



F.Y.B.A.
SEMESTER - I (CBCS)

ECONOMICS PAPER - I
MICRO ECONOMICS

SUBJECT CODE : UBA1.35

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August 2021, Print - I, ISBN : -978-93-91735-01-2

Published by

: Director,
Institute of Distance and Open Learning ,
University of Mumbai,
Vidyanagari, Mumbai - 400 098.

DTP Composed &
Printed by

: Mumbai University Press
Vidyanagari, Santacruz (E), Mumbai - 400098

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I

F.Y.B.A. Semester – I (CBCS) Microeconomics – I (Academic Year: 2021-22 at IDOL)

Preamble: This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on the development of analytical thinking with the help of statistical tools among the students and develop the skill of application of microeconomics concepts to analyze the real life situations.

Module - I: Introduction to Microeconomics

Microeconomics: Meaning, Scope, Nature, Importance and Limitations; Basic Economic Problems; Role of Price Mechanism in a Market Economy; Positive Economics and Normative Economics; Concepts of Equation, Functions, Graphs, Diagrams, Line, Slope and Intercept

Module - II: Ten Principles of Economics

Trade-Off Faced by the Individuals; Significance of Opportunity Cost in Decision Making; Thinking at the Margin; Responses to incentives; Benefits from Exchange; Organization of Economic Activities through Markets and its Benefits; Role of Government in improving Market Outcomes; Dependence of Standard of Living on Production; Growth in Quantity of Money; Inflation and Unemployment Trade Off

Module - III: Markets, Demand and Supply

What is a Market; What is Competition; Demand Curves: Market Demand versus Individual Demand, Movements along the Demand Curve, Shifts in the Demand Curve; Supply Curves: Market Supply and Individual Supply, Shifts in Supply Curve; Market Equilibrium - Three Steps to Analyze Changes in Equilibrium; Price Elasticity of Demand, Methods of Measuring Price Elasticity of Demand – Total Outlay Method, Percentage Method and Point Method; Concepts of Income Elasticity of Demand, Cross Elasticity of Demand and Promotional Elasticity of Demand

Module IV: Consumer's Behavior

Introduction to Cardinal and Ordinal Approaches; Indifference Curve Analysis - Properties of Indifference Curves, Budget Line, and Consumer's Equilibrium; Income, Price and Substitution Effect; Derivation of Demand Curve; Consumer's Surplus: Strong Ordering and Weak Ordering

II

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Module - I

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 Basic economic problems
- 1.8 Approaches to deal with basic economic problems
- 1.9 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
- To study basic economic problems
- To study approaches to deal with basic economic problems and role of price mechanism in a market economy

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. Macroeconomics concerns itself with those aggregates which relate to the whole of the economy. According to Kenneth Boulding, “Macroeconomics deals not with individual quantities but with aggregates of these quantity, not with individual incomes but with national income, not with individual prices but 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 macroeconomics 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 Macroeconomics 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 macroeconomics it is more 'aggregative' in nature. For instance in Microeconomics we apply the technique of 'slicing'. Whereas in Macroeconomics we resort to the technique of 'lumping'.

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

Whereas Macroeconomics 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 Macroeconomics 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 BASIC ECONOMIC PROBLEMS

The main purpose of every economic activity is to combine available resources in order to produce output that will satisfy our needs and wants. Needs are the basic necessities of life of human beings such as food, clothing and shelter without which one cannot survive. Wants are the things which are required by the human beings to live a comfortable life. Availability of resources is scarce compared to these unlimited wants. The scarcity of resources is the root cause of all economic problems. It further leads to the problem of choice. Scarcity forces individuals to make choices about what to have and what to give up, it also forces societies to make choices. The larger and more advanced a society is, the more numerous and complex these choices may be. In the end, however, these choices leads to three basic economic questions.

1. What goods and services should we produce and in what quantities?

Because of scarcity of resources, no society can produce everything its people might want. This raises the question: What goods and services are most wanted and needed? Every society must decide on how much of each of the many possible goods and services it will produce by using available resources. Whether to produce more of necessary or to have more of luxury goods. Whether to have more agricultural goods or to have industrial products and services. Whether to use more resources in education and health or to use more resources in building military services.

2. How these goods and services to be produced?

Goods and services are produced by combining the factors of production: land, labor, and capital. But how is this done, exactly, and in what combination? Whether to use more labour or more

machines. Which of the available technologies to adopt in the production of each of the goods?

3. For whom these goods and services to be produced?

Goods and services are distributed in a variety of ways. Who gets how much of the goods that are produced in the economy? How should the produce of the economy be distributed among the individuals in the economy? Who gets more and who gets less? Whether or not to ensure a minimum amount of consumption for everyone in the economy.

Thus, every economy faces the problem of allocating the scarce resources to the production of different possible goods and services and of distributing the produced goods and services among the individuals within the economy. So the allocation of scarce resources and the distribution of the final goods and services are the central economic problems.

Production possibility curve / Production Possibility Frontier (PPC/PPF)

PPC shows different combinations of two different goods which can be produced by an economy by using all of its resources in the best possible ways under the given circumstances. The assumptions of PPC are as following:

- a) Economy produces just two goods
- b) Resources are given
- c) There are no technological changes
- d) Resources are fully employed
- e) Average cost of production is minimum in all over the economy

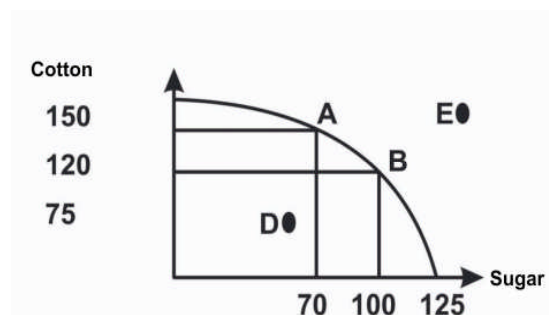


Fig 1.1

In the above diagram, X axis measures production of sugar and Y axis measures production of cotton. At point A economy is producing 120 units of sugar and 70 units of cotton. If it opts to produce at point B, it can produce 75 units of sugar and 100 units of cotton. It could be seen that opportunity cost of producing 30 additional units of cotton is 45 units of sugar. Performance of an economy can also be explained with PPC. For example in the above diagram if economy produces either at point „A“ or „B“, there is an efficient use of resources i.e. economy is producing at

its optimum level. However, point "D" determines in-efficient or underemployment of resources i.e. economy is not producing at its optimum level. Whereas, in the fig. point „E" is unattainable under given conditions.

Shifts in PPC

There is a complete rightwards shift in PPC if there is an increase in the quantity and quality of natural resources or increase in the quality and quantity of capital or improvement in health, education, motivation and skill of the labour force or due to research and development and even international specialization or trade shift PPC outward. In the above diagram point „E" is attainable if PPC shifts outwards. Whereas there may be an inward shift of PPC due to scarcity of these resources due to uncertainties such as natural calamities, wars etc.

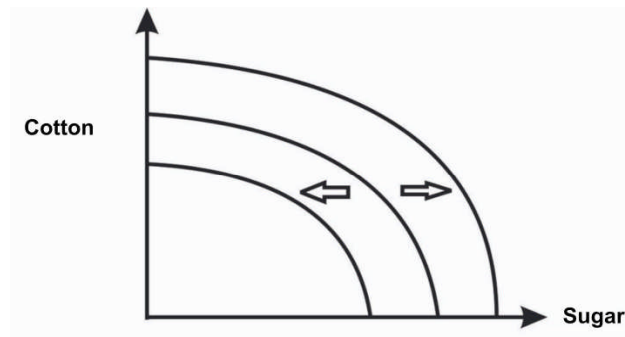
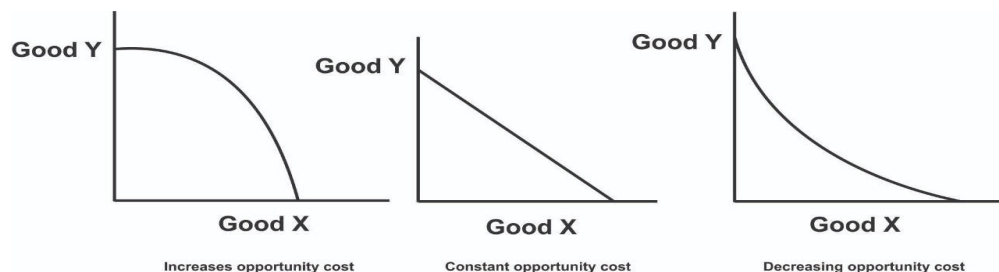


Fig. 1.2

Shapes of Production possibility Curve

PPC shapes depend upon the opportunity cost (rate of transformation) and opportunity cost depends upon the gradient of the curve. If gradient increases opportunity cost increases and the shape of the PPC will be concaved i.e. outwards bending. If gradient is constant, PPC will have a linear curve which means opportunity cost is constant and if the gradient decreases, opportunity cost will be decreased and the shape of the curve will be convex that is bending toward origin.



Positive Economics

Fig 1.3

1.8 APPROACHES TO DEAL WITH BASIC ECONOMIC PROBLEMS:

All societies face the three economic problems and how these are answered depend on the type of economic goals and ideologies adopted by the system.

1. The Centrally planned economic system:

In centrally planned economic system all the resources are owned and controlled by the state. There is no scope for private ownership. All land, housing, factories, power stations, transport systems etc. are owned by the government. The idea of public ownership in these societies is based upon the desire for a more equitable distribution of income and wealth.

In this system all of the decisions, what to produce, how to produce and how to distribute are taken by the state. Therefore production decisions are very complex in nature. This system is bureaucratic by nature, hence, changing decisions are very complex and time consuming. Usually workers are paid equally without considering their ability and productivity; therefore, there is lack of incentive to work hard. Due to lack of profit motive; there is no incentive to innovate. As a result firms operate inefficiently. In such economies usually goods are of poor quality as well as no variety is available to consumer, as a result they do not enjoy better living standard. The closed example of Centrally planned economy is China.

2. The Market economy:

This system is based on laissez-faire policy. It means let the people do without any interference of the government. In this system resources are allocated on the basis of price mechanism. Market forces, that is, demand and supply are allowed to change freely in allocation of resources. Therefore, decisions are made easily and quickly by seeing the changes in demand and supply forces in the market. Government plays very limited role in this system. Private ownership of resources plays an important role in this system. In this system there is a freedom of choice and enterprise. Consumers are free to spend their income as they want. On the other hand entrepreneurs may use their resources so as to maximize their profit. Consumers are considered sovereign in this system because goods and services are produced according to their desires. To earn maximum profit is the main motive which gives incentive to innovate. Another important feature of this system is competition. Competition leads to increase in efficiency of enterprises. United States of America is a closed example of the Market economy.

This system has several flaws. Firstly, this system produces only those good and services which bring profit for the business. There is no importance to the production of public goods like parks, roads etc. Similarly merit goods like education and health are underdeveloped. On the other hand, demerit goods like weapon, drugs, cigarettes are produced more to generate heavy profit. In market economies, to gain higher profit, firms reduce their cost of production by neglecting negative externalities. It is the cost which incur by the whole society due to a production process. Firms only employ those factors of production which bring more profit to the firm. As a result many of the factors of production remain either unemployed or underemployed. It is said that consumers are sovereign in market economy but in reality there is a producer sovereignty, which produce goods and force consumer to buy them. In market economies monopolies are established. These monopoly practices exploit consumers due to weak role of the state. Another major drawback of this system is inequalities in the distribution of income and wealth. This system creates a wide gap between rich and poor.

3. Mixed economy:

In reality, there is no such existence of pure planned economies and pure market economies. Usually we have mixed economies. However, in some of the mixed economies government plays major role and in some of the economies individuals are stronger.

In mixed economies, usually there are two sectors; private sector and public sector. Private sector is controlled by individuals. It possesses most of the features of market economies like private ownership, economic freedom for producers and consumers, profit is the main motive, competition etc. This sector also possesses some of the evils of market economies like under provision or no provision of public goods, similarly, self interest as the dominating motive which may exploit interest of the society. Public sector is controlled by the state. In many of the developed and emerging economies this sector has very limited role to play. However, this sector produces those goods and services which are not produced by the private sector. It makes laws which protect consumers and society from the disadvantages of the market economy. It forms competition policies which control monopolies by regulating and controlling quality, quantity and to the certain extent prices of products. It also makes laws against pollution, redundancies and unfair trade practices to serve the interest of the masses.

1.9 QUESTIONS

1. Explain the concept and meaning of Micro Economics.?
2. Explain the Nature & Scope of Microeconomics?
3. Explain the Concept of Macro Economics and Distinguish between Micro and Macro Economics?
4. Discuss various basic economic problems.
5. Explain the production Possibility Curve.
6. Discuss the role of price mechanism in a market economy.



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 Basic tools in economics
- 2.8 Summary
- 2.9 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
- To study different basic tools used in 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 negativate 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.

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'.

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 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.

2.4.2 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 scenario. It is aptly remarked, "Since the given Walrasian 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.

2.4.3 Significance of General Equilibrium

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. Leontiff 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.

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 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.

2.7.1 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.

2.7.2 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.

2.7.3 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.

2.7.4 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 $0 < b < 1$.

2.7.5 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.

2.7.6 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.

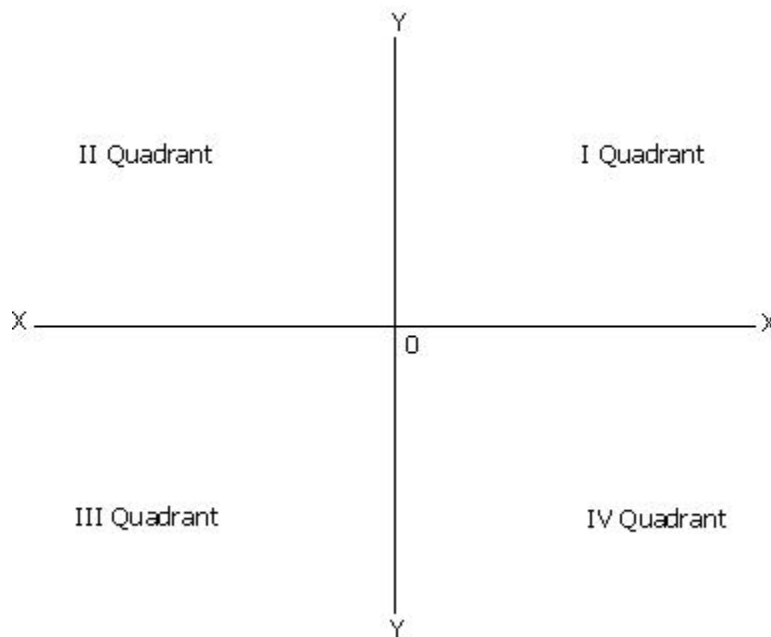


Fig. 2.1

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.

2.7.7 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:

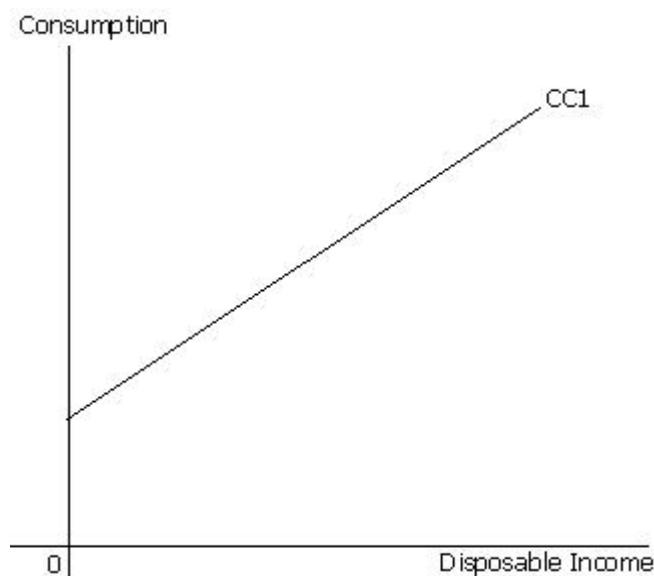


Fig. 2.2

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.

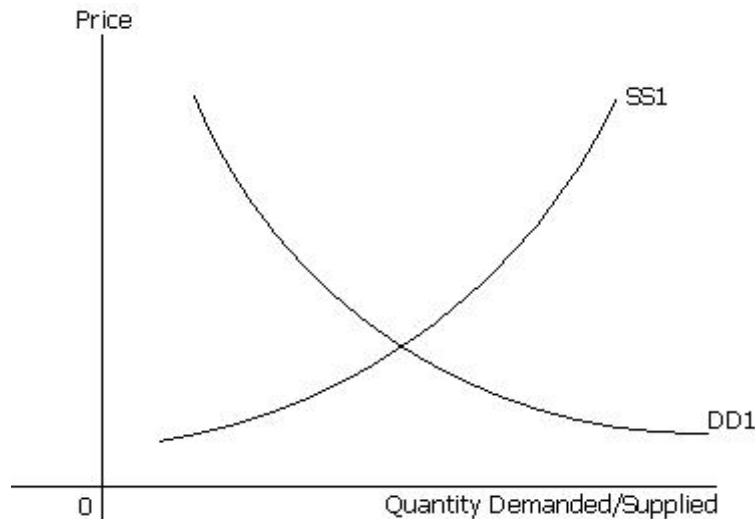


Fig. 2.3

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.

2.7.8 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:

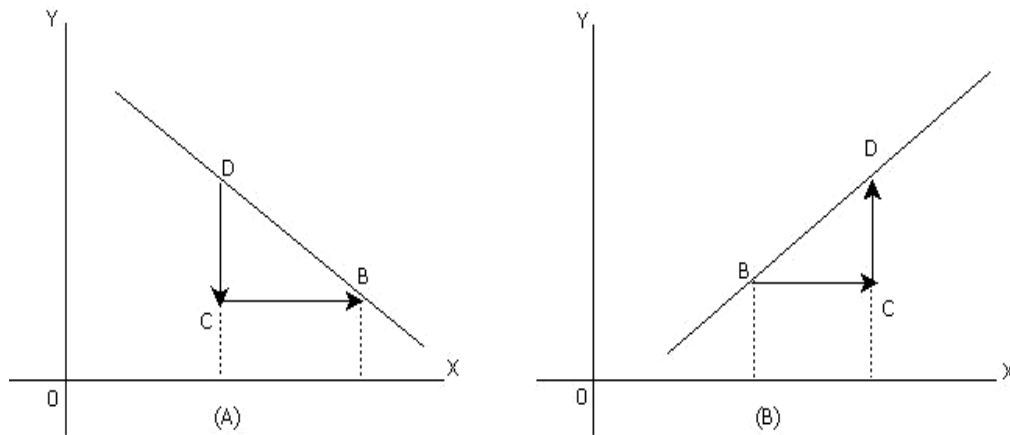


Fig. 2.4

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 $0Y_1/0X_1$

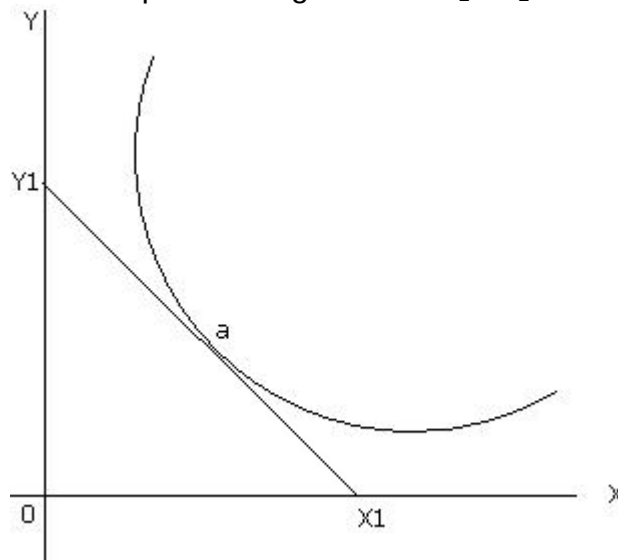


Fig. 2.5

The main properties of slope are:

- i) It can be numerically measured.
- ii) In case of a straight line, the slope is constant throughout the curve.
- iii) In case of a non-linear curve, the slope changes throughout 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.

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.)

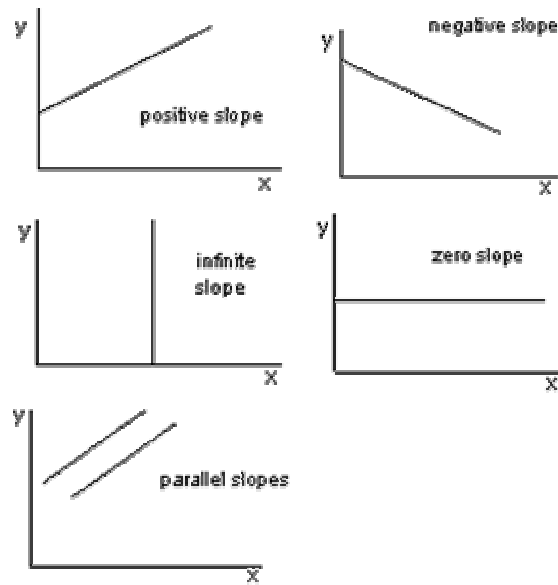


Fig. 2.6

An example of the use of slope in economics

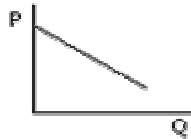
Demand might be represented by a linear demand function such as

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

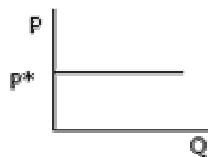
$Q(d)$ represents the demand for a good

P represents the price of that good.

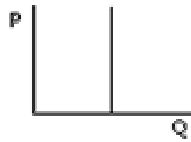
Economists might consider how sensitive demand is to a change in price.



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.

Fig. 2.7

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 .

$$\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{\Delta Y}{\Delta X} = \frac{y_1 - y_2}{x_1 - x_2} = \frac{y_2 - y_1}{x_2 - x_1}$$

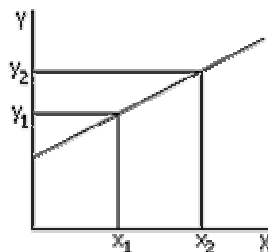


Fig. 2.8

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)

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

2.7.9 INTERCEPT

The horizontal line at the base of the graph is called as the **x-axis** and the vertical line on the left hand side of the graph is called as the **y-axis**. In economics, generally we use graphs where price is (p) represented on the y-axis, and quantity (q) is represented on the x-axis.

An **intercept** is a point where a line on a graph crosses ("intercepts") either x-axis or y-axis. In mathematically, the x-intercept is the value of x when y = 0. Similarly, the y-intercept is the value of y when x = 0. The point where two lines on a graph cross is called an **intersection point**. In previous section we have discussed about the slope. Let us discuss this with the help of an example.

Suppose $y = mx + b$

Where, m is the slope and b is the y-intercept.

Let us discuss this with the help of a supply curve.

Since the demand curve shows a positive relation between quantity supplied and price, the graph of the equation representing it must slope upwards. If the supply equation is linear, it will be of the form:

$$P = a + b Q_s$$

where **a** is the intercept along the Y-axis (the lowest price anyone would sell for) and **b** is the slope of the line. Graphically it is represented as follows:

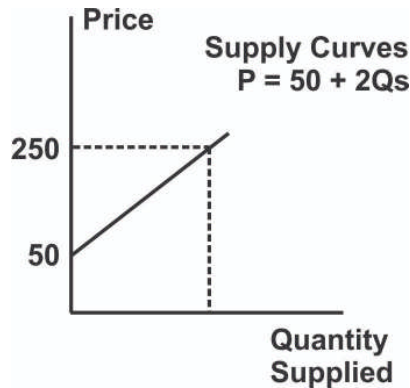


Fig. 2.9

Where the lowest price anyone would sell for is Rs.50 and in order to supply 100 units of the good, the price must be at a minimum Rs.250.

2.8 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.
5. Variables, Ceteris Paribus, Functions, Equations, Identities, Graphs and Diagrams, Lines and Curves, Slopes, Limits and Derivatives, Time Series etc. are the basic tools of economic analysis.

2.9 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.
7. Explain in brief various mathematical tools used in economic analysis.



Module - II

3

TEN PRINCIPLES OF ECONOMICS - I

Unit Structure:

- 3.0 Objectives
- 3.1 Introduction
- 3.2 Principles of Individual Decision Making
- 3.3 Individual face trade off
- 3.4 Significance of opportunity cost in decision making
- 3.5 Rational people think on the margin
- 3.6 People respond to incentives
- 3.7 Questions

3.0 OBJECTIVES

- 1. To study basic principles of economics
- 2. To study marginal profit principle
- 3. To study how people respond to incentives

3.1 INTRODUCTION

The word 'Economics' is originated from the Greek Work 'Oikonomikos' which can be divided into two parts.

- a) 'Oikos' which means 'Home' or 'House' and
- b) Nomos means 'Management'.

Thus in simple terms, economics means 'Home Management' or 'Management' of a Household.

This management becomes essential because our wants are unlimited and the resources at our disposal are limited. Thus scarcity of resources is the root cause of economic problem. Thus economics explains the optimum allocation of scarce resources to satisfy as many wants as possible.

Economics deals with people and is a reflection of how they interact with each other when they go about making decisions regarding their lives. It explains how people make decisions say how, when, where, what, whom, how much to sell, what to buy, where to work, whom to sell etc.

Basically the 10 principles are divided into three broad categories

(I)	(II)	(III)
Principles of Decision Making	How people Interact	How the Economy as a whole works.

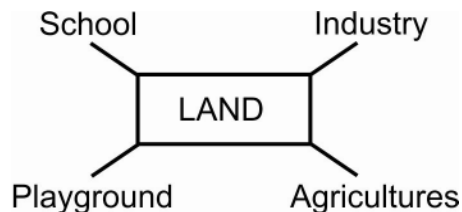
3.2 PRINCIPLES OF DECISION MAKING

Out of 10 principles the first four economic principles are in principles of Individual Decision Making.

3.3 PRINCIPLE 1 :INDIVIDUAL FACE TRADE OFF (PEOPLE FACE TRADE OFF)

Trade off means a situation where we have to give up one thing in order to have another. Thus it is said that 'There is no such thing as free lunch'. Thus to get something we like we usually have to give up something we don't like. Thus in simple terms to get one thing we have to sacrifice or give up another thing.

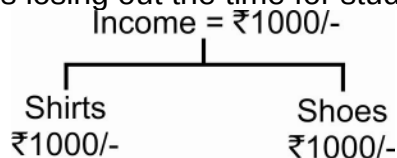
This situation arises because our wants are unlimited and the resources which are used to satisfy these wants are limited.



Now in this case we have only one plot of land. If we use it for the school building then we have to give up or sacrifice other alternatives i.e. industry agriculture, playground etc.

Society comes across several trade-offs like to have guns (military goods) or Butter (civilian goods). If we spend more on national defence to protect the country from external aggression then we will have to spend less on personal goods which will increase the std. of living of people.

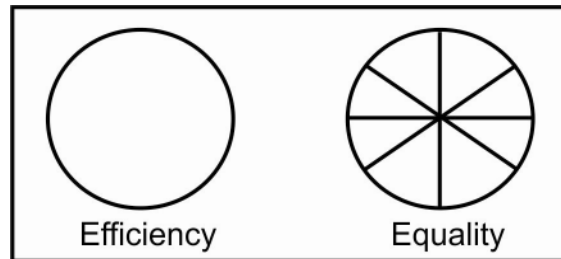
Similarly for a student, if he decides to go out to watch a film with friend then he is losing out the time for studies



In this case though you wish to have both (shirt and shoes), you cannot have it due to limited income. Thus if you decide to buy a shirt then you will lose shoes and vice versa.

Another trade-off faced by the society is between efficiency and equality.

Efficiency means that society is getting the maximum benefits from its scarce resources. Equality means that those benefits are distributed uniformly among society's members. Thus efficiency refers to the size of economic pie and equality refers to how the pie is distributed into individual slices.



When the government tries to cut the economic pie into more equal slices, the pie gets smaller. Government policies get this conflict between efficiency and equality. For e.g. Govt. policies of unemployment insurance or welfare system will help the most needy people in the society. This will bring equality. But other policies say like personal income tax, then only those who earn more will pay more tax. More on rich, no or less on poor. This will bring equality. But it might reduce efficiency. It is so because when wealth gets distributed from rich to poor then people will feel that why to work hard and earn more. They will work less and produce less goods and services.

Of course it does not mean what decisions they will or should make. Society should not stop protecting the environment just because environmental regulations reduce our material std. of living or the poor should not be ignored just because helping them disturbs the work incentives.

Nonetheless, people are likely to make good decisions only if they understand the options which are available to them. Thus study of economics starts by acknowledging life's trade-offs.

3.4 PRINCIPLE 2 :SIGNIFICANCE OF OPPORTUNITY COST IN DECISION MAKING

Scarcity of resources forces the people to make trade-offs. This people must always consider how to spend their limited

income or time to satisfy their unlimited wants or needs. This decision making requires comparing the costs and benefits of alternative uses or course of action.

Here we use the term 'opportunity cost'. It means the next best alternative given up by the factor. For e.g. The opportunity cost of playing football today evening is perhaps the foregoing or giving up the chance to play cricket. When we eat ice-cream then we forego or sacrifice or give up the chance of using that money for some other purpose.

Let us take another example let us assume that a person say Mr. A is having Rs. 1000/- with him. Now he has two options. One option is that he can keep this money in the banks fixed deposit and earn 5% rate of interest per annum (year). It means he will get interest of Rs. 50/-. The other option is that Mr A can invest this money in some business activities which gives him 10/- returns (income) per year. i. e. Mr. A will earn Rs. 100/-

Now Mr. A will choose the best. ie he will use that money in business activity. It gives him Rs. 100/- on Rs. 1000/-. But to remain in business activity, Mr. A has to sacrifice or forego or give up the option of keeping in fixed deposit and earn Rs. 50/-. Thus the opportunity cost of remaining in business is to give up Rs. 50/-.

Another example is that a person has Rs. 50/- with him. He is going to spend the income on samosa and Idli whose price is Rs. 10/- per unit.

Samosa	Idli
A 5	0
4	1
3	2
2	3
1	4
0	5

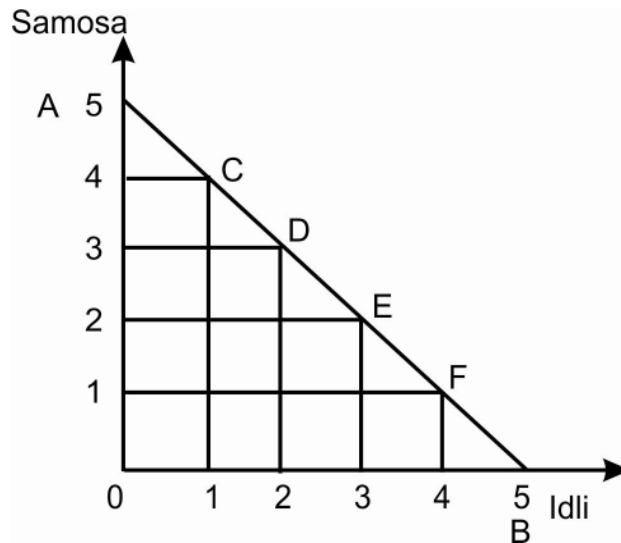


Figure 3.1

First take point D. It shows that he will have 2 idlis (Rs. 20) + 3 samosa (Rs. 30) = Rs. 50. Now if the consumer wishes to have 4 idlis ($4 \times \text{Rs. } 10 = 40/-$) then he will have to give up or sacrifice the samosas. Now at point F, the consumer will have 4 idlis (Rs. 40/-) and only one samosa (Rs. 10) = Rs. 50/-. Thus the opportunity cost of getting more idli is to sacrifice few samosas.

Economics normally assumes that people are rational. Rational people systematically and purposefully do the best to achieve their objectives. For e.g. A rational consumer tries to maximise his satisfaction (TU i.e. Total Utility) and the producer tries to maximize profit rational people make the best use of available opportunities.

3.5 PRINCIPLE 3 : RATIONAL PEOPLE THINK ON THE MARGIN

Marginal changes are small, incremental changes to an existing plan of action.

For e.g. a student who is pondering whether she should add one more study course next semester. As a rational decision maker, she will add the extra course as long as her marginal benefits of carrying extra course is greater than the marginal cost of doing that course.

Let us take another example. We know that marginal means additional or extra or one more or incremental etc. let us assume that a person is producing cricket ball. Now after producing one more cricket ball there is some additional cost and benefit. Let us say that the additional cricket bats is sold at r 50/- and l'ts cost is only Rs. 20/- Now here the person will produce the additional

cricket ball because the profit is of Rs. 30/-. But on the other hand, if the price of cricket bat falls to Rs. 15, but the cost remain Rs. 20/- only. Now it is not correct to produce additional cricket ball because the cost of making additional ball (Rs. 20/-) is greater than the revenue which can be earned from it (Rs. 15/-).

The cost of additional ball is called as marginal cost (MC) and revenue obtained by selling extra ball is called marginal Revenue (MR) Now if $MR > MC$ then there is a sense in producing additional ball.

Let us take an example of airline Company. It is about how much the airline should charge the passengers who fly standby, for e.g. Let us assume that the airline is flying a plane with 100 seats. It costs Rs. 50,000/- to the airline. Now the average cost of each seat is Rs. 500/- (Rs. 50,000/- 100/-). Now we might conclude that the airline should never sell a ticket for less than Rs. 500/-.

But a rational firm will always try to find out different ways to increase its profit. For that it will have to think at margin. Suppose, if the plane is about to take off with 10 empty seats and if the standby passenger will pay less for a seat. Here the airline should sell the ticket at little low price. If the plane has empty seats then the cost of adding one more passenger is very less. Although the Ac is r 500/-. Yet the MC is very less. Here selling the ticket is profitable as long as the standby passenger pays more than MC.

3.6 PRINCIPLE 4 : PEOPLE RESPOND TO INCENTIVES

Incentive is something that induces a person to act. Incentives are the motivating forces. Incentives may be positive or negative.

Prices act QS incentives and signals changes in price act as incentives. For e.g., if price rises then it acts as an incentive to the seller to sell more. The firm may now divert the resources from the production of low price product to the production of high price product. It is done to get more profit. It is done to get more profit.

Another e.g. is of public policy towards seat belts and auto safety. In 1960s, Palph Nader's book. 'Unsafe at Any speed' influenced the congress to pass a law which required that the car makers must make the seat belts as standard equipment on all cars. The direct effect of this law is to save lives.

Wages also actas incentives. Increment in wage may improve the efficiency of the labourer.

Societies where the disincentives to tax evasion are very high will produce honest tax payers. But if the incentives to tax evasion (i.e. non-payment of tax) were outweigh the incentives to being honest, then the same tax payer will become dishonest.

If the returns on coming to the meeting on time are high then the people will be more punctual. But if people get high returns on coming late then those who come on time than the rational individual will decide not to be punctua (will come late).

Incentives to keep small size of family will lower birth

3.7 QUESTIONS

1. What is opportunity cost? Explain the significance of opportunity cost in decision making.
2. Explain 'People respond to incentives'.
3. Explain four principles of economics in individual decision making.
4. Explain how individuals face trade off in decision making.



4

TEN PRINCIPLES OF ECONOMICS - II**Unit Structure:-**

- 4.0 Objectives
- 4.1 How people interact
- 4.2 Organisation of economic activities through market
- 4.3 Role of government in improving market outcomes
- 4.4 Macroeconomic instability
- 4.5 Growth in the quantity of money and inflation
- 4.6 Inflation and unemployment trade off
- 4.7 Questions

4.0 OBJECTIVES

- 1) To study how do people communicate with each other
- 2) To understand how does whole economy work
- 3) To study the relationship between increase in quantity of money and inflation
- 4) To study the relationship between inflation and unemployment

4.1 HOW PEOPLE INTERACT

It includes following principles.

PRINCIPLE 5 :- INDIVIDUALS AND NATIONS BENEFIT FROM EXCHANGE

This principle states that trade can make every one better off. As an individual consumer we consume a variety of products. But as an individual producer we cannot produce all the things which we consume. So we concentrate on the production of few and for remaining products we depend on others. Then we fulfill all our wants by entering into exchange.

Adam Smith's pointed out the basic propensity to truck, barter and exchange. Exchange gives you benefit let us take a 2 x 2 x 1 model i.e. 2 countries, 2 Commodities and 1 labour model.

	Commodity x	Commodity y
Country A	10	25
Country B	25	10

Suppose in country 'A' a labourer produces 10 units of com. x and 25 units of com. y and in country B, the labourer produces 25 units of com. x and 10 units of com. y. Now instead of producing both the goods, country A should specialize in the production of commodity y and country B must specialize in the production of com. x and then they should exchange. In that case both the countries will get more of x and y.

Division of labour also results in specialization and increases the efficiency of labour. This will result in more production. This higher output will be exchanged to get some other thing which is less in supply.

4.2 PRINCIPLE 6 :- ORGANISATION OF ECONOMIC ACTIVITIES THROUGH MARKET

Most of the time it is more efficient to organize economic activity through market. Market provides exchange. A variety of goods and service are exchanged in the market. We come across different types of markets. For e.g.

Markets can be local or global :- Market for groceries, market for Marathi films in Maharashtra etc. is local. Whereas market for crude oil is international.

Market can be Physical or Virtual :- Physical market is where actual sell and purchase takes place for e.g. vegetable or fish market in a your local area. Similarly we get virtual market where buyers and sellers don't know each other directly (one to one) for e.g. selling on internet, teleshopping etc.

The organisation of economic activities depend on the economic system which prevails in an economy. An economic system is composed of people, institutions and their relationship to resources. It deals with the problem of scarcity and allocation of resources. We come across 3 economic systems.

a) Command Economy : Here the economy is controlled by the government or bureaucracy. The government, through the central planning makes all decisions about how, when, where, what, how much etc. to produce.

b) Market economy : Here the decision making activity is done by firm and individuals. The firms decide on how, when, where, what etc. to produce and individuals decide on how, when, where, at what price to buy. The demand and supply decisions of individuals and firms are transmitted through the price system. In this system, self interest is the main motive.

c) Mixed Economy : It is a mixture of command and market economy.

Now In a market economy price mechanism plays an important role. Equilibrium is attained through price mechanism. Allocative Function is the most important role of the market. It brings efficient allocation of scarce resources by the firm and the household. It is done through invisible hand and market forces. Market price acts as a signal to producers, whether to produce more or less.

Market also performs the creative function. It provides an environment for change that helps the expansion of production and consumption.

Thus, following are the important functions of market.

- a) Market economy functions automatically
- b) It is highly competitive
- c) It gives incentives to producers to produce goods needed by consumers.
- d) It provides an incentive to acquire useful skill.
- e) It encourages to conserve resources.
- f) There is a high degree of economic freedom. i.e. freedom to take economic decisions.

4.3 ROLE OF GOVERNMENT IN IMPROVING MARKET OUTCOMES

Problems of Market Economy: The markets do not achieve maximum efficiency in the allocation of scarce resources and governments feel it necessary to intervene to rectify this and other problems of the market. The conditions required for markets to perform their allocative and creative functions in an optimal manner are not likely to be satisfied in any economy. The important problems of a market economy are:

- 1) Domination by few :** Competition between firms is often limited. A few large firms may dominate the industry. In these cases they may charge high prices and make large profits. Rather than responding to consumer wishes, they may attempt to persuade consumers by advertising. Consumers are susceptible to advertisements for products that are unfamiliar to them.
- 2) Removes incentive to be efficient :** Lack of competition and high profits may remove the incentive for firms to be efficient.

- 3) **Unequal distribution** : There is nothing in the market that guarantees an equitable distribution of income in the society. Power and property may be unequally distributed. Those who have power and property will gain at the expense of those without power and property.
- 4) **Externality** : Presence of externality leads to market failure. Externalities arise whenever an individual or firm can take an action that directly affects others without paying for a harmful one. When externalities are present, firms and individuals do not bear all the consequences of their action. A very good example of an externality is the pollution emitted by a firm. When the firm do not pay for the pollution their cost would be low and they would produce more. Presence of externalities leads to inefficient allocation of resources.
- 5) **Imperfect information** : The role of invisible hand in a market is based on the assumption that the market participants such as consumers, firms, government, workers, etc. have perfect information. They have full information about their opportunities, availability of goods, characteristics of goods and so on.

In reality the market participants are not perfectly informed. Imperfect information inhibits the ability of markets to perform the tasks that they carry out well when the information is complete.

The imperfect information possess the problem of asymmetric information. Asymmetric information is a market situation in which one party in a transaction has more information than the other party. This can affect the firm's strategy. It can lead to market failures. For instance, asymmetric information can lead to poorly-functioning markets, that is, too much or too little of a good may be produced. Contracting can be difficult. Fraud is possible. Consumers may fear purchasing goods when they know that the seller knows more about the quality of a good than they do. The problem of buyer ignorance allows rogue traders to operate. The greater the information asymmetry between sellers and consumers, the greater the scope for deception and fraud. Under these circumstances rogue traders are more likely to thrive. For instance, take the case of builders; by cutting corners and using inferior materials lower quality builders can undercut higher quality builders. However, consumers, due to information asymmetry, may simply believe that all builders are much the same and may go with the cheapest cost. As a result, reputed builders may be forced to cut their costs, by reducing the quality of their work, simply to stay in business. Thus, imperfect information leads to the market inefficiencies and market failures. Thus, governments have to make measures to help improve the information for consumers, investors and other market participants.

6) Fail to provide public goods : The public goods are those goods that the marginal cost of providing a pure public good to an additional person is zero and it is impossible to exclude people from receiving the good. In other words, public goods are characterized by two important features, that is, **non-rival in consumption and non-excludability**. Non-rival in consumption means that the consumption of one individual does not reduce the benefits derived by other individuals. Thus, it would not be appropriate to exclude others from enjoying such benefits. The provision of such goods cannot be undertaken through market forces because market failure occurs.

Since the benefits of such goods are available to all, consumers will not voluntarily pay for those goods. This is the **free-rider problem** that accompanies public goods. Since it is difficult to exclude anyone from using them, those who benefit from the public goods have an incentive to avoid paying for them. Hence, the market failure occurs in the provision of public goods.

The examples of public goods are defence, law and order and so on.

4.4 PRINCIPLE 8:- MACROECONOMIC INSTABILITY

A market economy may lead to macroeconomic instability. There may be periods of recession with high unemployment and falling output, and other periods of rising prices.

Role of Government:-

Since there are many problems and failures of market economy we need government to correct market failures or at least to lessen them. The government has an important role to play in the economic development of a country, but not so much as a direct provider of goods and services, rather as an agency to correct market failures.

The government can play an important role to correct market failures and improve economic efficiency. The government intervention is needed in the economy.

- i) To improve economic efficiency by correcting market failures.
- ii) To pursue social values of equity by altering market outcomes.
- iii) To pursue other social objectives by the provision of public and merit goods and at the same time prohibiting the consumption of merit goods.

According to R. A. Musgrave and P. B. Musgrave, government policy is needed to guide, correct, and supplement the

market mechanism in certain respects. The operation of government includes not only financing but has broad bearing on the level and allocation of resource use, the distribution of income, and the level of economic activity. These functions are carried out through government budget.

1) The government has an important role to play in development process. It is essential to correct market imperfections :

Government regulation and measures will be needed to secure the conditions necessary for the functioning of market mechanism. Government has an important role at correcting market failures arising from imperfect information, imperfect competition, externalities and public goods. In the case of imperfect competitions, firms use their market power to raise prices and reduce output. The MRTP Act or Competition Policy Act of the government can help to maintain competitive force and restrain firms from abusing their monopoly power. Similarly, imperfect information can lead to inefficient functioning of product and labour markets. Government can set up regulatory authorities such as SEBI (Securities Exchange Board of India) to compel the firms to provide information about their financial conditions.

2) To correct problems of imperfect information : Asymmetric information refers to the imbalance of knowledge in a market between buyers and sellers. For example, in the market for bank loans the borrowers know more about their own circumstances than the lenders. As consequences, banks could make bad loans. (i.e. adverse selection) which makes them cautious and leads to credit rationing. It would be very costly for banks to obtain all the information about high-risk customers. In this case the government has to make provisions to make the banks to lend to high risk customers at concessional rates. Similarly, in the insurance market, the individuals know more about their health than the suppliers of insurance. Those who know they are prone to illness are more likely to take out insurance, and also more likely to be turned down. **Moral hazard** is present when the possession of insurance encourages the activity that is insured leading to resource waste and higher insurance premium to all. In this case where prob. and the government may have to regulate private insurance companies or to provide the service itself at a lower cost.

3) To provide legal structure : The contractual arrangements and exchanges needed for market operation cannot exist without the protection and enforcement of a governmentally provided legal structure. In this respect, government can provide necessary legal structure and ensure their implementation by the firms and other parties in the market.

4) To provide public goods and merit goods : Even if the legal structure is provided and barriers to competition are removed, the production or consumption characteristics of certain goods like public goods and merit goods are such that they cannot be provided through the market. In the case of public goods there is the free-rider problem due to its characteristics. The important characteristics of a public good are :i) It is **non-rival in consumption**, that is, the consumption by one user does not reduce the supply available to others, ii) It is **non-excludable** i.e. users cannot be prevented from consuming the public good. As a consequence the market fails in the provision of public goods. Thus, government has to ensure their provision. The important public goods that are very important for economic development are defence, law and order, and the provision of basic infrastructure such as roads, sewers, clean water and so on.

On the other hand merit goods are the goods that the government consider to be good for the people, for example education, health, etc. if they are provided by the market people may under consume such good. Thus they having to be subsidised or provided free by the government. Merit goods have to be provided by the private sector as well as by the state.

5) To correct the problems arising from externalities : There will arise problems of “externalities” which lead to “market failure”. This requires correction by the government either by way of budgetary provisions, subsidy or taxation. In the case of goods with positive externalities (like research) the firms produce too little of goods and in the case of goods with negative externalities (such as that generate pollution) the firms production of goods with positive externalities. Most infrastructure projects, such as transport facilities, power generation, irrigation schemes and so on, and social, capital, such as education and health facilities come under this category. They have greater social returns than the private returns and therefore they will be underprovided from a social point of view unless the private providers in the market are compensated or subsidised.

The activities with negative externalities (those that pollute the environment) impose costs on the society that are not paid for by the provider and hence the market oversupplies those goods from a social point of view. Government can curb negative externalities through regulation or taxation.

6) To correct unequal distribution of income and wealth : The distribution of income and wealth which result from the market system and form the transfer of property rights through inheritance is likely to be unequal. In the market system, individual's incomes are related to their ownership of assets and their productivity. In

most of the countries, wealth is concentrated in the hands of the few. In many countries inequalities are linked to inheritance. The government has to take variety of programs aimed at the poor. These programs aimed at redistribution of income from the rich to the poor through welfare programs and taxation policies.

7) To provide an institutional environment : The state has to provide the appropriate institutional environment for markets to flourish and operate efficiently including the maintenance of macroeconomic stability. In this sense the markets and governmental intervention are complementary. Economic, social and sustainable development is not possible without an effective state. State should act as partner and facilitator than director. State should work to complement markets, not replace them. Good economic policies including the promotion of macroeconomic stability is needed for sustainable growth and the reduction of poverty.

8) To secure important social objectives : The market system does not necessarily bring high employment, price level stability, socially desired rate of growth, poverty eradication and economic development. Measures should be taken to improve health and nutrition in developing countries. The living standards of the poor has to be improved by providing clean water, adequate sanitation and ensuring basic amount of food to the poor. Government policies are needed to secure these objectives.

9) To provide social security : The market system cannot provide the social security to its citizens, suffering from unemployment, sickness, old age disability and so on. The government has to step in to provide social security to the citizens.

10) To guide the use of natural resources : The market mechanism cannot bring about appropriate allocation of natural resources for the present and future generations similarly, the market mechanism may not be able to control the pollution of environment. Therefore, consumption of natural resources, pollution control, etc. should be guided by government policies.

It should be noted, while the government policies can improve on market outcomes, government measures always may not succeed. This is because government policy is not made by angels but by a political process that is far from perfect.

4.5 PRINCIPLE 9 :- GROWTH IN THE QUANTITY OF MONEY AND INFLATION

Inflation is a situation of a continuous, uninterrupted, long term increase in price level.

It is a situation of too much of money supply chasing too few goods. This can be explained with an example we wish to overcome the problem of poverty. We think that the people are poor because they do not have enough money. Then people might think that let's ask the central bank (RBI in India) of the country to print new notes and distribute them amount people. But the problem is that when they have enough money to buy goods, and if the Quantity of goods remains constant then the prices will start rising. It shows that people have enough money to buy goods but goods are not available. This is a case of too much money, chasing too few goods. This leads to inflation i.e. price rise.

But of course if this higher money supply is used to bring full utilisation of unused resources then the production will increase.

But generally mere increase in money supply leads to price rise.

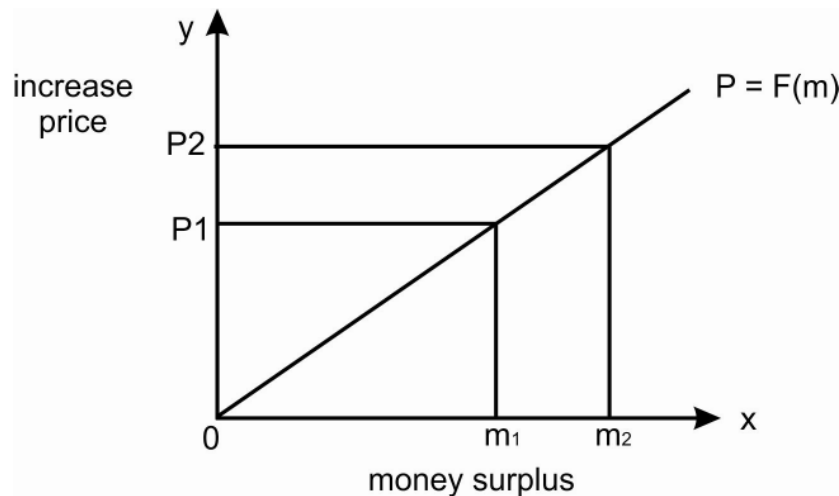


Figure 4.1

4.6 PRINCIPLE 10 :- INFLATION AND UNEMPLOYMENT TRADE OFF

Inflation – Unemployment Trade-off is a situation where increased employment is accompanied by increased inflation and lower inflation is accompanied by lower growth.

People wish to have less inflation and less unemployment is less then inflation is high and when unemployment is high, inflation is less. This is explained in the Phillips curve.

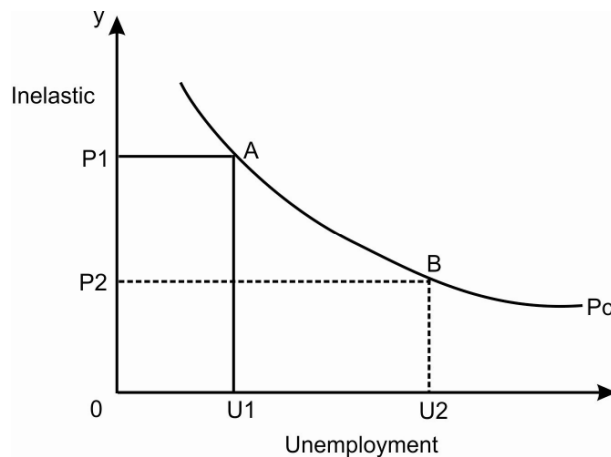


Figure 4.2

At point 'A' unemployment is less. It is only OU_1 . It means more people are employed. They get income. Their purchasing power and so demand for goods increases. As this is not matched by the supply of goods, we get high price situation (OP_1) i.e. inflation.

If unemployment is high i.e. OU_2 then a large number of people do not have sufficient income – thus they have less purchasing power – so demand for goods is less – prices fall (OP_2) – so less inflation.

Similarly if prices are high (P_1) i.e. if there is inflation then the profit of producer is high – so high investment – so more employment and less unemployment (OU_1).

But if prices are low (OP_2) i.e. if inflation is low – low profit – low investment – less demand for labour and other resources – so low employment – i.e. high unemployment.

4.7 QUESTIONS

- 1) Explain 'trade is good for all' by giving example.
- 2) Explain the role of government in improving market structure.
- 3) Write notes on
 - a) Private market and role of government
 - b) Inflation and unemployment
 - c) Market failure



Module III

5

MARKETS, DEMAND AND SUPPLY

Unit Structure:

- 5.0 Objectives
- 5.1 Market: (Market and Competition)
- 5.2 Meaning of demand
- 5.3 Determinants of demand
- 5.4 Law of demand
- 5.5 Individual demand and market demand
- 5.6 Changes in demand (Increase and decrease in Demand)
- 5.7 Supply
- 5.8 Law of supply
- 5.9 Individual supply and market supply
- 5.10 Change in supply
- 5.11 Market equilibrium
- 5.12 Questions

5.0 OBJECTIVES

1. To study the concept of market
2. To understand law of demand and demand curve
3. To study the concepts of individual demand and market demand
4. To study the concept of market equilibrium
5. To study the difference between individual supply and market supply

5.1 MARKET:- (MARKET AND COMPETITION)

Market, in economics, means, a network of dealings between buyers and sellers irrespective of any geographical specification. Thus, market brings together the buyers and sellers of a particular goods or services. Demand and supply explain the behaviour of people and their interactions with one another in a competitive market economy. Demand and supply are the two basic tools which

- a) are at the core (centre) of exchange economy
- b) make the economies work
- c) affect the events and policies in an economy

Depending on the number of buyers and sellers, nature of the commodity, concept of entry and exit etc. we come across different types of markets such as perfect competition, monopoly, monopolistic competition, Oligopoly, duopoly etc. for e.g.

- Perfect Competition is a market of large number of buyers and large number of sellers, selling homogeneous product. (Seller as Price taker)
- Monopoly is a market of large number of buyers and single seller, selling homogeneous product (Seller / monopolist as Price maker)
- Monopolistic competition is a market of large number of buyers and sufficiently large number of sellers selling heterogeneous or differentiated product.
- Oligopoly is a market of large number of buyers and few sellers selling differentiated products (Kinked Demand curve)
- Duopoly is a market of large number of buyers and two sellers selling differentiated products (Special case of oligopoly.)

Similarly we also have

- Local Market mainly for perishable goods and services.
- State or National market for durable items. Other case is Marathi films have bigger market in Maharashtra state. But Hindi films have national market.
- International Market is for different goods and services like financial services.
- We also come across share (Stock Market) bullion Market (for precious metals like gold / silver etc.), Real Estate market.

We come across competition in the market. Competition is the effort of two or more parties to ensure their position and efficiency. Competition brings out the best of quantity and quality. It ensures the most efficient or optimum allocation of productive resources.

5.2 MEANING OF TERM DEMAND

In an ordinary language, demand means a desire or a want for something. But a mere desire or willingness is not a demand in economics. In economics demand means any desire or willingness backed by purchasing power. Thus demand = willingness to Buy + Ability to pay.

E.g. If Mr. X wants to buy BMW car but does not have the ability then want will not be converted into demand. Similarly Mr. Y may have the ability to buy chicken but has no desire or willingness to buy it as he is vegetarian.

In both the cases there is no demand because willingness and ability both do not go together.

5.3 DETERMINANTS OF DEMAND

(Factors influencing Demand for a product.)

Demand for a particular commodity or a product depends on the following factors:-

1) Price of the product (P)

Price is the basic determinant of demand. Demand for any product depends on the price of that product. Usually, there is an inverse relationship between the two i.e. higher the price, lower is the demand and lower the price, higher is the demand.

2) Prices of substitutes (P_{sub}) :

Demand for a particular product depends not only on the price of that product but also on the prices of other substitutes available in the market. If 'X' and 'Y' are two substitutes (Pepsi / coke), then demand for x depends not only on the price of x but also on the price of Y.

3) Income (Y):

Demand for a product depends on the disposable income of the individual usually; income and demand are directly related. Income reveals the purchasing power. Thus higher the income, greater is the demand and lower the income, lower is the demand.

4) Taste and Preference (T/P) :

Demand for several products like ice creams, cakes etc. depends on the taste of a person. At the same time, different people have different preferences for different products. For e.g. Non-vegetarian person will give higher preference to non-veg food than veg. food.

5) Habit (H) :

Demand for a product also depends on the habit. When the person is habituated to the consumption of a particular commodity then he creates demand for it. For eg. Demand for cigar, tobacco, liquor, pan masala etc.

6) Fashion (F) :

When the consumption or use of a particular product is in fashion trend, then demand for that product rises. Once the consumption goes out of fashion the demand decreases.

(7) Expectations about future price change :- (Fp)

If the consumer expects some change in future price then his present demand for the product gets affected. For e.g. If the consumer expects that the price is going to rise in future, then his present demand for the product increases.

8) Advertising (A) :

In the competitive market, the demand for many products depends on advertisements and sales propaganda. Demand for many products such as soaps, toothpastes etc. is determined by the advertisement

9) Government Policy (GP) :

If a govt. imposes a tax on the commodity then its demand falls due to a price. If the govt. offers the subsidy on the product then its demand rises.

10) Climate / Season :- (CI)

Demand for certain products depends on the climatic conditions and seasonal changes. For e.g. Demand for umbrella in rainy season.

11) Social Factor (S) :

Demand for a commodity is also affected by social factors like customs, traditions, value system, culture etc. For e.g. Demand for traditional sweets.

5.4 LAW OF DEMAND

The law of demand establishes a functional relationship between the price and demand for a commodity.

Demand for any product depends on several factors like Price of the product, income, taste, habit, fashion etc. But, if we allow all of them to change then the analysis becomes complicated. To avoid this we make use of the assumption 'Ceteris Paribus' i.e. 'other things being equal' or 'other things remaining same or constant and take relation between P and D.' This gives us the law of demand.

The law of demand states that other things being equal, Quantity demanded of any commodity (say X) varies inversely with the Price of that commodity (i.e. X). Thus when Price rises, the demand falls and when price falls, the demand rises.

$$D_x = f(P_x, \overline{Y}, Y, P, H, A, F, \dots)$$

$$D_x = f(P_x)$$

$$P_x \downarrow D_x \uparrow \text{ and } P_x \uparrow D_x \downarrow$$

Demand Schedule :-

Demand schedule is a tabular presentation of a relation between Price and Quantity demanded. It shows the quantities of the goods that people plan to buy at various prices.

Price per Unit (com. x) (Rs.)	Quantity Demanded (com. x) (units)	
50	8	Q
40	12	R
30	20	S
20	30	T
10	50	U
5	65	V

Table 5.1

The above schedule or table shows an inverse relationship between price and demand. It shows that when price falls from Rs. 50 to Rs. 5 per unit, the quantity demanded rises from 8 units to 65 units. Similarly when price rises from Rs. 5 to Rs. 50 per unit, the quantity demanded falls from 65 units to 8 units. Thus, higher the price (Rs. 50), lower is the demand (8 units) and lower the price (Rs. 5), higher is the quantity demanded (65 units).

Demand Curve :- Demand curve is a graphical presentation of a relation between price and quantity demanded.

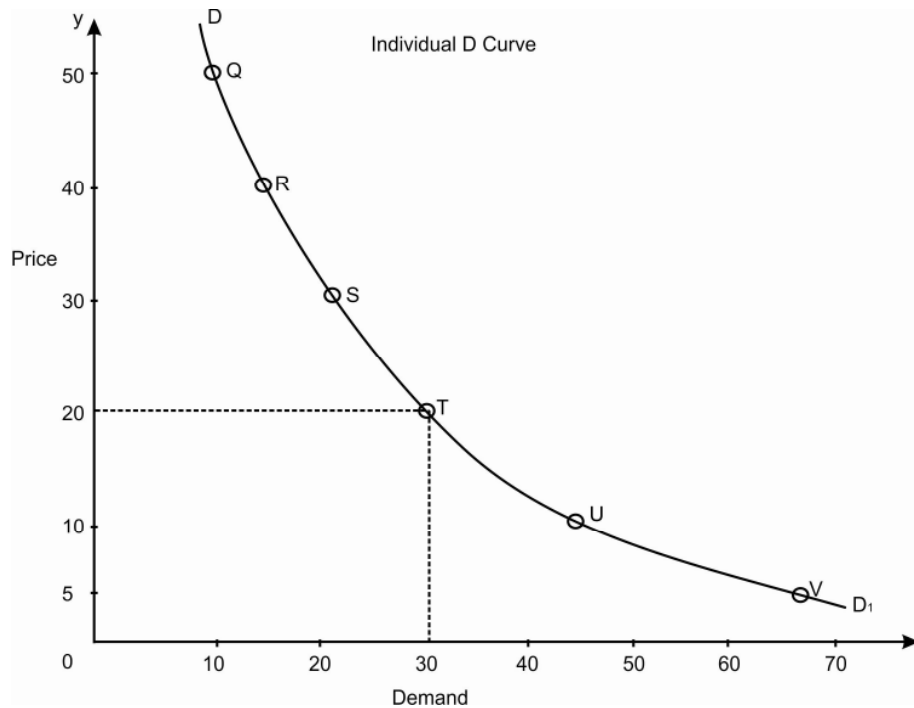


Figure 5.1

The demand (dependent variable) is shown on the X-axis and price Independent variable is shown on the Y-axis. DD is a demand curve which slopes downwards from left to right. It shows an inverse relationship between price and quantity demanded. Each and every point on the demand curve gives a specific relationship between price and quantity demanded. For e.g. At some point 'T', the price is Rs. 20 and Quantity demanded is 30 units. The inverse relationship between price and demand is true for almost all goods in the economy.

Assumptions of the law of Demand

Law of demand is based on following assumption

1. Income remains constant :- There is no change in income – i.e. neither increase nor decrease.
2. There is no change in the prices of substitutes.
3. There is no change in the taste and preference of the consumer.
4. There is no change in fashion and advertisement.
5. No change in govt. Policy. There is neither increase nor decrease in taxes or subsidies.
6. Consumer does not expect any change in the future price.
7. The quantity of money in circulation remains constant.

Demand function for price

Law of demand explains the functional relationship between price and quantity demanded.

$$Q_x = f(P_x)$$

Q_x = Quantity Demanded of commodity X

f = Functional relationship

(P_x) = Price of commodity X

$$Q_x = a - bP_x$$

$$Q_x = 100 - 5P_x$$

Price Per Unit `	Quantity Demanded in Unit $Q_x = 100 - 5P_x$
0	100
1	95
2	90
3	85
4	80
5	75

Table 5.2

It shows an inverse relationship between price and quantity demanded.

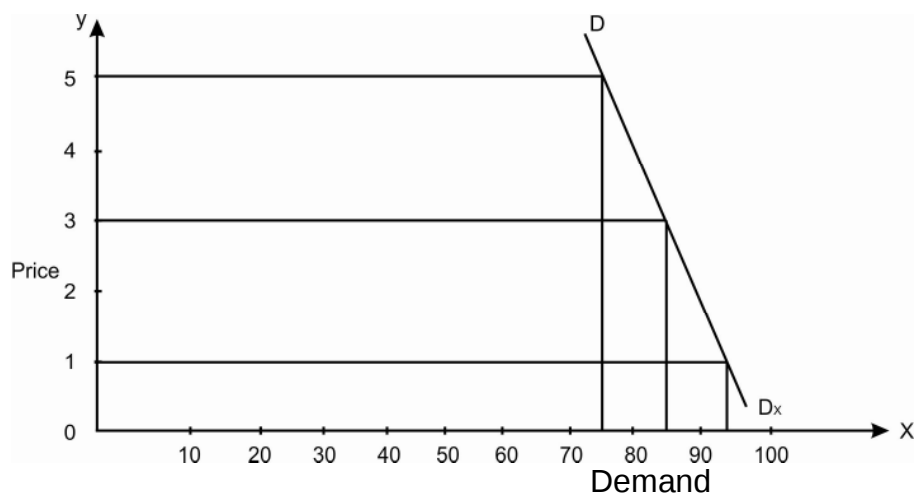


Figure 5.2

❖ Individual Demand v/s Market Demand is a desire backed by purchasing power.

5.5 INDIVIDUAL DEMAND AND MARKET DEMAND

Individual Demand:

Individual demand is the demand for a commodity by an individual buyer, at a particular price and at a particular point of time in the market. It is a part of market demand.

Individual Demand schedule gives us the tabular presentation of a relation between price and Quantity demanded by an individual.

Let us take the price of some commodity X and the Quantity demanded of commodity X by two individuals, say individual A and individual 'B' separately.

Price of Com. X	Demand Individual A	Price of Com x	Demand Individual A
50	1	50	2
40	2	40	4
30	3	30	6
20	4	20	8
10	5	10	10

Table 5.3

The above tables show that as the price of commodity x falls, the demand for commodity x, rises for both the individuals. From these two schedules we can draw two demand curves for individual A and B respectively.

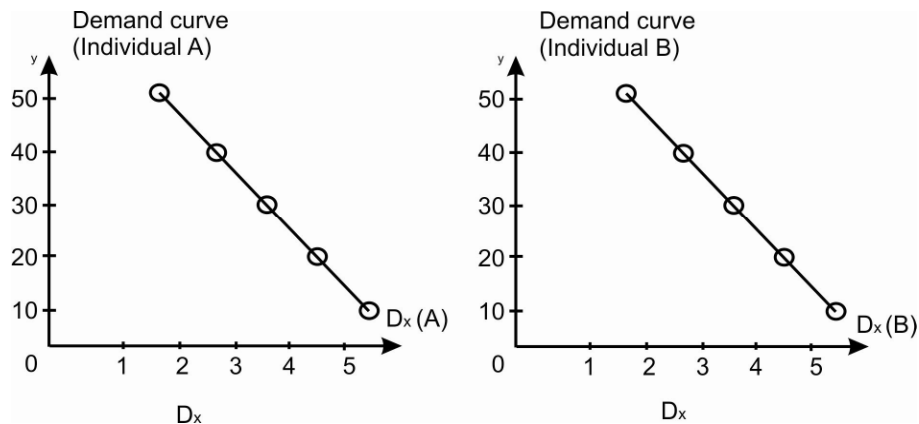


Figure 5.3

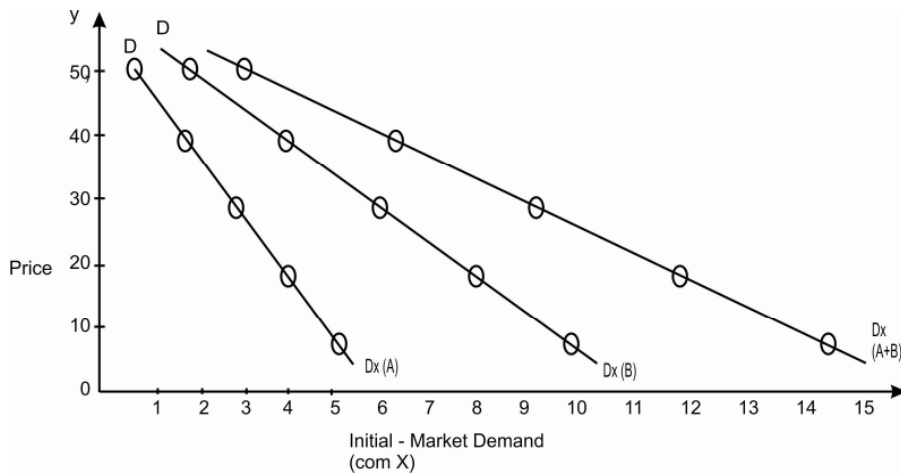
In both cases the demand curve slopes downwards from left to right, indicating inverse relationship between price and quantity demanded.

Market Demand :

It refers to the sum of (aggregate or total) all the individual demands in the market for a particular commodity, at a particular price and time in the market. Market demand is a summation of individual demands.

Market Demand scheduler is a tabular presentation of the relation between quantity demanded and different prices of com. X by all consumers in the market. It is calculated at a point of time.

Price of Com. X	Quantity Demanded		Market Demand
	Individual A	Individual B	
50	1	2	03
40	2	4	06
30	3	6	09
20	4	8	12
10	5	10	15

Table 5.4**Market Demand curve****Figure 5.4**

Demand on x axis and price on y-axis

The above diagram shows that the demand curves of individual A, B and the market demand curve ($D = D_A + D_B$) slope downwards from left to right. This indicates an inverse relationship between price and demand. Market demand curve ($D = D_A + D_B$) being the summation of D_A and D_B is bit flatter.

Variation in Demand and changes in Demand. (Movement Vs shift in Demand curve)

Variation in demand :- There are many factors that determine demand. One of the important factors is price. When the demand changes only due to changes in price then we get variation in demand. It is explained in two ways namely Extension(Expansion) and Contraction of demand.

In this we keep all other variables constant and bring change in price of the product alone.

$$D_x = f(P_x, \overline{P_{sub}}, Y, T, P, H, A, F, \dots)$$

$$D_x = f(P_x)$$

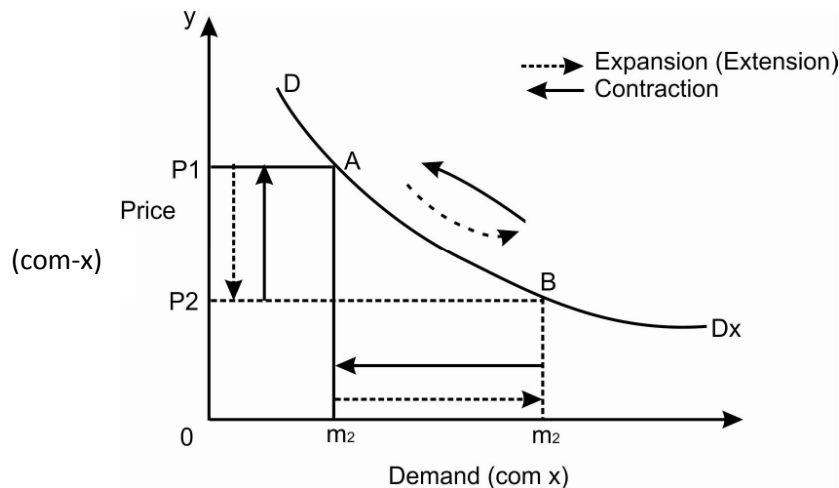


Figure 5.5

Demand is shown on the x-axis and price on the y-axis. DDx is a demand curve which slopes downwards from left to right. Let us take two points viz. A and B on this demand curve.

At point 'A' the price is OP_1 and the demand is OM_1 . At point 'B' the price is OP_2 and the demand is OM_2 .

Now when Price falls from OP_1 to OP_2 then the demand expands from OM_1 to OM_2 . The consumer moves from point A to point B, but remains on the same demand curve DD. This is called as the Extension or expansion of demand. Similarly when price rises from OP_2 to OP_1 , then demand contracts from OM_2 to OM_1 . The consumer moves from point B to A, but remains on the same demand curve DD. This is called as contraction of Demand.

Thus in expansion (extension) and contraction of demand we get two important things :

1. Change in price of commodity alone. (Keeping other variables constant.)
2. Movement along a given demand curve

For e.g. If government increases the tax on a soft drink say 'Goldy' to discourage the consumption. Now due to the imposition of tax the price of 'Goldy' drink rises and thus the demand contracts. But if the tax is removed then the price of 'Goldy' falls and the demand expands.

5.6 CHANGES IN DEMAND(INCREASE AND DECREASE IN DEMAND) (SHIFT IN D CURVE)

Demand for any product depends on the price of that product and also on several factors like prices of substitutes, income, taste, preference etc. In changes in demand we remove the assumption other things remaining the same and bring a change in all demand determinants.

Thus the price may or may not change but the change in factors other than price gives us either increase or decrease in demand.

Increase in Demand :

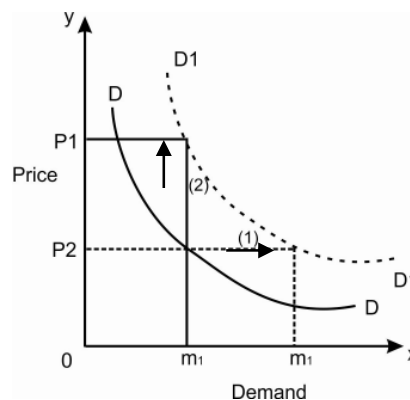


Figure 5.6

In this diagram, the demand is shown on the x-axis and the price on the y-axis. DD is the original demand curve and op is the original price.

Now increase in demand is shown in two ways

1. At a higher price (OP_1), same quantity is demanded i.e. OM and
2. At a same price (OP) more quantity is demanded i.e. OM_1 .

We get a shift in the demand curve from DD to D_1D_1 . The demand curve shifts to the right of the original demand curve

This happens due to

- i) Increase in income ii) change in taste and preference in favour of that commodity iii) Rise in prices of substitutes iv) Change in fashion v) Rise in population etc.

Decrease in Demand:-

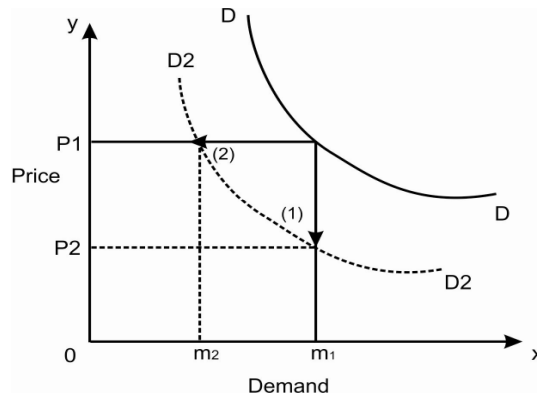


Figure 5.7

Demand on the x-axis and price on the y axis. DD is the original demand curve. OP is the original price and OM is the original quantity demanded. Now the decrease in demand is shown in two ways.

- 3) At same price (OP_1) less quantity is demanded i.e. OM2 and.
- 4) At a lower price (OP_2), same quantity demanded i.e. OM₁.

In this case, the demand curve shifts from DD to D_2D_2 . The demand curve shifts to the left of the original demand curve.

This happens due to

- i) Fall in income
- ii) Change in taste and preference against the commodity
- iii) Consumption goes out of fashion.
- iv) Fall in prices of substitutes
- v) Fall in population etc.

Thus in increase and decrease in demand we get 2 things

- I) Change in factors other than price (price may or may not change)
- II) A shift in the demand curve. To the right increase and to the left decrease.

A combined case (you can draw a linear or non-linear demand.)

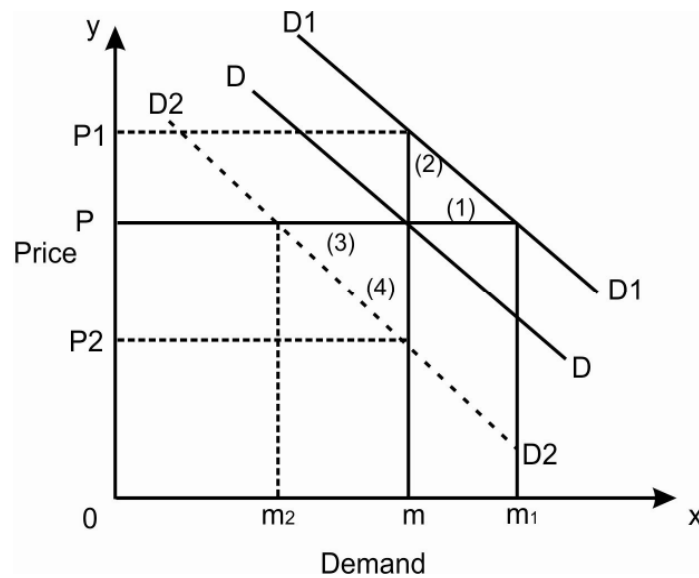


Figure 5.8

Variation in Demand		Change in Demand	
1)	It occurs due to change in price alone	1)	It occurs due change in factors other than price
2)	It gives us <u>movement</u> along a given demand curve	2)	It gives us a <u>shift</u> in demand curves
3)	It is explained with Expansion (Extension) and Contraction of Demand.	3)	It is explained with increase and decrease in Demand.

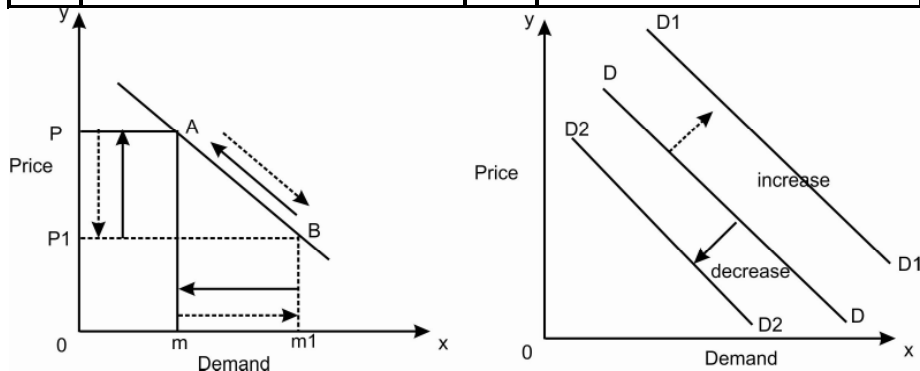


Figure 5.9

5.7 SUPPLY (S)

The supply side of the market explains the behaviour of the seller. In economics supply means, the amount of the commodity which the seller is able and willing to offer for sale at a particular price, during a particular period of time. Supply is a relative term. It

is always referred in relation to price and time. Supply & price are directly related.

In economics, supply means. “the amount of the commodity which the seller (producer) is able & willing to offer for sale at a particular price, during certain period of time.

Determinants of supply :- (factors influencing supply) Factors affecting supply of a commodity are –

- 1) **Price of the commodity** :- Price is the single largest factor influencing the supply of a commodity. More is supplied at a lower price & less at a higher price.
- 2) **Seller's expectations** :- sellers expectations about the future price affects the supply. If a seller expects the price to rise in the future, he will with- hold his stock at present and there will be less supply now.
- 3) **Natural Conditions** :- Supply of some commodities such as agricultural products, depends on the natural environment or climatic conditions like rain fall, temperature etc. e.g. A good monsoon will produce a good harvest, so the supply of the agricultural products will increase.
- 4) **Transport Conditions** :- There should be well connected proper approach routes, quick & cheap modes of transportation & effective and quick communication systems. This will increase supply.
- 5) **Price of Related products** :- Prices of substitutes or related products also influence the supply of a commodity. If the price of wheat rises, farmers may grow more of wheat & less of rice so supply of wheat will rise.
- 6) **Cost of Production** :- When the cost of production rises the supply decreases. E.g. When factor payments (rent, wages etc.) increases, the cost of production rises & supply falls.
- 7) **The state of Technology** :-The supply of the commodity depends upon the methods of production. An improvement in technique of production reduces cost & so supply increases.
- 8) **Factors outside the Economic sphere** :- Fire, wars, earthquakes etc. may destroy productive assets of the commodity and restrict future supplies.
- 9) **Govt. policies(Taxes & subsidies)** :- With an increase in the rate of a tax on a commodity, the supply of that commodity would decrease & vice versa. On the other hand, with an increase in the amount of a subsidy on a commodity, its supply would increase and vice versa.
- 10) **Nature of Market** :- Supply of a commodity would be higher when there is a competitive market. But in monopoly, the supply

may be low. This is so because a monopolist may create artificial scarcity to raise the price.

11) Period of time :- In a very short period, the supply of a commodity may be fixed, whatever may be the price. But over a period of time, the supply is adjusted with demand.

12) Self – Consumption :- If a farmer keeps a large stock for self – consumption then the supply is less.

$$S_x = f(P_x, P_{sub}, S_{ex}, p, Mat, Cond, \dots)$$

5.8 LAW OF SUPPLY

The law of supply explains the relationship between price and quantity supplied. The law of supply states that 'other things remaining the same, quantity supplied of any Commodity (say x) varies directly with the price of that commodity (i.e. x). Thus when price rises, the supply rises and when the price falls, the supply also falls.

$$S_x = f(P_x, \overline{P_{sub}}, \overline{I}, \overline{G}, \overline{T}, \overline{G_p}, \dots)$$

$$S_x = f(P_x)$$

$$P_x \downarrow S_x \downarrow, P_x \uparrow S_x \uparrow$$

(I = Investment, G = Goal, T = Technology etc.)

Supply Schedule :- Supply schedule is a tabular presentation of a relation between price and quantity supplied of a particular commodity. It shows the quantities of the good that the seller plans to sell at various prices.

Table 5.5

Price () (Com. X)	Supply (Com. X)
50	500 T
40	400 U
30	300 V
20	200 W
10	100 X

The above table (schedule) shows the direct relationship between the price and Quantity supplied. It shows that when price falls from Rs. 50/- to Rs. 10/- then the supply also falls from 500 units to 100 units. Similarly, when the Price rises from Rs. 10/- to Rs. 50/- then the supply prices from 100 units to 500 units. Thus, higher the price (Rs. 50/-), higher is the supply (500 units) and lower the price (Rs. 10/-), lower is the Quantity supplied (100 units).

Supply Curve: It is a graphical (diagrammatic) presentation of a relation between price and quantity supplied.

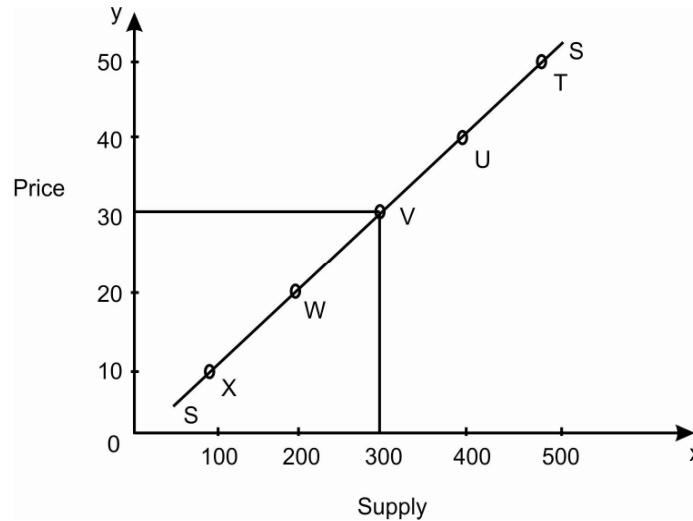


Figure 5.10

Supply on x-axis and price on the y-axis. SS is the supply curve which slopes upwards from left to right. It shows a direct relationship between price and quantity supplied. Each and every point, on the supply curve gives us a specific relationship between price and supply at that point. For e.g. Point 'V' shows that the price is Rs. 30/- and the supply is 300 units. This direct relationship between price and supply is true for almost all goods in the economy.

Assumptions of Law of supply

Assumptions :- The law of supply is based on following assumptions.

- 1) **Self-consumption** :- The law assumes that the producer of a commodity does not increase his own consumption of a commodity.
- 2) **Technology** :- The law assumes that there is no change in the technique of production. The technology or the method of production remains constant. i.e. absence of technological change.
- 3) **Cost of Production** :- The law of supply assumes that the cost of production remains constant. There is no change in the cost of production. E.g. Wages, Interest etc. are unchanged.
- 4) **Fixed Scale of Production** :- During a given period of time it is assumed that the scale of production remains constant. If the scale of production changes, then the level of supply will also change irrespective of change in the price of the product.

- 5) **Govt. Policies** :- Govt. Policies like taxation policy, trade policy etc. are assumed to be constant. There is no change in subsidies also.
- 6) **No change in Transport Cost** :- The law assumes that transport facilities & transport costs are unchanged. There are given means of transport.
- 7) **No speculation** :- The law assumes that the sellers don't speculate about the future changes in the price of the product.
- 8) **Prices of Competitive Goods** :- It is assumed that the prices of all competitive goods which are substitute to a product remain constant.
- 9) **Weather Conditions** :- The law assumes that the weather conditions are normal e.g. Normal rain fall, absence of natural calamities etc.

5.9 INDIVIDUAL SUPPLY AND MARKET SUPPLY

Supply is the quantity (amount) of a commodity which the seller is able and willing to sell at a particular price and at a particular time in the market.

Individual supply: It is the supply of a commodity by an individual seller at a particular price and at a particular point of time in the market.

Individual supply schedule :It gives us the price and quantity supplied of a commodity by an individual seller.

Let us take the price of some commodity X and the quantity supplied of commodity X by say two sellers A and B.

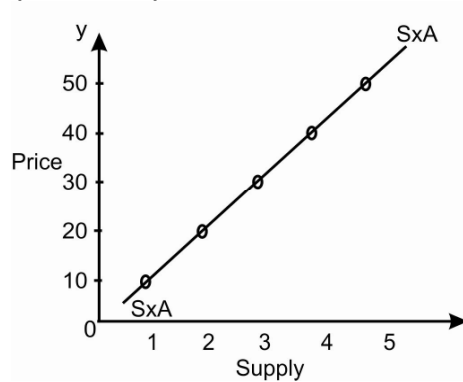
Table 5.6

Price of Com. X	Supply of X by Seller A	Price of Com x	Supply of X by Seller B
50	5	50	10
40	4	40	8
30	3	30	6
20	2	20	4
10	1	10	2

The above tables show that for both the sellers (A and B), sell less of X when price falls and supply more of commodity x when price of commodity x rises.

Individual supply curve :- It is a graphical presentation of a relation between price and supply.

Supply curve
(Seller - A)



Supply curve
(Seller - B)

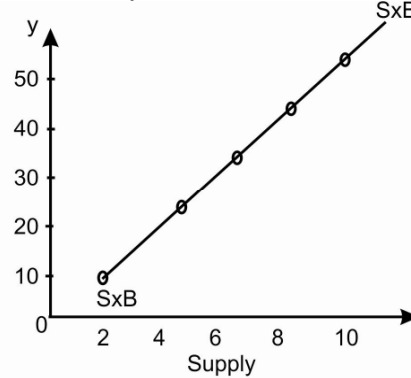


Figure 5.11

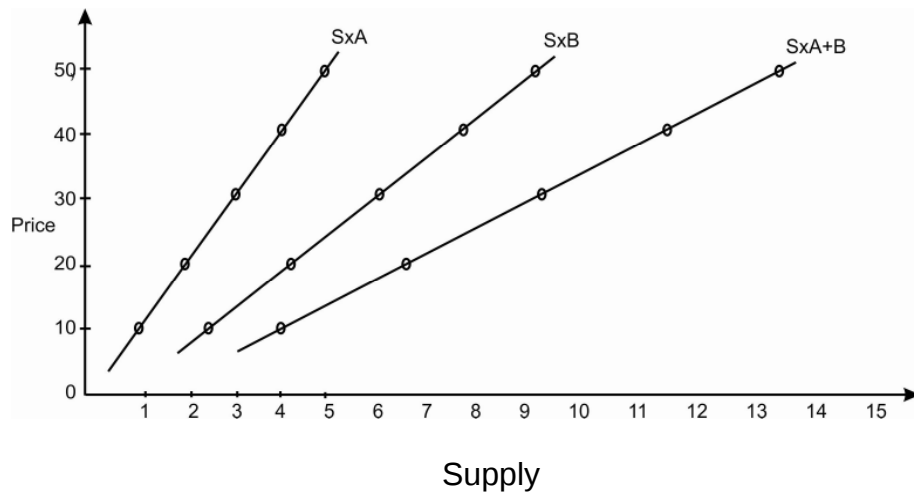
Upward sloping supply curve (S_{xA} and S_{xB}) give direct relationship between price and supply.

Market supply :- It refers to a sum of (aggregate / total) all the sellers supply in the market of a particular commodity, at a particular price and time in the market. Market supply is the summation of all individual supply.

Market supply schedule :- It is a tabular presentation of a relation between quantity supplied at different prices of com. x by all the sellers in the market. It is calculated at a point of time.

Price of Com. X	Quantity Supplied		Market Supply
	Seller A	Seller B	
50	5	10	15
40	4	8	12
30	3	6	9
20	2	4	6
10	1	2	5

Table 5.7

Total Market supply curve :-**Figure 5.12**

Supply on the x-axis and price on the y-axis. The above diagram shows that the supply curves of sellers A and B and the market supply curve (Sx A+B), slopes upwards from left to right. This shows a direct relationship between price and supply. The market supply curve (S x A + B) being the commission of s x A and S x B is flatter.

- Variation in supply and changes in supply (Movement V/S shift in supply curve)**

Variation in Supply : Supply of any commodity depends on several factors such as price of that product, prices of substitutes, investment outlay, goal, technology etc. But in variation in supply we assume that all other variables remain constant and we take note of change in price alone that affects the supply. It is explained in two ways viz. extension (Expansion) and contraction of supply.

In this case we keep all other variables constant and bring change in price of the product alone, which affects supply.

$$S_x = f(P_x, \overline{P_{sub}}, \overline{I}, \overline{T}, \overline{G_p}, \dots)$$

$$S_x = f(P_x)$$

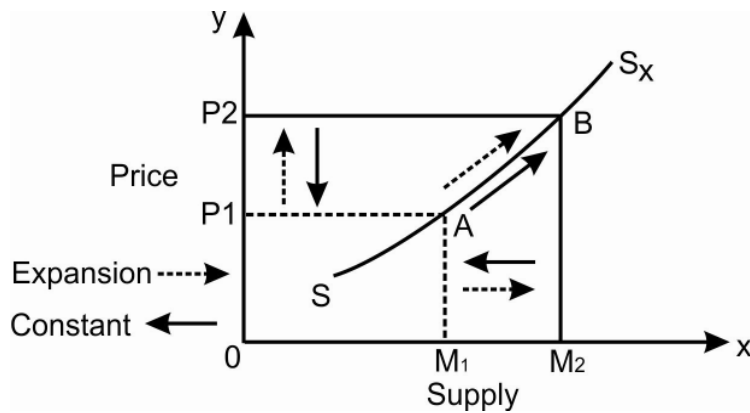


Figure 5.13

Supply is shown on the x axis and price on the y-axis. SS_x is the supply curve which slopes upwards from left to right. We select two points on supply curve as A and B.

At point 'A' the price is OP_1 and supply is OM_1 . At point 'B', the price is OP_2 and the supply is OM_2 .

Now, when price rises from OP_1 to OP_2 then the supply expands from OM_1 to M_2 . The seller moves from point A to B but remains on the same supply curve i.e. SS. This is called as Expansion (Extension) of supply.

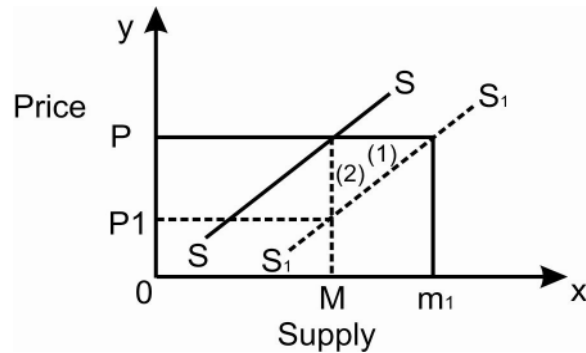
Similarly, when price falls from OP_2 to OP_1 , the supply contracts from OM_2 to OM_1 . Now the seller moves from point B to point A but remains on the same supply curve i.e. SS. This is called as **contraction of supply**.

Thus in extension and contraction of supply, we get i) change in price alone ii) movement along a given a supply.

5.10 CHANGES IN SUPPLY – SHIFT IN SUPPLY CURVE (INCREASE AND DECREASE IN SUPPLY)

Supply of any product or commodity depends on the price of that product and also on the technology, govt. policy, goal or objective etc. In, changes in supply we remove the assumption 'other things remaining constant' and bring a change in all variables.

Thus the price may or may not change but change in factors other than price gives us either increase or decrease in supply. We get a shift in supply curve.

Increase in Supply :**Figure 5.14**

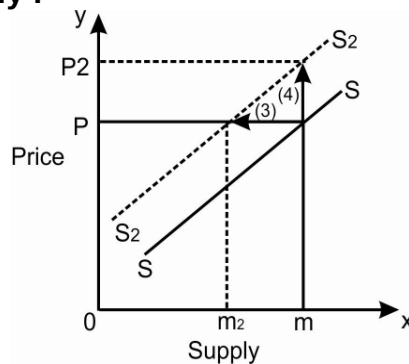
Supply on the x-axis and y-axis. SS is the upward sloping supply Curve (original). The original Price is OP and Original Quantity supplied is OM. Now, increase in supply is shown in two ways.

1. At same price (OP), more quantity is supplied i.e. OM1 and
2. At a lower price (OP1), same quantity is supplied i.e. OM.

We get a shift in the supply curve from SS to S1S1. The supply curve shifts to the right of the original supply curve.

This happens due to

- i) Fall in cost of production,
- ii) Improvement in technology
- iii) Favourable change in govt. Policy
- iv) Increase in investment etc.

Decrease in supply :**Figure 5.15**

SS is the Original supply curve. OP is the original price and OM is the original quantity supplied. Now increase in supply is shown in two ways :-

- 3) At same price (OP), less quantity is supplied i.e. OM2 and
- 4) At a higher price (OP2), same quantity is supplied, OM.

In this case the supply curve shifts to the left of the original supply curve (SS to S_2S_2)

This happens due to

- i) Rise in cost
- ii) govt. policy becomes unfavourable
- iii) fall in investment outlay
- iv) Transport bottleneck etc.

Thus in increase and decrease in supply we get

- I) Change in factors other than price
- II) Shift in the supply curve – to the right then increase and to the left then decrease in supply.

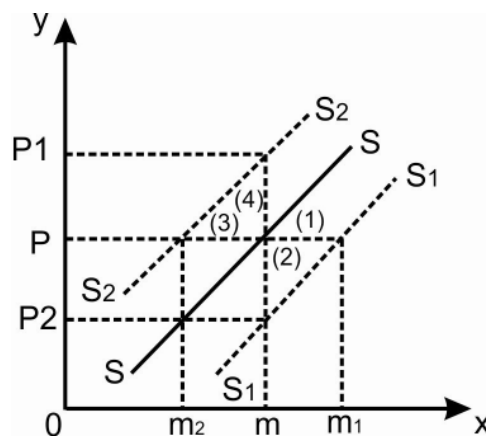


Figure 5.16

Variation in Supply		Change in Supply	
1)	It occurs due to change in price alone	1)	It occurs due change in factors other than price
2)	It gives us <u>movement</u> along a given supply curve	2)	It gives us a <u>shift</u> in supply curves
3)	It is explained with Extension and Contraction of supply.	3)	It is explained with an increase and decrease in supply. If the curve shifts to the right then increase and if to the left then decrease

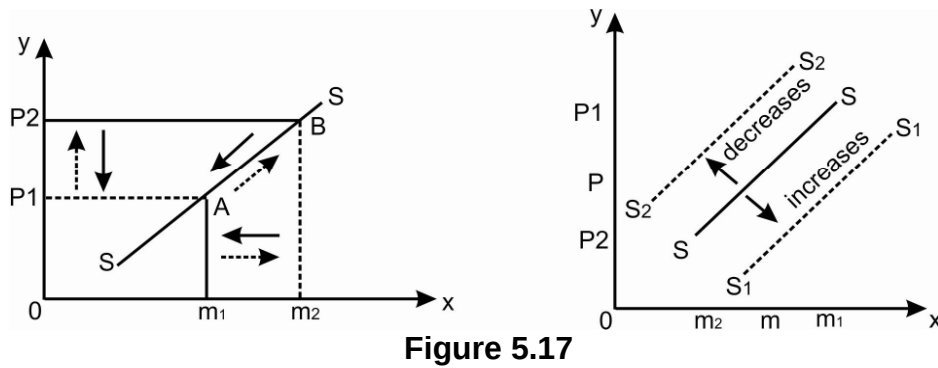


Figure 5.17

5.11 MARKET EQUILIBRIUM

Market is a network of dealings between buyers and sellers irrespective of any geographical specification.

Equilibrium is a state of rest or balance where two opposite forces are balanced with each other in such a way that any further movement away from that position is not possible as well as profitable.

As to cut a piece of cloth we need two blades of scissors, similarly to determine the market price of a commodity we need two economic variables viz. demand and supply. Demand and supply together give us the market equilibrium.

The demand and price are inversely related and the demand schedule and curve explains the quantities that individual plan to demand at various prices.

Similarly the supply and Price are directly related and the supply schedule and supply curve explains the quantities that a seller plans to sell at various prices.

Price (₹)	Demand	Supply	Pressure on Price
50	100	500	Downward
40	200	400	Downward
30	300	300	Neutral
20	400	200	Upward
10	500	100	Upward

Table 5.8

To begin with, let us assume that the price is Rs. 50/- At this price the supply (500 units) is greater than the demand (100 units). Due to the excess supply we get a downward pressure on the price (too much of anything reduces its value). Now the price falls to Rs.

40/- Now there is some increase in demand and fall in supply, yet the supply is greater than the demand. Thus we get a further downward pressure on price. The process continues till we reach equilibrium point i.e. price (Rs. 30/-) where $D = S$ (300 units).

Similarly at the price Rs. 10/-, we find that the supply (100 units) is less than the demand (500 units). It shows scarcity ($S < D$) and scarcity gives higher value to the product. Thus there is an upward pressure on price. It rises till it reaches the equilibrium point, i.e. E.

Thus Rs. 30/- is the equilibrium price where $D = S$. No further movement is possible as well as profitable. 300 units is the equilibrium quantity. This equilibrium price is also called a 'market clearing price' because at this price everyone in the market is satisfied.

It is explained in the following diagram

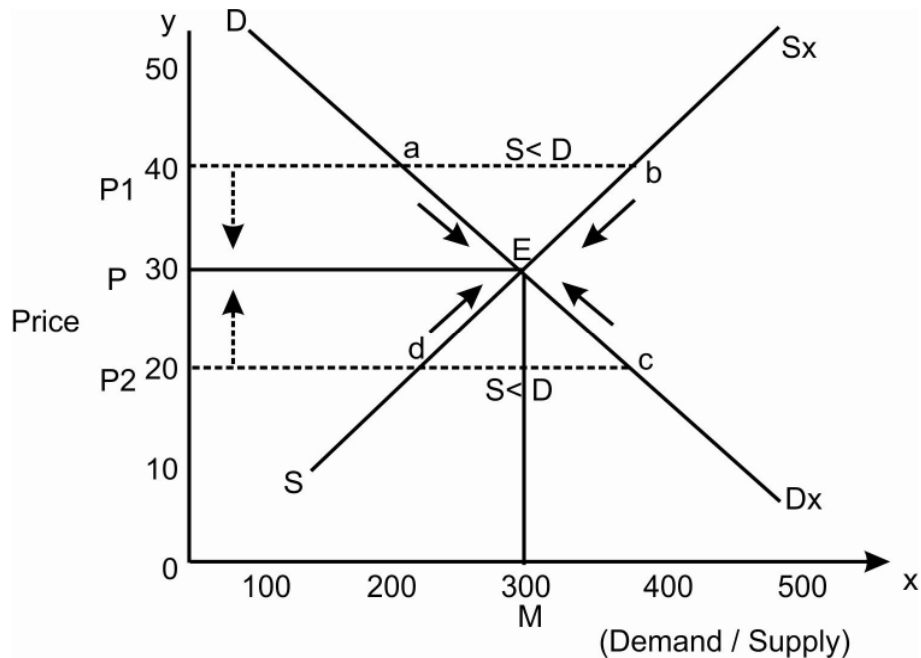


Figure 5.18

Units of commodity (D and S) are shown on the x-axis and price on the y-axis. The downward sloping demand curve DD_x cuts the upward sloping supply curve SS_x at equilibrium point 'E'. At this point the equilibrium price is 'OP' (Rs. 30/-) and equilibrium quantity is OM. (300 units).

Now, let us assume that the price rises from OP to OP_1 . Now we find that the supply P b is greater than the demand P_1a . Due to surplus, there is a downward pressure on the price and it falls back to OP.

Similarly at OP2 price, the supply P_2d is less than the demand P_2C . Now, due to scarcity the price rises till it comes back to the original price OP.

In this way, with the necessary changes in demand and supply, the system comes back to the original point of equilibrium (e.g. A ball kept at the bottom of the bowl.)

Example

Equilibrium Price

Demand Equation:-

$$D_x = a - bP_x$$

Where D_x = Demand for commodity x

a = constant parameter giving Quantity demanded irrespective of price.

b = Constant parameter giving relation between P_x and D_x

P_x = Price of Commodity X.

As 'b' has negative sign the relationship is inverse.

Supply Equation:-

$$S_x = c + dP_x$$

S_x = Supply of commodity x

c = Constant parameter giving quantity supplied irrespective of price

d = Constant Parameter giving relationship between P_x and S_x

P_x = Price of commodity X

Here 'd' has a positive sign. Thus the relationship is direct.

Let us assume that

$$D_x = 34 - 3P_x \text{ and } S_x = 6 + 4P_x$$

Now at equilibrium :

$$D_x = S_x$$

$$\therefore 34 - 3P_x = 6 + 4P_x$$

$$\therefore 34 - 6 = 4P_x + 3P_x$$

$$\therefore 28 = 7P_x$$

$$\therefore P_x = \frac{28}{7}$$

$$\therefore P_x = 4$$

Now let us insert price '4' in the equations of demand and supply.

$$D_x = 34 - 3P_x \quad S_x = 6 + 4P_x$$

$$D_x = 34 - 3(4) \quad S_x = 6 + 4(4)$$

$$D_x = 34 - 12 \quad S_x = 6 + 16$$

$$D_x = 22 \quad S_x = 22$$

$P_x = 4$ is the equilibrium price where Quantity demanded equals quantity supplied. (i.e. 22 units)

Market Not in Equilibrium :

Market not in equilibrium explains a situation of disequilibrium in the market. It is a situation where $D > S$ or $S < D$. Thus there is either shortage or surplus.

At equilibrium $S = D$ but if $S \neq D$ then

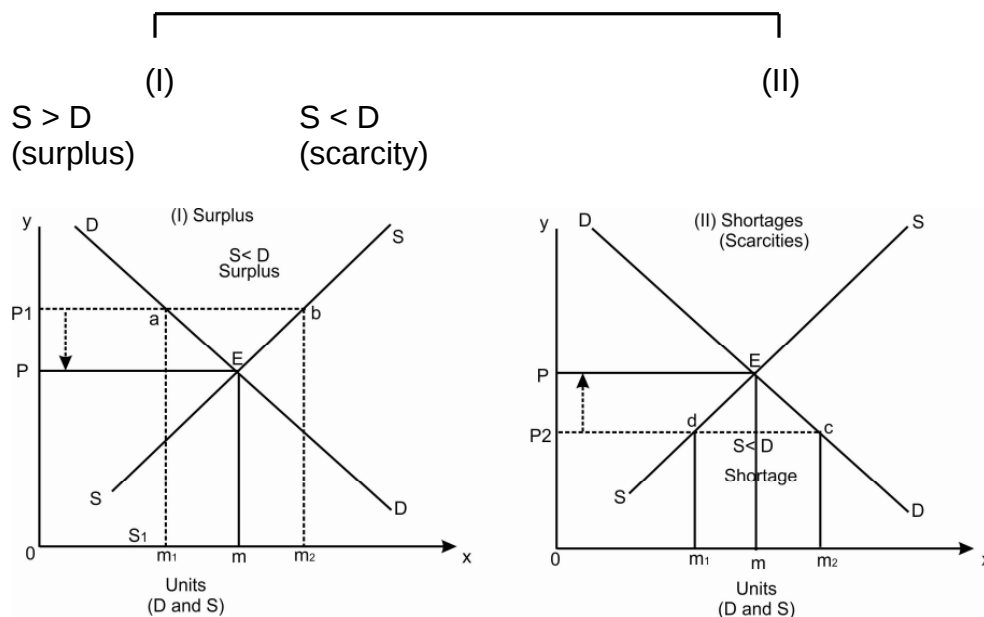


Figure 5.19

- I) In diagram I, we find that at OP_1 price the supply $P_1 b$ (OM_2) is greater than the demand $P_1 a$ (OM_1). It shows that there is surplus in the market. The seller wishes to sell more but demand is less. Thus to attract the buyers, the seller will lower the price. The process continues till we reach the equilibrium point (E), price (OP) and quantity (OM).
- II) In diagram II, we find that at OP_2 Price, the supply P_2d (OM_1) is less than the demand P_2c (OM_2). It shows that there is a scarcity or shortage of goods. The buyers are willing to buy more but the supply is less. Now the seller will take advantage of this situation and will raise the price. The process continues till the system reaches the equilibrium point (E), Price (OP) and quantity (OM).

Thus the activities of buyers and sellers always push the market price towards the equilibrium price. The shortages and surpluses are temporary. Reaching equilibrium point (fast or slow) differs from market to market.

Three steps to analyse changes in Equilibrium :

The position of the demand and supply determines equilibrium price and quantity. Due to the changes in factors other than price we get a shift in the demand and supply curves. These factors are changes in prices of substitutes, income, investment outlay, govt. policy etc. it gives us either increase or decrease in demand and supply.

The effects of shift in demand and supply on market equilibrium are studied in three steps.

- A change due to shift in demand curve.
- A change due to a shift in supply curve
- A change due to shift in both i.e. the demand and supply.

A) Change in Market equilibrium due to a shift in demand curve.

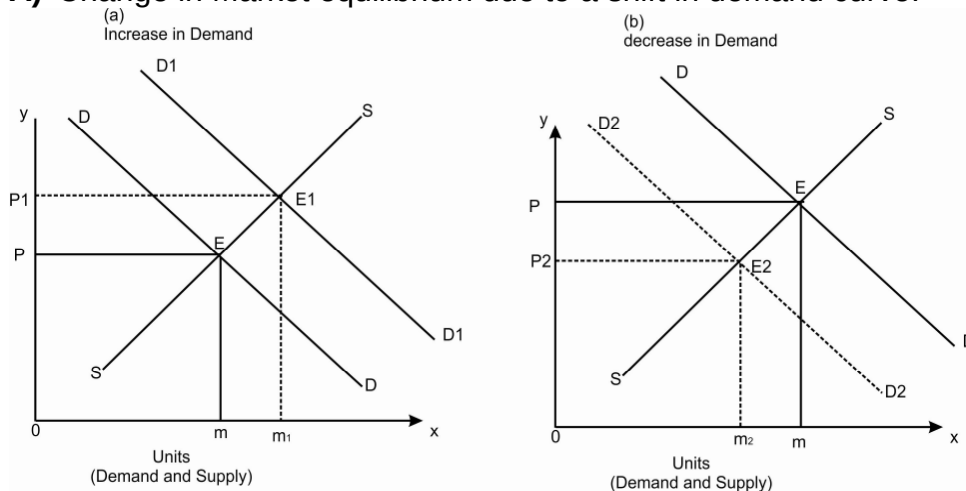


Figure 5.20

Let us explain the situation with an example of Air-conditioners (ACs). In the above diagram 'E' is the original point of equilibrium, OP is original equilibrium price and OM is original equilibrium quantity ($D=S$).

a) Case of increase in demand :

Let us assume that it is a summer. Due to the rise in heat we get an increase in demand of ACs in spite of no change in price. When the demand for ACs increases we get a shift in the demand curve (to the right) from DD to D1D1. It cuts the supply curve (SS) at a new equilibrium point E1. Now the price rises from OP to OP₁. This rise in price brings higher supply and at new equilibrium point, the demand equals supply at OM₁.

In this case we get two important things. One is we get a shift in demand curve from DD to D_1D_1 . i.e. increase in demand. Another is that at new equilibrium point E_1 there is an expansion of supply as we remain on the same supply curve.

b) Case of Decrease in Demand :-

During winter the demand for ACs falls due to cold. Thus the demand curve shifts to D_2D_2 i.e. decrease in demand. It cuts the supply curve (SS) at new equilibrium point E_2 . The price falls to OP_2 . Now due to fall in price, the seller will contract the supply. Now the new quantity will be OM_2 . In this we get decrease in demand where we shift over to a new demand curve D_2D_2 . We also get a contraction of supply (movement on the same supply curve SS).

B) Change in market equilibrium due to a shift in supply curve.

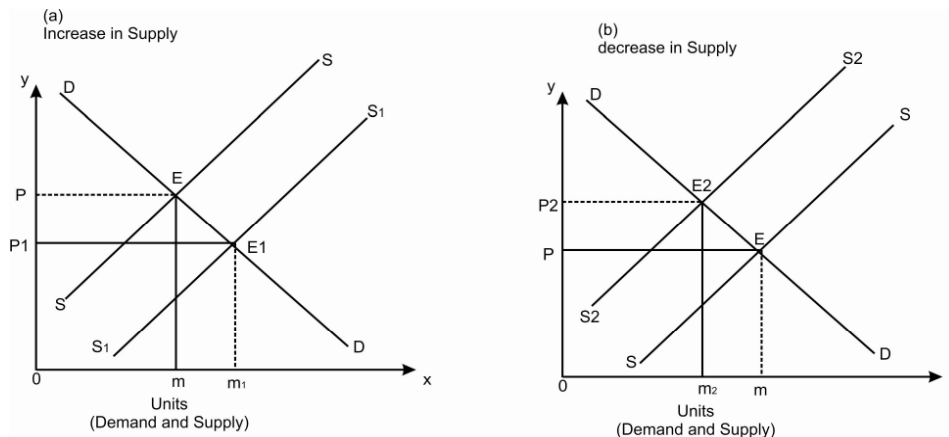


Figure 5.21

In both the diagrams DD is the original demand curve cutting SS which is original supply curve. Original equilibrium point is E , equilibrium price is OP and equilibrium quantity is OM .

Let us take e.g. of production of sugarcane and sugar, affecting its supply.

a) Increase in supply :-

Let us assume that due to sufficient rainfall, the production of sugarcane increases. Thus the supply of sugar increases which results in the fall in price of sugar. Thus the supply curve shifts to the right S_1S_1 and cuts the demand curve at new equilibrium point E_1 . The price falls from OP to OP and supply increases to OM_1 .

Now due to the fall in price of sugar, the demand for sugar will rise. More sweets will be created due to fall in cost of input i.e. sugar. Thus higher supply will be matched by higher demand (OM_1) at new equilibrium price OP_1 . Here (at E_1) we get an increase in supply where supply curve shifts to the right (S_1S_1) and expansion of demand i.e. movement along a given demand curve DD .

b) Decrease in supply :-

Let us assume that due to a bad monsoon, the production of sugarcane falls. Thus the supply of sugar decreases. The curve shifts to the left (S_1 to S_2) and we get a new equilibrium point E_2 . Now the price rises to OP_2 . Now new quantity supplied (OM_2) will be matched by contraction of demand to OM_2 . (fall in supply of sugarcane reduces the supply of sugar OM_2). Thus price of sugar rises to OP_2 .

In this case we get decrease in supply i.e. shift in supply curve SS to S_2S_2 and contraction of demand i.e. movement from E to E_2 along a given demand curve DD .

c) Change in market Equilibrium due to a shift in both i.e. Demand and supply.

In this case we observe and study a simultaneous increase or decrease in demand and supply. We can explain this with the help of several situations like increase in supply, decrease in demand and vice versa and even the change in extent (more or less).

In this case let us observe two situations with increase in demand and decrease in supply.

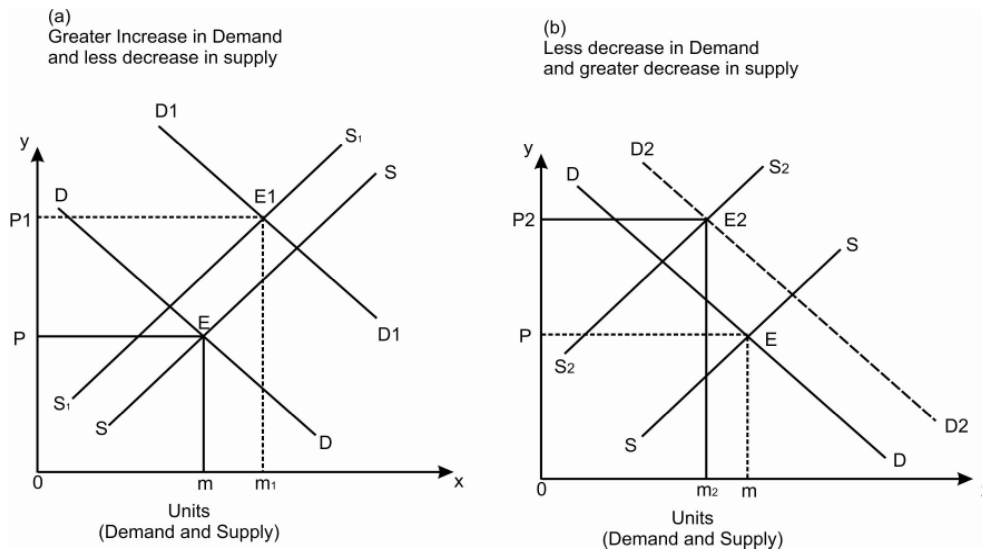


Figure 5.22

In both the cases the original point of equilibrium is E ($D = S$), OM is original quantity and OP is original equilibrium price.

a) In this we find that demand increases more than proportionately. We get a large increase in demand. Thus demand curve shifts from DD to D_1D_1 (greater distance). Say due to festival demand for sugar increases very fast.

But we get a decrease in supply may be due to bad season. But here supply decreases slightly from SS to S1S1.

Now the new equilibrium point is E1 and price rises sharply from OP to OP1 due to very high increase in demand.

b) In this case we get a moderate increase in demand from DD to D2D2. But due to a very bad season the supply of sugarcane and so sugar decreases sharply from SS to S2S2. Now the price again rises sharply from OP to OP2 and Quantity falls from OM to OM2.

Thus in both the cases, the price rises sharply from OP to OP1. In one case (a) the quantity rises and in other it falls (b).

5.12 QUESTIONS

- 1) What is market?
- 2) What is competition?
- 3) Write a note on Demand Curve.
- 4) Explain the difference between Individual demand and market demand.
- 5) Explain the difference between individual supply and market supply.
- 6) Explain the concept of market equilibrium.
- 7) Write notes on
 - Law of demand
 - Law of supply



ELASTICITY OF DEMAND

Unit Structure :-

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Various Concepts of Demand Elasticity
- 6.3 Price elasticity of Demand.
 - 6.3.1 Measurement of Price Elasticity of Demand
 - 6.3.2 Degrees of Price elasticity on Demand Curve
 - 6.3.3 Different degrees of elasticity
 - 6.3.4 Price Elasticity of demand and changes in total expenditure
 - 6.3.5 Determinants of price elasticity of demand
- 6.4 Income elasticity of Demand
 - 6.4.1 Income elasticity and proportion of income spent.
 - 6.4.2 Income elasticity : Necessities, Luxuries and Inferior goods.
- 6.5 Cross Elasticity of Demand
- 6.6 Promotional Elasticity of Demand.
- 6.7 Summary
- 6.8 Questions

6.0 OBJECTIVES

After reading this unit you will come to know :-

- The concept of elasticity of demand
- Price elasticity of demand
- Measurement of price elasticity
- Different Degrees of price elasticity
- Determinants of price elasticity
- Income elasticity of demand
- Cross elasticity of demand
- Promotional elasticity of demand

6.1 INTRODUCTION

When the price of a good falls, its quantity demanded rises and when the price of the good rises its quantity demanded falls,

except in case of a Giffen good. This is generally known as law of demand. This law of demand indicates only the direction of change in quantity demanded in response to a change in price. This does not tell us by how much or to what extent the quantity, demanded of a good will change in response to a change in its price. This information as to how much or to what extent the quantity demanded of good will change as a result of a change in its price is provided by the concept of elasticity of demand. The concept of elasticity of demand forms the subject matter of the present chapter. The concept of elasticity has a very great importance in economic theory as well as in applied economics.

6.2 VARIOUS CONCEPTS OF DEMAND ELASTICITY :-

It is price elasticity of demand which is usually referred to as elasticity of demand. But, besides price elasticity of demand. There are various other concepts of demand elasticity. As we know, that demand for a good is determined by its price, incomes of the people price of related goods etc. Quantity demanded of a good will change as a result of a change in the size of any of these determinants of demand. Accordingly, there are three kinds of demand elasticity : Price elasticity income elasticity, and cross elasticity.

Price elasticity of demand relates to the responsiveness of quantity demanded of a good to the change in its price.

Income elasticity of demand refers to the sensitiveness of quantitative demanded to the change in income.

Cross elasticity of demand refers to the degree of responsiveness of demand for a good to a change in the price of a related good, which may be either a substitute for it or a complementary with it.

Besides these three Kinds of elasticity's there is another type of elasticity of demand called elasticity of substitution which refers to the change in quantity demanded of a good in response to a change in its relative price alone, real income of the individual remaining the same.

6.3 PRICE ELASTICITY OF DEMAND :-

As said above, price elasticity of demand expresses the response of quantity demanded of a good to changes in its price, given the consumers income his tastes and prices of all other goods. In other words, price elasticity of demand is a measures of relative change in quantity purchased of a good in response to a relative change in its price. Price elasticity can be precisely defined

as the proportionate change is quantity demanded in response to a small change in price, divided by the proportionate change in price. Thus,

$$\text{Price Elasticity} = \frac{\text{Proportionate change in quantity demand}}{\text{Proportionate change in price.}}$$

$$= \frac{\text{Change in quantity demand} / \text{Quantity demand}}{\text{Change in price} / \text{Price}}$$

or in symbolic terms,

$$\begin{aligned} ep &= \frac{\Delta q / q}{\Delta p / p} = \frac{\Delta q}{q} \div \frac{\Delta p}{p} \\ &= \frac{\Delta q}{q} \times \frac{p}{\Delta p} \\ &= \frac{\Delta q}{\Delta p} \times \frac{p}{q} \end{aligned}$$

Where ep stands for price elasticity

Q stands for quantity

P stands for price

Δ stands for infinitesimal changes.

Mathematically speaking price elasticity of demand (Cp) is negative, since the change in quantity demanded is in opposite direction to the change in price. But for the sake of convenience in understanding the magnitude of response of quantity demanded to the change in price we ignore the negative sign and take into account only the numerical value of the elasticity e.g. if 2% change in price leads to 4% change in quantity demanded of good A and 8% change in that of B then the above formula of elasticity will give the value of price elasticity of good A equal to 2 and of good B equal to 4. It indicated that the quantity demanded of good B changes much more than that of good A in response to a give to a given change in price But if we had written minus signs before the numerical values of causticities of two goods, that is, if we write the elasticity of two goods, that is, if we write the elasticity's as 2 and 4 respectively as strict mathematics would require us to do then since -4 is smaller than -2, we would be misled in concluding that price elasticity of demand of B is less than that of A hence it is better to ignore minus signs and draw conclusions from the numerical values of elasticity.

5.3.1. Measurement of Price Elasticity of Demand :-

There are two methods of measuring price elasticity of Demand.

A] Point Elasticity of Demand.

B] Arc Elasticity of Demand.

A. Measurement of elasticity at a point on the Demand Curve :-

Let a straight line demand curve DD^1 be given and it is required to measure elasticity at point R on this curve. In fig. 5.1 corresponding to point R on the demand curve DD^1 price is OP and quantity demanded is OQ. With a small fall in price from OP to OP^1 , quantity demanded increases from OQ to OQ^1 .

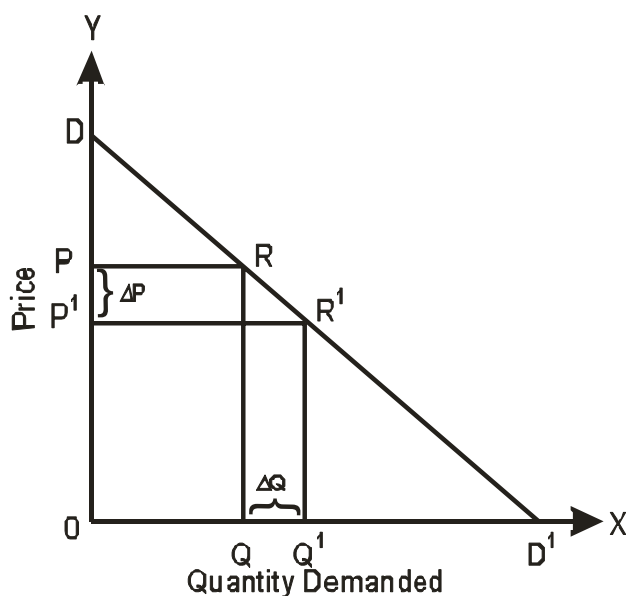


Figure 6.1

$$\text{Price elasticity} = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price}}$$

using symbols,

$$ep = \frac{\Delta q}{q} \div \frac{\Delta p}{p}$$

$$= \frac{\Delta q}{q} \times \frac{p}{\Delta p} = \frac{\Delta q}{\Delta p} \times \frac{p}{q} = \text{-----}(i)$$

In figure 6.1 when price falls from OP to OQ¹ quantity demanded increases from OQ to OQ¹. This change in price by PP¹ Causes change in quantity demanded (ΔQ) by OQ¹. Substituting these in (i) above, we get.

$$ep = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{QQ^1}{PP^1} \times \frac{OP}{OQ}$$

Since in Fig. 6.1, QQ¹ = MR¹ and PP¹ = RM and

OP = QR

$$\text{Therefore } ep = \frac{MR^1}{RM} \times \frac{QR}{OQ} \text{----- (ii)}$$

Now take triangles RMR¹ and RQD¹ in fig 6.1

$\angle MR^1R = \angle QD^1R$ (Corresponding $\angle$ S)

$\angle RM^1R = \angle RQD^1$ (Right $\angle$ S)

Their $\angle MRR^1$ is common to both the triangles

Therefore triangles RMR¹ and RQD¹ are similar. A property of similar triangles is that their corresponding sides are proportional to each other. From this it follows that

$$\frac{MR^1}{RM} = \frac{QD^1}{QR}$$

Writing $\frac{QD^1}{QR}$ in place of $\frac{MR^1}{RM}$ in equation (ii), we

$$\text{have } ep = \frac{QD^1}{QR} \times \frac{QR}{OQ}$$

$$ep = \frac{QD^1}{OQ}$$

Now the triangles QD¹R and PDR are similar as their corresponding angles are equal. Therefore, we have

$$\frac{QD^1}{PR} = \frac{RD^1}{RD}$$

It will be seen from figure 6.1 PR = OQ. Thus, substituting OQ for PR in (iii) above, we have

$$ep = \frac{QD^1}{OQ} - \frac{RD^1}{RD}$$

Hence from above we find that price elasticity at point R on the straight line demand curve DD' is

$$= \frac{RD^1}{RD} = \frac{\text{LowerSegment}}{\text{UpperSegment}}$$

Measurement of price elasticity on a Demand Curve

Alternative Ways :-

i] Vertical Axis formula

ii] Horizontal Axis formula

There are two alternative ways of measuring point price elasticity of demand with the help of formula one measuring price elasticity as ratio of distance on the vertical axis and the other measuring it as ratio of distance on the horizontal axis.

Vertical Axis formula Consider a linear demand curve DD' in Figure 6.2. where we are required to measure price elasticity of demand at price OP at which OQ quantity of commodity X is demanded.

The measure of price elasticity of demand is given by

$$ep = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

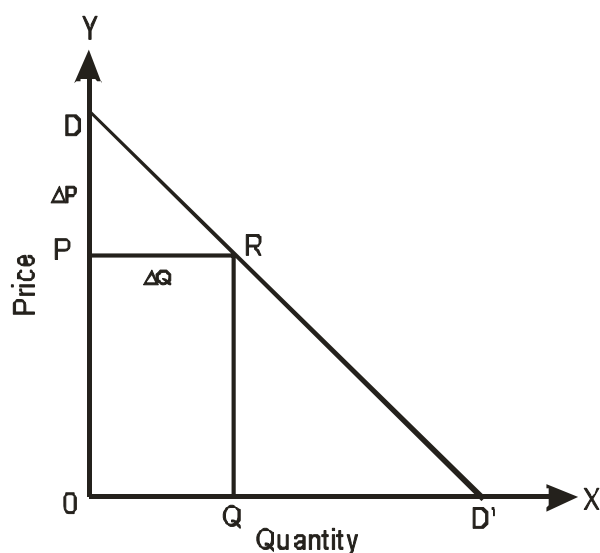


Fig 6.2 Measuring point elasticity on a Demand Curve

The First term in this formula namely $\frac{\Delta Q}{\Delta P}$ is the reciprocal of the slope of the demand curve (Note that the slope of the linear demand

curve DD^1 is equal is $\frac{\Delta P}{\Delta Q}$, which remains the same all along the linear demand curve DD^1).

Thus, $\Delta P / \Delta Q$ is a measure of the slope of the linear demand curve which is equal to PD/PR . Thus,

$$\begin{aligned} ep &= \frac{1}{PD / PR} \times \frac{OP}{PR} \\ &= \frac{PR}{PD} \times \frac{OP}{PR} = \frac{OP}{PD} \end{aligned}$$

Thus, price elasticity at price OP can be obtained from measuring the ratio of distance OP and PD on the vertical axis (i.e. price axis)

Horizontal Axis Formula: Likewise we can measure the point elasticity of demand as a ratio of the distances on the horizontal axis (i.e. the quantity axis). We do this by taking another expression for the slope of the demand curve DD^1 . Now, starting from point R downward in Figure 6.2, the slope of the demand curve DD^1 is

$$\frac{\Delta P}{\Delta Q} = \frac{QR}{QD^1}$$

Substituting this in our elasticity measures we have

$$\begin{aligned} ep &= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{1}{\Delta P / \Delta Q} \times \frac{P}{Q} \\ &= \frac{1}{QR / QD^1} \times \frac{QR}{QD^1} = \frac{QD^1}{QR} \times \frac{QR}{OQ} = \frac{QD^1}{OQ} \end{aligned}$$

Thus price elasticity of point R on the linear demand curve or at the given price OP can be measured by three alternative ways :

Using vertical axis formula $ep = \frac{OP}{PD}$

Using horizontal axis formula $ep = \frac{QD^1}{OQ}$

Using the ratio of distances on the demand curve $ep = \frac{RD^1}{RD}$

Non linear Demand Curve :-

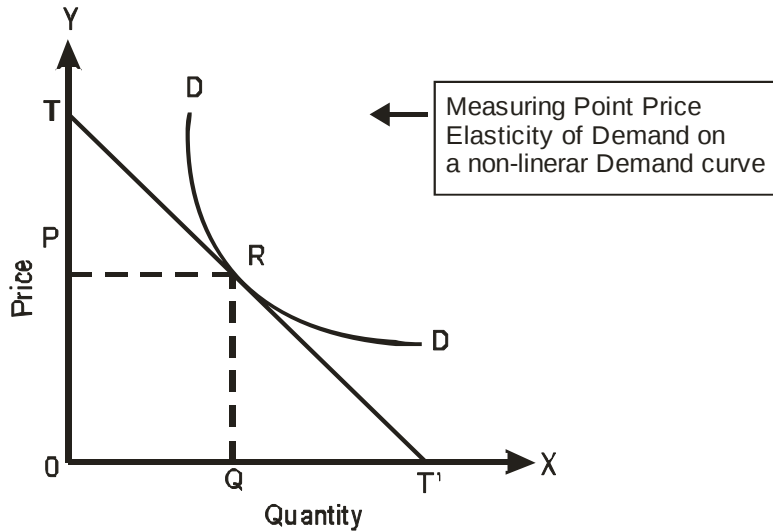


Figure 6.3

Measuring point price Elasticity of Demand on a Non linear Demand Curve

But if the demand curve is not linear like DD^1 , but is as is usual a real curve as given in Fig. 6.3 then, in order to measure elasticity in this case, we have to draw a tangent TT^1 to the given point R on the demand curve DD and then measure elasticity by finding out the value of $\frac{RT^1}{RT}$

6.3.2. Degrees of Price Elasticity on Demand Curve :-

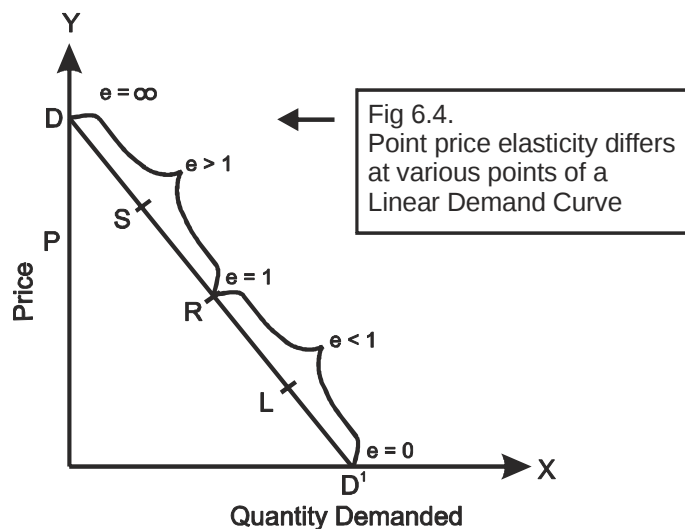


Figure 6.4

Now again, taken the straight line demand curve DD^1 (Fig 6.4). If point R lies edacity at the middle of this straight line demand curve, then elasticity will be equal to $\frac{RD^1}{RD} = 1$, as lower segment is equal to upper segment.

Similarly elasticity will go on decreasing as we move towards point D^1 . This is because lower segment will become smaller and smaller, whereas upper one will be increasing. At point D^1 , the elasticity will be zero.

On the contrary, as we move towards point D, elasticity will go on increasing as lower segment will become greater and greater than the upper segment and at point D, elasticity will be infinity.

6.3.3. Different Degrees of Elasticity :-

1. Perfectly Inelastic Demand $E_p = 0$

When the demand for a commodity is not responsive to any change in price demand is perfectly inelastic. In this case, the demand curve will be a vertical line in Fig 6. and E_p is equal to zero at every point on this demand curve e.g. The demand for salt is not likely to change with the change in price.

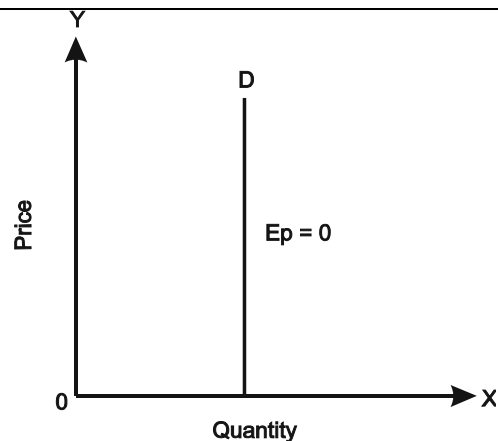


Figure 6.5(a)

2. Perfectly Elastic Demand :- $E_p = \infty$

Demand is perfectly elastic when the purchases are prepared to buy all that is available in the market at a particular price. In this case, the demand curve is horizontal at given price OP as in Fig 6. If price increases even marginally, nothing will be purchased.

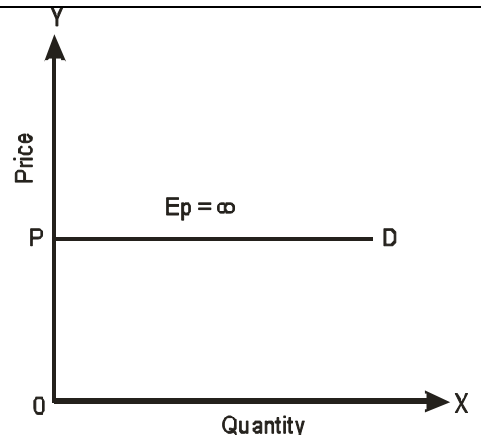
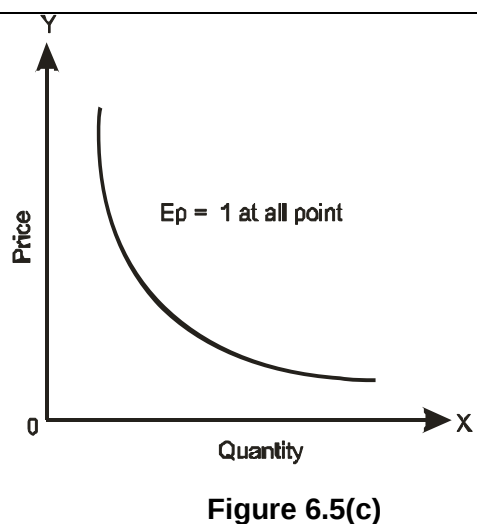


Figure 6.5 (b)

3. Unit Elasticity of Demand $E_p = 1$.

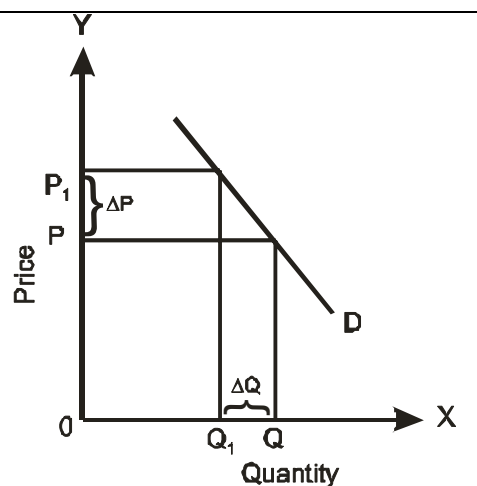
Demand is unitary elastic when the percentage change in quantity demanded equals the percentage change in price. In this case, the demand curve is a rectangular hyperbola as in Fig 6.

At any point on this curve the value of elasticity is equal to unity.



4. Relatively Inelastic Demand $E_p < 1$

Demand is Relatively inelastic when the percentage change in quantity demanded is less than percentage change in price in this case, the demand curve is steeper as in Fig 6. and therefore $\Delta p > \Delta Q$



5. Relatively Elastic Demand $E_p > 1$

Demand is relatively elastic when the percentage change in quantity demanded is greater than percentage change in price. In this case the demand curve is flatter as in Fig 6. and therefore $\Delta p < \Delta Q$.

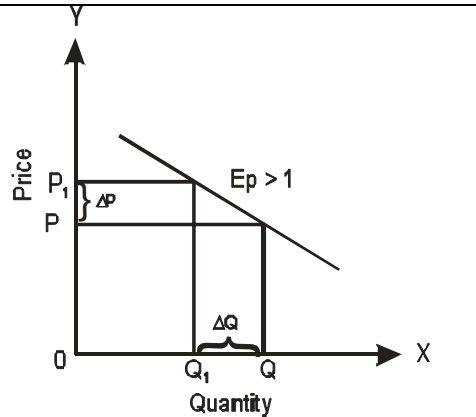


Figure 6.5(e)

The different degrees of price elasticity is summarized in Table 6.1

Table 6.1 : Degrees of price Elasticity of Demand

Coefficient of Elasticity	Categories of Elasticity	Implication
$E_p = 0$	Perfectly Inelastic	Quantity demanded does not change as price change
$E_p = \infty$	Perfectly elastic	At a particular Price demand is unlimited
$E_p = 1$	Unit Elasticity	Percentage change in quantity demanded equals the percentage change in price
$E_p < 1$	Relatively Inelastic	Percentage change in quantity demand is less than the percentage change in price
$E_p > 1$	Relatively Elastic	Percentage change in quantity demand is large then the percentage change in price

6.3.4. Price Elasticity of Demand and Changes in Total Expenditure

It is often useful to know what happens to total expenditure model by the consumers on a good when its price changes.

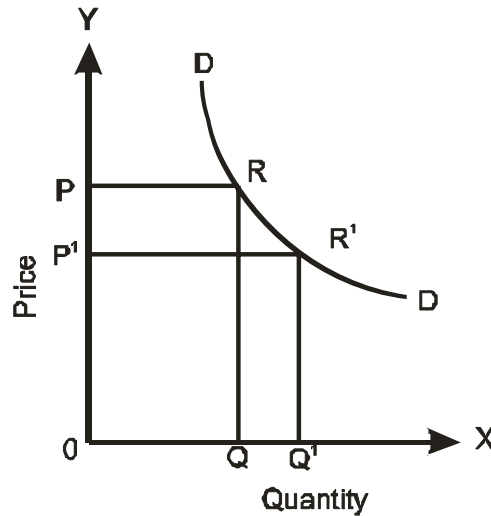


Figure 6.6

In Figure 6.6, a demand curve DD of a good is shown. When the price of good is OP, its quantity demanded is OQ. Since the total expenditure is price multiplied by the quantity of the good purchased, therefore consumers total expenditure

$$= OP \times OQ$$

$$= \text{area OQRP}$$

Now if the price of the good falls from OP to OP^1 the quantity demanded increases from OQ to OQ^1 . At new price OP^1 , therefore

$$\text{Total expenditure} = OP^1 \times OQ^1$$

$$= \text{area OQ}^1\text{R}^1\text{P}^1$$

Now, whether the total expenditure rises or falls or remains the same with the changes in the price of the good depends upon the price elasticity of demand. The following is the relationship between changes in total expenditure and price elasticity of demand.

As seen above, the price elasticity of demand measure the ratio of proportionate change is quantity demanded to the proportionate change in price. That is, ignoring signs

$$ep = \frac{\Delta Q / Q}{\Delta P / P} \text{ or } \frac{\% \Delta Q}{\% \Delta P}$$

If price elasticity of demand is greater than one, then ignoring the signs $\% \Delta Q > \% \Delta P$. On the other hand, if price elasticity of demand is less than one $\% \Delta Q < \% \Delta P$. And if price elasticity equals one or in other words, demand is unitary elastic, $\% \Delta Q = \% \Delta P$. For the sake of convenience, we write the results of this relationship in table 6.1.

Table 6.2 Relationship between Price Elasticity (ep) and Total Expenditure (TE)

Price Change	Elasticity greater than one	Elasticity less than one	Elasticity equal to one
	($e_p > 1$)	($e_p < 1$)	($e_p = 1$)
Price falls	TE increases	TE decreases	No Change in TE
Price rises	TE decrease	TE increases	No Change in TE

6.3.5. Determinants of Price Elasticity of Demand

We have explained above the concept of price elasticity of demand and also how it is measured. Now an important question is what are the factors that determine whether the demand for a good is elastic or inelastic. The following are the main factors which determine the price elasticity of demand for a commodity.

1] Availability of Close Substitutes :-

Of all the factors determining price elasticity of demand the number and closeness of substitutes available for a commodity is the most important factor. If for a commodity close substitutes are available its demand tends to be elastic. If the price of such a commodity rises, the people will shift to its close substitutes and as a result the quantity demanded of the commodity will greatly decline. The greater the possibility of substitution, the greater the price elasticity of demand for it. If for a commodity substitutes are not available people will have to buy it even when its price rises, and therefore its demand would tend to be inelastic. For instance, if the price of tea were to increase sharply many consumers would turn to coffee and as a result the quantity demanded of tea will decline very much. On the other hand if the price of tea falls, many consumers will change from coffee to tea. Thus, the demand for tea

is elastic. It is the availability of close substitutes that makes the consumers sensitive to the changes in the price of tea and this makes the demand for tea elastic. On the other hand, demand for common salt is inelastic because good substitutes for common salt are not available. If the price of common salt rises slightly the people would consume almost the same quantity of salt as before since good and close substitutes are not available.

2] The importance of a commodity in consumers Budget :-

Another important determinant of the elasticity of demand is how much it accounts of the consumer's budget. In other words, the proportion of consumer's income spent on a particular commodity also influences the elasticity of demand for it. The greater the proportion of income spent on a commodity the greater will generally be its elasticity of demand and vice versa. The demand for common salt, soap, matches and such other goods tends to be highly inelastic because the households spend only a fraction of their income on each of them. When the price of such a commodity rises, it does not make such difference in consumer's budget and therefore they continue to buy almost the same quantity of such commodity and therefore, the demand for them is inelastic. On the other hand, demand for cloth in a country like India tends to be elastic since households spend a good part of their income on clothing. If the price of cloth falls, it will mean a great saving in the budget of many households and therefore they will then tend to increase the quantity demanded of the cloth. On the other hand if the price of cloth rises many households will not afford to buy as much quantity of cloth as before and therefore, the quantity demanded of cloth will fall.

That the higher the proportion of income spent on a commodity the greater the price elasticity of demand for the commodity can be easily seen from the elasticity equation stated below :-

$$e_{xp} = (1 - K_x) e_s + K_x e_i$$

Where e_{xp} represents price elasticity of demand for good X, e_s the substitution elasticity, K_x the proportion of income spent on good X and e_i the income elasticity for good X. Thus, the higher K_x given e_s and e_i remaining the same, the higher will be the price elasticity of demand for good X.

3] The Number of Uses of a Commodity :-

The greater the number of uses to which a commodity can be put, the greater will be its price elasticity of demand. If the price of a commodity having several uses is very high, its demand will be

small because at a higher price it will be put to only the most important uses and if the price of such a commodity falls it will be put to less important uses also and consequently its quantity demanded will rise significantly. To illustrate, milk has several uses. If its price sharply rises it will be used only for essential purposes such as feeding the children and sick persons. If the price of milk falls, it would be devoted to other uses such as preparation of ice cream and sweets. Therefore the demand for milk tends to be elastic.

4] Complementarity between Goods :-

Complementarity between goods or joint demand for goods also affects the price elasticity of demand. Households are generally less sensitive to the changes in price of goods that are complementary with each other or which are jointly used than in case of changes in the prices of those goods which have independent demand or used alone e.g. demand for common salt is inelastic.

5] Time for adjustment :-

The element of time also affects the elasticity of demand for a commodity. Demand tends to be more elastic if the time involved is long. This is because in the long run consumers can find ways of economizing on a particular good and also discover substitute goods for a commodity. In the short run, substitution of one commodity by another is not so easy. Hence, the demand is generally more inelastic in the short run than in the long run.

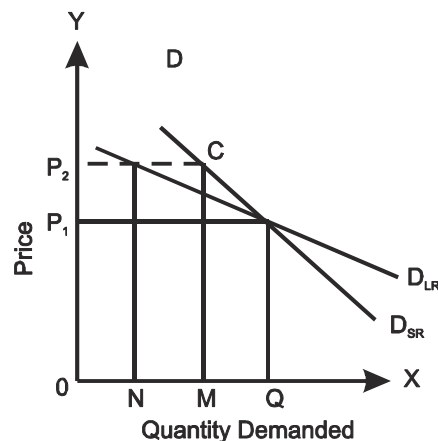


Fig. 6.7

Demand is more elastic in the long run.

Figure 6.7

Figure 6.7 graphically depicts that demand for a good is more elastic in the long run when more time is allowed for adjustment than in the short run. D_{SR} is the short run demand curve for a good which shows the reaction of consumers immediately following the changes in the price of a commodity say petrol. On the other hand,

D_{LR} depicts the changes in the quantity demanded of a good consequent to changes in its price when consumers have made full adjustment to price changes. The two curves D_{SR} and D_{LR} are intersecting at point C and long run demand curve D_{LR} is flatter than the short run demand curve D_{SR} . If the price rises from OP_1 to OP_2 in the short run following this rise in price consumers make some adjustments and reduce the quantity demanded to M. It will be seen from Fig. 6.7 that due to fewer possibilities of adjustment and substitution in the short run the consumers reduce their demand only by a small amount QM. However, in the long run after the rise in price of the goods, it is possible to make full adjustments in order to economise consumption of the petrol and also to use cheaper substitutes in its place. Over a period of time people may switch to gas based automobiles, use public transport instead of their private vehicles or even may rent residential flat nearer to their place of employment. In the long run, they make full adjustment and reduce their quantity demanded by a large amount to ON.

It is worth mentioning here that for influencing elasticity of demand for a commodity all the above factors must be taken into account.

Check your Progress:

1. Discuss various degrees of price elasticity of demand.
2. Explain how price elasticity is measured.
3. What are the determinants of price elasticity of demand.

6.4 INCOME ELASTICITY OF DEMAND

Another important concept of elasticity of demand is income elasticity of demand. Income elasticity of demand shows the degree of responsiveness of quantity demanded of a good to a small change in the income of consumers. The degree of response of quantity demanded to a change in income is measured by dividing the proportionate change in quantity demanded by the proportionate change in income.

$$\text{Income Elasticity} = \frac{\text{Proportionate Change in purchase of a good}}{\text{Proportionate Change in income}}$$

$$\begin{aligned} \text{i.e. } ei &:= \frac{\frac{\Delta Q}{Q}}{\frac{\Delta M}{M}} \\ &= \frac{\Delta Q}{Q} \times \frac{M}{\Delta M} \\ &= \frac{\Delta Q}{\Delta M} \times \frac{M}{Q} \end{aligned}$$

M = Initial Income

Q = Original quantity

ΔM = Change in income

ΔQ = change in Quantity

If for instance, consumers income rises from Rs. 100 to Rs. 102 the quantity purchased of good X by him increases from 25 units to 30 units per week, his income elasticity of demanded for x is :-

$$ei = \frac{\frac{5}{25}}{\frac{2}{100}} = \frac{5}{2} \times \frac{100}{25} = 10$$

6.4.1. Income Elasticity and Proportion of Income spent :-

There is a useful relationship between income elasticity for a good on the one hand and proportion of income spent on it. The relationship between the two is described in the following three propositions.

1. If Proposition of income spent on the good remains the same as income increases, then income elasticity for the good is equal to one.
2. If proposition of income spent on the good increases as income increases, then the income elasticity for the good is greater than one.
3. If proposition of income spent on the good decreases as income reassess then income elasticity for the good is less than one.

6.4.2. Income elasticity : Necessities, Luxuries and Inferior Goods

Income elasticity varies depending upon whether the good is a necessity, luxury or an inferior good.

If the good is a necessity income elasticity is positive but less than unity and the quantity demanded increases less than proportionately to increases in income.

On the other hand, in case of luxuries, income elasticity is greater than one. As income increases the consumer spends more than proportionate increases in income on them. Income elasticity of a luxury good increases at higher levels of income.

Finally, in case of inferior goods, income elasticity is negative and consumers quantity demanded of these goods declines as their income increases.

6.5 CROSS ELASTICITY OF DEMAND :-

Very often demands for two goods are so related to each other that when the price of any of them changes the demand for the other goods also changes, when its own price remains the same. Therefore, the changes in the demand for one good in response to the change in price of another good represents the cross elasticity of demand of one good for the other.

Coefficient of cross

Elasticity of demand of =

$$\frac{\text{Proportionate change in the quantity demanded of } X}{\text{Proportionate change in the price of good } Y}$$

$$\begin{aligned} ec &= \frac{\frac{\Delta q_x}{q_x}}{\frac{\Delta p_y}{p_y}} = \frac{\Delta q_x}{q_x} \div \frac{\Delta p_y}{p_y} \\ &= \frac{\Delta q_x}{q_x} \times \frac{p_y}{\Delta p_y} \\ &= \frac{\Delta q_x}{\Delta p_y} \times \frac{p_y}{q_x} \end{aligned}$$

Where, ec stands for cross elasticity of demand of X for Y.

q_x : original quantity demanded of X

Δq_x : Change in quantity demanded of X

P_y : original price of good Y.

ΔP_y : a small change in the price of Y.

Now take an example, if the price of coffee rises from rupees 7.50 per hundred grams to rupees 8 per hundred grams and as a result the consumers demand for tea increases from 60 hundred grams to 70 hundred grams. The cross elasticity of demand of tea for coffee can be found out as following :-

In the above example

$$\Delta q_x = 70 - 60 = 10 \text{ hundred grams.}$$

$$q_x = 60 \text{ hundred grams.}$$

$$\Delta P_y = 8 - 7.50 = 50 \text{ paisa}$$

$$P_y = 7.50 \text{ Rupees} = 750 \text{ paisa}$$

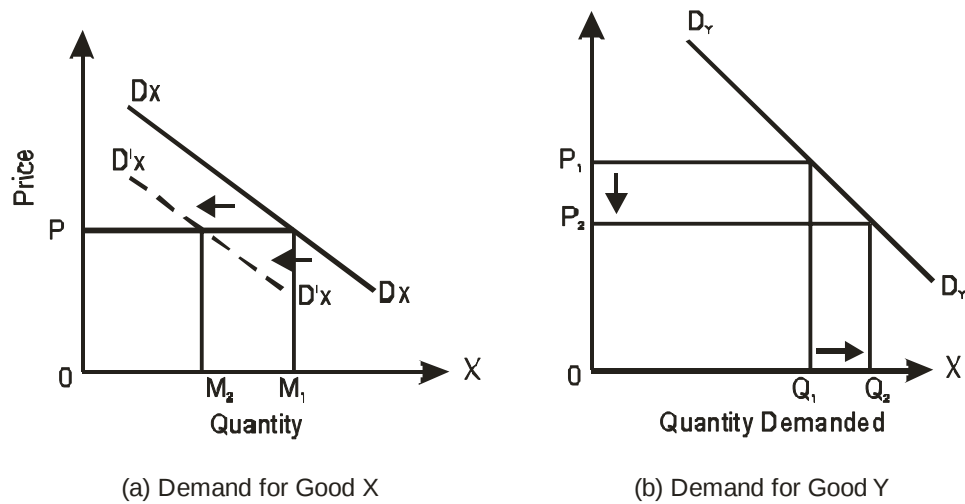
$$= \frac{\Delta q_x}{\Delta P_y} \times \frac{P_y}{q_x}$$

$$\begin{aligned} \text{Cross elasticity of demand} &= \frac{10}{50} \times \frac{750}{60} \\ &= \frac{5}{2} = 2.5 \end{aligned}$$

When two goods are substitutes of each other, then as a result of the rise in price of one goods, the quantity demanded of the other good increases.

Therefore, the cross elasticity of demand between the two Substitute goods is positive.

On the other hand, when the two goods are complementary with each other just as bread and butter tea and milk etc. the rise in price of one good brings about the decrease in demand for the other. Therefore, the cross elasticity of demand between the two complementary goods is negative.



Demand Relation Between Two Substitutes Good

Figure 6.8

6.6 PROMOTIONAL ELASTICITY OF DEMAND :-

Promotional Elasticity of Demand refers to the proportionate change in the quantity demanded due to proportionate change in the promotional expenditure incurred by the entrepreneur or manager.

E_p = Proportionate change in quantity demanded

Proportionate Change in
Promotional Expenses (S)

$$E_p = \frac{\Delta Q / Q}{\Delta S / S}$$

$$= \frac{\Delta Q}{\Delta S} \times \frac{S}{Q}$$

ΔQ : Change in quantity

ΔS : Change in promotional expenses

Q Original Quantity

S Original Promotional expenses.

Check your Progress:

Write notes on:

1. Types of income elasticity of demand.
2. Types of Cross elasticity of demand.
3. Promotional elasticity of demand.

6.7 SUMMARY

Thus you must have understood that the concept of elasticity of demand is quite useful in deciding the direction and magnitude of change in quantity demanded of a commodity due to change in any of its determinants (price, income, price of related goods and promotional expenditure).

6.8 QUESTIONS

1. Define the following :
 - a] Elasticity
 - b] Price elasticity of demand,
 - c] Income elasticity
 - d] Promotional elasticity.
2. What is price elasticity of demand? Brings out different degrees of price elasticity of demand.
3. Explain the determinants of price elasticity of demand.
4. Write notes on the following :
 - a] Price elasticity of demand
 - b] Income elasticity of demand
 - c] Cross price elasticity of demand
 - d] Promotional elasticity of demand.



Module IV

7

CONSUMER'S BEHAVIOUR

Unit Structure :

- 7.0 Objectives
- 7.1 Introduction to Cardinal And Ordinal Utility Approaches
- 7.2 Marshaallian Utility Analysis
- 7.3 Law of Equi-marginal utility
- 7.4 Consumer's Surplus
- 7.5 Summary
- 7.6 Questions

7.0 OBJECTIVES

- To understand the meaning of cardinal and ordinal measurement of utility approaches
- 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.

7.1 INTRODUCTION TO CARDINAL AND ORDINAL UTILITY APPROACHES

Measurement of utility is an important concept while understanding the behavior of the consumer. There are two different approaches in this regard of measurement of utility as following:

- (A) Cardinal measurement of utility: Neo-classical economists, such as Alfred Marshall, Walrus believed that utility is cardinal and can be measured quantitatively like other mathematical variables, such as height, weight, velocity, temperature, etc. Therefore, these economists developed cardinal utility concept to measure the utility derived from a good. They developed a unit of measuring utility, which is known as utils. For example, according to the cardinal utility concept, an individual gains 20 utils from ice-cream and 10 utils from coffee.

The cardinal utility concept is based on the following assumptions:

- a. One util equals one unit of money
- b. Utility of money remains constant

However, the major limitation of cardinal measurement of utility is that the exact or absolute measurement of utility is not possible. This is because of the fact that the utility derived by a consumer from a good depends on various subjective factors, such as changes in consumer's moods, tastes, and preferences.

These subjective factors are not possible to determine and measure in quantitative terms or not possible to give them numbers. Therefore, no such technique has been devised by economists to measure utility. Utility; thus, is not measureable in cardinal terms. However, it has a prime importance in consumer behavior analysis.

(B) Ordinal measurement of utility

However, modern economists, such as J.R. Hicks, introduced the concept of ordinal measurement of utility. According to this concept, utility cannot be measured numerically, it can only be ranked as 1, 2, 3, and so on. For instance, an individual prefers ice-cream than coffee, which implies that utility of ice-cream is given rank 1 and coffee as rank 2. According to them, it may not be possible to measure exact utility, but it can be expressed in terms of usefulness of a good such as more or less.

According to neo-classical economists, cardinal measurement of utility is possible in practical situations. Moreover, they believed that the concept of cardinal utility is useful in analyzing consumer behavior. However, modern economists believed that utility is related to psychological aspect of consumers; therefore, it cannot be measured in quantitative terms. In addition, they advocated that the ordinal utility concept plays a significant role in consumer behavior analysis. Modern economists also believed that the concept of ordinal utility meets the theoretical requirements of consumer behavior analysis even when there is no cardinal measure of utility is available.

7.2 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.

7.3 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 two 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 7.1 we show the derivation of the demand curve.

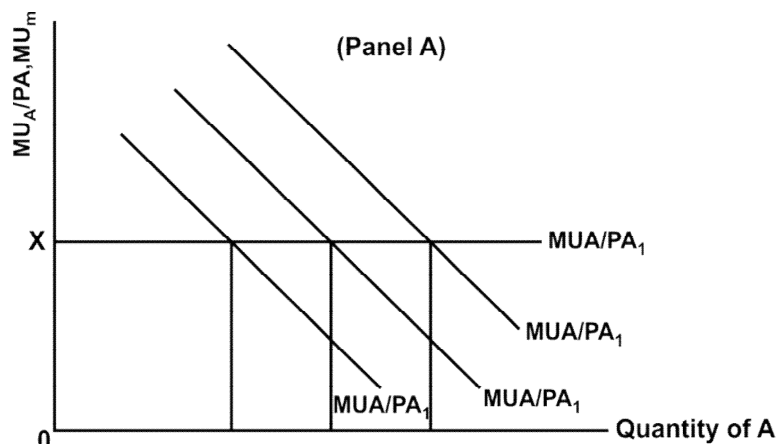


Figure 7.1

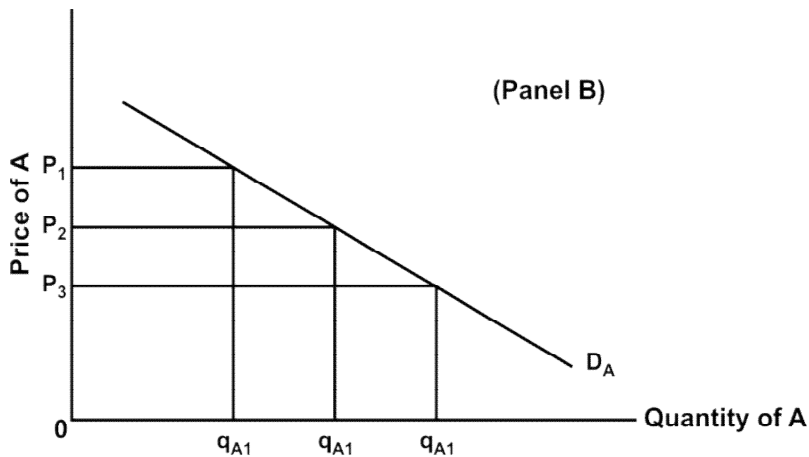


Figure 7.2

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. Distinguish between cardinal and ordinal measurement of utility.
3. What is the law of Equi-marginal utility?

7.4 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.

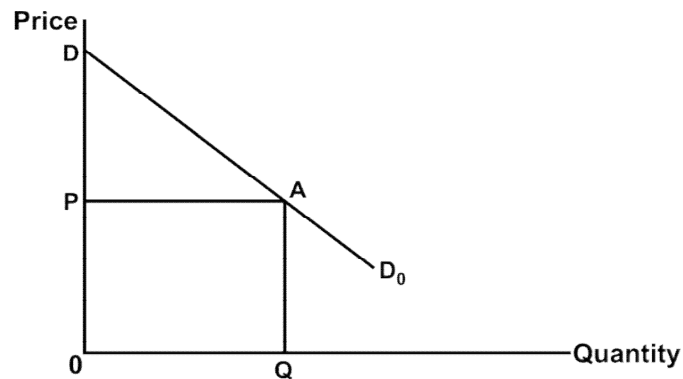


Figure 7.3

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 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 that 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

7.5 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. Consumer's surplus is the relationship between the price and utility of a good.

7.6 QUESTIONS

1. Explain the concept of cardinal utility analysis. What are its main limitations?
2. Explain the law of equi-marginal utility.
3. Explain the concept of consumer's surplus and its uses.



INDIFFERENCE CURVE ANALYSIS

Unit Structure :

- 8.0 Objectives
- 8.1 Introduction
 - 8.1.1 Scale of Preferences
 - 8.1.2 Indifference Curve
 - 8.1.3 Properties of Indifference Curves
 - 8.1.4 Budget Line of Price Line
 - 8.1.5 Consumer's Equilibrium
- 8.2 A Income, Substitution and Price effects
 - 8.2.1 Income Effect
 - 8.2.2 Substitution Effect
 - 8.2.3 Price Effect
- 8.3 Breaking-up of the Price Effect
 - 8.3.1 Price Effect of a Normal Good
 - 8.3.2 Price Effect of a Giffen Good
- 8.4 Derivation of the Demand Curve
- 8.5 The Revealed Preference Theory
- 8.6 Summary
- 8.7 Questions

8.0 OBJECTIVES

- To understand the concept of indifference curves
- To understand the derivation of consumer's equilibrium
- To understand different effects of changes in prices and income
- To understand the derivation of the demand curve
- To understand the concept of revealed preference

8.1 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.

8.1.1 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.

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

8.1.2 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 .

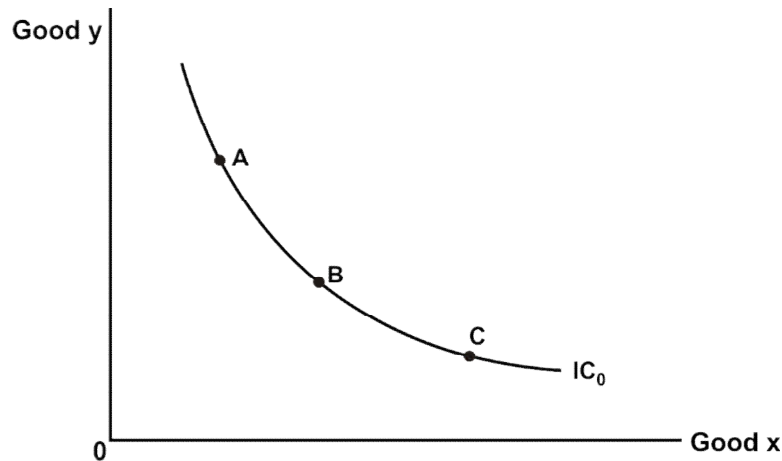


Figure 8.1

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.

8.1.3 Properties of Indifference Curves:

Let us now examine the properties of indifference curves.

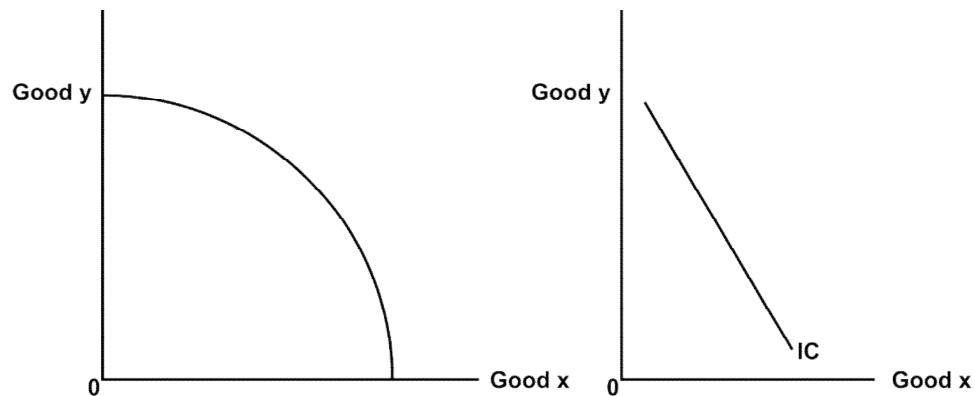


Figure 8.2

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 8.2 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 8.2 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 8.3 we explain this property.

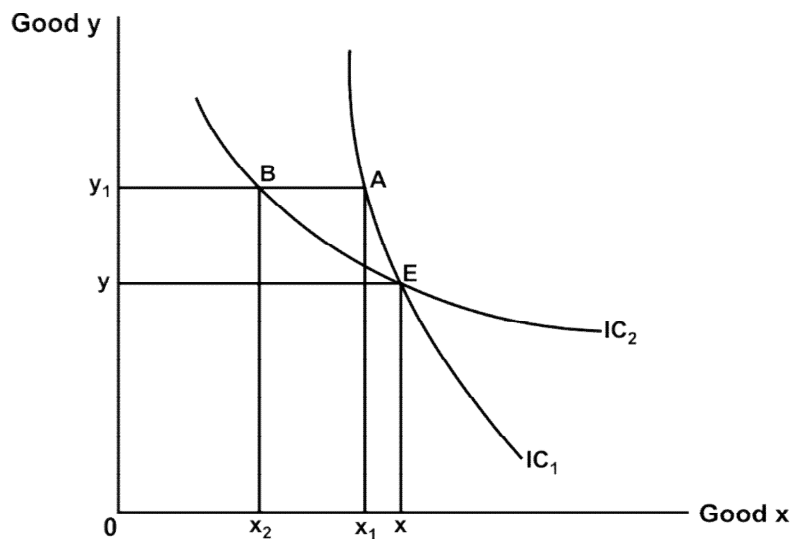


Figure 8.3

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 8.4.

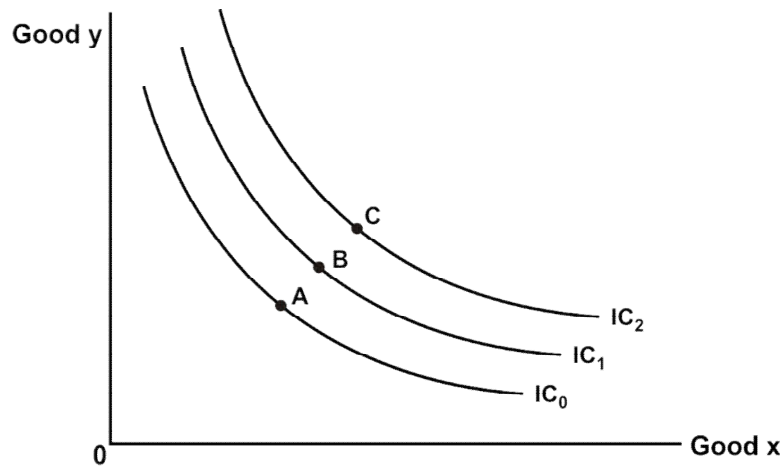


Figure 8.4

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.

8.1.4 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 8.5 shows the budget line.

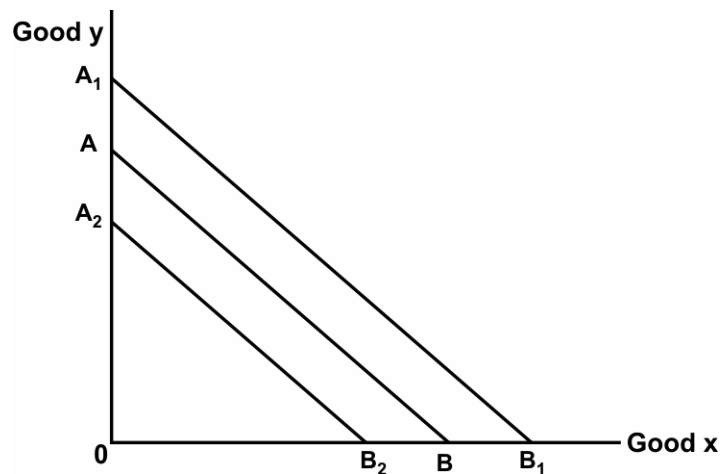


Figure 8.5

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.

8.1.5 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 8.6 shows the consumer's equilibrium.

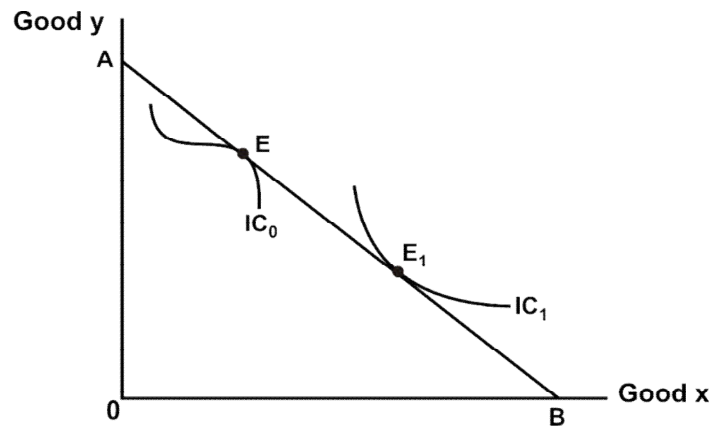


Figure 8.6

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?

8.2 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.

8.2.1 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 8.7 shows the impact of a change in income on the demand for different goods.

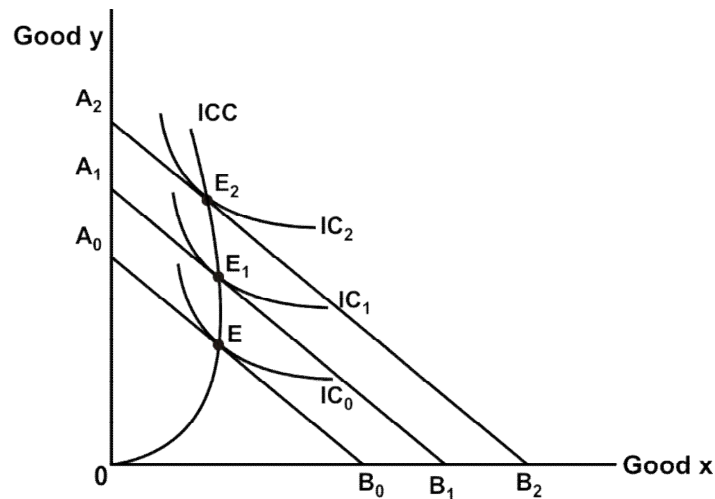


Figure 8.7 (a)

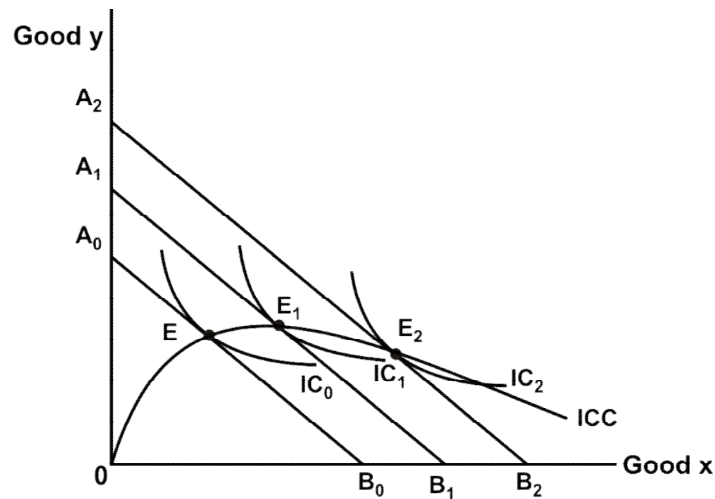


Figure 8.7 (b)

In Figure 8.7 (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 8.7 (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 8.8 shows the different possible combinations of ICC depending upon the nature of the two goods.

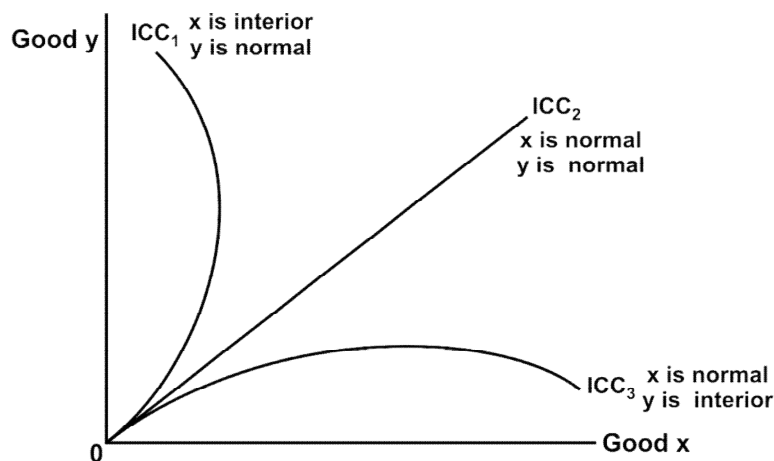


Figure 8.8

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

8.2.2 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 8.9 shows the substitution effect.

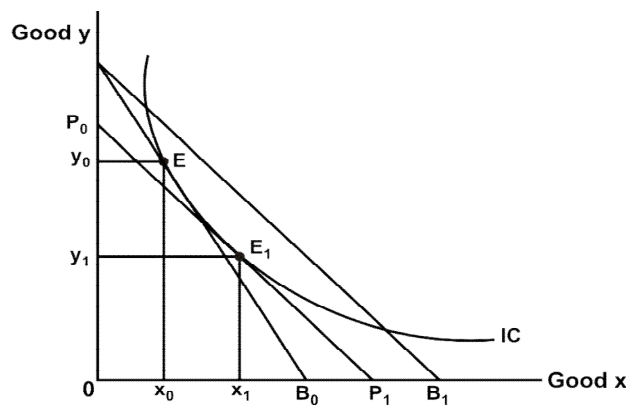


Figure 8.9

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.

8.2.3 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 8.10 explains the price effect.

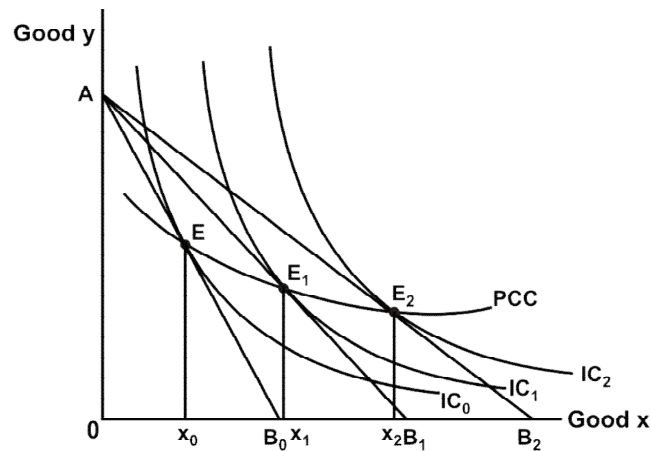


Figure 5.10

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 Ey_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 8.11 shows the possible slopes of the PCC.

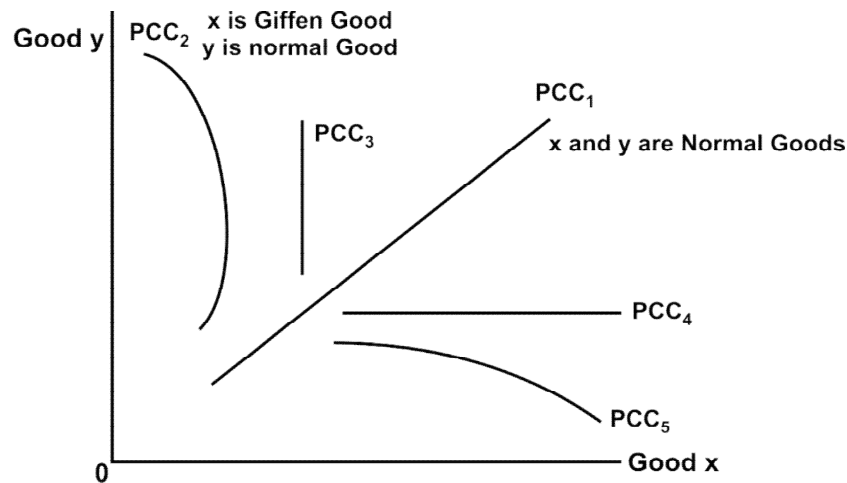


Figure 8.11

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.

8.3 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 8.12 shows the price effect of a normal good.

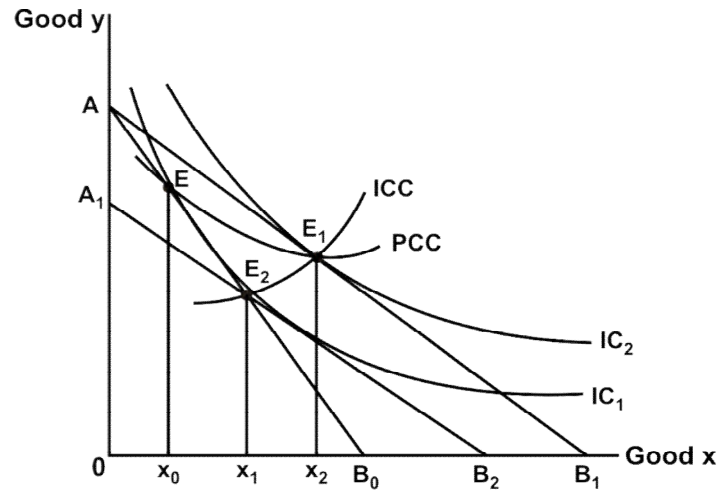


Figure 8.12

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

$$x_0x_2 = x_1x_2 + x_0x_1$$

8.3.2 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 8.13 explains the price effect of a Giffen good.

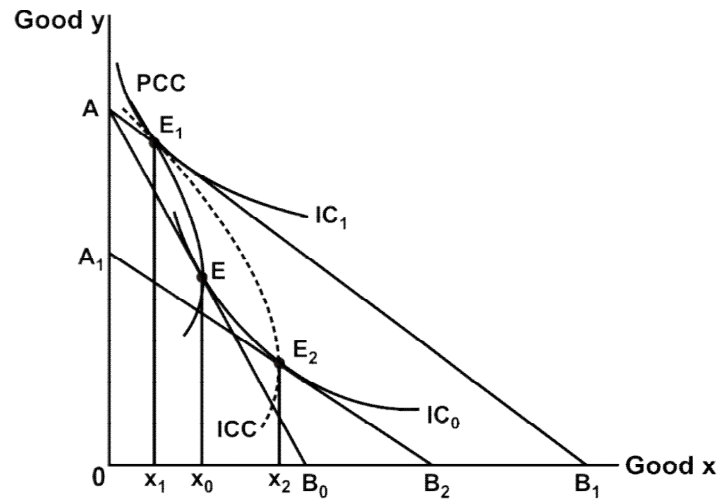


Figure 8.13

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

8.4 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.

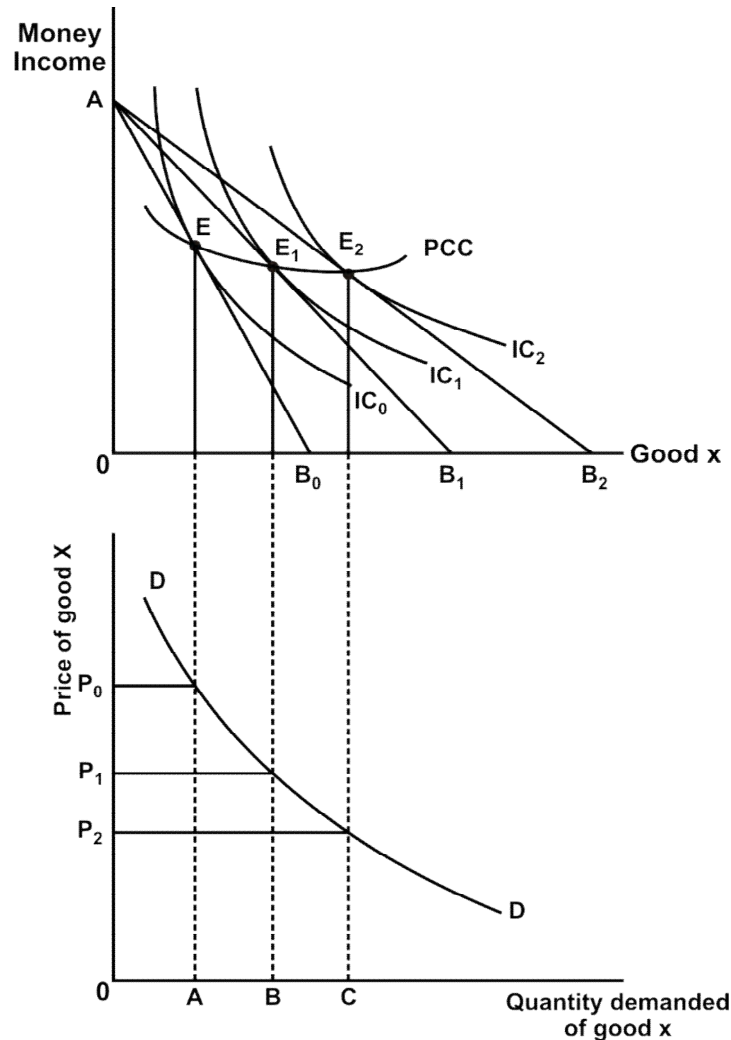


Figure 8.14

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

8.5 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.

In Samuelson's Choice reveals preference hypothesis when a consumer chooses a combination A, it means he considers all other alternative combinations which he could have purchased to be inferior to A. That is, he rejects all other alternative combinations open to him in favour of the chosen combination A. Thus, choice of the combination A reveals his definite preference for A over all the other rejected combinations. With the help of this hypothesis we can obtain definite information about the preferences of a consumer from the observations of his behaviour in the market. By comparing preferences of a consumer revealed in different price-income situations we can obtain certain information about his preference scale.

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 8.15 shows this.

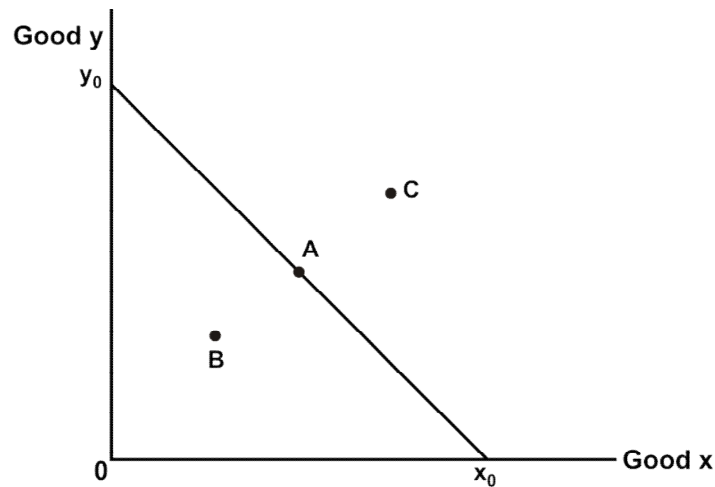


Figure 8.15

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.

Samuelson's revealed preference theory is based upon the strong form of preference hypothesis. In revealed preference theory, strong- ordering preference hypothesis has been applied. Strong ordering implies that there is definite ordering of various combinations in consumer's scale of preferences and therefore the choice of a combination by a consumer reveals his definite preference for that over all other alternatives open to him.

J. R. Hicks in his "A Revision of Demand Theory" does not consider the assumption of strong ordering as satisfactory and instead employs weak ordering hypothesis. Under weak ordering hypothesis (with an additional assumption that the consumer will always prefer a larger amount of a good to a smaller amount of it), the chosen combination A is preferred over all positions that lie within the triangle oy_0x_0 and further that the chosen position A will be either preferred to or indifferent to the other positions on the budget line y_0x_0 .

"The difference between the consequences of strong and weak ordering, so interpreted amounts to no more than this that under strong ordering the chosen position is shown to be preferred to all other positions in and on the triangle, while under weak ordering it is preferred to all positions within the triangle, but may be indifferent to other positions on the same boundary as itself."

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.

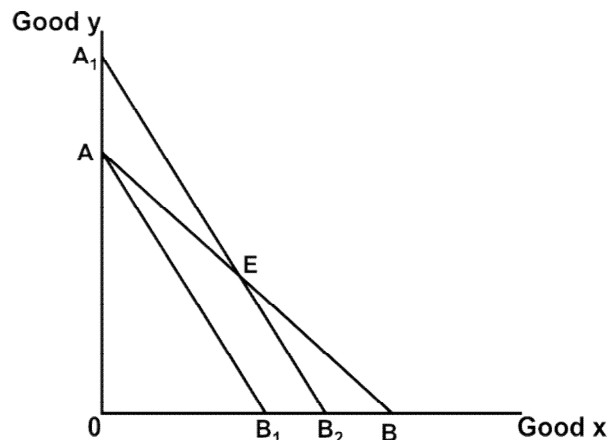


Figure 8.16

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 AB_1 . 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 A_1B_2 . The consumer will not choose a point on EB_2 portion of the new budget line since he will have lesser units than before. So the choice of the consumer will be within the A_1E 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 8.17.

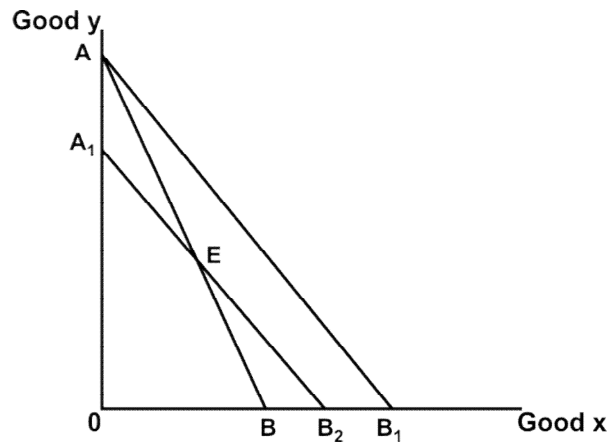


Figure 8.17

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?

8.6 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.

8.7 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.



QUESTION PAPER PATTERN**F. Y. B. A. (Sem - I)**

- 1) All Questions are compulsory
- 2) All Question Carry Equal Marks
- 3) Figures to the right indicates marks to a Sub – Question

Q.1 Attempt any two of the following (On Module – I)

- a. _____ (10 Marks)
- b. _____ (10 Marks)
- c. _____ (10 Marks)

Q. 2) Attempt any two of the following (On Module – II)

- a. _____ (10 Marks)
- b. _____ (10 Marks)
- c. _____ (10 Marks)

Q. 3) Attempt any two of the following (On Module – III)

- a. _____ (10 Marks)
- b. _____ (10 Marks)
- c. _____ (10 Marks)

Q. 4) Attempt any two of the following (On Module – IV)

- a. _____ (10 Marks)
- b. _____ (10 Marks)
- c. _____ (10 Marks)

Q. 5) Attempt any two of the following

- a. _____ (10 Marks)
- b. _____ (10 Marks)
- c. _____ (10 Marks)

