.

The long-run equilibrium conditions are- $MR = MC$ and $AR = AC$.

As the firm is earning just normal profit, there is no tendency for the number of firms in the group to change. Thus, the long run equilibrium of the firm implies equilibrium for the group as a whole also.

Since the long run equilibrium is shown by the tangency between the AR and AC curves; it implies that the equilibrium output OQ will necessarily be less than the least cost output OQ₁. This is true because a downward sloping AR curve can be tangential to U shaped AC curve at some point to the left of the minimum point (c₁). It means that in the long run economies of

scale are not fully exploited by the firm and there is excess or unutilized capacity equal to OQ_1 amount of output.

12.3 PRODUCT DIFFERENTIATION

Monopolistic competition is characterized by product differentiation and selling costs. Product differentiation emerges out of the typical nature of competition in such market. Each individual firm in a group producing a particular type of commodity has to face the competition from the other firms in the group. The competition is of two types i.e. price competition and product differentiation.

Price competition is reflected in the individual price setting of a firm. The firm may set a slightly lower price than its rivals for inducing the buyers to purchase its product. Thus price decisions are independently taken by every firm.

Product competition is reflected in the product differentiation. Product differentiation implies the special features introduced by the firm so as to distinguish its product from the other similar products in the market.

It may occur in many ways. The firm may have its own physical features of the product such as color, shape, appearance, size, fragrance etc. which may be helpful in giving some distinction to its product.

The firm may also have a different technique of production or other qualities of the product. Sometimes the brand-name, trade-mark, packing etc. are also used for product differentiation.

The product differentiation is a specific character introduced by each individual firm in the monopolistic competition.

12.4 SELLING COSTS

The firm in order to bring its distinguishing character to the notice of the customer has to spend on advertising and publicity of its product through other methods of sales promotion. Most of the firms spend on advertising on radio and television. The modern age is in fact an age of advertisement hence the firm has to spend sizeable amount of money on advertisements. The market in the modern days has changed in such a manner that the customers are prejudiced in favour of certain goods. At present, they go to the market with pre-determined choice of the products, mostly formed by the advertisements. Considering this the firms have to spend a

lot on publicity, if they have to induce the customers to buy their product. They try to impress upon the customer the specialties of differentiating qualities of their product. The expenses incurred on such sales promotion activities are called as selling costs.

Prof. Chamberlin has defined selling costs as, “costs incurred in order to alter the position or shape of the demand curve for a product.”

12.5 WASTES OF MONOPOLISTIC COMPETITION

Under monopolistic competition there are several wastes and both the consumers and factors of production are exploited. These wastes have been pointed out by Prof. Chamberlin. The wastes are-

- 1 Excess Capacity- Under monopolistic competition a firm’s equilibrium output is less than the optimum output. The average cost at the equilibrium level is more than minimum. There is excess or unused capacity, which is a waste in monopolistic competition.
- 2 High Price for the Consume- Under monopolistic competition a consumer has to pay a higher price for a product than under perfect competition even in the long run period. Though the firm is earning only normal profits the price paid by the consumer is more than that under perfect competition.
- 3 Selling Cost- Under monopolistic competition extra expenditure is incurred by firms on competitive advertising to increase individual sales. The advertising is considered as a waste under monopolistic competition because it leads to wasteful competition among rival firms and increase cost which is not necessary in the market. This cost is passed on to the consumers in the form of higher price. Thus, competitive advertising is a clear waste of resources.
- 4 Unemployment- In monopolistic competition, the problem of unemployment is created due to many reasons. One of these is the fact that the productive capacity is not fully utilized under monopolistic competition and therefore, employment is not increased. Further, in order to maintain high prices, production is sacrificed and this may create cyclical unemployment.
- 5 Lack of Specialization- Since there are many rival firms producing similar but not identical products the scope for large scale production is limited by smallness of size. There is inadequate specialization and a firm can not reap the advantages or economies of large scale production. Thus

consumers are deprived of the fruits of specialization and large scale production.

- 6 Cross Transport- There is a waste of cross transport under monopolistic competition. The product of Calcutta manufacturer may be sold in Mumbai and a similar product of Mumbai may be sold in Calcutta. The consumers have to pay an increased price, which would include transport costs. If the Calcutta producer serves the Calcutta market and Mumbai producer serves the Mumbai market, transport cost can be avoided and consumers would be benefitted. But this does not happen because of product differentiation and every rival producer likes to capture the market throughout India.

12.6 INTRODUCTION – OLIGOPOLY MARKET

Oligopoly is that form of imperfect competition where there are a few firms in the market producing either homogeneous product or producing products which are close but not perfect substitutes of each other. It differs from monopoly as well as perfect competition and monopolistic competition.

The term 'Oligopoly' is derived from the Greek words 'oligos' which means a few and 'pollis' which means to sell. In short, oligopoly means literally few sellers.

According to Baumol, 'Oligopoly is an industry with a small number of large firms.' It is characterized by the existence of a large number of buyers but a few sellers producing either homogeneous or differentiated products.

According to Stigler, 'Oligopoly is that situation in which firm's market policy is based on the expected behavior of close rivals.' Oligopoly is a market situation in which there are more than two sellers.

12.6.1 Classification/ Types :

Oligopoly can be classified under different bases.

1. Perfect (Pure) Oligopoly and Imperfect (Differentiated) Oligopoly: - This classification is made on the basis of product differentiation. Oligopoly is perfect if the product produced by the competing firms is homogeneous or identical. On the other hand, oligopoly is imperfect when the firms produce products which are close but not perfect substitutes.
2. Open Oligopoly and Close Oligopoly: - This classification is done on the basis of freedom to enter the industry. An open

oligopoly refers to that market situation where the new firms are free to enter the industry. A closed oligopoly is that market situation where the new firms are not allowed free entry into the industry.

3. Collusive Oligopoly and Non- Collusive Oligopoly: -This classification is done on the basis of agreement or understanding among the firms. A collusive oligopoly refers to that market situation where the firms instead of competing, comes together to fix the prices and outputs of the industry. A non-collusive oligopoly implies lack of any understanding or agreement among the firms.
4. Partial Oligopoly and Full Oligopoly: - This classification is done on the basis of presence of absence of price leadership. Partial oligopoly refers to that market situation where the industry is dominated by one large firm which is looked upon as the price leader. Rest of the smaller firms look to the price leader for fixing the price of their products. Full oligopoly refers to that situation where price leadership is clearly visible by its absence.
5. Syndicated Oligopoly and Organized Oligopoly: - This classification is done on the basis of the degree of coordination to be found among the firms. The former refers to that situation where the firms sell their products through a centralized syndicate. The latter refers to that situation where the firms organize themselves in to a central association for fixing prices, outputs, quotas and sales etc.

12.7 FEATURES OR CHARACTERISTICS OF OLIGOPOLY

Main features of oligopoly are:

1. Few sellers: - There are few dominant or large firms, each producing a significant portion of the total output.
2. Homogeneous or differentiated products: - The output in an oligopolistic market may be either homogeneous or differentiated.
3. Barriers to entry: - There are restrictions to entry of new firms.
4. Mutual interdependence: - This is the only feature which sets oligopoly apart from other market structures. It means that price and output decisions of one firm affect the similar decisions of other firms. Because of high degree of interdependency amongst firms, the demand curve faced by an oligopolistic firm is undefined.

Since the demand curve is undefined the solution is indeterminate. Based on different behavioral assumptions a different solution is obtained. One such solution is price leadership i.e. there is one dominant or large sized firm which is a price leader. The other small firms accept this price.

5. Selling cost: - Heavy selling costs are incurred by firms to attract customers.

12.7.1 Price Rigidity or Stability :

An important characteristic of oligopoly is price rigidity. Price rigidity refers to the situation of kinked demand curve. In this situation oligopolistic price remains constant over a period of time in spite of changes in demand and cost conditions in the industry.

In other words, each oligopolist will support and follow to the prevailing or going on price to avoid uncertainties in the market. Hence there is price rigidity which suggests absence of price movement by the oligopolist.

There are number of reasons for price rigidity. They are-

1. There is a lot of uncertainty in due to the reactions of the rival firms.
2. The seller may increase their sales promotion efforts to increase their sales at the current prices instead of reducing it.
3. A stable price might have been established through agreement and prolonged negotiations.
4. In order to prevent the entry of new firms, the existing sellers may set the price at a lower level. The firm would not like disturb the existing price to achieve this objective.

12.7.2 Kinky (Kinked) Demand Curve :

The kinked demand curve was first introduced by Paul M. Sweezy to explain price rigidity under oligopoly. The kinked demand curve represents the pattern of business behavior of a firm which has no incentive either to raise or to lower its price. The firm formulates its attitude on an estimate of what its rivals will do or will not do. We can explain this with the help of following figure.

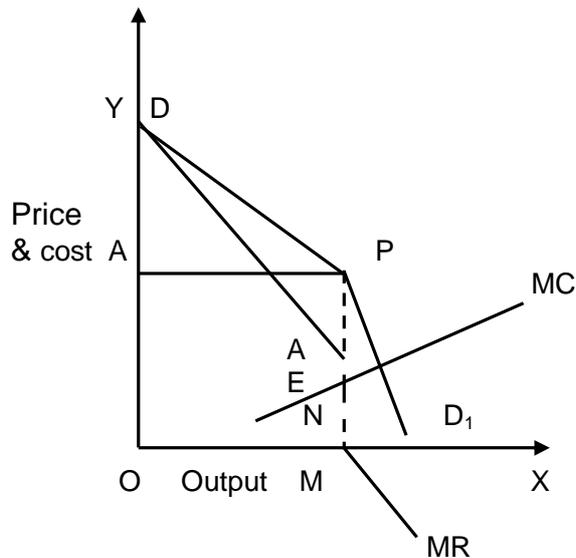


Figure 12.5

In the alongside diagram DD_1 is the demand curve (average revenue) with a kink at point 'P' which shows that the firm is producing and selling the OM output at OA price. MR is the marginal revenue curve corresponding to the kinked demand curve. It has a discontinuous portion AN .

MC is the marginal cost curve passing through the point 'E' at which the oligopolist is maximizing his profits at the prevailing price OA . In other words, the oligopolist will be in equilibrium at point 'E' and the prevailing price is OA at which kink is found in the demand curve DD_1 .

At OA price, PD portion of the demand curve is highly elastic. It shows that if the firm raises its price, other firm will not follow it. As a result, its sales will fall considerably. The corresponding portion of the MR curve is positive so that any increase in price will not only reduce total sales but also total revenue and profits also.

On the other hand, PD_1 portion of the demand curve below p is less elastic. It shows that if the firm reduces its price below OA , its rival firms also reduce their prices. The corresponding part of the MR curve below N is negative, No doubt firm's sales would increase, but the total profits would be less than before. Thus it is clear that, the firm will have no incentive either to raise or to lower the established price. Hence, the prevailing price OA will remain rigid.

12.8 QUESTIONS

1. Explain the characteristic features of monopolistic competition.
2. Explain how a firm attains an equilibrium in the short run and long run under monopolistic competition.
3. Discuss the wastes of monopolistic competition.
4. Explain the meaning and features of Oligopoly market.



Module 6

PRICING METHODS AND CAPITAL BUDGETING

Unit Structure :

- 13.0 Objectives
- 13.1 Introduction
- 13.2 Importance of Pricing Policy
- 13.3 Pricing Objectives
- 13.4 Factors affecting pricing policy
- 13.5 Methods of Pricing
- 13.6 Questions

13.0 OBJECTIVES

After having studied this lesson you should be able :-

- To Know in detail the concept of pricing
- To understand different methods and kinds of pricing
- To identify the factors affecting pricing policy
- To apply pricing decision at the time of introducing new products

13.1 INTRODUCTION

Pricing assumes a significant role in a competitive economy. Price is the main factor which affects the sales of a organisation. A good price policy is of great importance to the producers, wholesalers, retailers and the consumers. Marketers try to achieve their long-run pricing objectives through both price policies and price strategies. If the prices are high, few buyers purchase and if the prices are low, many buyers purchase. Thus market may be reduced or increased. That is, the price increases in relation to the sales revenue. Thus pricing is a critical situation.

Therefore, a sound pricing policy must be adopted to have maximum sales revenue. In the early stages of men, prices were set by buyers and sellers negotiating with each other. The seller may demand a higher price than expected and the buyer may offer a price less than the expected one. Ultimately they arrive at an agreeable price through bargaining. Now in the competitive economy, development of large business aims to have one price policy. In certain cases, the buyer looks at the price as an indicator of product quality. If the price is higher, the buyer believes the products to be of high quality.

In case the quality is not up to the mark he expects, he feels that the price is high. Hence, one cannot say that the price is high or low, without considering the quality of the product to be purchased. The price is greatly affected or influenced for future production and marketing. Prices play an important role in the economy. The time within which the product is sold varies. The goods, which are of a perishable nature and frequent changes of style, may not be stocked for long time. In the case of durable goods, they can be stocked for longer time, in the hope of getting favorable price rise. Holding the stock depends upon the financial resources of farmer, mi, middleman, wholesaler etc., and the perish ability of the goods.

13.1.1 Price

Price may be defined as the exchange of goods or services in terms of money. Without price there is no marketing in the society. If money is not there, exchange of goods can be undertaken, but without price; i.e., there is no exchange value of a product or service agreed upon in a market transaction, is the key factor which affects the sales operations.

What you pay is the price for what you get.

Price is the exchange value of goods or services in terms of money. Price of a product or service is what the seller feels it worth, in terms of money, to the buyer.

13.2 IMPORTANCE OF PRICE POLICY

A well formed price policy has special importance if price rise is a continuous process in planned economy. It has not only the influenced the living standard of people but due to increase in the expenditure of full planning, the prescribed aims and objectives of the planning are shattered. As a result, there is obstruction of economic development. But in underdeveloped countries, with economic development, price rise is quite natural. Till the increase in monetary income of the public is more than price rise, there is no comprehension. But when there is more price rise than investment

and national income, there is a need to protect from the defects of monetary fluctuations. It requires price regulation.

In short, in developing countries, the significance of price policy can be known from the following facts:

1. To Maintain Appropriate Living Standard. Price rise lets living standard of people fall and economic development of the country is obstructed. To maintain the proper living standard, price control is essential.

2. To Maintain Planning. As price rises, the work of planning increases which results in obstruction in the prescribed aims and objectives of the planning. To maintain the planning process in a fine manner, prices should be controlled at all costs.

3. Protection from Monetary Fluctuations. When price increase is more than investment and national income increases, monetary fluctuation defects are created. To remove them appropriate price control is required.

4. Establishment of Balance in Demand and Supply. In a developing economy, due to changing circumstances, balance of demand and supply disrupts by which consumer, producer and investor have to take hardships. This shows that there is need to balance the demand and supply in a proper way.

5. For Well Adjusted Distribution Management. With the view point of consumers for quick supply of goods on less prices distribution management should be well adjusted. For this, it is necessary to control the consumer price.

6. Multifaceted Development of National Resources. The major objective of economic planning is multifaceted development of national resources. Thus, price policy should be quite independent as price regulation can adjust this motto.

13.3 PRICING OBJECTIVES

To perform the marketing job efficiently, the management has to set goals first pricing is no exception. Before determining the price itself, the management must decide the objectives of pricing. These objectives are logically related to the company's overall goal or objectives. The main goals in pricing may be classified as follows.

13.3.1. Pricing for Target Return (on investment) (ROI):

Business needs capital investment in the shape of various types of assets and working capital. When a businessman invests capital in a business, he calculates the probable return on his investment. A certain rate of return on investment is aimed. Then, the price is fixed accordingly. The price includes the predetermined average return. This is seller-oriented policy. Many well-established firms adopt the objective of pricing in terms of "return on investment." Firms want to secure a certain percentage of return on their investment or on sales. The target of a firm is fixed in terms of investment. For instance, a company may set a target at 10 or 15% return on investment. Further, this target may be for a long term or short term. Wholesalers and retailers may follow the short term, usually a year, they charge a certain percentage over and above the price they purchased, which is enough to meet operational costs and a desired profit. This target, once chosen, can be revised from time to time. This objective of pricing is also known as pricing for profit. Certain firms adopt this method as a satisfactory objective, in the sense they are satisfied with a certain rate of return.

13.3.2. Market Share:

The target share of the market and the expected volume of sales are the most important considerations in pricing the products. Some companies adopt the main pricing objective so as to maintain or to improve the market share towards the product. A good market share is a better indication of progress. For this, the firm may lower the price, in comparison to the rival products, with a view to capturing the market. By reducing the price, customers are not exploited but rather benefited. The management can compare the present market share with the past market share and can know well whether the market share is increasing or decreasing. When the market share is decreasing, a low pricing policy can be adopted by large scale manufacturers who produce goods needed daily by the consumers. So the margin of profit comes down because of the low price, but the competitors are discouraged from entering the market. By a low pricing policy, no doubt, market share can be increased, besides attracting new users.

13.3.3. To Meet or Prevent Competition:

The pricing objective may be to meet or prevent competition. While fixing the price, the price of similar products, produced by other firms, will have to be considered. Generally, producers are not in a haste to fix a price at which the goods can be sold out; one has to look to the prices of rival products and the existing competition and chalk out a proper price policy so as to be able to face the market competition. At the time of introduction of products to the market, a low price policy is likely to attract customers, and can establish a good market share. The low price policy discourages the competitors.

13.3.4. Profit Maximisation:

Business of all kinds is run with an idea of earning profit at the maximum. Profit maximisation can be enjoyed where monopolistic situation exists. The goal should be to maximise profits on total output, rather than on every item- The scarcity conditions offer chances for profit maximisation by high pricing policy. The profit maximisation will develop an unhealthy image. When a short-run policy is adopted for maximising the profit, it will exploit the customers. The customers have a feeling of monopoly and high price. But long run policy to maximise the profit has no drawbacks. A short-run policy will attract competitors, who produce similar goods at low cost. As a result, price control and government regulations will be introduced.

13.3.5. Stabilize Price:

It is a long-time objective and aims at preventing frequent and violent fluctuations in price. It also prevents price war amongst the competitors. When the price often changes, there arises no confidence on the product. The prices are designed in such way that during the period of depression, the prices are not allowed to fall below a certain level and in the boom period, the prices are not allowed to rise beyond a certain level. The goal is to give and let live. Thus firms forego maximum profits during periods of short supply of products.

13.3.6. Customer Ability to Pay:

The prices that are charged differ from person to person, according to his capacity to pay. For instance, doctors charge fees for their services according to the capacity of the patient.

13.3.7. Resource Mobilization:

This is a pricing objective, the products are priced in such way that sufficient resources are made available for the firms' expansion, developmental investment etc. Marketers are interested in getting back the amount invested as speedily as possible. The management may fix a higher price and this trend will invite competitors with low priced similar products.

13.3.8. Survival and growth:

An important objective of pricing is survival and achieving the expected rate of growth. Profits are less important than survival. According to P. Drucker, avoidance of loss and ensuring survival are more important than maximisation of profit.

13.3.9. Prestige and goodwill:

Pricing also aims at maintaining the prestige and enhancing the goodwill of the firm.

13.4 FACTORS AFFECTING PRICING POLICY

Price policy is government by external factors and internal factors. External factors are-elasticity of demand and supply competition goodwill of firm, trend of the market, and management policy. Keeping in view above facts, certain general considerations which must be kept in view while formulating a suitable price policy are listed below:

(A) Internal Factors

(1) Organisational Factors :

Pricing decisions occur on two levels in the organisation. Over-all price strategy is dealt with by top executives. They determine the basic ranges that the product falls into in terms of market segments. The actual mechanics of pricing are dealt with at lower levels in the firm and focus on individual product strategies. Usually, some combination of production and marketing specialists are involved in choosing the price.

(2) Marketing Mix

Marketing experts view price as only one of the many important elements of the marketing mix. A shift in any one of the elements has an immediate effect on the other three-Production, Promotion and Distribution. In some industries, a firm may use price reduction as a marketing technique. Other firms may raise prices as a deliberate strategy to build a high-prestige product line. In either case, the effort will not succeed unless the price change is combined with a total marketing strategy that supports it. A firm that raises its prices may add a more impressive-looking package and may begin a new advertising campaign.

(3) Product Differentiation

The price of the product also depends upon the characteristics of the product. In order to attract the customers, different characteristics are added to the product, such as quality, size, colour, attractive package, alternative uses etc. Generally, customers pay more price for the product which is of the new style, fashion, better package etc.

(4) Cost of the Product

Cost and price of a product are closely related. The most important factor is the cost of production. In deciding to market a product, a firm may try to decide what prices are realistic, considering current demand and competition in the market. The product ultimately goes to the public and their capacity to pay will fix the cost; otherwise product would be flapped in the market.

(5) Objectives of the Firm

A firm may have various objectives and pricing contributes its share in achieving such goals. Firms may pursue a variety of value-oriented objectives, such as maximizing sales revenue, maximising market share, maximising customer volume, minimizing customer volume, maintaining an image, maintaining stable price etc. Pricing policy should be established only after proper considerations of the objectives of the firm.

(B) External Factors

External factors are those factors which are beyond the control of an organisation. The following external factors would effect the pricing decisions :

1. Demand

The nature and condition of demand should be considered when fixing the price. Composition of the market, the nature of buyers, their psychology, their purchasing power, standard of living, taste, preferences and customs have large influence on the demand. Therefore the management has to weigh these factors thoroughly. If the demand for a product is inelastic, it is better to fix a higher price for it. On the other hand, if demand is elastic, lower price may be fixed.

2. Competition:

In modern marketing, a manufacturer cannot fix his own price without considering the competition. A number of substitutes enter the market these days. Hence the influence of substitutes has also to be considered when fixing a price. A firm must be vigilant about the prices charged by competitors for the similar products. If prices are fixed higher than the prices charged by competitors, the customers are likely to switch over to the products of competitors. On the other hand, if the prices charged are much lower than the prices of the rivals, the customers may become suspicious about the quality and hence lower price may not lead to higher sales. To avoid competitive pricing, a firm may resort to product differentiation. Sometimes a higher price may itself differentiate the product. In view of these, the management must be very careful in determining the prices.

3. Distribution channels:

Distribution channels also sometimes affect the price. The consumer knows only the retail price. But there is a middleman working in the channel of distribution. He charges his profit. Thus when the articles reach the hands of consumers, the price becomes higher. It sometimes happens that the consumers reject it.

4. General Economic conditions:

Price is affected by the general economic conditions such as inflation, deflation, trade cycle etc. In the inflationary period the management is forced to fix higher price. In recession period, the prices are reduced to maintain the level of turnover. In boom period, prices are increased to cover the increasing cost of production and distribution.

5. Govt. Policy:

Pricing also depends on price control by the Govt, through enactment of legislation. While fixing the price, a firm has to take into consideration the taxation and trade policies of gov't.

6. Reactions of consumers:

An important factor affecting pricing decisions is the attitude of consumers. If a firm fixes the price of its product unreasonably high, the consumers may boycott the product.

13.5 METHODS OF PRICING

There are four basic pricing policies. They are:

1. Marginal Cost pricing
2. Full -Cost pricing
3. Multi-product pricing
4. Limit pricing : Bain's Model.

13.5.1. Marginal Cost pricing

Under both full cost pricing and rate of return pricing, the prices are set on the basis of total cost (variable cost + fixed cost). Under the marginal cost pricing, the price is determined on the basis of marginal or variable cost. In this method, fixed costs are totally excluded.

Under marginal cost pricing, prices are determined on the basis of marginal cost and not on the basis Of fixed cost. In case of marginal cost pricing, fixed cost is ignored. The firm uses those costs that are directly attributed to the output of a specific product. Pricing decision involves planning for the future and as such, it should be dealt solely With the anticipated Wand estimated revenues, expenses and capital outlays. All type of past outlays, i. e. : historical cost and sunk cost give rise to the full cost.

The important objective of a firm is to maximise profits, to attain this objective the firm seeks to fix its prices so as to maximise its total contribution to fixed costs. The above objective is achieved by - considering each product in isolation and fixing its price at a level which is calculated to maximize its total contribution.

There are two assumptions in this regards:

- (1) **Possibility of Market separation:** The firm should be able to separate its markets so that he can charge higher price in one market and lower price in other markets (i.e. price discrimination).
- (2) **There are no legal restrictions:** Now, we will see in terms of graphical representation how to determine price under the marginal cost pricing principle.

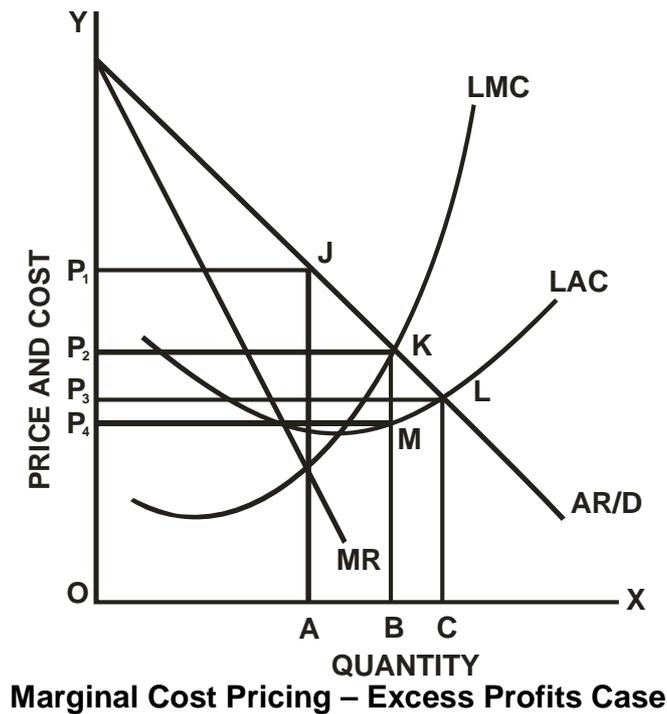


Figure 13.1

• Figure 13.1 shows three possible prices which a public utility enterprise may charge given the freedom it is granted by the government. In case the public utility enterprise enjoying monopoly is not regulated by the government, it may have the freedom to charge profit maximising price. In Figure, OP_1 is the profit maximising price of the output, as at this output level $LMC = MR$. If the government follows the average cost pricing rule for regulating the price of the product of the public utility enterprise, the price will be OP_3 . It may be noted that $D = LAC$ at price OP_3 . At price OP_3 the public utility enterprise obtains a fair return but it leads to non-efficient allocation of resources. For the efficient allocation of resources the marginal cost pricing rule is to be followed. In Figure, the price which equals marginal cost is OP_2 and it is obtained at the intersection of the demand curve with LMC . Since $OP_2 > OP_3$, the public utility enterprise manages to earn profits which are larger than what may be considered as fair return on investment. In the diagram the excess profits are equal to the area of the rectangle

P4P2KJvl — the difference between marginal and average cost per unit at the output OB, multiplied by OB or (KM x OB). In this case, the allocation of resources is also efficient.

Thus, The marginal cost pricing, however, may not always ensure fair return to a public utility enterprise.

Advantages of Marginal Cost pricing

- (1) This method is very useful in a competitive market.
- (2) This method helps in optimum allocation of resources. It is particularly useful when the products have low demand.
- (3) This method is suitable to pricing over the life cycle of the product
- (4) It is the most suitable method of short run pricing.
- (5) The method is useful at the time of introducing a new product.

Disadvantages of Marginal cost pricing

- (1) Firms may not be able to cover up costs and earn a fair return on capital employed.
- (2) It requires a better understanding of marginal costing technique.
- (3) When costs are decreasing this method is not suitable because it will result losses.
- (4) This method is not suitable for long run.

13.5.2. Cost plus Pricing:

The theory of full cost pricing has been developed by Hall and Mitch. According to them, business firms under the conditions of oligopoly and monopolistic competitive markets do not determine price and output with the help of the principle of $MC = MR$. They determine price on the basis of full average cost of production $AVC + AFC$ margin of normal profit.

This is the most common method used for pricing. Under the method, the price is fixed to cover all costs and a predetermined percentage of profit. In other words, the price is computed by adding a certain percentage to the cost of the product per unit. Under this method, cost includes production cost (both variable and fixed) and administrative and selling and distribution cost (both variable and fixed). This method is also known as margin pricing or average cost pricing or full cost pricing or mark-up pricing. This method is very popular in wholesale trade and retail trade.

Cost plus pricing is a most commonly adopted method. Under this method, cost of product is estimated and a margin of some kind of profit is added on the bases of which the pricing is determined. Empirical evidences have shown that a majority of the business

firms usually set prices for their products on the basis of cost plus a fair profit percentage.

Briefly, thus

Cost-plus Pricing = Cost + Fair Profit.

Cost : In cost-plus pricing principle in practice, cost refers to full allocated cost. According to Joel Dean there are however, three different concepts of the cost component used in the formula of cost pricing

1. Actual cost;
2. Expect cost, and
3. Standard cost.

Actual cost refers to historical cost for the latest available period. It covers wage bills, raw-material costs, and overhead charges at the then current output rate. Expect cost means a forecast for the pricing period on the basis of expected prices, output rates and productivity. Standard cost refers to a normal cost determination at some normal rate of output at a given level of capacity utilisation and productivity at a normal level.

In practice, usually, the cost base is determined from engineering estimates plus cost experience- historical data and projections. Fair Profit: By fair profit is usually meant a fixed percentage of profit mark-up. It is arbitrarily determined. Typically, it is determined at 10 per cent in many cases. However, fair profit mark-up differs from industries to industries and among different firms in the same line of production. These variations are due to many factors, such as

- differences in turnover rate,
- differences in risks,
- differences in competitive intensity; and
- differences in traditions or customary fixation of profit margin in different business.

Apparently, the ' Fair Profit ' in cost plus pricing principle in practical business is fundamentally different from the concept of 'Normal Profit' in economic analysis.

Advantages of Cost plus Pricing

- (1) This method is appropriate when it is difficult to forecast the future demand.
- (2) This method guarantees recovery of cost. Hence it is the safest method.
- (3) It helps to set the price easily.
- (4) Both single product and multi product firms can apply this method for pricing.

- (5) It ensures stability in pricing.
- (6) If this method is adopted by all firms within the industry, the problem of price war can be avoided.
- (7) It is economical for decision making.

Disadvantages Of Cost Plus Pricing

- (1) This method ignores the effect of demand.
- (2) It does not consider the forces of market and competition.
- (3) This method uses average costs, ignoring marginal or incremental costs.
- (4) This method gives too much importance for the precision of allocation of costs.

13.5.3 MULTI-PRODUCT PRICING

Big firms usually produce a number of related products at the same time. These are multi product firms. The multi-product firm, thus, involves a 'product line' or 'multi-product' pricing. In multi-product pricing strategy, the firm considers that the demands for the various goods are inter-related. Secondly, it can enjoy a greater cost economy in the sense that production costs tend to be lower when the goods are produced in a joint operation.

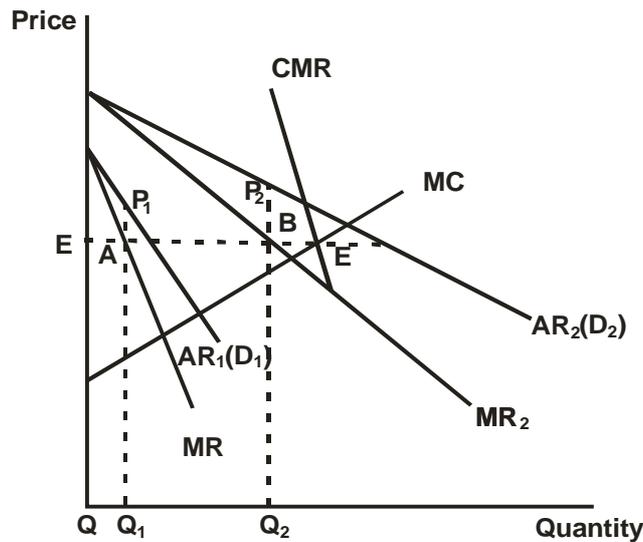
Multi goods produced by the firm may be in two categories :

- Substitutes/competitive
- Complementary

For this reason the firm has to look into the cross — elasticity of demand for the multi-product. Complementary products will have negative price — Cross-elasticity demand coefficient. Substitutes products will have a positive price-cross-elasticity demand coefficient.

In multiple products, therefore when converting products are produced, the firm considers demand elasticity. The product having inelastic demand will be high priced. While, the product having more elastic demand will be low priced. Similarly, cost functions will be taken into account. More costly items will be high priced, with high margin for the make-up.

The multi-product pricing strategy is to manipulate the combination of prices for different items, until an optimum or profit maximising price structure is determined.



Multi – Product Pricing

Figure 13.2

In case of jointly demanded complementary products, for instance in case of telephone exchange services, such as telephone connection and telephone services, two different price levels are prescribed. Installation charges and the use charges. Again, use charges will vary as per the number of calls. Obviously, a price structure is to be evolved that lends to profit and sales maximisation.

13.5.4 LIMIT-PRICING: BAIN'S MODEL

Price, as we have discussed in the earlier sections of this chapter has to cover the cost and bring a reasonable profit to the producer. Exceptions if at all, are made in very few cases. In an oligopoly market, price is rigid due to uncertainties prevailing in oligopoly situations. Even a monopolist who is a price maker may charge a high price in order to avoid an entry of a substitute product or service is totally protected by law.

In an oligopoly situation, entry is free. However there are a number of factors that prevent entry. The existing firms always have a fear or threat of potential entry. It is in the interest of the existing or established firms to prevent the potential entry so that they can maintain their share of market and profit, which may not attract or induce the potential entry. Such a price is called limit-price, which was profounded by J. Bain.

Bain's theory of Limit-price was published in 1949 in an article and subsequently his important work "Barriers to New Competition" was published in 1956. Limit price is a price charged by the firms to discourage entry of a new firm into the market. It is a price set by firms which is above the long run average cost (LAC). The price is above LAC, that is, a price higher than long-run price

charged in a perfectly competitive market. It has remained higher because of barriers to potential entry. Limit price is also below monopoly price (where $P > MC = MR$) where profits are maximised. The existing firms in the market do not charge monopoly prices in order to discourage a new entry,

The limit price theory is based on the following assumptions :

1. There is a determinate long-run demand curve for industry output, which remains unaffected by price adjustment of sellers or by entry.
2. The first assumption leads to determinate market marginal revenue curve.
3. There is effective collusion among the established oligopolist.
4. The established firms in the market can decide a limit price, below which entry will not occur. The limit price set depends on:
 - i) Estimation of cost of the potential entrant
 - ii) Market elasticity of demand
 - iii) Shape and level of LAC
 - iv) Size of the market
 - v) Number of firms in the industry
5. Above the limit price, entries are attracted, leading to a considerable concern concerning the sales of existing firms in the post entry period.
6. Existing firms try to maximize their profit in the long-run.

Based on the above assumptions we will explain the limit-price theory with help of fig.

In figure, the market demand curve is 'DABD'. The corresponding marginal revenue curve is 'Dabm'. Limit price is set at PL, which is at point A on demand line. AD, part of demand line is uncertain to the existing firms as the behavior of the entrant is known. AD' part of demand curve and a part of marginal revenue line are certain for the existing firms.

If the existing firms fix the limit price PL, then they could charge the monopoly price, that is the price where $LAC_1 = MC_1 = MR$ where the corresponding price is P_m . However this price will be uncertain after the entry of a new firm. Hence profit in the post entry period too are uncertain, therefore, they must be risk discounted. Price PL will bring a certain amount of profit whereas at P_m (where $LAC_2 = MC_2 = MR$ at point b on MR line). Price P_m is lower PL. Hence the limit set by PL price is not relevant.

When entry preventing price PL is decided, the alternatives available to the existing firms are:

- (i) To charge PI price and prevent entry.
- (ii) To charge a price less than PI and prevent entry (that is Pm price which is less than PI)
- (iii) To Charge a price above PI and face uncertainty situation that arises after the new entry.

If entry takes place, the established (existing) firms either have to function with uncertainties with regard to demand, price and profit or must have collusion. In case of collusion the existing firms have to share the market demand with the new entrant and face the consequent impact on profit. According to Bain firms charge limit price which is lower than monopoly price, to prevent entry and secure maximum long-run profit.

Limit price, therefore, is a price that discourages or prevents entry. It is argued that a firm can deter entry by keeping its price relatively low.

13.6 QUESTIONS:-

1. What are the objectives of pricing policy?
2. Explain the method of cost-plus pricing. What are its limitations?
3. Discuss the major factors involved in or affecting the pricing policy.
4. Describe the important pricing methods.
5. Write notes on:
 - a) Cost-plus pricing.
 - b) Marginal Cost Pricing.
 - c) Bain's Limit Pricing Model.
 - d) Multi Product Pricing



CAPITAL BUDGETING

Unit Structure :

- 14.0 Objectives
- 14.1 Introduction
- 14.2 Meaning of Capital Budgeting
- 14.3 Importance or Significance of Capital Budgeting
- 14.4 Need for Capital Budgeting
- 14.5 Problems and difficulties in Capital Budgeting
- 14.6 Stages of Capital Budgeting
- 14.7 Introduction : Methods of Capital budgeting
- 14.8 Investment Criteria / Investment Appraisal
- 14.9 Questions

14.0 OBJECTIVES

After having studied this lesson you should be able :-

- To Know in detail the concept of Capital Budgeting
- To understand different methods and kinds of pricing
- To identify the factors affecting Capital Budgeting
- To know the concept of Investment Criteria/Investment Appraisal.
- To understand different methods of Capital Budgeting

14.1 INTRODUCTION

Every business has to decide upon its investment, as it involves high risk. An apt decision on investment program leads a business firm to achieve its high profit; hence a methodology to assist the management to take correct decision on its investment proposals is quintessential for which capital budgeting technique would assist. Capital budgeting is concerned with designing and carrying through a systematic investment program.

14.2 MEANING OF CAPITAL BUDGETING

Meaning: Capital budgeting implies a process of conceiving, generating, evaluating and selecting the most profitable investment proposal or project. It involves a plan for the investment of funds. Project planning refers to a long-term planning in respect of capital expenditure on a scheme or project.

Capital Budgeting is also referred to as **Project Planning**. Capital budgeting is concerned with designing and carrying through a systematic investment programme. It is concerned with planning and control of capital expenditure.

Capital budgeting refers to the process of planning capital projects, raising funds and efficiently allocating resources to those capital projects. Capital budgeting decisions may be defined as the decision of the firm to invest its current finances most efficiently in long-term productive activities, with expenditure on flow of future benefits over a long period.

14.3 IMPORTANCE OR SIGNIFICANCE OF CAPITAL BUDGETING

The Major issues in Capital budgeting or project planning are:

- (a) Determining the worthiness of the investment project.
- (b) The cost and returns form of project.
- (c) The availability of funds and their allocation.
- (d) Organising a project, determining the resources and assigning the responsibilities of the different departments.
- (e) Co-ordinating and controlling the entire scheme
- (f) Estimating the time for the completion of the project.

Capital budgeting is issued for:

- (1) Expansion of production facilities.
- (2) Entering new product lines.
- (3) Replacement of worn-out capital and equipment.
- (4) Planning major advertising campaigns.
- (5) Employee training Programmes.
- (6) Research and Development.
- (7) Decision to purchase or rent equipments.
- (8) Undertake any other investment project which would result in costs and revenue over a long period. Capital Budgeting has great significance in decision regarding financing investments. Firms classify investment as follow:

1. **Investment** to develop, produce and sell **new products** or **new markets**.
2. Investment to **replace worn-out equipments**.
3. Expenditure incurred to **reduce the cost** of labour through training programmes and other inputs.
4. Investment to expand production facilities in response to demand for traditional products
5. Investment to comply with government regulations like pollutions control, health and safety regulation, etc.
6. Capital Budgeting decisions are very significant for the manager and owner of the firm due to the following reasons:
 - a) Long-term investment involves commitment of funds it would be difficult to reverse and hence proper project planning is inevitable.
 - b) The finance involved is quite large which would affect the profitability of the firm.
 - c) Since project are long period, the impact of capital budgeting on profitability has great relevance.
 - d) Capital budgeting helps to reduce uncertainties and improve profitability.

Capital budgeting are vital for the reputation of the management. the expected rate of returns on total capital depends on capital budgeting.

Thus capital budgeting has great significance in the investment planning and profitability of the firm.

14.4 NEED FOR CAPITAL BUDGETING

The need for capital budgeting arises due to the following reasons:

- a) To provide a framework for the future courses of action.
- b) For capital budgeting.
- c) To avoid loss of capital invested.
- d) Long term investment is fixed capital influences the business actions in the long run.
- e) To reduce the degree of risk and uncertainty.
- f) To achieve flexibility and control influence the business actions in the long run.
- g) To ensure optimum utilization of resources and avoid wastage.
- h) To direct capital funds to specific uses and earn maximum returns.
- i) Serves as an index of business performance.

The investment projects involve large sums of money. Long-term investments once made cannot be reversed without significant loss of capital. The whole conduct of business will be affected if there is no project planning.

Investment decision broaden the base on which profit will be earned. A proper mix of capital investment is important to ensure adequate rate of return on investment.

Long-term investment decisions are extensive. The decisions extended beyond the current accounting period and correctness cannot be determined immediately. Because of time factor involved, capital budgeting decisions are subject to higher degree of risk and uncertainty than short-run decisions.

Capital budgeting is very essential because its absence may lead to considerable loss. Capital budgeting is necessary to know the rate of return on long-term investments.

Capital budgeting is given more and more attention because of the increasing trends towards separation of ownership from management. Companies with strong demands, weak resources position and tight financial position give great importance to capital budgeting techniques. Capital budgeting has now become one of the most important areas of managerial decision making.

14.5 PROBLEM AND DIFFICULTIES IN CAPITAL BUDGETING

- (1) Problem of selecting the most profitable investment project.
 - (2) Problem of measuring the most intangible benefits involved in a particular project.
 - (3) Difficulty of measuring even the tangible benefits due to the dynamic nature of the economy.
 - (4) Due to inflation, estimates of the cost and benefits may not be valid.
 - (5) Inadequate information due to lack of statistical records.
- Budgetary limitations and huge cost are major problems in project planning.

Project planning is complex and it requires proper analysis for arriving at a rational decision.

The capital budgeting problem consists of broadly three questions.

- (1) How much money will be needed for expenditure in the near future.
- (2) How much money will be available.

- (3) How the available money be allocated among the various competing projects.

The first is to make survey of opportunities and select projects on the basis of their prospective profitability.

The second problem involves measuring the cost of capital - how much can be raised internally and, how much externally.

The third problem is how to ratio the funds. This is crux of capital budgeting problem for it amounts to selection of project.

The starting point for a capital budget is a survey of company's anticipated needs for capital i.e. **the demand for capital**. The discovery and development of goods investment proposals require effort.

The **supply of capital** is the problem of finding the sources form where money will come and how much will be available. A distinction must be made between internal and external sources.

The principal marginal problems in connection with internal sources are:

- a) To forecast how much cash will be generated internally.
- b) To decide how much cash to payout in dividends.
- c) To decide how much of remaining should be tied in long-term projects.

As regards to external sources much depends upon the state of the capital market and the company's reputation and financial stability.

The basic aim of capital budgeting is to maximise the firm's long-run profit potential. The firm must select the most profitable project for investment. There might be **capital rationing** and all profitable investment opportunities may not be accepted.

The basic problem in capital budgeting consist of (1) determining the cost of capital (2) determining the rate of return on different investment proposals under consideration. (3) Ranking them on basis of profitability.

The expected return on the various projects has to be compared with the cost of capital to determine which project to drop and which one to select as the best investment among the profitable ones.

14.6 STAGES OF CAPITAL BUDGETING

Since the planning is a complex process. It consists of several stages.

(1) Search for new investment proposals: The project planning process begins with the creation of new ideas of investment proposal

The management has to discover new investment opportunities for deciding the most profitable investments. The investment proposal should consider the governmental policies, performance of the existing industries, their input-output framework, knowledge of commercial geography, awareness of demand condition and technologies, advancements etc.

(2) Profit classification: In project planning, the projects are classified in to following categories.

- (a) Expansion of existing products.
- (b) Expansion for existing markets.
- (c) Replacement for maintenance
- (d) Replacement for cost reduction.
- (e) Innovations.
- (f) Environmental investments.
- (g) Others not covered by the above.

Investments in all this categories are evaluated under project planning.

(3) Analysis of costs and Benefits: This involves:

(a) Estimating cash flows: cash flows refer to the changes in revenues and costs of capital. the management has to forecast changes in cash flows which may emerge from each investment project. it is difficult to select a suitable method of cash flow analysis.

(b) Computing the cost of Capital: in computing the cost of capital, the availability of funds at the firm's disposal has to be considered.

(4) Measurement of investment worth: for comparison and ranking of different investment proposals, a common denomination is essential. The criteria for measuring investment worth are based on the discounting principle.

(5) Feasibility study: Feasibility study implies a detailed analysis about costs, means of financing, location, technology to be used,

requirement and availability of factor implies, demand potentiality, sales revenue expected, profitability etc.

(6) Decision making: After ranking the investment proposals, selection of suitable project to meet the objective in consideration is an important aspect of project planning.

(7) Implementation: Implementation of the selected investment proposal involves the construction of the plant building, choice of machineries, training of the staff, etc.

(8) Performance Review: There is a systematic evaluation of the operation of the project. This will help to prevent over optimism over pessimism and arrive at a cautious decision-making in future.

14.7 INTRODUCTION : METHODS OF CAPITAL BUDGETING

Every business has to decide upon its investment, as it involves high risk. An apt decision on investment program leads a business firm to achieve its high profit; hence a methodology to assist the management to take correct decision on its investment proposals is quintessential for which capital budgeting technique would assist. Capital budgeting is concerned with designing and carrying through a systematic investment program.

14.8 INVESTMENT CRITERIA / INVESTMENT APPRAISAL

Capital investment decisions are based on whether the management wants to replace the old equipment or install the new equipments. Whenever there are technological changes then old equipments have to be replaced by new ones. When a new equipment is to be purchased then the question about investment appraisal arises.

There are certain methods of evaluating proposed capital expenditure or what may be called the investment criteria. The measurement of investment worth is a very important aspect of project planning. The most commonly adopted investment criteria are:

- (A) Payback Period method (PBP).
- (B) The Net Present Value method (NPV).
- (C) The Internal Rate of Return Method (IRR).

14.8.1 Payback Period method:

The pay-back period method measures the time required to recover the original investment outlay from the annual cash inflow expected from the investment project. The pay-back period is used

to find out the period of time required to return the initial investment. It is measured in terms of money. This method is also known as *pay off* or *payout* period method. This is the most simple method and commonly used in capital budgeting for calculating investment appraisal. It indicates only the number of years required to recover the original investment and does not measure the rate of return.

The formula to calculate Pay- Back Period is :

$$\text{Pay-Back Period} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}}$$

Suppose project A involves the initial investment of Rs. 75,000 and The annual cash flow is Rs. 15,000. The pay-back period is as under:

$$\text{Pay- Back Period} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{75,000}{15,000} = 5 \text{ years}$$

Now Project B involves the initial investment of Rs. 80,000 and the annual cash flow is Rs. 20,000/-. then pay-back period for project B is as under:

$$\text{Pay- Back Period} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{80,000}{20,000} = 4 \text{ years}$$

If a firm applies the pay-back period criteria then project B will be accepted and project A will be rejected. Though project B involves higher capital outlay but its capacity to recover initial investment, period is rapid. Hence, the project B is considered to be good.

Example (1) Equal Annual Earnings :

Suppose a firm has five investment proposal with relevant data. Rank these proposals under pay-back period.

Calculation of PBP

Project	Initial Investment (Rs.)	Annual Cash Flow (Rs.)	Life in Years
A	20,000	4,000	8
B	6,000	2,000	3
C	8,000	4,000	5
D	12,000	3,000	10
E	15,000	2,500	15

From the above illustration, Pay Back Period is to be calculated and re-ranked as follows:-

Project	Initial Investment (Rs.)	Annual Cash Flow (Rs.)	Pay Back Period	Ranking
A	20,000	4,000	5	IV
B	6,000	2,000	3	II
C	8,000	4,000	2	I
D	12,000	3,000	4	III
E	15,000	2,500	6	V

$$\text{Pay-Back Period of Project A} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{20,000}{4,000} = 5 \text{ years}$$

$$\text{Pay- Back Period of Project B} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{6,000}{2,000} = 3 \text{ years}$$

$$\text{Pay- Back Period of Project C} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{8,000}{4,000} = 2 \text{ years}$$

$$\text{Pay- Back Period of Project D} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{12,000}{3,000} = 4 \text{ years}$$

$$\text{Pay- Back Period of Project E} = \frac{\text{Original or Initial Investment}}{\text{Annual Return or Cash flow}} = \frac{15,000}{2,500} = 6 \text{ years}$$

On the basis of pay-back period method, **Project 'C'** is considered to be good because it has lowest pay-back period of 2 years, other projects are also ranked accordingly. Project B, Project D, Project A and then Project E. This method is very popular in U.S.A for evaluating their overseas investments.

Example (1) Differences in Annual Earnings :

In case of projects which yield cash in varying amounts, the pay-back period may be obtained through the cumulative total of annual returns until the total equals the original investment outlay. The number of figures added will give the pay-back period. For example, suppose that the total cost of a project is Rs. 10,000 which yields cash flows over 5 years as given in col. 3 of the Table. The table shows also the calculation of pay-back period.

Calculation Of PBP

Year Column 1	Total Fixed Outlay Column 2 (Rs.)	Annual Cash Flow Column 3 (Rs.)	Cumulative total Column 4 (Rs.)
1 st	10,000	4,000	4,000
2 nd	-	3,500	7,500
3 rd	-	2,500	10,000 *
4 th	-	1,500	11,500
5 th	-	1,000	12,500

As the table shows, the cumulative total of annual outlay of the project at the end of the 3rd year. Thus, the pay-back period of the project is 3 years.

Advantages of PBP method:-

- 1) This method is simple to calculate.
- 2) It is easy to understand, safe and more realistic.
- 3) This method gives information about liquidity.
- 4) This method helps in selecting less risky projects.
- 5) This method is appropriate for assets with same economic life.
- 6) In this method gross earnings are taken into consideration complications in estimating capital wastage over the time period are avoided.

Disadvantages of PBP method:-

- 1) This method does not consider time value of money.
- 2) The pay back period does not consider profitability.
- 3) This method ignores the cash flow variation.
- 4) This method puts undue emphasis on liquidity and ignores capital wastage.
- 5) This method also ignores other objectives.

Example (3) : Pay Back Period

Project	Initial Outlay (Rs.)	Net Cash Flow (Rs.)			
		Year 1	Year 2	Year 3	Year 4
A	6,00,000	1,00,000	1,50,000	1,50,000	2,00,000
B	6,00,000	1,00,000	2,00,000	3,00,000	3,00,000

In case of **Project - A**, the pay-back period is
 $1,00,000 + 1,50,000 + 1,50,000 + 2,00,000 = 6,00,000$ i.e. **4 years** are needed to recover initial investment outlay.

Now in case of **Project-B**, the pay-back period is $1,00,000 + 2,00,000 + 3,00,000 = 6,00,000$. i.e. initial investment is recovered within **3 years**.

Hence, Project-B is desirable than Project-A.

14.8.2 The Net Present Value Method (NPV):

The net present value of an investment proposal is the difference between the total of present values of the estimated annual cash flows over the life of the project and the initial investment of the project. If net present value is positive then the investment in the project will be profitable. If net present value is negative then investment will be unprofitable.

The investment proposal that simply breaks even, will have a net present value of Zero. NPV is found out by:

NPV = [Present value of the gross earnings] - [Net Cash investment]

In this method, the value of time is considered very important. This method is based on the economic reasoning of discounting future cash flows to make them comparable. Money received at present is more valuable than equivalent amount of money received next year or the year after. The value of money will not remain the same in future because money received today can be invested to earn certain rate of interest.

If we represent the discount rate by 'r' then,

$$\text{NPV} = \frac{A_1}{1+r}$$

Where: A_1 = value in the first year

r = rate of interest

For e.g. if we invest Rs. 1000 at 10% interest rate then after one year we will get Rs 1100. It means Rs 1000 of this year is equivalent of Rs 1100 of next year.

In other words, Rs 1000 received next year will be less than Rs 1000 of this year. The amount received next year should be discounted by the prevailing interest rate. Suppose A_1 is Rs 100 and r is Rs 10% then the present value of A_1 is as under:-

$$\text{NPV} = \frac{A_1}{1+r} = \frac{100}{1+0.1} = \frac{100}{1.1} = 90.91$$

Ranking Proposals :

If there are a number of investment proposals then we have to calculate the net present value of cash flows of each proposal by using the following formula:

$$\text{Net Present Value (NPV)} = \frac{\text{Gross present value of the proposal}}{\text{Initial Investment}}$$

The project will be more profitable if the net present value index is high. We can also rank the various projects according to their net present value index.

Let us apply the above formula to find out the relative profitability of the five proposal as under:

Proposals	Initial investment (Rs)	Annual Cash Flow (Rs.)	Life in Years	Discount Factor at 10%	Period Value of total cash flow (Rs)	NPV Index	Ran king
1	2	3	4	5	6=3×5	7=6 ÷ 2	
A	60,000	12,000	15	7.76	92,120	1.55	III
B	85,000	23,000	22	8.89	204,470	2.40	II
C	25,000	5,000	07	5.03	25,150	1.00	V
D	20,000	4,000	10	6.32	25,280	1.26	IV
E	4,20,000	2,00,000	20	8.64	1728,000	4.11	I

On the other basis of the above table, Proposal 'E' is most profitable followed by B and A and D. If any project has NPVI less than one, the project should not be accepted.

14.8.3 Internal Rate of Returns (IRR):

This is another method of evaluation of projects based on the discount cash flow technique. This method considers time factor and therefore takes into account the opportunity cost of investment. The basic approach of this method is that the amount of money received today has more value than the amount of money received after a year and so on. This method is the same as the MEC (Marginal Efficiency of Capital) concept of J. M. Keynes in his General theory of Interest and Money. The Internal Rate of Return (IRR) is the rate of discount which equates the present value of the income stream over the life of the machine with the present value of the net cash investment. In other words, the net cash benefits are discounted at that rate of discount which reduces the net present value to zero.

The relevant formula is:

$$C_0 = \frac{A_1}{1+r} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \frac{A_4}{(1+r)^4} + \dots + \frac{A_n}{(1+r)^n}$$

Where: C = Current net investment (cost of the project)

A_t = Income stream of the project over different years (t=1 . . .n)

t = time period

r = internal rate of return

If internal rate of return is greater than the opportunity rate of interest then the project is accepted. If internal rate or return is less than the opportunity cost of investing available funds elsewhere then the project is rejected.

Advantages of IRR :

- 1) It considers the time value of money.
- 2) It considers the cash flow over the entire life of the project.
- 3) The calculation of the cost of capital is not a pre-condition for the use of the method.

Disadvantages of IRR :

- 1) It is difficult to understand.
- 2) It is difficult to use in practice.
- 3) Its calculation is complicated.

14.9 QUESTIONS

- 1) Explain the meaning of Capital Budgeting?
- 2) What is the Importance or Significance of Capital Budgeting?
- 3) Explain the Need for Capital Budgeting?
- 4) What are the Problems and difficulties in Capital Budgeting?
- 5) Explain the different stages of Capital Budgeting?
- 6) Describe the Pay Back Period method of project appraisal.
- 7) Explain the Net Present Value method of Capital Budgeting.
- 8) Write Short note on :-
(a) Internal Rate of Return method.

