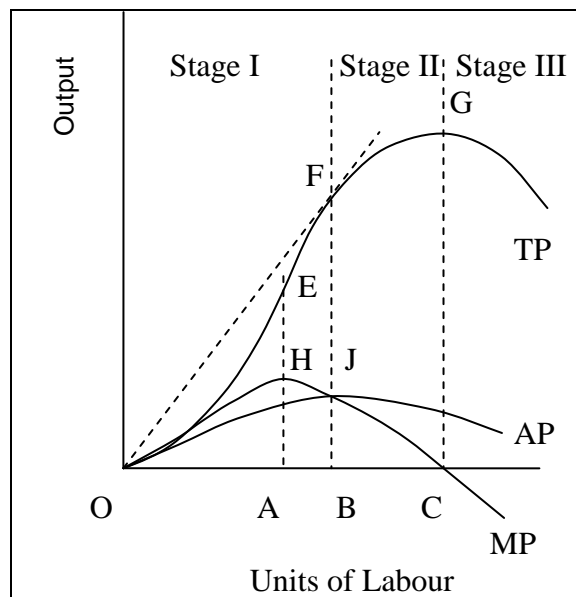


Class Notes on

BASIC ECONOMICS

(For BSc Forestry-first year students)



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Unit 1: Introduction

Economic Problem: Problem of Scarcity and Choice

Concept: Economics is mainly concerned with the utilisation of available material resources to satisfy human wants. Human wants are unlimited and means to satisfy them are scarce and limited. The problem of scarcity of resources is felt not only by individuals but also by the society as a whole. As the resources are limited in comparison to our wants, all our wants cannot be satisfied. Therefore we have to make a choice between these wants. This gives rise to the problem of how to use scarce resources to get maximum satisfaction. This is generally called the **central economic problem**, as it lies at the root of all economic problems faced by the individual and society.

Problem of Scarcity: The economic problem arises from the scarcity of resources relative to human wants. This gives rise to the struggle of man for existence and efforts by him to promote his well-being. Every economic system, be it capitalist, socialist or mixed, has to face this problem of scarcity of resources relative to wants for them. Similarly, every nation, be it developing like Nepal, India etc. or developed like USA, Germany, France etc. face the problem of scarcity of resources. However to say that the developed countries, where affluence and prosperity have been brought about also face this problem raises some doubts. But the fact is that, despite their affluence and riches, they also face this problem. Because their wants has also increased largely with the increase in their possession of goods and services. Their present wants still remain ahead of their resources and capability to produce.

Problem of Choice: Scarcity of resources requires that efficient use of them be made so that the people get the maximum possible satisfaction. Further, since it is not possible to satisfy all our wants, due to the scarcity of resources, we face the problem of choice – choice among various wants, which are to be satisfied. In other words, scarcity of resources in relation to wants gives rise to another economic problem – the problem of choice, choice among different alternatives. If it is decided to use more resources in production of one commodity then some resources must be withdrawn from another commodity. Thus problem of choice from the viewpoint of the society as a whole refers to which goods and in what quantities are to be produced and productive resources allocated for their production accordingly so as to achieve greatest possible satisfaction of the people.

The problem of choice is concerned with the following questions:

- 1) What to produce?
- 2) How to produce?
- 3) For whom to produce?
- 4) What provision should be made for economic growth?

What to Produce: This implies that society has to decide which goods and in what quantities are to be produced. The society has to choose among hundreds of consumer goods themselves and decide about allocation of resources between them. Further, it has to decide about what amounts of consumer goods and capital goods are to be produced. More generally, the society has to choose among varieties of goods such as clothes, shoes, cars, hospitals, schools, television, rice, oil, machinery, etc. for production. Moreover, the society must also decide the quantities of the selected goods to be produced, as it is not possible to produce unlimited amounts of these products.

How to Produce: This means with what combination of resources a society decides to produce goods. A combination of resources implies a technique of production. Usually various production techniques are available and the producers have to choose among them. For example a producer may choose capital intensive or labour intensive techniques for production. Scarcity of resources demands that goods should be produced with the most efficient method. Therefore it is society's interest that those techniques of production be used that makes greater use of relatively less scarce resources and economise relatively more scarce resources.

For Whom to Produce: This means how the national product is to be distributed among the members of the society. Due to the scarcity of resources wants of all the people cannot be satisfied.

Therefore the society has to decide who should get how much from the total output. In a free market economy, who would get how much of national output depends on the money income a person enjoys. Money income can be obtained in the form of wage, rent, interest and profit through utilizing one's labour or property in production process. Differences in the ownership of property and skill in a free market economy causes differences in money incomes of the people. As a result people with greater money income enjoy larger share of national output in this economy.

How the national income is to be distributed has been a burning topic not only in the field of economics but also in politics. Some have argued that all people should get equal incomes and hence equal shares from the national product. According to Karl Marx, the distribution of national income should be on the basis of "from each according to his ability to each according to his needs." Another important view has been that each individual should get income equal to the contribution he makes to the national production. In other words, since production is the combined efforts of the factors of production, i.e. land, labour, capital and enterprise, the national income or output is distributed among these factors according to their contribution. Landowner gets rent, capitalist gets interest, labour gets wages and entrepreneur gets profit.

What Provision should be Made for Economic Growth: If all resources available are used for production of consumer goods only, not leaving any resource for production of capital goods, the productive resource for production in future will not increase, rather it will decrease due to depreciation of capital. This means the living standard of the people will decline in the future. This requires that a part of its resources should be devoted to production of capital goods and to the promotion of research and development activities. This implies sacrifice of some current consumption. Therefore a society has to decide how much saving and investment, i.e. how much sacrifice of current consumption, should be made for future economic progress.

How these Basic Problems are Solved: There are two main methods to solve these basic problems. One method is to solve these problems through market or price mechanism. That is, all these problems are decided by the free play of the forces of demand and supply. In such economy, all the factors of production are basically owned by individuals as private property. Consumers are free to buy goods according to their desire. Those goods are produced more for which there is greater demand. Prices of goods as well as factors of production are determined by the forces of demand and supply. Prices of factors determine the income of the owners of these factors. It is these incomes which determine the distribution of national outputs among the various individuals in the society. Similarly, it is prices of the factors according to which the entrepreneurs decide which technique of production is to be used.

The other method is the adoption of economic planning. In this system, government sets up a central planning authority which takes decision regarding all these basic problems. In such an economic system, the capital and property are collectively owned by the society and production is organised by the government, as well as consumers lose their freedom of choice.

Concept of Microeconomics and Macroeconomics

The terms **microeconomics** and **macroeconomics** were coined and used by Ragner Frisch in 1933. The prefixes micro and macro have been derived from Greek words **micros**, meaning small and **macro**, meaning large respectively.

Microeconomics

Microeconomics is the study of the economic actions of individuals and small groups of individuals. It deals with the choice and decision making behaviour of the individual households, firms and industries and the relationship between prices and quantities of individual goods and services. It studies economic behaviour of individual economic entities and individual economic variable. In the words of K. E. Boulding – "Microeconomics is the study of particular firm, household, individual price, wage, income, industry and particular commodity." Similarly according to Leftwitch –

"Microeconomics concerned with the economic units as consumers, resource owners and business firms."

Microeconomics studies – (i) how an individual consumer allocate his limited resources to fulfil his unlimited wants and how he get maximum satisfaction; (ii) how an individual producer allocate his resources in production process and how he attain equilibrium; (iii) the process of product pricing; (iv) the process of factor pricing; (v) about efficiency in allocation of resources to consumers and producers, i.e. welfare theories.

Macroeconomics

Macroeconomics is the study of broad aggregates of the economy. It is the study of economic system as a whole. It studies not one economic unit like a firm or an industry but the whole economic system. Therefore it deals with totals or aggregate quantities and averages of economy as national income, total output, total consumption, saving and investment, total employment, general price level etc. According to Boulding – "Macroeconomics deals not with individual quantities as such but with aggregates of these quantities, not with individual income but with national income, not with individual prices but with price levels, not with individual outputs but with national output." Similarly according to Gardner Ackley – "Macroeconomics concerns itself with such variables as the aggregate volume of the output of an economy, with the size of national income and with the general price level." It deals with not only the determination of these aggregates but also how they change from time to time.

Macroeconomics is concerned with aggregate demand and supply, not with demand and supply of particular good or individual. It explains how the level of national income and employment is determined and analyses the factors, which bring changes in these levels. It studies consumption function and investment function; monetary system of the country, foreign trade, balance of payments and various subjects relating to public finance. It also deals with national policies as monetary policy, fiscal policies, foreign exchange policy etc.

Difference between Microeconomics and Macroeconomics

1. Microeconomics is the study of economic actions of individuals and small groups of individuals as particular households, firms, industries, commodities and prices. Macroeconomics deals with aggregates of these quantities i.e. national income, general price level, total investment etc.
2. The objective of microeconomics on demand side is to maximize utility and on the supply side is to maximize profits. Objectives of macroeconomics are full employment, price stability, economic growth and favourable balance of payments.
3. The subject matter of microeconomics is the price mechanism which operates with the help of demand and supply forces. These forces help to determine the equilibrium price in the market. The subject matter of macroeconomics is national income, output and employment, which are determined by aggregate demand and aggregate supply.
4. Laws of microeconomics are formulated by taking some assumptions. With the help of these assumptions, microeconomic laws establish relationship between cause and effects of economic phenomenon. This method of study is known as partial equilibrium analysis. In macroeconomics economic elements are categorized into aggregate units like aggregate demand, aggregate supply, total consumption, total investment etc. The interdependence of these economic factors, i.e. the total effect of an economic factor on the economy is also studied in macroeconomics. This method of study is known as general equilibrium analysis.
5. Microeconomics states its laws by assuming macro-variables constant. On the basis of these assumptions, it analyses how production and factors of production are allocated or distributed among different uses. Macroeconomics assumes micro-variables constant. On the basis of assumption of constant factor distribution, it explains how full employment can be achieved.
6. Individual demand and supply are the forces of equilibrium in microeconomics. In macroeconomics aggregate demand and supply are the forces of equilibrium.

Interdependence of Microeconomics and Macroeconomics

Though microeconomics and macroeconomics are two different approaches to study and there are differences between these two approaches, they are not totally independent. Microeconomics depends on macroeconomics and macroeconomics depends on microeconomics.

Dependence of Microeconomics on Macroeconomics: Change in macroeconomic variables also influences the microeconomic variables. For instance, when aggregate demand rises during a period of prosperity, the demand for individual products also rises. If this increase in total demand is due to the increase in demand of some particular commodities, profits of the firms producing these commodities also increases. This will increase the demand for the particular types of labours, needed for these industries. If the supply of such labours is less elastic, its wage rate will rise. Thus a macroeconomic change also brings changes in the values of microeconomic variables – in the demand for particular goods, the wage rate of particular industries, the profits of the particular firms etc.

Dependence of Macroeconomics in Microeconomics: Similarly macroeconomic variables are also dependent on microeconomic variables. The total is made up of parts. National income is the sum of the incomes of individual households, firms and industries. Total saving, investment and consumption are the result of saving, investment and consumption decision of individual firms, industries, households and persons. The general price level is the average of all prices of goods and services. For instance, the total level of output, income and employment in the economy also depends upon income distribution. If income distribution is unequal, i.e., the income is concentrated in the hands of a few rich people it will reduce the demand for consumer goods. Profits, investment and output will decline, unemployment will spread and ultimately the economy will face depression. Thus both microeconomic and macroeconomic approaches to the economic problems are interdependent.

Unit 2: Theory of Demand

Demand Function

Theory deals with concepts and functions. A function describes the mathematical relationship between two or more variables. If two variables are related in such a way that for each value of one of the variables (the independent variable) there corresponds only one value of the other variable (the dependent variable), then the second variable is said to be a function of the first one.

The demand function for a commodity describes the relationship between the various amounts of the commodities that might be bought during a given period of time in a given market and the determinants of those amounts. The determinants are: prices of the commodity, income of the consumers, their taste and habits, prices of the related goods, etc. Mathematically the demand function can be expressed as:

$$D_x = f(P_x, Y, P_r, T, u)$$

Where, D_x is the demand for commodity x , P_x is price of the commodity, Y is consumers' income, P_r is prices of related goods, T is measure of consumer's taste and habits, u is other determinants of the demand for x .

Demand Schedules and Demand Curves

Demand schedule is a table which shows the quantities of a commodity demanded at different prices in a given period of time. It states the relation between the two variables of price and quantity. There are two types of demand schedule- individual demand schedule and market demand schedule. Individual demand schedule shows the different quantities of a commodity that an individual would buy at different prices in a certain time period. Market demand schedule shows the different quantities of commodity demanded at different prices in a market by the whole body of consumers. It is the total sum of the individual demand schedules in a market. A hypothetical individual and market demand schedule is shown in the table below considering there are only two consumers in the market i.e., A and B.

Price (in Rs.)	Individual demand (units)		Market demand (units)
	Consumer A	Consumer B	
	1	6	
2	5	10	15
3	4	8	12
4	3	6	9
5	2	4	6

Individual demand curve of consumer A

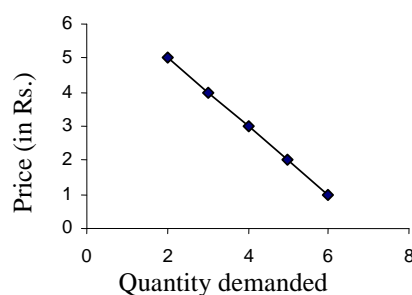


Fig. 2.1

Market demand curve

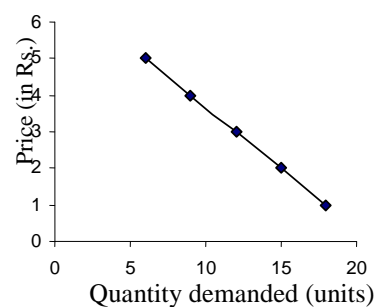
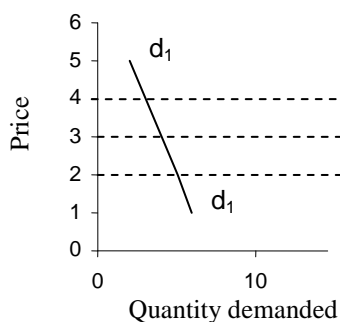
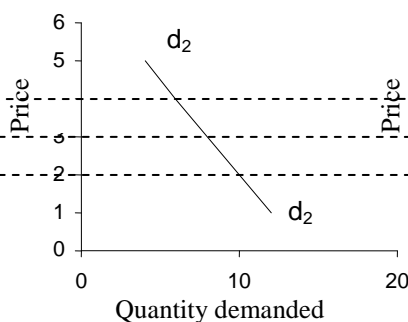


Fig. 2.2

Demand of consumer A



Demand of consumer B



Market Demand

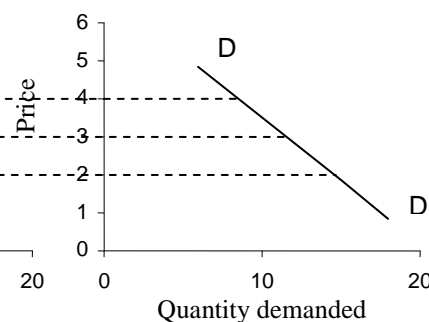


Fig. 2.3

A demand schedule does not say what the price is. It only says what amounts would be bought at different possible prices. The lower the price, the larger the quantity that is bought. Similarly, the higher the price, the smaller the quantity. This inverse relationship between price and quantity demanded is known as **law of demand**.

The geometrical representation of demand schedules are called **demand curves**. Individual and market demand schedules give individual and market demand curves. When we plot individual and market demand schedule on a graph we get individual and market demand curves as shown in Fig. 2.1 and Fig. 2.2 respectively. Market demand curve can also be derived graphically by the horizontal summation of individual demand curves as shown in Fig. 2.3.

Law of Demand

Law of demand states that the demand varies inversely with price, i.e., when the price of a commodity rises its demand falls and vice-versa, all other things remaining the same. According to Marshall- "The amount demanded increases with a fall in price and diminishes with a rise in price." Similarly in the words of Samuelson " Law of Demand states that people will buy more at lower prices and buy less at higher prices, other things remaining the same." For example if quantity demanded of a product at the price of Rs. 10 is 20 units, more than 20 units will be demanded when price falls to Rs. 5 and less than 20 units will be demanded when price rises to Rs. 15. This can also be explained with the help of a diagram (Fig.2.4), where DD is the demand curve. Figure shows that quantity demanded is D_1 at price P_1 and rises to D_2 when price falls to P_2 .

The law does not speak about the effect of demand on price. Further it only indicates the direction of change but not the degree of change. It states that the demand varies inversely with price, i.e. when the price rises demand falls and vice-versa.

Exception to the law

1. Giffen goods: In the mid – 19th century Sir Robert Giffen pointed out that in the case of English workers the law of demand does not apply to bread. He found out that when the price of bread increased, the low-paid workers in Britain demanded more of it cutting off demand for meat. This may happen to several other inferior goods as well called **Giffen Goods**.

2. Articles of distinction: Distinct commodities like diamonds and jewellery are demanded more when their price is high. This is because rich people want to show them distinct by having these goods as ordinary people cannot afford to purchase these goods.

3. Expectation of rise or fall in price in future: If consumers expect that the price of a commodity rise further in the future they will demand more when price of the commodity rises. Opposite will happen if they expect further fall in price in future.

4. Ignorance about quality: Sometimes consumers judge the quality of a commodity from its price. As a result they demand more when price of the good is high assuming the good is of high quality and vice-versa.

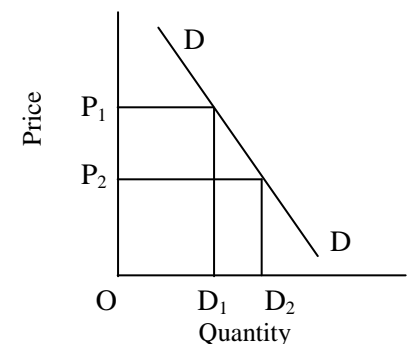


Fig. 2.4

Changes in Demand

When demand changes due to the change in price, all other things remaining the same, it is shown on the same demand curve through two different points as shown in Fig.2.4. In the figure, at price P_1 quantity demanded is D_1 which rises to D_2 when price falls to P_2 . When demand falls down due to the rise in price, it is called **contraction of demand** and when demand goes up due to the fall in price, it is called **extension of demand**.

But when demand changes due to the change in factors other than price, it is shown by the shift in the demand curve, i.e. the movement of the demand curve to the right or left. If demand rises due to the change in other factors, prices remaining the same, it is called **increase in demand**. Graphically it is shown by the shift in the demand curve to the right hand side as shown in Fig.2.5. Here initial demand curve D_1D_1 is shifted to D_2D_2 showing that quantity demanded is increased from Q_1 to Q_2 , price remaining the same at P . Similarly, if demand falls due to the change in other factors, prices remaining the same, it is called **decrease in demand**. Graphically it is shown by the shift in the demand curve to the left hand side as shown in Fig.2.6. Here initial demand curve D_1D_1 is shifted to D_2D_2 showing that quantity demanded is decreased from Q_1 to Q_2 , price remaining the same at P .

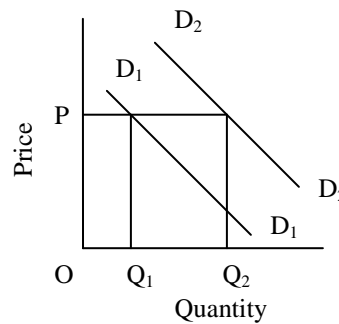


Fig. 2.5

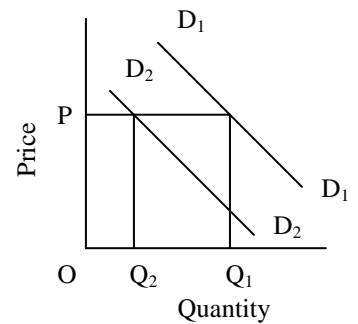


Fig. 2.6

Factors Causing the Change in Demand

1. **Price:** Demand rises with fall in price of the commodity and vice versa.
2. **Change in real income:** Demand for a normal good increase with rise in real income and decrease with fall in real income. But opposite happens in case of inferior goods.
3. **Change in prices of related goods:** Demand of a good increases when price of its substitutes rises and vice-versa. But demand of a commodity decreases when price of its compliments rises and vice-versa.
4. **Change in income and wealth distribution:** When income and wealth is distributed more evenly, demand for necessities and comforts increases and that for luxuries decreases. But if income and wealth distribution is unequal demand for luxuries increases.
5. **Change in population:** Demand for necessities generally increases with increase in size of population and vice-versa. Demand also depends on composition of population. For example, if percentage of old people in total population is increased, demand for walking sticks is increased, whereas demand for baby foods and diapers is increased in case of increase in percentage population of children.
6. **Change in climate and weather:** Demand also changes with change in climate or weather. For example, demand for ice-cream is increased in summer and demand for woollen clothes is increased in winter season.
7. **Change in tastes, habits, customs and fashion:** Changes in people's tastes, habits, customs and fashion also bring changes in demand. For example, as more and more Nepalese people are being habitual to tea, demand for tea is increasing day-by-day.
8. **Effect of advertisement:** An attractive advertisement of a product positively influence consumers which results in increase in demand for the product.
9. **Change in the quantity of money in circulation:** Purchasing power of people increases with increase in quantity of money in circulation which results in increase in demand for goods and services.
10. **Technological progress:** This brings new things in the market, which replace the old ones. As a result demand for old things decreases. For example, demand for typewriters is decreased as it is replaced by computers which are available at low price now-a-days due to the technological progress.
11. **Discovery of cheap substitutes:** Discovery of cheap substitute will cause decrease in demand of a product. For example discovery of nylon decreased demand for silk.

Unit 3: Elasticity of Demand

Meaning

In economics elasticity always has the same meaning. It is the ratio of the relative change in a dependent variable to the relative change in an independent variable. In other words, elasticity is the relative change in dependent variable divided by the relative change in the independent variable.

Elasticity of demand is the measure of the degree of change in the amount demanded of the commodity in response to a given change in its determinant.

Kinds or Elasticity of Demand

There are as many kinds of elasticity of demand as its determinants. But the most important of these elasticities are: (a) the price elasticity of demand, (b) the income elasticity of demand and (c) the cross elasticity of demand.

Price Elasticity of Demand: It is responsiveness of demand to change in price other things being unchanged. It measures the extent to which the quantity demanded of a good changes when its price changes. According to Kenneth Boulding- “elasticity of demand measures the responsiveness of demand to changes in price.” Similarly, in the words of Marshall- “the elasticity (or responsiveness) of demand in a market is great or small according as the amount demanded increases much or little for a given fall in price and diminishes much or little for a given rise in price.” Marshall was the first economist to give clear formulation of price elasticity as the ratio of a relative change in quantity to a relative change in price. Let E_p stands for price elasticity, then

$$\begin{aligned} E_p &= \frac{\text{Relative change in demand}}{\text{Relative change in price}} \\ &= \frac{\text{Percentage change in demand}}{\text{Percentage change in price}} \\ &= \frac{\Delta Q/Q}{\Delta P/P} \end{aligned}$$

E_p is always negative, because of the inverse relationship between demand and price, implied by the law of demand.

Income Elasticity of Demand: It measures the responsiveness of demand to change in income. It is the percentage change in amount demanded as a result of a given percentage change in income of a consumer. In the words of Watson- “Income elasticity of demand means the ratio of the percentage change in the quantities demanded to the percentage change in income.”

$$\begin{aligned} \text{Income elasticity, } E_y &= \frac{\text{Relative change in demand}}{\text{Relative change in income}} \\ &= \frac{\text{Percentage change in demand}}{\text{Percentage change in income}} \\ &= \frac{\Delta Q/Q}{\Delta Y/Y} \end{aligned}$$

For normal goods income elasticity will have a positive sign. For inferior goods income elasticity will have a negative sign. Sometimes it may be zero in case of several goods.

Cross Elasticity of Demand: It measures the responsiveness of demand for a good to a change in the price of related good, with own price remaining constant. According to Prof. Ferguson- “The cross elasticity of demand is the proportional change in the quantity of X demanded resulting from a given relative change in the price of the relative good Y”.

$$\begin{aligned} \text{Cross elasticity, } E_{xy} &= \frac{\text{Proportionate change in demand of X}}{\text{Proportionate change in price of Y}} \\ &= \frac{\Delta Q_x / Q_x}{\Delta P_y / P_y} \end{aligned}$$

Cross elasticity has a positive sign for substitute goods and a negative sign for complementary goods. It is zero for independent goods.

Degrees or Kinds of Price Elasticity of Demand

According to the degree of elasticity, price elasticity of demand can be classified as: (i) infinitely or perfectly elastic demand, (ii) perfectly inelastic demand, (iii) relatively elastic demand, (iv) relatively inelastic demand and (v) unitary elastic demand.

(i) Perfectly elastic demand: When an infinitely small change in price will cause an infinitely large change in amount demanded, it is known as perfectly elastic demand. In this case, a very small rise in price reduce the demand to zero, whereas a very small reduction in price leads to such a big expansion in demand that no seller is able satisfy this demand. This means $E_p = \infty$. This is shown by straight line demand curve parallel to x-axis, showing demand, as in fig. 3.1. This type of elasticity hardly exists in real world.

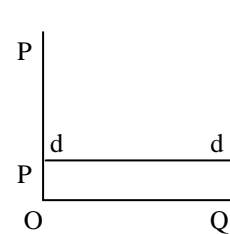


Fig. 3.1

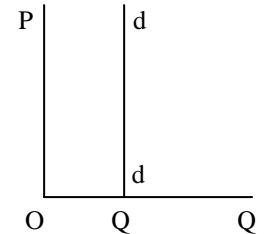


Fig. 3.2

(ii) Perfectly inelastic demand: When demand remains constant whatever the change in price may be, it is called perfectly inelastic demand. In this case $E_p = 0$. This is shown graphically by a straight line demand curve parallel to the y-axis, showing price (fig. 3.2). This type of elasticity also hardly exists in real world.

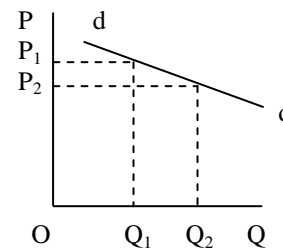


Fig. 3.3

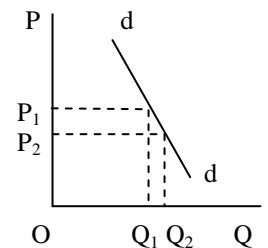


Fig. 3.4

(iii) Relatively elastic demand: When a small relative change in price leads to a considerable change in relative demand, it is known as relatively elastic demand. In this case $1 < E_p < \infty$. This is shown in fig. 3.3. This type of elasticity occurs mainly in the case of luxurious commodities.

(iv) Relatively inelastic demand: When a large proportionate change in price brings only a small proportionate change in demand, it is known as relatively inelastic demand. In this case $0 < E_p < 1$. This is shown in fig. 3.4. This type of elasticity occurs mainly in the case of necessary commodities.

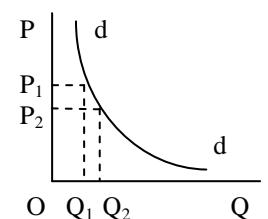


Fig. 3.5

(v) Unitary elastic demand: When a rise (or fall) in price leads to a fall (or rise) in demand by the same proportion as price, it is known as unitary elastic demand. In this case $E_p = 1$. This is shown in fig. 3.5. This type of elasticity occurs mainly in the case of commodities of comfort.

Determining Factors

1. Availability of substitutes: The demand is elastic for commodities having close substitutes, e.g. Coke and Pepsi.

2. Nature of the commodity: Demand for necessities is less elastic or inelastic whereas it is more elastic for luxuries.

3. Number of uses of a commodity: If a commodity is used for several purposes, the elasticity of demand is high, e.g. electricity.

4. Possibility of postponing: Elasticity of demand is higher for those commodities whose consumption or purchase can be postponed.

5. Level of income: Demand of the commodities consumed by high income group people is less elastic while that consumed by low income group people is more elastic.

6. Habitual necessities: Those commodities whose consumption is a habit with consumer have low price elasticity.

7. Proportion of expenditure: Demand for a commodity is less elastic, lesser is the proportion of expenditure on the commodity by the consumer.

8. Time period: Price elasticity in the short period is low, while in the long period it will be relatively higher.

9. Prevailing price level: Highly priced commodities and very low priced commodities have low price elasticity.

10. Jointly demanded goods: In this case elasticity is comparatively low.

Measurement of Price Elasticity of Demand

Total Outlay Method

Elasticity of demand can be measured from the change in the expenditure of the consumers on the commodity as its price change. This method was devised by Marshall. He distinguished between three separate cases of changes in total outlay resulting from a change in the price of the commodity.

1. If with a fall (or rise) in price total outlay increases (or decreases) the elasticity of demand is greater than one.
2. If with a change in price total expenditure remains constant, elasticity = 1.
3. If with a fall (or rise) in price total expenditure also falls (or rises), elasticity < 1.

The method can be explained with the help of the table given below. Table shows that when price falls gradually from Rs. 10 to Rs. 6, total expenditure rises from Rs. 10 to reach up to Rs. 30, which means elasticity is greater than one. Similarly, when price falls from Rs. 6 to Rs. 5, total expenditure remains constant at Rs. 30, which means elasticity is equal to unity. Finally, when price falls from Rs. 5 to Rs. 1, total expenditure also falls from Rs. 30 to Rs. 10, which means elasticity is less than 1. This can also be explained with the help of Fig. 3.6. In the figure curve ABCD shows the total outlays at different prices of the commodity. Figure shows that from point A to B total outlays rise with fall in price, which refers $E_p > 1$, from point B to C total outlays remains constant with fall in price, which refers $E_p = 1$, and from point C to D total expenditure fall with fall in price which refers $E_p < 1$.

Price (P) (Rs.)	Demand (Q) (units)	Total expenditure (P*Q) (Rs.)	E_p	Direction of price	Direction of total expenditure
10	1	10	} >1	↓	↑
9	2	18			
8	3	24			
7	4	28			
6	5	30	} =1	↓	↑
5	6	30			
4	7	28	} <1	↓	↔
3	8	24			
2	9	18			
1	10	10			

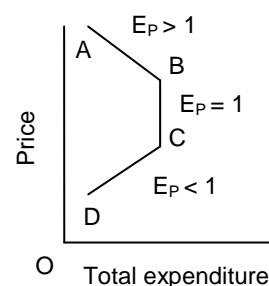


Fig. 3.6

Graphic Method

If the changes in price are very small we use as a measure of the responsiveness of demand the **point elasticity of demand**. Point elasticity of demand is defined as the ratio of an infinitesimally small relative change in quantity demanded to an infinitesimally small relative change in price. Symbolically:

$$E_p = \frac{dQ}{Q} \div \frac{dP}{P}$$

or $E_p = dQ/dP \times P/Q$

If the demand curve is linear, $Q = b_0 - b_1P$

its slope is $dQ/dP = -b_1$. substituting in the elasticity formula we obtain

$$E_p = -b_1 \times P/Q$$

which implies that elasticity changes at a various points of the linear demand curve. Graphically the point elasticity of a linear demand curve is shown by the ratio of the segments of the line to the right and to the left of the particular point. In fig. 3.7 the elasticity of the linear demand curve at point F is given by the ratio FD'/FD' .

Proof:

In fig. 3.7 we have

$$\begin{aligned} \Delta P &= P_1P_2 = EF \\ \Delta Q &= Q_1Q_2 = EF' \\ P &= OP_1 \\ Q &= OQ_1 \end{aligned}$$

If we consider very small changes in P and Q, then $\Delta P \approx dP$ and $\Delta Q \approx dQ$. Thus, substituting in the formula for the point elasticity, we have

$$E_p = dQ/dP \times P/Q = Q_1Q_2/P_1P_2 \times OP_1/OQ_1 = EF'/EF \times OP_1/OQ_1$$

Since the triangles FEF' and FQ_1D' are similar, $EF'/EF = Q_1D'/FQ_1 = Q_1D'/OP_1$

Thus $E_p = Q_1D'/OP_1 \times OP_1/OQ_1 = Q_1D'/OQ_1$

Furthermore the triangles DP_1F and FQ_1D' are similar, $Q_1D'/FD' = P_1F/FD = OQ_1/FD$ or $Q_1D'/OQ_1 = FD'/FD$

Thus the price elasticity at point F is: $E_p = FD'/FD$

Given this graphical measurement of point elasticity it is obvious that at the mid-point of a linear demand curve $E_p = 1$ (point M in fig. 3.7). At any point to the right of M $E_p < 1$ and at any point to the left of M, $E_p > 1$. At point D, $E_p \rightarrow \infty$, while at D' $E_p = 0$.

If the demand curve is non-linear as shown in fig. 3.8, to find out point elasticity at any point, say M, we draw a tangent to the demand curve at point M. Then the point elasticity at point M is given by the ratio MB/MA .

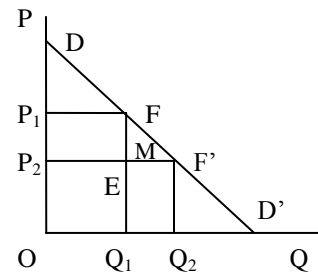


Fig. 3.7

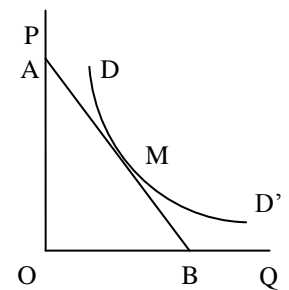


Fig. 3.8

Arc Method

For measuring price elasticity of demand when the changes in price are somewhat large or the price elasticity over an arc of the demand curve such as between points A and B in the fig. 3.9 is to be measured, the concept of arc elasticity has been evolved. In measurement of arc elasticity, we use the average of original and changed price and average of original and changed demand. Thus the formula for measuring arc elasticity of demand is:

$$\begin{aligned} E_p &= \frac{\Delta q}{(q_1 + q_2) / 2} \div \frac{\Delta p}{(p_1 + p_2) / 2} \\ &= \frac{\Delta q}{(q_1 + q_2) / 2} \times \frac{(p_1 + p_2) / 2}{\Delta p} \\ &= \frac{\Delta q}{\Delta p} \times \frac{(p_1 + p_2)}{(q_1 + q_2)} \end{aligned}$$

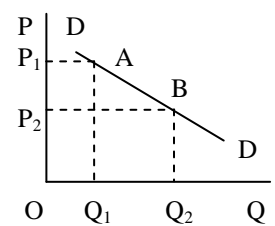


Fig. 3.9

The arc elasticity is a measure of the average elasticity, that is, the elasticity at the mid-point of the chord that connects the two points (A and B) on the demand curve defined by the initial and the new price levels (fig. 3.9). It should be clear that the measure of the arc elasticity is an approximation of the true elasticity of the section AB of the demand curve

Unit 4: Theories of Consumers' Behaviour

The meaning of Utility

Every good possesses a quality by virtue of which it satisfies a human want. This want satisfying power is known in economics as utility. Anything, which satisfies a human want directly or indirectly, is said to possess utility. Air, water, etc. (free goods) and food, clothes, land, house etc. (economic goods) satisfy human wants, and as such they possess utility.

Utility is subjective. It varies from individual to individual. E.g. a pen has no utility for one who cannot write. Utility varies in different situations. The same thing may possess different utilities for different purpose. E.g. water has different utilities when used for drinking, bathing or washing. It also varies with time. A change in taste, season or fashion may affect the utility of a commodity. It is a relative concept.

Utility may be distinguished from satisfaction. Satisfaction is what we get. It is the result of utility. If a thing possesses utility, it gives us satisfaction.

Utility and usefulness are not synonyms. If a thing possesses utility it does not necessarily follow that it is useful. E.g. cigarette is harmful, but it possesses utility for a smoker. The term **utility**, therefore as used in economics, has no ethical or moral significance. A thing may be good or bad, but if it satisfies a human want, we shall say it possesses utility.

Utility is different from pleasure. A good which possesses utility may not give pleasure when consumed, e.g. medicines. A thing which possesses utility may be tasteful and pleasurable or it may not give any pleasure.

Forms of utility: (a) form utility – change in utility by changing the form, (b) place utility – change in utility by changing the place, and (c) time utility – change in utility by storing a good.

Concept of Total, Marginal and Average Utility

Total Utility: It is the sum of the utility which he gets by consuming a particular quantity of a commodity. If a consumer consume one unit, or two, or three, or more at a time he get different utilities. One unit of commodity yields some amount of utility to the consumer. Two units yield more, three units still more and so on. As quantities increases total utility increases but total utility increases at a diminishing rate. To increase total utility at a diminishing rate means that the successive increments become smaller and smaller. Thus three units have more utility than two, and four have more than three. Total utility goes increasing till the utility from successive unit reaches to zero. At this point the consumer is totally satiated. After this level, disutility is obtained and total utility starts decreasing.

Marginal utility: As we know, when a consumer consumes various units of a commodity, he obtains higher utility from preceding units and lower utility from succeeding units. The utility derived from each additional unit is the marginal utility. It may be defined as the addition to the total utility obtained by the consumption of the last unit. In the words of Prof. Boulding, "Marginal utility of the quantity of a commodity is the increase in total utility which results from a unit increase in its consumption." The marginal utility of three units is the addition to the total utility from having three units instead of two.

$$MU_n = TU_n - TU_{n-1}$$

Average Utility: Total utility divided by the number of units of a commodity consumed gives average utility. It is the utility obtained from each unit of the commodity consumed in average, that is the utility per unit of the commodity consumed. As the MU goes on decreasing with increase in the consumption, AU also tends to fall, but the rate of fall in AU will be lesser than that in MU.

Cardinal Utility Analysis

This approach to the theory of demand was started by the classical economists of the late eighteenth and 19th centuries but matured at the hands of the 20th century economists, neo-classicals like Marshall and Pigou. The basic idea of this approach is that a consumer buys a certain commodity or

service because of its utility. It was assumed by the neo-classicals that utility which a consumer derives out of a commodity is identical with the satisfaction he expects to get out of its consumption. It can be measured cardinally, it is possible to know exactly the number of units of utility that a commodity or service contains for the consumer. The unit of measurement of utility may be called a util.

Basic Assumptions of Cardinal Utility Analysis

- 1. Rationality:** The consumer is supposed to be rational. He is able to make deliberate calculations and consistent choices.
- 2. Cardinal utility:** Utility is cardinally measurable, i.e., utility derived by the consumer can be stated in qualitative term.
- 3. Independence of utilities of different goods:** Utilities of different goods are independent. The utility obtained from the consumption of a good is a function of the quantity of that good alone. The consumption of one good does not affect the utility of another good.
- 4. Diminishing marginal utility:** Marginal utility derived by a consumer from the consumption of a commodity goes on diminishing as he consumes more and more of it.
- 5. Constant marginal utility of money:** The marginal utility of money to the consumer remains constant to him as he spends more and more on a commodity.

Law of Diminishing Marginal Utility

It was first propounded by a German economist Herman Henerich Gossen in 1854 and therefore also known as first law of Gossen. But it was Marshal who gave it the final shape.

The law states that the MU derived by a consumer from the consumption of a commodity goes on decreasing as he consumes more and more of it, other thing remaining the same. Marshall – "The additional benefit which a person derives from a given increase of a stock of a thing diminishes, other things being equal, with every increase in the stock that he already has."

The law can be explained with the help of the table and diagram given below. The table shows that as a consumer consumes more and more units of apple he derives less and less marginal utility.

Units of Apple	Total Utility	Marginal Utility
1	20	20
2	36	16
3	48	12
4	56	8
5	60	4
6	60	0
7	56	-4
8	48	-8

Therefore the total utility is increasing at a decreasing rate. In the diagram MU is the marginal utility curve of apple. The diagram shows that when consumer consumes Q_1 amount of apples he gets marginal utility equal to MU_1 and get lesser marginal utility MU_2 when he consumes Q_2 amount of

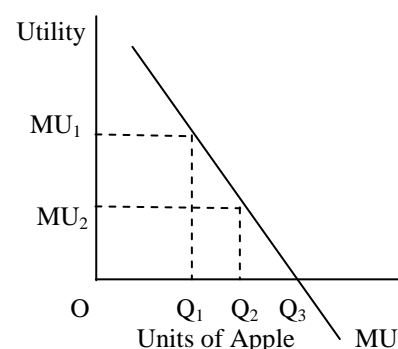


Fig. 4.1

apples. The figure also shows that the consumer gets zero marginal utility when he increases his consumption to Q_3 and gets negative utility beyond this level.

Assumptions

- 1. Uniform quality and size of the commodity:** The successive units of the commodity should not differ in quality and size.
- 2. Suitable quantity of consumption:** The units of the commodity should not be very small or very large.
- 3. Consumption within the same time:** Consumption must be in one sitting, i.e., there should not be long interval in between consumption of successive units.
- 4. No change in the mental condition of the consumer during consumption:** e.g. in case of liquor.
- 5. No change in fashion or taste:** There is no change in consumer's taste or fashion during the consumption.

6. No change in the price of the commodity or its substitute: It is assumed that the commodity's price is not changed with successive units and the price of the substitute also remains the same.

Exceptions or Limitations

- 1. Rare and curious goods:** Law does not apply to rare and curious goods like old coins, rare paintings etc.
- 2. Goods of display:** Things, which satisfy consumers' taste for display of his wealth or fashion such as jewellery.
- 3. Consumption of public goods:** The law does not apply to such public goods as telephones because the greater the number of telephones in a town, the greater is the utility obtained from the use of a telephone.
- 4. Intoxicants:** as intoxicants change the mental condition of the consumer as they consume more and more of it.
- 5. Poetry, music or good books:** These may give interested persons more and more utility.
- 6. First time consumption of a commodity:** In this case he may get increasing marginal utility for some time.

Theoretical and Practical Importance

- 1. Basis of some economic laws:** Several very important laws and concepts of economics are based on this law e.g., law of demand, the concept of consumer's surplus, the concept of elasticity of demand, law of substitution.
- 2. Importance to finance minister:** A finance minister takes this law as guideline for taxation. He taxes the commodities purchased by the rich at a high rate and those purchased by poor people at a low rate. Similarly, in case of income tax, the rich are taxed at higher rate, because MU of money to them is lower than that to the poor. This is called progressive taxation.
- 3. Importance to the consumer:** This law also works as a guideline to the consumer. He is advised to spend his income over the purchase of a number of commodities rather than on one commodity due to which he can get the maximum utility out of his expenditure.
- 4. Value in use and value in exchange:** The law help us to know the difference between value in use and value in exchange. Water has high value in use but no value in exchange because the MU of another unit of water is zero. On the other hand the value in exchange of a commodity like gold is very high because its MU is quite high.
- 5. Socialism:** Socialists take their stand on this law when they advocate a more equal distribution of wealth. They suggest to transfer some part of wealth with the rich to the poor through taxation and grants. They argue that the measure of sacrifice by the rich in terms of utility is much less as compared to the utility obtained by the poor. There is a net gain to society through this income transfer.

Does This Law Apply to Money?

It seems that the law of diminishing MU does not apply to money. Money is a general purchasing power. It enables the purchaser to buy anything he likes. Hence it is said that no person ever feels satisfied with money, however rich he may be. But slightly deeper thinking clearly tells us that this is not so. The MU of money also diminishes with the increase in money a man has. The importance of money to a rich man is not so much as it is for a poor man. A rich man spends it more freely and is much less worried in case he happens to lose a certain portion of it. Every increment in the amount of money that a man has brings him less and less extra pleasure. Hence the law of DMU applies to money also. There is no doubt that the utility of money diminishes slowly and is perhaps never zero. This is because money can buy any other commodity or service.

Law of Substitution

This law was also propounded by Gossen and therefore also known as second law of Gossen. But the final shape was given by Marshall. This law is also called law of maximum satisfaction or law of equi-marginal utility or law of indifference.

The law states that to get maximum utility from the expenditure of his limited income (budget), the consumer purchases such amount of each commodity that the last unit of money spent on each of them gives him the same MU. The consumer is faced with a choice among many commodities that he can and would like to buy, and his income is always insufficient to buy all the commodities for him and as much as he likes. Therefore, he would get maximum utility or satisfaction only if he allocates his limited income on the purchase of different commodities in such a way as yields him the same MU in all. For this the consumer substitutes some units of the commodity of greater utility for some units of the commodity of less utility. As a result the MU of the former will fall and that of the latter will rise, till the two MUs are equalised. This can be explained more clearly with the help of a numerical example. Suppose, a consumer has Rs. 6, which he wants to spend on apples and oranges, so that he obtains the maximum total utility. The following table shows the MU of spending successive rupees of income on apples and oranges. From the table we can easily see that the consumer obtains maximum total utility equal to 98 utils by spending Rs. 4 on apples and Rs. 2 on oranges, i.e. when MUs of both are equal to 14 units. Any other allocation of his budget will give him less total utility.

Units of money	MU of apple (Utils)	MU of banana (Utils)
1	20	16
2	18	14
3	16	12
4	14	10
5	12	8
6	10	6

The law can also be explained with the help of a diagram (fig. 4.2). In the figure curve MU_a represents marginal utility of apple and curve MU_b represents marginal utility of banana of spending one unit of money and MU_m represents the marginal utility of money. The diagram shows that the consumer, with total money equal to $OM+ON$, will gain maximum satisfaction if he spends OM units of money on bananas and ON units on apples, i.e. when marginal utility of spending last unit of money on both the commodities are equal (OR in the figure). Any other combination will give him lesser satisfaction. For example if the consumer decides to spend OM' on banana and ON' on apples (here $MM'=NN'$) rather than the former combination, his utility from banana will increase by area $MABM'$ whereas his utility from apple will decrease by area $N'CDN$, which is larger than the area $MABM'$. This means this combination will give him lesser total utility than the former combination.

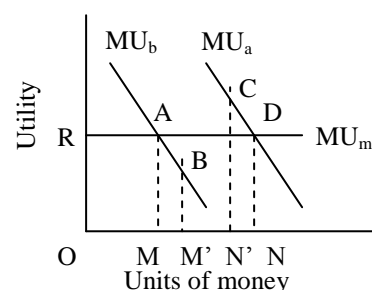


Fig. 4.2

We have shown here in the table and in the diagram only two commodities. Actually, the consumer purchases many commodities at the same time. But the same principle applies to all of them i.e., the MU of expenditure of the last (marginal) unit of money on all of them must be the same. MU of expenditure on a commodity is defined as the ratio of MU to its price. Therefore, the condition for maximisation of utility is given by:

$$MU_a/P_a = MU_b/P_b = MU_c/P_c = \dots = MU_n/P_n$$

Assumptions

1. Consumer is rational.
2. The utility is cardinally measurable.
3. MUs of the different commodities are independent of each other.
4. MU diminishes with more and more purchases.
5. The consumer has a limited amount of income to spend.
6. MU of money remains constant.

Criticism or Limitations

1. Effect of fashion and customs: Human being spend a lot of their money income on fulfilling social customs and fashions such as marriage ceremonies, birth day parties, death ceremonies etc. these acts are not done in the basis of the law of substitution. People even sacrifice higher utility, if custom and fashion is so required.

2. Individual goods: The law does not apply in the use of indivisible goods. The reason is that the consumer cannot divide the goods to adjust the units of utilities derived from their consumption.

3. Utility cannot be measured: The law is based on the assumption that utility is cardinally measurable. But in reality it is not possible. Utility is subjective and can only be felt. We cannot measure it in exact number.

4. Non availability of goods: The law does not apply when the goods of choice of consumers are not available in the market. In such a case, the consumer will have to buy a good which gives him lesser utility.

5. Lethargy of the consumer: Calculation of utility is very tiresome and therefore many consumers do not bother to calculate it. Thus they do not act according to the law.

6. Unlimited supply: The law does not apply to goods of unlimited supply like as free gift of nature.

Importance

1. Production: In production process various factors of production are used by the producer. To get maximum profit, he substitutes one factor for another to the point where marginal returns from all the factors are equal.

2. Consumption: In allocation of his income between consumption and saving the consumer tends to equate the marginal gain from an increase in consumption to the marginal loss from the resultant decline in saving. Similarly in spending his income on different commodities he tends to equate the marginal utility from the marginal units of money expenditure on each commodity.

3. Exchange: Exchange means substitution of one thing for another. The consumer exchange one commodity with other in such a way that the MU from both the commodities is equal.

4. Distribution: The share of each factor of production is determined on the basis of the principle of marginal productivity. The various factors are used in such a manner that the marginal product of each factor is equal.

5. Public finance: The law also works as the guideline for the government in public expenditure. The public revenues are so spent as to secure maximum welfare for the society. For this the government cut down expenditure where the return is low and increase expenditure on more productive or more beneficial works.

6. Allocation of time: The law also guides an individual in the allocation of his time between work and leisure. He must equate the MU of income from an hour's more work to the MU of leisure, which he has to forgo.

Derivation of Demand Curve

Derivation of demand curve is shown in the figure here. Figure shows the consumer's MU curves for expenditure on commodity X at two different prices. It is assumed that the MU of money (MU_m) is constant equal to OH . For equilibrium of the consumer, the MU/P ratio must equal to MU_m . At price P_1 , consumer purchase OM_1 amount because at this level $MU_x/P = MU_m$. This gives point d_1 . At price P_2 consumer will purchase OM_2 amount. This will give point d_2 and so on. Joining d_1 , d_2 and so on we get the demand curve as shown in the figure.

Criticism

- 1) Utility is subjective while demand is objective phenomena.
- 2) Difficult to measure utility.
- 3) Utilities of commodities are not independent.
- 4) It assumes too much and proves too little.
- 5) Unrealistic assumption of constant MU of money.
- 6) Only a particular equilibrium theory. It becomes inconsistent when we apply it to the case of two commodities.

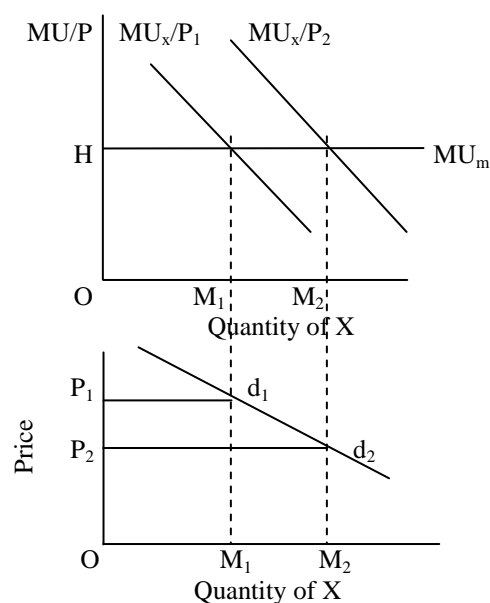


Fig. 4.3

- 7) Ignores income effect.
- 8) Fails to explain Giffen Paradox.

Consumer's Surplus

Sometimes a consumer feels that he is deriving more satisfaction from the consumption of a commodity than the amount of sacrifice he makes in money terms while getting it. This feeling in consumer's mind has been given the name of **consumer's surplus**. It is the difference between what we are prepared to pay and what we actually pay. The concept of consumer's surplus was invented by A.J. Dupuit. But the concept was fully developed and was brought into use by Marshall. Marshall defined consumer's surplus as "the excess of the price which a person would be willing to pay rather than go without the thing over that which he actually does pay." We can put it in the form of an equation thus:

Consumer's surplus = Total utility – Total amount spent

This can be explained with the help of a table given below. In the table marginal utility is expressed in terms of money (Rs.). Table shows that the total consumer's surplus is equal to Rs. 40 (=60-20).

Units of Apple	Marginal Utility	Price (Rs.)	Consumer's surplus
1	20	4	16
2	16	4	12
3	12	4	8
4	8	4	4
5	4	4	0
Total units = 5	Total utility = 60	Total amount spent = 20	Total = 40

The concept can also be explained graphically with the help of Fig. 3.3. In the figure, DD is the demand curve of a product which also shows the amount of money a consumer wants to pay for various amount of the commodity, i.e. the marginal utility of the consumer in monetary term. Now if the price of the product is OP, consumer will purchase OQ amount of the product. His total expenditure will be equal to area OPMQ and total utility will be equal to area ODMQ.

This means his surplus will be equal to area DPM.

Assumptions

1. Utility can be measured cardinally.
2. MU of money remains constant.
3. No change in income, taste and fashion.
4. No substitute is available.
5. MUs of different commodities are independent of each other.

Criticism

1. **Imaginary:** It is purely imaginary concept. It is not found in real life. No one will be willing to pay more than the price of the commodity. Actual price and willing price are always equal in real life.
2. **Difficult to measure:** It is difficult to measure exactly. It is a subjective concept and majority of consumers cannot express it in quantitative term.
3. **Not applicable to essential necessities:** For these commodities the consumer will be prepared to pay any price and therefore the consumer's surplus will be infinite in this case.
4. **Unrealistic assumptions:** Assumptions of cardinal measurability, constant marginal utility of money etc. are unrealistic.
5. **Not found in practice:** In practice a consumer will switch over to other commodity whose MU is higher before he reaches the point of marginal utility – price equality.

Importance

1. **In public finance:** Concept is useful to finance minister in imposing taxes and fixing their rates. He fixes higher rate of tax on those commodities which gives the consumers higher surplus. This will bring more revenue to the government while the consumers have to sacrifice comparatively less utility.

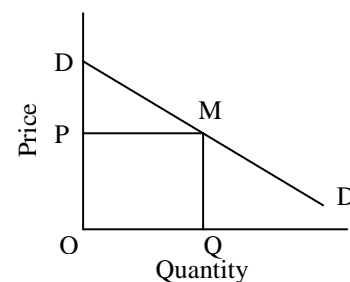


Fig. 4.4

2. **To the businessman and monopolist:** The businessman can raise prices of those commodities in which consumer's surplus is high and get more profit. Further, if the seller is monopolist, he can control supply and charge high price.
3. **Comparison of levels of living in different places:** The concept helps in comparing the standards of living between two places where money income is the same but other factors differ. In those places where there are greater amenities of life and civic facilities available at low price, people will enjoy large consumer's surplus and better living.
4. **Difference between value-in-use and value-in-exchange:** The concept helps to distinguish between value in use and value in exchange. For ex. We have much consumer's surplus from news papers, matchsticks, postcards etc. as we have to pay a very low price for them while they have high utility. In other words, value-in-use in case of such commodities is much higher than their value-in-exchange. The consumer's surplus depends on total utility whereas price depends on marginal utility.
5. **Measuring benefits from international trade:** The concept is helpful in explaining the advantages of international trade. It is said that a country must so arrange its imports and exports that the consumer's surplus in the country maximised. Likewise the government can tax relatively cheap imports to extract part of the consumer's surplus.
6. **In the pricing of public utilities:** It is advised that the government should discriminate between various users of public utility services according to the measure of consumer's surplus they got from it and should fix different charges according to the principle of price discrimination.

Ordinal Utility Analysis: The Indifference Curve Theory

Concept of Indifference Curve

English economist F.Y. Edgeworth invented it in late 19th century. Italian economist Vilfredo Pareto put it to extensive use.

Russian economist Slutsky was the first to explain the law of demand using indifference curve approach in 1915. Detailed study of indifference curve approach to the law of demand was given by English economists Hicks and Allen in 1928 in a paper 'A Reconsideration of the Theory of Value', *Economica*, 1934. Later Hicks wrote the theory in more detail in his book 'Value and Capital', published in 1939.

Assumptions

1. **Rational behaviour of the consumer:** He aims at the maximisation of his utility or satisfaction given his income and market prices.
2. **Utility is ordinal:** It cannot be measured but put into an order.
3. **Scale of preference:** Consumer is able to arrange the available combinations of goods according to preference or indifference for them.
4. **Diminishing marginal rate of substitution:** As the amount of a commodity with the consumer increases, he will be ready to exchange lesser and lesser amount of the other commodity for equal unit of the commodity whose amount is increasing.
5. **The total utility of the consumer depends on the quantities of the commodities consumed:** $U = f(q_1, q_2, \dots, q_n)$.
6. **Consistency and transitivity of choice:** If the consumer chooses bundle A over B in one period, he will not choose B over A in another period, if both bundles are available to him. Similarly if bundle A is preferred to B and B is preferred to C, then bundle A is preferred to C.
7. **Scale of preference is independent of the market prices.**
8. **Assumption of continuity:** Consumer can rank all conceivable combinations of goods according to his preference and indifference.

Indifference Schedule and Curve

An indifference schedule is a list of the various combinations of goods which give equal satisfaction to the consumer. Table given below contains a hypothetical indifference schedule taking two commodities orange and apple.

Combination	Orange	Apple
A	1	15
B	2	11
C	3	8
D	4	6
E	5	5

We can convert the indifference schedule into an indifference curve by plotting these combinations on a graph paper. An indifference curve is the locus of points, particular combinations or bundles of goods, which yield the same utility (level of satisfaction) to the consumer, so that he is indifferent as to the particular combinations he consumed. Symbolically it is given by the equation:

$$U = f(x_1, x_2, \dots, x_n) = k.$$

An indifference curve is generally presented graphically by taking two commodities at a time, i.e. one on the x-axis and the other on y-axis, as shown in fig.4.5.

Indifference Map

An indifference map shows all the indifference curves which rank the preferences of the consumer. Combinations of goods situated on an indifference curve yield the same utility. Combinations of goods lying on a higher IC give higher satisfaction and are preferred. Combinations of goods lying on a lower IC give lower utility. An indifference map is shown in fig.4.5.

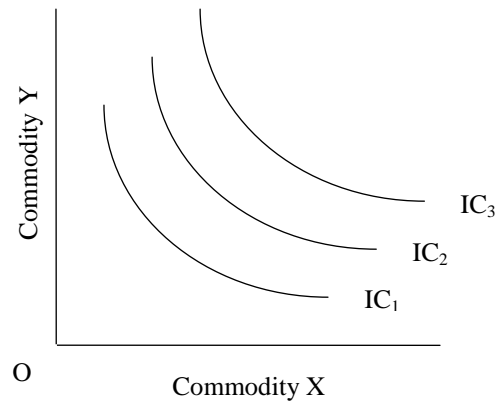


Fig. 4.5

The Marginal Rate of Substitution (MRS)

The marginal rate of substitution of x for y is defined as the number of unit of commodity y that must be given up in exchange for an extra unit of commodity x so that the consumer maintains the same level of satisfaction.

The MRS between two commodities is shown by the shape of the IC showing their combinations. Mathematically it is written as:

$$MRS_{x,y} = \Delta y / \Delta x$$

(and more accurately, $MRS_{x,y} = -dy/dx = \text{slope of the IC}$)

The convex indifference curve falling from left down to the right shows the law of diminishing MRS. Hicks has given his justification for assuming a diminishing MRS. There are two reasons for this: (i) each particular want is satiable. Therefore as a consumer obtains more and more of one commodity his intensity of the need for it goes on diminishing. As a result, the consumer will be prepared to sacrifice less amount of the other commodity in order to get more and more of this commodity. (ii) Goods are imperfect substitutes for one another.

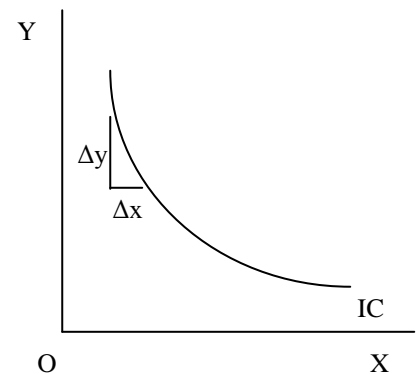


Fig. 4.6

Properties of Indifference Curves

1. Higher ICs represent higher level of satisfaction: In fig. 4.7 combination B (x_2, y_2) includes more of commodities X and Y and therefore gives more satisfaction than combination A (x_1, y_1). This means IC₂ gives more satisfaction than IC₁.

2. ICs slope from left downward to the right: It cannot be parallel to x-axis as shown in fig. 4.8. Because in this case combination B (x_2, y_1) gives more satisfaction than combination A (x_1, y_1). Similarly, it cannot be parallel to y-axis as shown in fig. 4.9, as in this case combination B (x_1, y_2) gives more satisfaction than combination A (x_1, y_1). It cannot be upward sloping as shown in fig. 4.10, as in this case combination B (x_2, y_2)

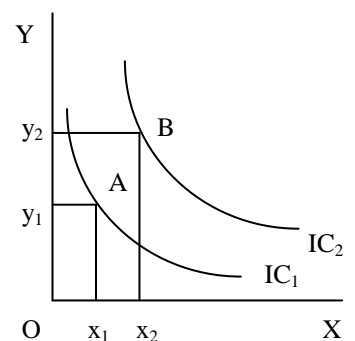


Fig. 4.7

gives more satisfaction than combination A (x_1, y_1). Therefore the only possibility is that it slopes from left downward to the right.

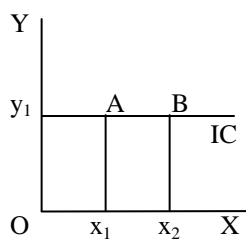


Fig. 4.8

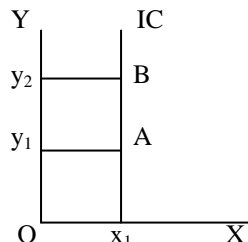


Fig. 4.9

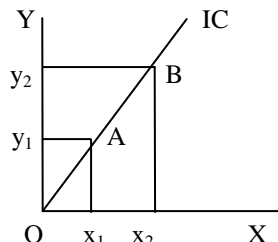


Fig. 4.10

3. The ICs are convex to the origin: It cannot be straight line as shown in fig.4.11. Because in this case marginal rate of substitution ($\Delta y/\Delta x$) is constant throughout the curve, which is violation of the axiom of diminishing marginal rate of substitution. Similarly it cannot

be concave to the origin as shown in fig. 4.12. Because in this case MRS is increasing from left to right, which is violation of the axiom of diminishing MRS. Therefore it can only be convex to the origin as shown in fig. 4.13.

4. ICs do not intersect each other:

If they intersect each other as shown in fig. 4.14 then the point of intersection shows two different level of satisfaction which is impossible. In fig. 4.14 point A gives higher level of satisfaction than point B as the former combines more of commodities X and Y. The point of intersection C lies both on IC_1 and IC_2 which implies $C = A$ as well as $C = B$, which is impossible.

5. ICs may not be parallel

6. ICs do not touch the axes: If it touches the axes as shown in fig.4.15 then it implies that there is perfect substitutability between commodity X and Y which is violation of the assumption of imperfect substitutability.

7. ICs for perfect substitute and perfect

components: If commodities are perfect substitutes the IC becomes a straight line with negative slope as shown in fig. 4.16. If the commodities are complements the IC takes the shape of a right angle (fig. 4.17). In the first case the equilibrium of the consumer may be a corner solution, that is, a situation in which the consumer spends all his income on one commodity. These situations are not observed in the real world and are usually ruled out from the analysis of the consumer's behaviour. In the case of complementary goods, IC analysis breaks down, since there is no possibility of substitution between the commodities.

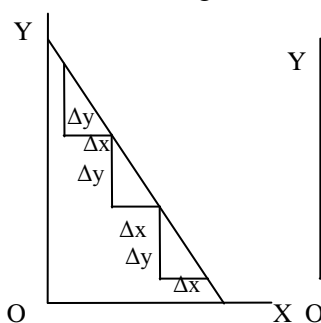


Fig. 4.11

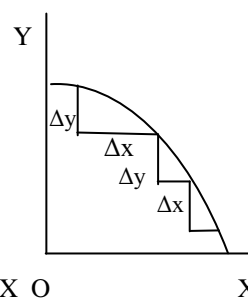


Fig. 4.12

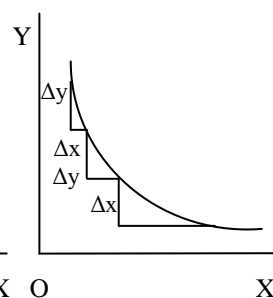


Fig. 4.13

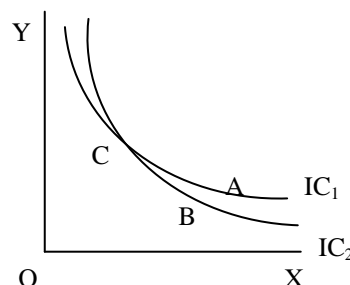


Fig. 4.14

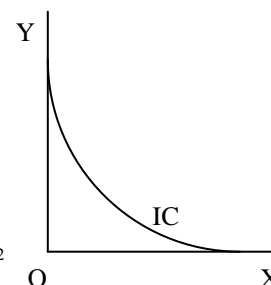


Fig. 4.15

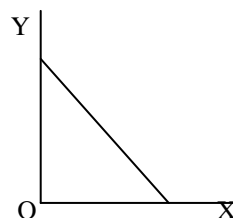


Fig. 4.16

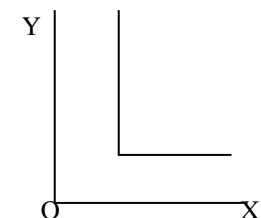


Fig. 4.17

The Budget Constraint

In order to study consumer's behaviour, we assume that the consumer has the given income with which he wants to purchase at the given prices of the commodities. Income acts as a constraint in the attempt for maximising utility. The consumer wants to go higher and higher up on his ICs in his indifference map. But choice is limited to the combinations of the commodities he can purchase with

his given income at the given prices. The income constraint in the case of two commodities, may be written as:

$$Y = p_x q_x + p_y q_y.$$

We can present the income constraint graphically by the budget line, whose equation is derived from the above expression, by solving for q_y :

$$q_y = (1/p_y) Y - (p_x/p_y) q_x$$

Assigning successive values to q_x (given the income Y and the commodity prices p_x, p_y) we may find the corresponding values of q_y . Thus, if $q_x = 0$, i.e. if the consumer spends all his income on y , the consumer can buy Y/p_y units of y . Similarly if $q_y = 0$, $q_x = Y/p_x$. In the figure, these results are shown by the points A and B. If we join these points with a line we get the budget line. Slope of this line is

$$\frac{OA}{OB} = \frac{Y/p_y}{Y/p_x} = \frac{p_x}{p_y}$$

Mathematically the slope of the budget line is the derivative

$$\delta q_x / \delta q_y = p_x / p_y$$

The budget line or price line shows all those combinations which can be bought by the consumer at the given prices. It shows the possible combinations of consumer's consumption.

If consumer's income or the price of the commodities changes the price line also changes its position. This is shown in fig. 4.19 and 4.20.

1. Change in consumer's income: If prices of the commodities remain constant, the price line shifts parallel to the right with increase in the consumer's income and to the left with decrease in his income.

2. Change in price of the commodity: If income being the same, change in price of any one of the commodities results in a change in the slope of the price line.

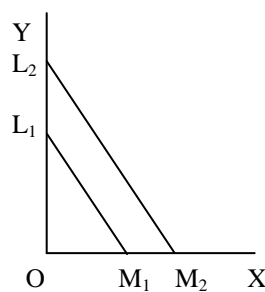


Fig. 4.19

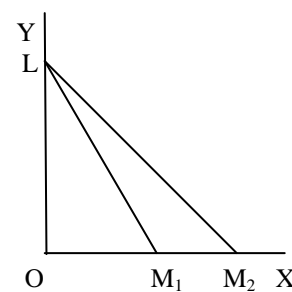


Fig. 4.20

Equilibrium of the Consumer

Given the indifference map of the consumer and his price line, we can find out the combination, which gives him maximum satisfaction. For this we superimpose the price line on consumer's indifference map as in fig. 4.21. The aim of the consumer is to get maximum satisfaction. So he tries to go to the highest indifference curve attainable with his given price line. The consumer will be in equilibrium at that point (combination of goods) which lies on his price line as well as at the highest possible IC. This condition is fulfilled at point E in the fig. Therefore the consumer will be in equilibrium at point E, i.e. he will get maximum satisfaction by consuming x_e and y_e amounts of the commodities X and Y. It is also clear from the figure that the equilibrium point of the consumer is the point of tangency of the budget line with the highest possible IC. At the point of tangency the slope of the budget line (p_x/p_y) and the IC ($MRS_{x,y}$) are equal.

$$MRS_{x,y} = p_x/p_y$$

This is the first order condition (being tangent to IC) for equilibrium. The second order condition is implied by the convex shape of the IC, i.e. diminishing MRS.

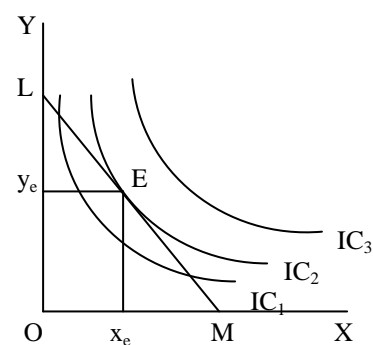


Fig. 4.21

Income Effect

With a change in consumer's income, prices of the commodities being the same, his budget line shifts parallel to the right if income increases and to the left if it decreases as shown in the figure. As a result the equilibrium points also changes. Joining all these equilibrium points (E_1, E_2, E_3 in fig. 4.22) we get a curve called income consumption curve (ICC). The amount of change in demand due to change in income is called income effect. In the figure x_1x_2 and y_1y_2 is income effect.

The ICC can take different shapes according to the type of the commodity. If both the commodities are normal, the income effect for both the commodities will be positive and the ICC slopes upward from left to right (Fig. 4.23). But if one of the commodities is inferior, the ICC bends back showing negative income effect to the inferior good. In fig. 4.24 ICC_1 shows the situation when X is inferior and ICC_2 when Y is inferior.

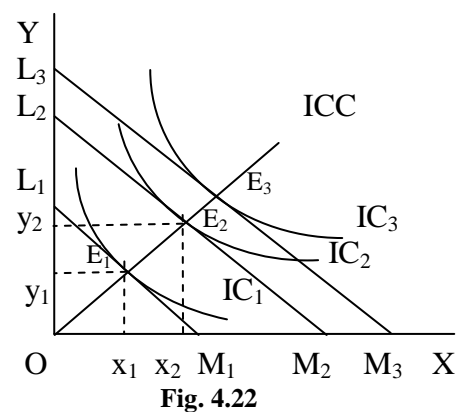


Fig. 4.22

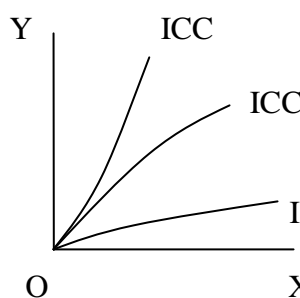


Fig. 4.23

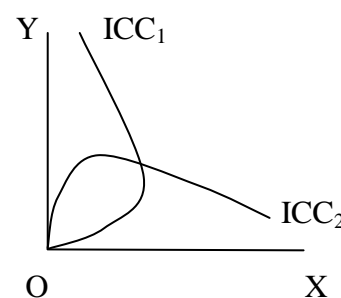


Fig. 4.24

Price Effect

If the price of one commodity changes, while consumer's income and the price of other commodity remain constant, slope or position of the budget line also changes. As a result consumer's equilibrium points also change. In fig. 4.25 LM_1 shows the consumer's initial budget line. At this situation he is in equilibrium at point E_1 . Now the price of X falls and his budget line shifts to LM_2 , then finally to LM_3 . The equilibrium point also changes to E_2 , then to E_3 . Joining all these points we get a curve called price consumption curve (PCC). Change in demand due to the change in price of the commodity is called price effect. In the fig. x_1x_2 and x_2x_3 is price effect.

PCC can take different shapes depending on the nature of commodity, i.e. whether it is inferior or normal good. In other words price effect can be negative or sometime positive depending on the nature of commodity.

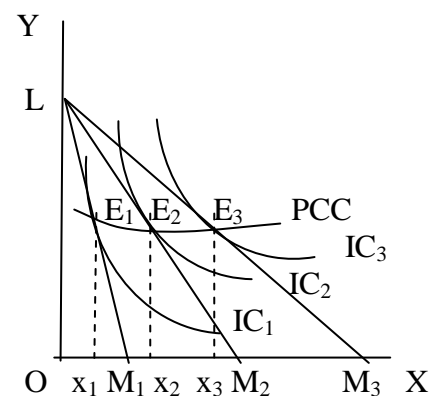


Fig. 4.25

Substitution Effect

The change in the quantity of a good purchased due to only to the change in the relative prices, real income remaining constant is called substitution effect. When price of a commodity, say X, falls the consumer's real income increase to find out the change in amount demanded of X due to the change in relative prices only the consumer's money income should be reduced by an amount so that his real income will be the same as before. The amount by which the money income is reduced so that the consumer should be neither better off nor worse off than before is called compensating variation in income. This is shown graphically by a parallel shift of the new budget line until it becomes tangent to the initial IC. Even after compensating for the gain in real income, the consumer would buy more of X because X has become relatively cheaper. This increase in the amount purchased of X, due to the fall in the relative price of X is the substitution effect. This is shown in fig. 4.26. In the fig. LM_1 is the initial price line of the consumer and he is in equilibrium at E_1 . When price of X fall his price line shifts to LM_2 and he is in equilibrium at E_2 . Now the

consumer's income is reduced so that he is in the same situation as before the fall in price of X. As a result his price line shifts parallel to the left until it becomes tangent to IC_1 at E_3 ($L'M'$). Now his new equilibrium point is E_3 . The amount x_1x_3 is the substitution effect of the price change. The substitution effect of the price change is always negative.

Break-up of Price Effect into Income Effect and Substitution Effect

When price of a commodity changes, the amount demanded of the commodity also changes as shown in the fig. 4.26. Due to the fall in price of X demand changes from Ox_1 to Ox_2 . This is the total price effect (x_1x_2 in the fig.) which may be split into income effect and substitution effect. Income effect measures the change in the amount demanded of the commodity due to the change in the real income of the consumer resulting from the change in price. Substitution effect is the change in amount demanded of the commodity due to the change in relative price of the commodity only. In the figure movement from point E_1 to E_3 (i.e. x_1x_3) shows the substitution effect of price change. However, the compensating variation does not show the new equilibrium of the consumer. This is defined by the point E_2 on IC_2 in the fig. The consumer has in fact higher purchasing power and if the commodity is normal, he will spend some of his increased real income on X thus moving from x_3 to x_2 . This is the income effect of the price change.

In summary (in the fig.):

x_1x_2 = price effect

x_1x_3 = substitution effect

x_3x_2 = income effect

Therefore, price effect = substitution effect + income effect

Table below shows effect of price change for different types of commodities:

Type of commodity	Substitution effect	Income effect	Price effect	Law of demand
Normal good	Negative	Negative	Negative	Hold
Inferior good	Negative	Positive & less than substitution effect	Negative	Hold
Giffen good	Negative	Positive & more than substitution effect	Positive	Does not hold

Break-up of Price Effect – Slutsky's Method

When price of the commodity changes, real income of the consumer also changes. To make the consumer's real income same as before the changes in the price of commodity, his money income is reduced (or increased) by an amount so that the consumer neither better off nor worse off than before. In Hicks-Allen method the reduction (or increment) is made in such a way that the consumer will be on the same IC as before price change. But in Slutsky's method, the reduction (or increment) is done in such a way that the consumer can buy the same combinations of commodities if he wants as before price change. This is shown in fig. 4.27. Here, LM_1 is the initial budget line of the consumer. When price of X fall his budget line shifts to LM_2 . Now his money income is reduced by an amount so as to keep the real

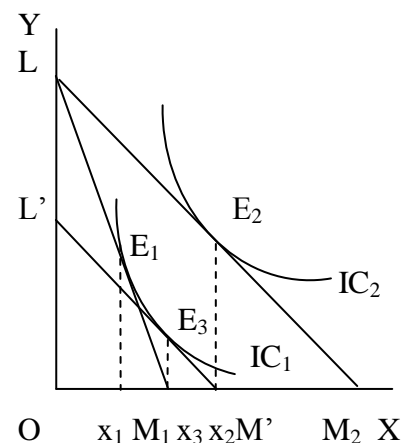


Fig. 4.26

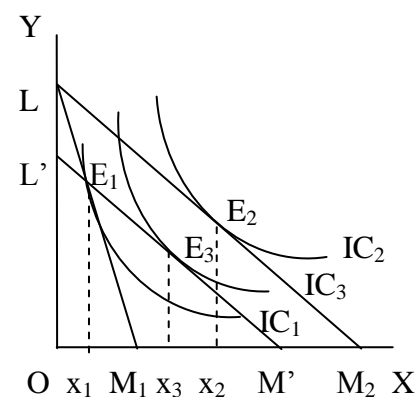


Fig. 4.27

purchasing power of the consumer the same as before, due to which his budget line shifts parallel to reach L'M'. At this situation he is in equilibrium at E₃ on the new indifference curve IC₃ which is higher than IC₁.

Here price effect (x_1x_2) = substitution effect (x_1x_3) + income effect (x_3x_2)

Derivation of Demand Curve

Derivation of the consumer's demand curve with the help of IC is shown in fig 4.28. In the fig. LM₁ is the initial budget line of the consumer at price P₁ (of X) and he is in equilibrium at point E₁. It means he consumes x₁ amount of X at price P₁. It gives point A in panel B of the fig. When price falls to P₂ his budget line moves to LM₂ and his new equilibrium point is E₂ with x₂ amount of the commodity X. This gives point B in panel B. Similarly, when price further falls to P₃ his budget line moves to LM₃ and he will be in equilibrium at E₃ with x₃ amount of X. This gives point C in panel B. Joining all these points (A, B, C etc.) we get the required consumer's demand curve DD as shown in the fig.

Criticism

Advantage:

1) The assumptions of this theory are less stringent than for the cardinal utility approach. Only ordinality of preferences is required, and the assumption of constant utility of money has been dropped.

2) The methodology of IC has provided a framework for the measurement of the 'consumer's surplus', which is important in welfare economics and in designing government policy.

3) This approach established a better criterion for the classification of goods into substitutes and complements. Earlier theorists were using the total effect of a price change for this purpose, without compensating for the change in real income. Hicks suggested measuring the cross-elasticity after compensating for changes in real income. But in practice its application is impossible because it requires knowledge of the individual preference functions, which cannot be statistically estimated. On the other hand, the usual approach of the total price effect is feasible because it requires knowledge of the market demand functions which can be empirically estimated.

Limitations:

1) The axiomatic assumption of the existence and convexity of the IC.

2) The consumer's ability to order his preference as precisely and rationally as the theory implies is questionable. Prof. Armstrong has argued that a consumer is indifferent between two alternative combinations only because he is not in a position to perceive the difference between the two.

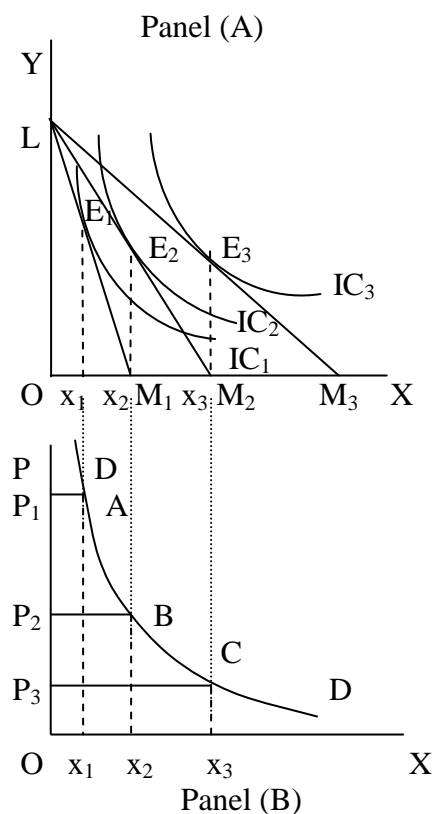
3) The ordering of preferences valid for very short period. The preferences of the consumers change continuously under the influence of various factors.

4) Old wine in a new bottle: It has retained most of the weakness of the cardinalist school with the strong assumption of rationality and the concept of the marginal utility implicit in the definition of the marginal rate of substitution.

5) Unrealistic assumption of continuous IC.

6) Complicated nature of IC analysis with more than two commodities.

7) Based on rare cases of weak ordering: According to Samuelson the IC analysis becomes subjective through this assumption because it is not possible to find very many situations of indifference in practice.



Unit 5: Theory of Production

Concept of Production

Production is sometimes defined as the creation of utility or the creation of want-satisfying goods and services. Fraser- "If consuming means extracting utility from, producing means putting utility into." But this is not a scientifically correct definition. To produce a thing which has utility but not value is not production in the economic sense. Production, therefore, should be defined not as creation of utility but creation (or addition) of value.

Utility or value can be created in three forms: (i) form utility, (ii) place utility and (iii) time utility. In broader sense, any activity that uses resources and creates consumer satisfaction is production. In other words, production means the transformation of inputs into outputs.

Factors of Production

Anything directly contributing to production process is called factors of production. Modern economists use the term **inputs** rather than the term **factors of production**. Traditionally the factors of production have been classified as land, labour, capital and organisation (or enterprise). Some economists reduce this classification from four to two, land and labour (or man and nature), on the ground that they are the only original or primary factors.

Production Function

The production function is the functional relationship between the physical inputs and the physical outputs. It is a purely technical relation which connects factor inputs and outputs. It describes the transformation of factor inputs into products (output) at any particular time period. It represents the technology of a firm, of an industry, or of the economy as a whole. It includes all the technically efficient methods of production.

Algebraically, it can be expressed as:

$$Q = f(a_1, a_2, a_3, \dots, a_n)$$

Where Q stands for quantity of output and $a_1, a_2, a_3, \dots, a_n$ stands for quantities of inputs $A_1, A_2, A_3, \dots, A_n$ respectively.

Each firm has a production function whose form is determined by the state of technology. It represents the technical choice open to the producer firm within the given span of time under consideration. A short period production function is different from a long period production function. When technical progress takes place, new production functions come into being. The new has a greater flow of outputs from the same inputs or smaller quantities of inputs for the same output.

Economic theory looks to two kinds of input-output relations in production function:

- ii) the relation where quantities of some inputs are fixed while quantities of other inputs varies and known as law of variable proportions – the short run production function, and
- iii) the relation where all of the inputs are variable and known as law of returns to scale – the long run production function.

Concept of Total, Average and Marginal Product

Total Product (TP): Total product is the total amount of output produced during a given period of time by a given number of factors of production. As the amount of a factor/s increases total output increases. But the rate of increase in total product varies at different levels of employment of a factor. This is shown in table below.

Average Product (AP): AP of a factor is the TP divided by the number of units of a factor. It is output produced per unit of a factor employed.

$$AP = TP / \text{No. of units of a factor employed}$$

It has been generally found that as more units of a factor are employed for producing a commodity, the AP first rises and then it fall. (See table.)

Marginal Product(MP): MP of a factor is the addition to the total production by the employment of an extra unit of a factor, keeping all other factors constant.

$$MP_n = TP_n - TP_{n-1}$$

Or $MP = \Delta TP / \Delta N$, where N is the no. of factors employed.

It has been found that MP of a factor rises in the beginning and then ultimately falls as more of it is used for production other things remaining the same. (See table.)

No. of Workers	Total Product (Units)	Average Product (Units)	Marginal Product (Units)
1	100	100	100
2	220	110	120
3	270	90	50
4	300	75	30
5	320	64	20
6	330	55	10
7	330	47	0
8	320	40	-10

Law of Variable Proportion

The law deals with the short run. In the short run factors of production are of two types – fixed and variable. In the short run quantity of output can be changed by altering the variable factors only.

Law of variable proportions shows the production function with one factor variable while other factors are kept constant. When the quantity of one factor is altered keeping the other factors constant, the proportions between the variable and fixed factors is changed. The law shows the direction and the rate of change in the firm's output when the amount of only one factor of production is varied.

The law states that when the units of a variable input are increased while quantities of other inputs are held constant, the increases in total production become, after some point smaller and smaller. According to Leftwich – “The law of variable proportions states that if the input of one resource is increased by equal increments per unit of time while the inputs of other resources are held constant, total product (output) will increase, but beyond some point the resulting output increases will become smaller and smaller.” Similarly according to P. A. Samuelson – “An increase in some inputs relative to other fixed inputs will, in a given state of technology, cause output to increase, but after a point the extra output resulting from the same addition of extra inputs will become less and less.”

Assumptions: The law is based on the following assumptions:

- i) Short run
- ii) Constant technology
- iii) Homogeneous factors/efficiency
- iv) Changeable input ratio

The law can be explained with the help of the Table given below, which contains hypothetical data. The table shows that when the number of workers increases, all other factors being constant, the total product increases at an increasing rate at the beginning (100 to 220), then increases at a decreasing

No. of Workers	Total Product (Units)	Average Product (Units)	Marginal Product (Units)	Stages of Production
1	100	100	100	} Stage I
2	220	110	120	
3	270	90	50	} Stage II
4	300	75	30	
5	320	64	20	
6	330	55	10	} Stage III
7	330	47	0	
8	320	40	-10	

rate (220 to 230) and finally after reaching at a maximum level (330 in the table), it begins to decrease (330 to 320).

The operation of the law can also be explained with the help of the figure given below. Figure shows that the curve of total product (TP) rises first at an increasing rate and then at a decreasing rate to its maximum, after which it declines.

The slope of the TP curve $\partial TP / \partial L$ is marginal product. In the figure the marginal

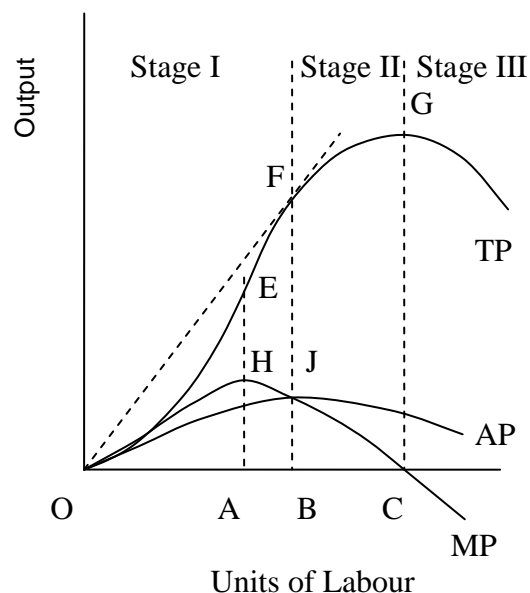
product curve (MP) is drawn by finding out the slope of the TP curve. Similarly the average product of labour is the total product divided by the units of labour, TP/L at various level of output.

Three Stages of the Law

Stage 1: TP to a point (E in the fig.) increases at an increasing rate, i.e. MP rises. After that point TP goes on rising but at a diminishing rate, i.e. MP falls but is positive. Stage 1 ends where the AP curve reaches its highest point. This is the stage of increasing returns.

Stage 2: TP continues to increase at a diminishing rate until it reaches its maximum point (G in the fig.), where the 2nd stage ends. Both AP and MP decreases but are still positive. At the end of this stage MP is zero. This is the stage of diminishing returns.

Stage 3: Total product declines and therefore the TP curve slopes downward. MP is negative. This is stage of negative returns.



Criticism

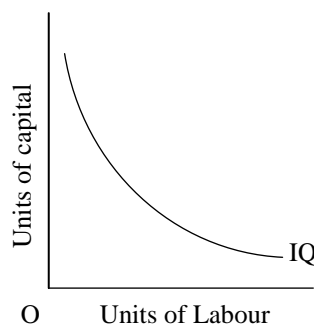
- 1. Incorrect assessment:** According to the law, MP will be negative (TP will be diminished) in the third stage. But in reality no producer goes on increasing factor input till MP becomes negative. Therefore the law is based on incorrect assessment.
- 2. Possibility of constant return:** According to the law increasing returns to the factor is followed by diminishing returns. But it is possible that there is constant returns (constant MP) for some time after the stage of increasing returns.
- 3. Continuous process of technological improvement:** The law assumes that the production technology will be the same. But in reality, technological progress is a continuous process. It cannot be stopped for even a short while.
- 4. Factors not totally fixed or variable:** In reality no factor is totally fixed or totally variable.

Concept of Isoquant

Isoquants are like the indifference curves which are used to explain consumer's equilibrium. An isoquant, also called iso-product curve or equal-product curve, shows different combinations of factors of production which yield equal production. Since all combinations on the same iso-product curve give producer the same quantity of output, it is also called *production indifference curve*. The concept can be easily understood with the help of a table given below.

The table is prepared on the assumption that only two factors of production (capital and labour) are

Combinations of labour and capital	Units of labour	Units of capital	MRTS _{LK}
A	1	15	-
B	2	11	4
C	3	8	3
D	4	6	2
E	5	5	1



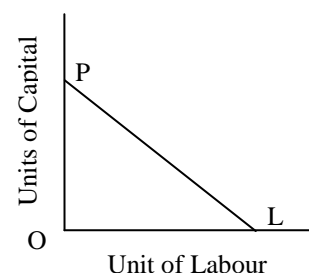
used for producing a certain amount of output. Any combination of capital and output in the table gives the same amount of output. This is called iso-product schedule. Plotting these combinations on a graph paper we get iso-product curve as shown in the fig.

The Marginal Rate of Technical Substitution (MRTS): The rate at which one factor of production can be substituted for the other, remaining on the same isoquant, is known as the MRTS. MRTS of labour for capital (MRTS_{LK}) is the number of units of capital which can be replaced by one unit of

labour, the quantity of output remaining the same. This is shown in the above table. It has a diminishing tendency.

Concept of Iso-cost Curves

The choice of a combination of factors of production depends upon the financial resources at the disposal of the producer and the prices of the factors. Iso-cost line is the line showing different combinations of two factors which the producer can get for a certain amount of money at given prices of the factors. This is shown in the fig. by the line PL.



Laws of Returns to Scale

In the long run expansion of output can be achieved by variation in the use of all factors as all factors are variable. The laws of returns to scale refer to the behaviour of production or returns when scale of production is changed. In the long run output can be increased by a change in the use of all factors keeping the same proportion or by changes in different proportions. But the concept of returns to scale is concerned with the first case, i.e. the behaviour of output as all inputs are varied by the same proportion.

The law propounds that there are three distinct stages in the behaviour of the marginal product (return) to the changes in scale of production. These are increasing, constant and decreasing returns to scale.

In the case of increasing returns to scale, when all productive factors are increased in a given proportion output increases by a greater proportion. For example, if all the productive factors are doubled and output is increased by more than double then it is called increasing returns to scale.

In the case of constant returns to scale, when all productive factors are increased in a given proportion output also increases by the same proportion. For example, if all the productive factors are doubled and output is also increased by double then it is called constant returns to scale.

In the case of decreasing returns to scale, when all productive factors are increased in a given proportion output increases by a smaller proportion. For example, if all the productive factors are doubled and output is increased by less than double then it is called decreasing returns to scale.

The law can be explained with the help of figures given below. Fig. 1 shows that output is increased from 100 units to 250 units, i.e. more than double by doubling inputs (capital and labour). This is the case of increasing returns. Similarly Fig. 2 shows that output is increased from 100 units to 200 units by doubling the inputs. This is the case of constant returns. Fig. 3 shows that output is increased from 100 units to 150 units by doubling the inputs. This is the case of decreasing returns.

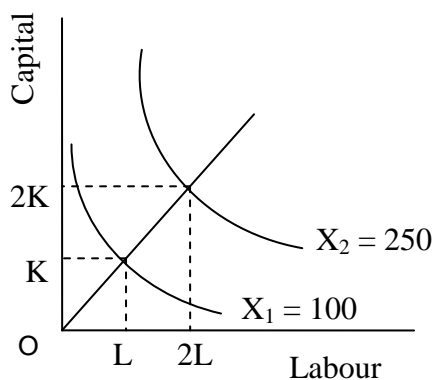


Fig. 1

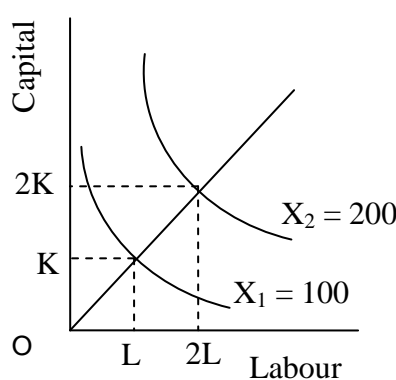


Fig. 2

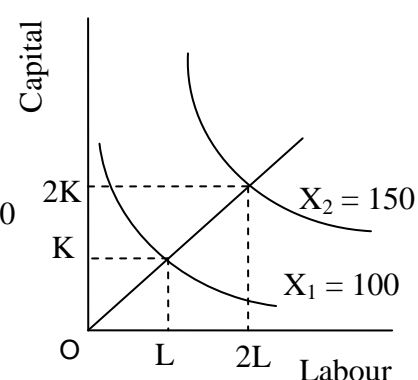


Fig. 3

Reasons Behind Increasing, Constant and Decreasing Returns

In the beginning when the scale of production is increased, marginal product also increases due to the greater division of labour which raise efficiency of labour. Indivisibility of the factor is another source of increasing returns to scale. An indivisible factor cannot be sub-divided into parts. The whole of it has to be employed to carry on production. For example the capital equipment of a given capacity is the indivisible factor. Similarly, an entrepreneur is also an indivisible factor.

But it can be possible only to certain limit. As the firm expands, it experiences growing diseconomies of large scale production. These diseconomies are mainly the result of increasing managerial difficulties. Coordination of the work becomes more and more difficult, decision making becomes difficult. Thus as output grows, management becomes overburdened and less efficient in the discharge of its functions as coordinator and ultimate decision maker.

When the firm grows the economies of scale and diseconomies of scale becomes equal to each other and the firm experiences constant returns to scale. But after some time when the firm continues to grow the diseconomies override the economies and the firm experience decreasing returns to scale.

Criticism

1. Proportionate changes in factor input not possible: It is not possible to change always all factors of production at the same proportion. Therefore this law cannot be regarded as relevant to actual life condition.

2. Factor response variable with technical change: This law deals with long run situation. But in the long run technology is also bound to improve which may affect each factor differently. A factor may become more efficient than other due to the technological improvement. Therefore proportionality remains no longer valid.

3. Perfect competition: This law is based on conditions of perfect competition. But perfect competition is not possible in reality.

Condition for Equilibrium of the Firm with Profit Maximization

The goal of the firm is profit maximization, i.e. the maximization of the difference: $\Pi = R - C$. Therefore the producer will be in equilibrium when he gets maximum profit. We can examine producer's equilibrium with the help of isoquants and isocost lines taking two different cases:

(a) Maximisation of profit Π , subject to cost constraint: In this case total cost and prices are given (C, P_L, P_K, P_x) and the problem may be stated as follows:

$$\text{Maximize } \Pi = R - C$$

$$\text{Or } \Pi = P_x X - C$$

Clearly maximization of Π is achieved in this case if X is maximised, since C and P_x are constants.

(b) Maximisation of profit Π , for a given level of output: In this case prices and output are given and the problem may be stated as:

$$\text{Maximize } \Pi = R - C$$

$$\text{Or } \Pi = P_x X - C$$

Clearly maximization of Π is achieved in this case, if cost is maximized, given that X and P_x are constants.

Case (a): Maximization of output subject to a cost constraint

A firm will be in equilibrium when it maximizes its output given its total cost outlay and the prices of the factors (P_K, P_L) and product (P_x). This is shown in fig. 1. Fig. shows that the maximum level of output the firm can produce, given the cost constraint, is X_2 defined by the tangency of the isocost line and the highest isoquant. The optimal combination of factors of production is K_2 and L_2 . Higher levels of output (to the right of e) are desirable but not attainable due to the cost constraint. Other points on AB or below it lie on a lower isoquant than X_2 . Hence X_2 is the maximum output possible under the above assumptions. At the point of tangency (e) the slope of the isocost line (P_L/P_K) is equal to the slope of the isoquant (MP_L/MP_K). This constitutes the first condition for equilibrium. The second condition is that the isoquant be convex to the origin. In short, conditions for equilibrium are:

- (i)
$$\frac{P_L}{P_K} = \frac{MP}{MP_K} = \frac{\partial X/\partial L}{\partial X/\partial K} = MRS_{L,K}$$
- (ii) The isoquant must be convex to the origin

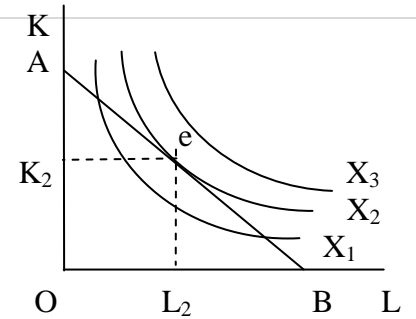


Fig. 1

Case (b): Minimization of cost for a given level of output

The conditions for equilibrium of the firm are formally the same as in case (a). That is there must be tangency of the (given) isoquant and the lowest possible isocost curve and the isoquant must be convex to the origin. However, the problem is conceptually different in the case of cost minimization. The entrepreneur wants to produce a given output with the minimum cost outlay. In this case we have a single isoquant which denotes the desired level of output, but we have a set of isocost curves as in the figure (2). Curves closer to the origin show a lower total cost outlay. The isocost lines are parallel because they are drawn on the assumption of constant prices of factors and therefore all the isocost curves have the same slope P_L/P_K .

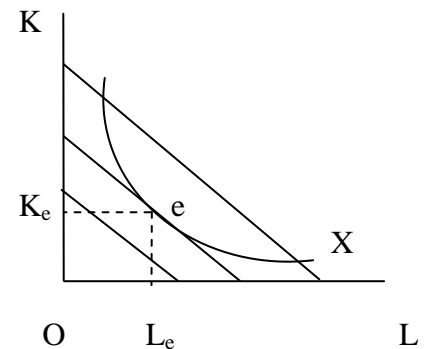


Fig. 2

The firm minimizes its cost by employing the combination of capital and labour determined by the point of tangency of isoquant X with the lowest isocost line, i.e. K_e and L_e (fig. 2). Points below e are desirable because they show lower cost but are not attainable for output X. Points above e show higher cost.

Hence point e is the least cost point denoting least cost combination of the factors K and L for producing X.

Clearly the condition for equilibrium (least cost) are the same as in case (a), i.e.

Production possibility Curve

Production possibility curve or frontier represents graphically alternative production possibilities facing an economy (or a multi-product firm). As the total productive resources of the economy are limited, the economy has to choose between different goods. The productive resources can be used for the production of various alternative goods. Therefore the society has to decide which goods to be produced more and which ones less. In other words, there may be various combinations of goods (production possibilities) that the society can produce with its limited resources at a given technology. The society has to choose one combinations among these alternative production possibilities. Production possibility curve is the locus of all these possible combinations. Table, given below, shows the various production possibilities between commodities X and Y with the given resources and technology. This is called production possibility schedule. If we plot the data of this

Production Possibilities	Commodity X (unit)	Commodity Y (unit)
A	0	15
B	1	14
C	2	12
D	3	9
E	4	5
F	5	0

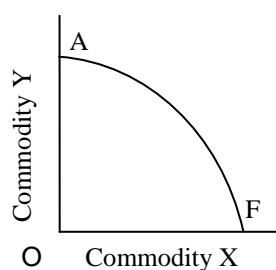


table on a graph paper we get a curve as shown in the fig. given below. This curve AF is called the production possibility curve. It shows the various combinations of two goods which the economy can produce with a given amount of resources. The production possibility curve is also called

transformation curve because in moving from one point to another on it, one good is transformed into another, not physically but by transferring resources from one use to the other.

Assumptions

1. Factors of productions are fixed.
2. There is full employment in the economy.
3. Substitution of factors of production, i.e., the factors can be shifted from the production of one good to another.
4. No change in technology.
5. Based on short run.

Shift of PPC: If the productive resources like land, labour and capital equipment increase or the economy makes progress in technology, the PPC will shift to the right which indicate possibility of producing more of both the goods.

Unit 6: Costs

Concepts of Cost

Money Cost and Real Cost

Nominal or money cost is the money outlay of a firm on the process of production of its output. It is also called expenses of production. It includes the expenses made by the entrepreneur to the factors or inputs he employs. These are wages and salaries paid to labours, expenditure on machineries and equipments and needed repairs, payment for raw materials, power, fuel, transportation, rents, trademark, advertisement, insurance and the taxes.

While a producer considers only the money costs of procuring the inputs, economists are also interested to the real cost of production. They like to look behind the money costs from the social view point. But the real cost has been variously interpreted by the economists. Adam Smith regarded pains and sacrifices of labour as real cost of production. According to Marshall, it includes the “real cost of efforts of various qualities” and “real cost of waiting”. Marshall called it social cost.

Accounting cost and Economic Cost

When an entrepreneur undertakes an act of production he has to pay prices for the factors which he employs for production. These payments are included in his cost of production. An accountant will take into account only the payments made by the entrepreneur to the suppliers of various productive factors. And therefore this is called accounting cost. But an economist’s view of cost of production is somewhat different from this. Economists would also include in the cost of production – (i) the normal return on money capital invested by the entrepreneur himself in his own business, which he could have earned if invested outside, (ii) the wages or salary he could have earned if he had sold his services to other and (iii) money rewards for other factors owned by the entrepreneur himself and employed in his own business. The accountant would not include these items in cost of production but the economists consider them as bona fide costs and will accordingly include them in cost. This cost is called economic cost.

Explicit Cost and Implicit Cost

The accounting costs which the firm makes to other factor owners for purchasing or hiring the various factors are also known as explicit costs. The normal return on money capital invested by the entrepreneur, wages and salary for his services and money rewards for the other factors the entrepreneur himself owns and use them in the firm are known as implicit costs. Therefore,

$$\text{Economic cost} = \text{Accounting cost or Explicit cost} + \text{Implicit cost}$$

It may be pointed out that the firm will earn economic profits only, if it is making revenue in excess of the economic cost.

Opportunity Cost

The opportunity cost of any good is the next best alternative good that is sacrificed. This is the foregone value of resources in their next best alternative use. The opportunity cost of production is defined in terms of the sacrifice of output of another good which could have been produced by the same resources used in the production of the first good. For example the factors which are used for the manufacture of a car may also be used for the production of equipment for the army. Therefore, the opportunity cost of production of a car is the output of the army equipment sacrificed, which could have been produced with the same amount of factors that have gone into the making of a car. It should be remembered that the opportunity cost of anything is only the next best alternative foregone, not any other alternative good that could be produced with the same factors.

The concept of opportunity cost is very fundamental to economics. Robbins’ famous definition of economics goes in terms of the scarcity of resources and their ability to be put into various uses. In production factors must be paid at least the price they are able to obtain in the next best alternative use. Relative prices of goods tend to reflect their opportunity costs.

Social Cost

Social cost is the total cost of production of a commodity which includes the direct and the indirect costs which the society has to pay for the output of the commodity. For example a factory owner will count his costs of production and never those of the people living around the factory who have to pay in the form of increased laundry bills due to the soot and smoke coming out of the factory chimneys. In this case social cost is more than private cost. Other examples of social cost being more than private cost are: air and water pollution, wastes by mining or industries etc. On the other hand, certain cases can be noticed where private cost is more than social cost. For example a forest farm provide healthy environment for people living around it.

Fixed and Variable Factors

There are some inputs or factors which can be readily adjusted with the changes in the output level. A firm can readily employ more workers use more raw materials, more chemicals if it has to expand production. Thus labour, raw materials, chemicals etc. are the factors which can be readily varied with the change in output. Such factors are called variable factors. On the other hand there are factors such as capital equipments, buildings, top management personnel which cannot be readily varied for making changes in output. It requires a comparatively long time to make variations in them. Such factors are called fixed factors.

Short Run and Long Run

Corresponding to the distinction between variable factors and fixed factors, economists distinguish between the short run and long run. The short run is the period of time in which output can be increased or decreased by changing only of variable factors such as labour, raw materials, chemicals etc. In the short run quantities of the fixed factors such as capital equipments, factory buildings etc. cannot be varied for making changes in output. On the other hand the long run is defined as a period of time in which the quantities of all factors may be varied. In the long run the output can be increased not only by using more quantities of labour and raw materials but also by expanding the size of the existing plant or by building a new plant with a larger productive capacity. It may be noted that the word plant in economics stands for a collection of fixed factors, such as factory building, machinery installed, the organisation represented by the manager and other essential skilled personnel.

Short Run Costs: Total Fixed and Variable Costs

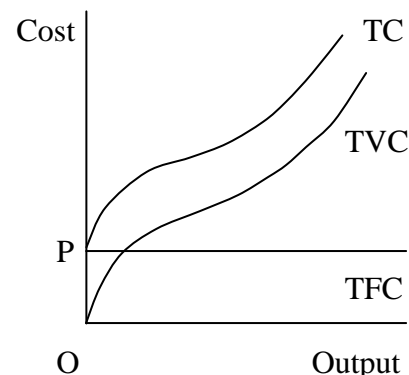
In the short run, fixed costs are those which are independent of output, i.e. they do not change with change in output. These costs are a fixed amount which must be incurred by a firm in the short run, whether the output is large or small. Even if the firm closes down for some time in the short run but remains in business, these costs have to be borne by it. Fixed costs are also known as overhead costs and include charges such as contractual rent, insurance fee, maintenance costs, property taxes, interest on capital invested, minimum administrative expenses such as manager's salary, watchman's wages etc. Thus fixed costs are those which are incurred in hiring the fixed factors of production whose amount cannot be altered in the short run.

Variable costs, on the other hand, are those costs which are incurred on the employment of variable factors of production whose amount can be altered in the short run. Thus total variable costs (TVC) change with changes in output in the short run. These costs include payments such as wages of labour, prices of the raw materials, fuel and power used, the expenses incurred on transporting etc. If a firm shuts down for sometime in the short run, then it will not use the variable factors of production and therefore will not incur any variable cost. Variable costs are made only when some amount of output is produced and the TVC increase with the increase in the level of production. Variable costs are also called prime costs or direct costs. Total cost (TC) of a business is the sum of TVC and total fixed cost (TFC). Thus $TC = TFC + TVC$. Because one component, i.e. the TVC varies with the change in output, the TC of production will also change with the changes in the level of output. The

concept of TC, TVC and TFC in the short run can be easily understood with the help of the table given below.

Short run TFC, TVC and TC can be diagrammatically shown as in the following fig. In the fig. TFC curve runs parallel showing that this cost remains constant whatever the level of output. OP is the TFC at zero output and it remains the same throughout. TVC curve starts from the origin showing that it is zero when output is zero. It rises upward showing that as the output is increased the TVC also rises. TC curve is obtained by adding up vertically TFC and TVC curves. Thus TC curve has the same shape as TVC curve but is everywhere above TVC at a constant height determined by the level of TFC.

Output (units)	TFC (Rs.)	TVC (Rs.)	TC (Rs.)	AFC (Rs.)	AVC (Rs.)	AC (Rs.)	MC (Rs.)
0	100	0	100	-	-	-	-
1	100	50	150	100.00	50	150.00	50
2	100	80	180	50.00	40	90.00	30
3	100	102	202	33.33	34	67.33	22
4	100	128	228	25.00	32	57.00	26
5	100	165	265	20.00	33	53.00	37
6	100	210	310	16.67	35	51.67	45
7	100	266	366	14.29	38	52.29	56
8	100	336	436	12.50	42	54.50	70



Short Run Average Costs and Cost Curves

Average Fixed Cost (AFC): It is the total fixed cost divided by the number of units of output produced.

$$AFC = \frac{TFC}{Q}$$

As the output of a firm increases, AFC will tend to decline continuously. This is because the TFC remains constant at any level of output. This is shown in the above table. Graphically AFC is shown by a falling curve SAFC in the figure given above. The AFC curve is negatively sloped throughout because as output increases, it gets spread over greater number of units.

Average Variable Cost (AVC): AVC is obtained by dividing the TVC with the corresponding level of output.

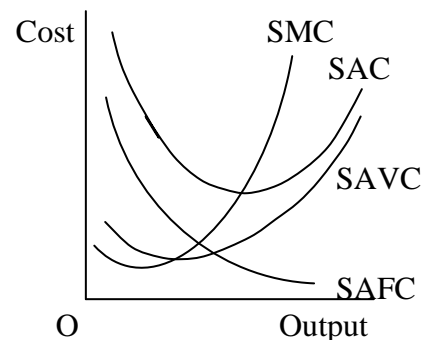
$$AVC = \frac{TVC}{Q}$$

The AVC will generally fall as the output increases from zero to the normal capacity output due to the occurrence of increasing returns. But beyond the normal capacity output the AVC will rise steeply because of the operation of diminishing returns. This is shown in the table above. The AVC curve is shown in the fig. above by the curve SAVC which first fall, reaches a minimum and then rises up.

Average Cost (AC): AC is the overall cost per unit of output. It can be obtained either by dividing the TC by the corresponding output or by adding AFC and AVC.

$$AC = \frac{TC}{Q} = \frac{TFC + TVC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q} = AFC + AVC$$

Therefore AC also falls as output increases to its minimum and then rises up. This is shown in the table and fig. above. Fig. shows that in the beginning, both SAVC and SAFC fall, The SAC curve therefore falls sharply in the beginning. When SAVC begins rising but SAFC is falling steeply, the SAC curve continues to fall. This is because during this stage the fall in SAFC weighs more than the rise in SAVC. But as output increases further, there is a sharp rise in SAVC which more than offsets



the fall in SAFC. Therefore the SAC curve rises after a point. Thus the SAC curve is almost of a 'U' shape.

Marginal Cost (MC): MC is addition to the TC caused by producing one more unit of output. In other words, MC is the addition to the TC of producing n units instead of n-1 units where n is any given number.

$$MC_n = TC_n - TC_{n-1}$$

Since the MC is change in TC as a result of a unit change in output, it can also be written as:

$$MC = \frac{\Delta TC}{\Delta Q}$$

If we consider the TC curve, $\frac{\Delta TC}{\Delta Q}$ represent the slope of it. Therefore MC at a certain output level can be found out by calculating the slope of the TC curve at the point corresponding to that output level.

As AVC or AC, the MC also falls as the output increases in the beginning due to the occurrence of increasing returns. But after reaching its minimum level the MC rise with increase in output due to the operation of diminishing returns. This is shown in the table given above.

The marginal cost curve in the short run is shown in the fig. above by the curve SMC, which is drawn by finding out the slope of the TC curve at different levels of output. The fig. shows that the curve first falls, reaches its minimum and then rises.

The relation between AC and MC: The relation between the MC and AC is the same as that between any other marginal – average quantities. When MC is less than AC, AC falls and when MC is greater than AC, AC rises. But if MC neither falls nor rises, the MC and AC are equal to each other. This marginal average relationship is a matter of mathematical truism. This relationship is shown in the table above.

The relationship between AC and MC can be easily remembered with the help of fig.1. Fig. shows that when MC is above AC, MC pulls the AC upwards, and if MC is below AC, MC pulls AC downwards. When MC stands equal to AC, AC remains the same, i.e. MC pulls AC horizontally.

Fig. 2 shows AC and MC curves drawn together. As long as SMC curve lies below SAC curve, SAC is falling. When SMC lies above SAC, SAC is rising. At a point of intersection L where SMC is equal to SAC, SAC is neither falling nor rising, i.e. at point LAC has just ceased to fall but has not yet begun to rise. Thus SMC cuts SAC from below at the latter's minimum point.

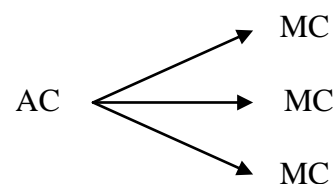


Fig. 1

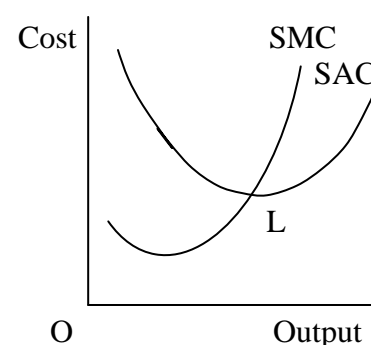


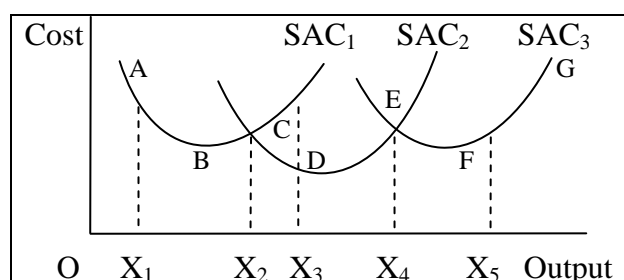
Fig. 2

Long Run Costs

Long Run Average Costs/Cost Curve

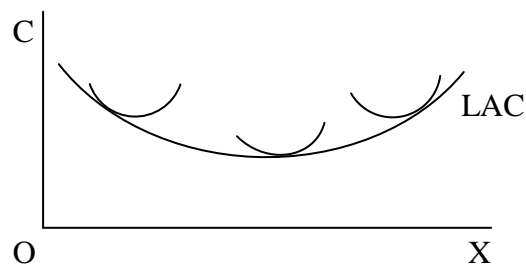
In the long run all factors are assumed to become variable. Therefore, there is no fixed cost but only variable costs in the long run. Long run cost curve is a planning curve in the sense that it is a guide to the entrepreneur in his decision to plan the future expansion of his output. The long run average cost curve is derived from short run average cost curves.

Each point on the LAC corresponds to a point on a short run average cost curve which is tangent to the long run average cost curve at that point. Suppose that the available technology to the firm at a particular point of time includes three methods of production, each with a different plant size: a small plant which operates with the costs denoted by the curve SAC₁, the medium sized plant with SAC₂ and the large plant with SAC₃ as in the fig. above. If the firm plans to produce output X₁, it will choose the small plant SAC₁. If its demand



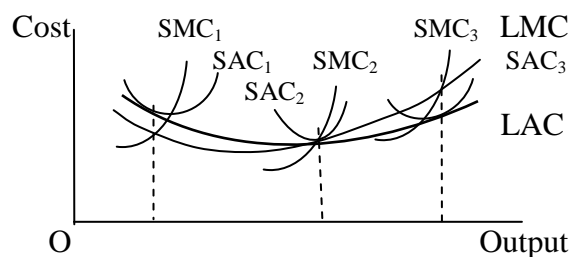
reaches the level X_2 the firm can continue to produce with the small plant or it can install medium-size plant. Because cost of production is same for both the plants. If the firm decides to produce more than X_2 such as X_3 , it will choose medium-size plant. For output more than X_4 it will choose large size plant. Therefore in this condition the long run the cost curve will look like the curve ABCDEFG.

Now if we relax the assumption of the existence of only three plants and assume that there is a very large number (infinite number) of plants, we obtain a continuous curve as in the figure, which is the planning long run average cost curve (LAC) of the firm. It is also called 'envelop curve' because it envelopes the SAC curves. The 'U' shape of LAC reflects the laws of returns to scale.



Long Run Marginal Cost/Cost Curve

The long run marginal cost (LRMC) curve is derived from the short run marginal cost curves but does not 'envelope' them. The LRMC curve is formed from points of intersection of the corresponding short run marginal cost curves with vertical lines (to the X-axis) drawn from the points of tangency of the corresponding short run average cost curves with LAC curve as in the fig. The LRMC must be equal to the SMC for the output at which the corresponding SAC is tangent to the LAC.



Unit 7: Revenue and Revenue Curves

Concept of Total, Average and Marginal Revenue

Total Revenue (TR): The sale proceeds that a firm gets from the sale of its product are called revenue. The total sales value received by the seller from selling a given amount of the product is called total revenue. It is calculated by multiplying the total sale by the price at which the product is sold. [TR = P×Q, where P is price and Q is quantity sold].

Average Revenue (AR): AR is revenue earned per unit of output. It can be obtained by dividing the total revenue by the number of units produced and sold. [AR = TR/Q]. If a seller sells various units of a product at the same price, then AR would be the same thing as price. But when he sells different units of a given product at different prices, then the AR will not be equal to price. In the actual life we find that different units of a product are sold by the seller at the same price in the market (except when he discriminates and charges different prices for different units of good). Thus in economics we use AR and price as synonyms except when we are discussing price discrimination by the seller.

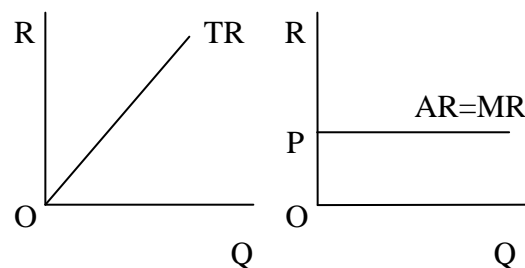
Marginal Revenue (MR): MR is the addition made to TR by the sale of an additional unit of the product in the market. [MR = TR_n – TR_{n-1}, where n is the number of units sold.] Except under ideal condition (which we call perfect competition in economics) the firm will find that it can sell more in the market only at a lower price than before. This means that ordinarily sale of more and more units of the product is expected to make less and less and less additions to TR. In other words, MR ordinarily goes on falling as more is sold.

The concept of TR, AR and MR can be made more clear with the help of the tables given below.

Revenue Curves

Under Perfect Competition: Under perfect competition a large number of firms sell homogeneous product at a given price in the market. Price is determined by the market through the forces of demand and supply and it is beyond the control of an individual firm. But the firm can sell any amount of product at the prevailing market price. If the price or AR remains constant when more units of a product is sold, the MR will be equal to AR. This is so because if one more unit is sold and the price does not fall, the addition made to the total revenue by that unit will be equal to the price at which it is sold. In other words, TR increases in the same proportion as quantity of sale. This is shown in the table and fig

Sales (unit)	Price or AR (Rs.)	TR (Rs.)	MR (Rs.)
1	10	10	10
2	10	20	10
3	10	30	10
4	10	40	10
5	10	50	10

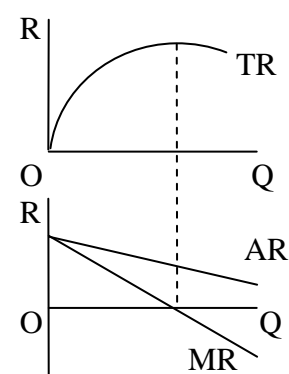


In the fig. TR curve is straight line through the origin,

which means it increases at a constant rate. Similarly, as price is constant AR curve is parallel to x-axis and MR curve coincides with it.

Under Monopoly: The monopolist firm fixes the price of its product by itself. But the sale of its product depends on the demand of its product. Therefore, under monopoly, if a firm want to increase its sale it must lower the price of the product.

Sales (unit)	Price or AR (Rs.)	TR (Rs.)	MR (Rs.)
1	10	10	10
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	5	30	0
7	4	28	-2
8	3	24	-4



Therefore, the AR and MR of a monopolist firm goes on declining as quantity sold increases. This

means under monopoly TR increases at a decreasing rate. This is shown in the table and diagram. In the fig., TR curve is rising but at a declining rate with the rise in quantity sold. Similarly AR and MR curves are declining throughout. But the rate of declining is more in case of MR than AR. Therefore MR curve lies below AR curve.

Unit8: Theory of Supply

Supply Schedules and Supply Curves

There are two types of supply curves- **individual (or single producer) supply curve** and **market supply curve** derived from individual (single producer) supply schedule and market supply schedule respectively.

Single producer supply schedule is a table, which shows different quantities of a commodity supplied by a particular seller at various prices at a moment of time or during a period of time. It shows the response of an individual seller to the change in price. Market supply schedule is sum total of the supply schedules of all the individual suppliers in a market. It shows the total amount of the commodity supplied at different prices in a market by all the sellers. A hypothetical single producer's and market supply schedule is shown below in the table assuming only two sellers (A and B) in the market.

Price (in Rs.)	Individual supply (units)		Market supply (units)
	Seller A	Seller B	
1	10	5	15
2	20	10	30
3	30	15	45
4	40	20	60
5	50	25	75

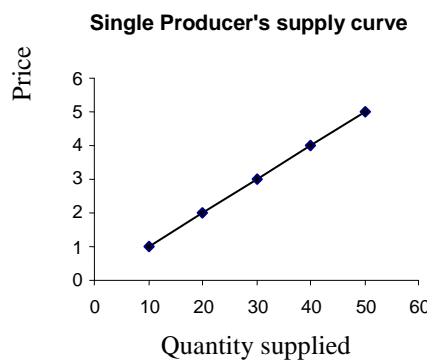


Fig. 1.7

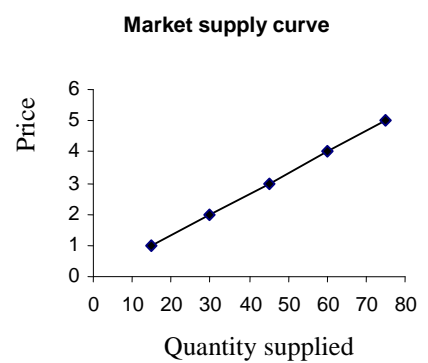


Fig. 1.8

Individual supply curve and market supply curve is derived from the above schedule as shown in Fig. 1.7 and Fig. 1.8 respectively. Market supply curve can also be derived graphically by the horizontal summation of individual supply curves as shown in Fig. 1.9.

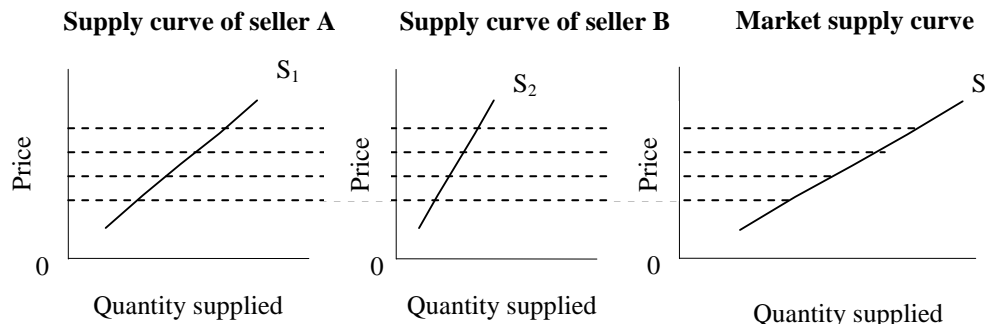
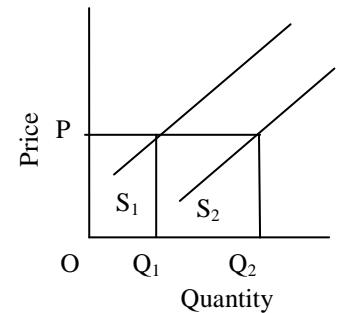
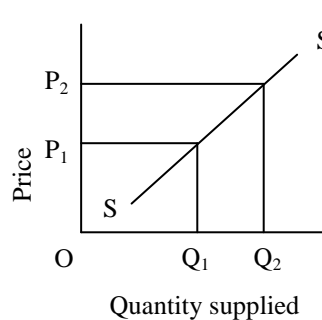


Fig. 1.9

Supply curve slopes upward from left to right. The degree of recline is determined by the degree of change in supply in response to change in price.

Change in Supply

When supply change with change in price, ceteris paribus, it is shown on the supply curve through different points as shown in Fig.1.6. When supply rises due to the rise in price, it is called **extension of supply** and when it falls due to the fall in price, it is called **contraction of supply**. In the figure quantity supplied is Q_1 at price P_1 and rises to Q_2 with rise in price to P_2 .



But when supply changes due to the factors other than price, it is shown by the shift in the supply curve, to the right or left. When supply rises due to the change in the condition of supply, price remaining the same, it is known as **increase in supply**. Graphically it is shown by the rightward shift of the supply curve as in Fig. 1.10. In the figure S_1 is the initial supply curve which is shifted rightward to S_2 showing that quantity supplied is increased from Q_1 to Q_2 while price remaining the same at P . Similarly, when supply falls due to the change in the condition of supply, price remaining constant, it is known as **decrease in supply**. Graphically it is shown by the leftward shift of the supply curve as in Fig. 1.11. In the figure S_1 is the initial supply curve which is shifted leftward to S_2 showing that quantity supplied is decreased from Q_1 to Q_2 while price remaining the same at P .

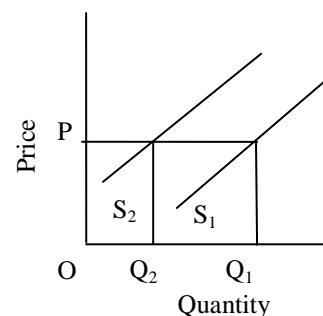
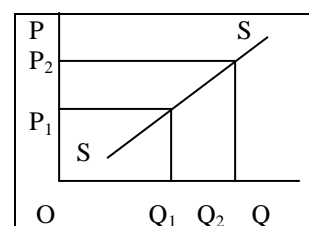


Fig. 1.11

Law of Supply

It expresses the relationship between price and quantity supplied. It states that, other things remaining the same, as the price of the commodity rises, its supply also rises and as the price falls supply also falls. In the words of Prof. Lipsey – “ceteris paribus, the quantity of a commodity produced and offered for sale will increase as the price of the commodity rises and decreases as the price falls.” It establishes a direct relationship between price and quantity supplied, i.e. higher the price, larger is the supply, and lower the price, higher is the supply. The law can be explained with the help of the table and diagram given above.



The law can be explained with the help of the table and diagram given above.

Exception to the law

1. **Auction sale:** In auction, goods are sold to the highest bidder and it is possible that the price offered is lower than the expectation.
2. **Expectation of further fall (or rise) in price:** In this case supply rises with fall in price and falls with rise in price.
3. **Need of certain amount of money:** In this case as the seller can collect the required amount of money by selling less when price is high. The supply will be low at high price and vice-versa.
4. **Supply of labour:** When wage rate increases to an adequate level some family members, generally women, elders and children, of the labour class families stop working. Not only this if the wage rate is very high, the labourers may work for lesser hours. Therefore labour supply falls with rise in wage rate.

Factors Affecting Supply

1. **Price:** Supply rises with price and vice-versa.
2. **Change in technology:** Improvement in production technique increases productivity and efficiency which results in increase in supply.
3. **Natural factors:** Adequate and timely rainfall increase agricultural production and therefore supply of these products. On the contrary, failure of rain, floods, land slide etc. decrease agricultural production and therefore supply of these products. This also affects industrial products where these are used as raw materials.
4. **Change in factor prices/cost of resources:** Supply decreases with rise in factor prices and vice-versa.
5. **Transportation facility:** Improvement in transport facility reduces transport cost and increase supply.
6. **Alliance among producer:** Sometimes producers may form mutual alliance and cut-off supply to raise price of the product in the market to get more profit.

7. Change in government policy: Change in government policies such as industrial, agricultural, trade, fiscal policy etc. also brings changes in supply. These may be favourable which brings increase in supply and unfavourable which brings decrease in supply.

8. War and tension/political uncertainty: This will decrease supply.

9. Discovery of new sources of raw materials: This will increase supply.

Unit 9: Market Equilibrium

Perfect Competition

Characteristics of Perfect Competition

1. A large number of firms or sellers: The existence of a large number of firms producing and selling the product ensures that an individual firm exercises no influences over the price of the product. The output of an individual firm constitutes a very small fraction of the total output of the industry so that any increase or decrease in output by an individual firm has a negligible effect on the total supply of the product of the industry. Also there is to be no agreement or collusion among the sellers.

2. Large number of small, unorganised buyers: Numbers of buyers are supposed to be large enough to prevent any one buyer from affecting the price in the market by his own action of purchasing more or less and purchases made by any one of the buyers are small as compared with the purchases of all the buyers in the market. Further, buyers are also thought to be completely unorganised.

3. Homogeneous product: The products of all firms in the industry are fully homogeneous and identical. They are similar in colour, shape, design, quality and service.

4. Free entry and exit of firms: There is no barrier to entry or exit from the industry. Entry or exit may take time, but firms have freedom of movement in and out of the industry.

5. Profit maximisation: The goal of all firms is profit maximisation. No other goals are pursued.

6. No government regulation: There is no government intervention in the market (tariffs, subsidies, rationing of production or demand and so on are ruled out).

7. Perfect mobility of factors of production: The factors of production are free to move from one firm to another throughout the economy. It is also assumed that workers can move between different jobs, which imply that skills can be learned easily.

8. Perfect knowledge: It is assumed that all sellers and buyers have complete knowledge of the conditions of market. Therefore sellers cannot charge higher price and will not charge lower price than the prevailing market price.

Short Run Equilibrium

A. Equilibrium of Firm in the Short Run

By the equilibrium of the firm is meant that stage of the firm in which it has no tendency to move either forward or backward. In other words, a firm is said to be in equilibrium when it is not beneficial for it to change the level of output. It is also termed as the ideal situation for a firm. A firm can be in a state of equilibrium only when it is earning maximum profit or minimum loss. This is defined as the difference between total cost and total revenue: $\Pi = TR - TC$

The equilibrium of firm can be shown graphically in two ways. Either by using TR and TC curves, or the MR and MC curves.

Equilibrium of a firm through TR-TC curve approach is shown in fig.1. The fig. shows that the firm maximises its profit at output, where the distance between the TR and TC curves is the greatest. It means the firm is in equilibrium at output X_e . At levels smaller than X_1 and larger than X_2 the firm has losses.

Finding equilibrium graphically through TR-TC approach is

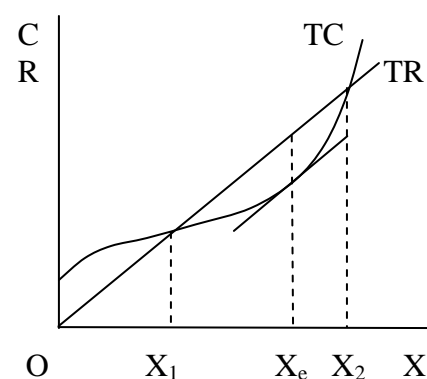


Fig.1

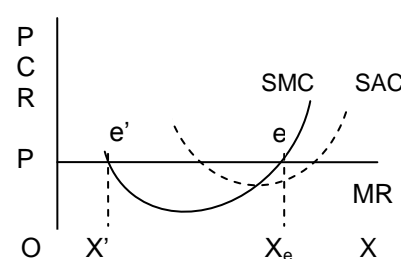


Fig. 2

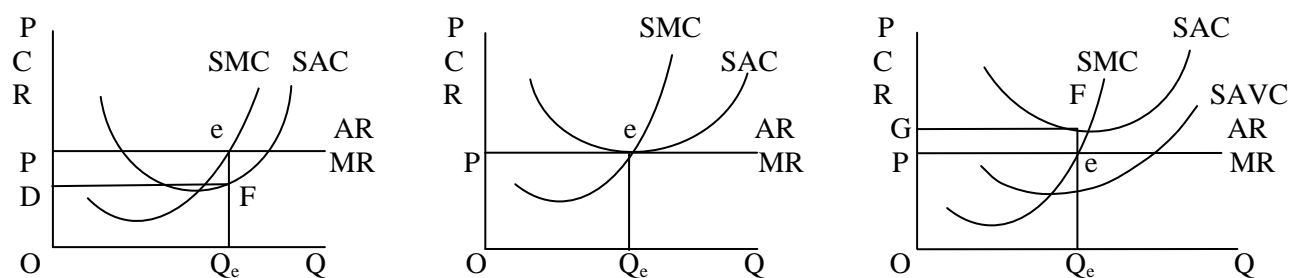
difficult. The alternative approach is based on MR and MC. Fig. 2 shows equilibrium of firm through this approach. According to this approach the firm will be in equilibrium at the level of output defined by the intersection of MC and MR curve (point e in fig. 2). To the left of e profit has not reached its maximum level because each unit of output to the left of X_e brings to the firm a revenue which is greater than its marginal cost. To the right of X_e each additional unit of output costs more than the revenue earned by its sale, so that a loss is made and total profit is reduced. In summary:

- (a) If $MC > MR$ total profit has not been maximised and it pays the firm to expand its output.
- (b) If $MC < MR$ total profit is being reduced and it pays the firm to cut its production.
- (c) If $MC = MR$ short run profits are maximised.

Thus the first condition for the equilibrium of the firm is $MC = MR$. However, this condition is not sufficient, since it may be fulfilled and yet the firm may not be in equilibrium. In fig. 2 we can see that the condition $MC = MR$ is fulfilled at point e', yet clearly the firm is not in equilibrium, since profit is increased with increase in output. The second condition for equilibrium requires that MC must cut MR from below, i.e. the slope of the MC must be steeper than the slope of the MR curve at the point of intersection. At point e in the fig. both conditions:

- (i) $MC = MR$ and
- (ii) slope of $MC >$ slope of MR

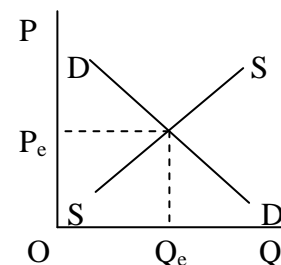
are satisfied. Therefore point e is the equilibrium point.



The fact that a firm is in short run equilibrium does not necessarily mean that it makes excess profits. Whether the firm makes excess profits, normal profits or losses depends on the level of AC at the equilibrium and the price or AR. If the AC is below the price at equilibrium (fig. 1) the firm earn excess profit (equal to area PeFD). If AC is equal to the price (fig. 2) the firm earn only normal profit. If AC is above the price (fig. 3) the firm makes loss (equal to area PeFG). In this case the firm will continue to produce only if it covers its variable costs. Otherwise it will close down, since by discontinuing its operations the firm minimises its losses.

B. Equilibrium of Industry

An industry is said to be in equilibrium when it has no tendency either to expand or contract its output. Given the market demand and market supply the industry likes to stick to a level of output at that price which clears the market, i.e. at the price at which the quantity demanded is equal to the quantity supplied. If on a particular price level demand is more than supply, it will be profitable for the industry to increase production. Similarly if demand is less than its supply, industry will reduce its output. Thus the industry will be in equilibrium only when at a particular price demand equals its supply. In the fig. given above the industry is in equilibrium at price P_e , at which quantity demanded and supplied is Q_e . However, this will be a short-run equilibrium, if at a prevailing price firms are making excess profits or losses. In the long run, firms that make losses and cannot readjust their plant will close down. Those that make excess profits will expand their capacity, while excess profits will also attract new firms into the industry. This will change the output of the industry.



Long-Run Equilibrium

A. Equilibrium of the Firm in the Long-Run

In the long-run the firms are in equilibrium when they earn only normal profit. If they are making excess profits new firms will enter into the industry. This will lead to a fall in price (a downward shift in the individual AR curve). This will continue until the LAC is tangent to the AR curve. Similarly, if the firms make losses in the long-run they will leave the industry and the market price will rise; i.e. the individual AR curve shifts upward. This will continue until all the remaining firms get normal profit. This is shown in fig. given above.

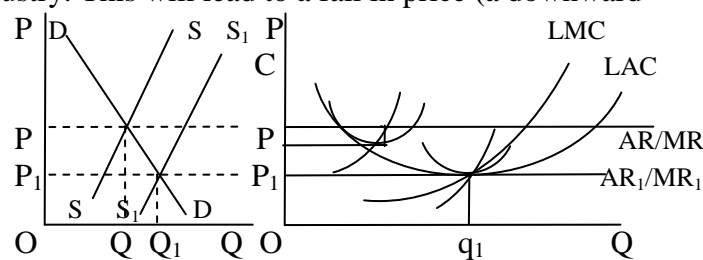


Fig. shows that the firm is in long-run equilibrium at price P_1 producing output q_1 . The condition for long-run equilibrium of a firm is: $LMC = LAC = AR = MR$; and the LMC curve cuts the MR curve from below. This implies that at long-run equilibrium $SMC = SAC = LMC = LAC = AR = MR$.

B. Equilibrium of Industry

The industry is in long-run equilibrium only when a price is reached at which all firms are in equilibrium and earning only normal profits. Under these conditions there is no further entry or exit of firms in the industry. This is shown in fig. given above. In the fig. the industry is in long-run equilibrium at price P_1 , where total demand OQ_1 is equal to supply and all the firms under the industry are in equilibrium making just normal profit with output Oq_1 .

Price and Output Determination under Perfect Competition

Under perfect competition price is determined by the industry. Firm is only price taker and not a price maker. The equilibrium price, under perfect competition, is determined by the interaction of demand and supply of the industry. At this given equilibrium price, output is determined by the firm according to its point of equilibrium. Total output of firms within the industry at different price level constitutes total supply of the industry under perfect competition.

Before Marshall there was a dispute among economists as to whether the force of demand (i.e. marginal utility) or the force of supply (i.e. cost of production) is more important in determining price. Marshall gave equal importance to both demand and supply in the determination of equilibrium price.

The demand of all consumers and the supply of all firms together determine the price, which is then taken as given by each of them. Prices are determined in the market where consumers and sellers meet and exchange

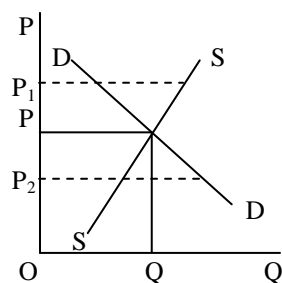


Fig. 1

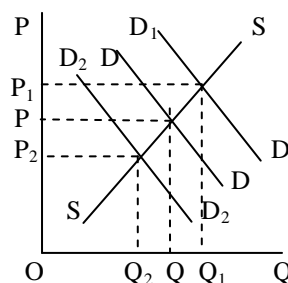


Fig. 2

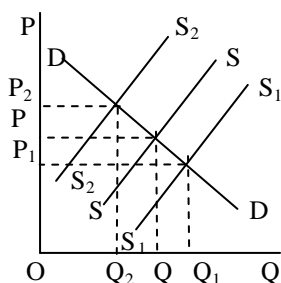


Fig. 3

takes place among them. The price which tends to settle down or comes to stay in the market is one at which quantity demanded is equal to quantity supplied. The price at which demand and supply are equal is known as an equilibrium price, since at this price the forces of demand and supply are balanced or are in equilibrium. The determination of equilibrium price is given in fig. 1. Fig. shows that given the demand and supply curve equilibrium price P is determined in the market where total demand Q is equal to total supply. If the prevailing price is more than equilibrium price P such as P_1 , then there will be excess supply and price will fall to reach P . Similarly, if the price is less than P , there will be excess demand and price will rise to reach P .

Change in demand: This is shown in fig. 2. Fig. shows that price and quantity supplied rises with increase in demand while falls with decrease in demand.

Change in supply: This is shown in fig. 3. Fig. shows that price falls and quantity supplied rises with increase in supply, while price rises and quantity supplied falls with increase in supply.

Monopoly

Characteristics of Monopoly

1. One seller and a large number of buyers: Monopoly is said to exist when there is only one seller of a product. In simple monopoly the number of buyers is assumed to be large. Therefore, no one buyer can influence the price by his individual actions.

2. No close substitute: The second condition of monopoly is that there should not be any close substitute of the product sold by the monopolist. If it is not so, the monopolist can not charge a price according to his own desire, i.e. he can not be a price-maker.

3. Restriction on the entry of new firms: There is a strict barrier on the entry of new firms. Monopolist faces no competition.

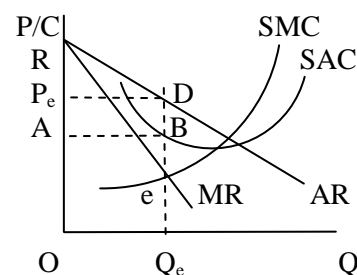
4. Nature of demand curve: As there is only one firm producing a product, the demand curve (or AR curve) of a monopolist is downward sloping. This means a monopolist can sell more at lower price. When AR slopes downward, MR always lies below AR and slopes downward.

Equilibrium of the Monopolist / Price and Output Determination

A. Short Run Equilibrium

The monopolist maximises his short-run profits if the following two conditions are fulfilled: (i) $MC = MR$ and (ii) MC must cut MR from below.

In the fig. the equilibrium of the monopolist is defined by point e , at which the MC intersects the MR curve from below. Price is P_e and quantity is Q_e . The monopolist realises excess profit equal to the area $ABDP_e$. But it is not sure that the monopolist always gets excess profit in the short-run. He may get just normal profits or even losses in the short-run.



In perfect competition the firm is a price-taker, so that its only decision is output determination. The monopolist is faced by two decisions: setting his price and his output. However, given the downward sloping demand curve, the two decisions are interdependent. The monopolist will either set his price and sell the amount that the market will take at it, or he will produce the output defined by the intersection of MC and MR , which will be sold at the corresponding price. The monopolist cannot decide independently both the quantity and the price at which he wants to sell it.

B. Long-Run Equilibrium

In the long-run the monopolist has the time to expand his plant, or to use his existing plant at any level which will maximise his profit. With entry blocked, however, it is not necessary for the monopolist to reach an optimal scale (minimum point of LAC). Neither is there any guarantee that he will use his existing plant at optimum capacity. What is certain is that the monopolist will not stay in business if he makes losses in the long-run. He will most probably continue to earn supernormal profits even in the long-run, given that entry is barred. However, the size of his plant and the degree of utilisation of any given plant size depend entirely on the market demand.

Monopolistic Competition

Meaning: One of the sub-divisions of imperfect competition is monopolistic competition. It is that sub-category of the many possible market situations under imperfect competition which is the nearest to perfect competition. It involves many sellers and buyers, but with product differentiation. There is a difference between the product of one and the other seller. The products are close but not exact substitute. There may be differences in quality, style, colour, size, packing, trade names, brand, type of service, location of store etc. Under this market condition, a firm has some freedom to fix its price. It has a price policy. But while fixing the price of the product, the seller has to take into consideration the reactions of his rivals.

Characteristics

1. Large number of sellers and buyers: The number of sellers is sufficiently large that there is no feeling of mutual interdependence among them. Large number of buyers ensures no effect of individual buyer on price and output determination.

2. Differentiated product: Differentiation of the product may be real or fancied. Real or physical differentiation is done through differences in material used, design, colour or workmanship. Imaginary differences can be built up through packaging, advertisement, use of trade mark etc. The differentiation may also be linked with the condition of his sale – location of his shop, salesmanship, reputation etc.

3. Unrestricted entry: Entry into the industry is unrestricted. New firms are able to commence production of very close substitutes for the existing brands of the product.

4. Selling costs: Every firm tries to promote its own product among the consumers through different types of expenditures on advertisement. The advertisement expenditure may be done on different methods of appealing to the consumers to purchase its brand of the product. Selling costs are in the nature of costs which have to be covered along with production costs.

5. Price policy of a firm: The firm has a price policy under monopolistic competition.

6. Imperfect knowledge: The existence of monopolistic competition depends upon imperfections in the knowledge of the buyers. Much of the selling cost is simply meant to create imaginary superiority in the minds of consumers. The product may really be the same but consumers may come to know a particular brand name more than the other.

7. Non-price competition: Through non-price competition firms in the market try to win over customers. There are definite methods of competing rivals other than in price. It may be a guarantee for repairs within a particular time, after sales service, a gift scheme with particular purchases, a discount not declared in the price list or transport free of cost.

Heroic Assumptions

To steer clear of difficulties of varying costs and product differences, Chamberlin makes ‘heroic’ assumptions:

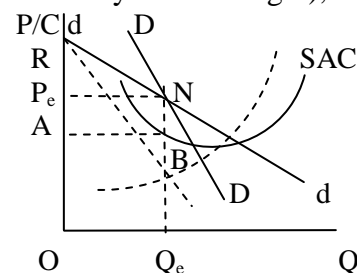
The firm in the group have identical cost curves that do not change with the expansion or contraction of the group. The demand for the products of various firms in the group is uniform throughout the group. This means that consumers’ preferences be evenly distributed among different sellers and that differences between the products be such as not to give rise to differences in costs.

The Two Demand Curves – The Subjective and the Objective

Prof. Chamberlin made use of two demand curves in his discussion of monopolistic competition. The demand curve facing an individual firm, describes the demand for the product of one firm, prices of all products in the group being given. This demand curve means the increase in quantity demanded for sales when a firm cuts down its price provided others do not cut down their prices. On the contrary it shows the fall in quantity demanded or sales of the product of a firm which will come about if it raises its price provided others do not raise their prices. This type of demand curve is known as subjective or imagined demand curve (or planned sales curve). The other type of demand curve is market or objective demand curve (or actual sales curve or share of the market curve) confronting an individual firm. This shows the demand or sales of the product of a firm when the prices of all firms in a product group move simultaneously in the same directions and by the same amount so that they are always identical with each other. The market demand curve of a firm will be less elastic than its subjective demand curve, since equal alteration of all prices simultaneously will prevent the movement of customers from one seller to another. The market demand curve of each firm slopes downward because the demand for the general class of the product rises as a result of the fall in prices. The market demand curve facing an individual firm is a fractional part of the total demand curve for the general class of product. Therefore this demand curve varies with the number of firms in the product group, to the left as more and more firms enter the product group.

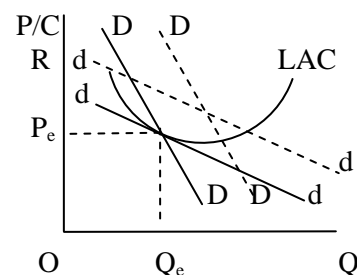
Short-Run Equilibrium

A producer under monopolistic competition, as under perfect competition and monopoly works on the principle of profit maximisation. Accordingly, he will fix price and output at which MC equals MR. Since he does not know his market demand curve DD (there is in fact no way of knowing it), he must go by his subjective demand curve dd. Thus in order to reach price output equilibrium, the producer would equate MC with subjective MR. In fig. he is in equilibrium when he is charging price P_e and producing output Q_e . Since we assume that all producers are alike in respect of demand and cost conditions, all will be setting price P_e . Hence point N will lie on the market demand curve. Therefore, through point N we have constructed the market demand curve DD.



Long-Run Equilibrium

Lured by these supernormal profits earned by the firms in the group, other firms would try to enter the group. Similarly the existing firm adjust their plant in the long run to get more profits. These activities will have two effects. First the total market demand would now be shared between more firms with the result that the market demand curve DD facing each individual firm will shift to the left. Second, new firms in a bid to attract new customers will cut down price and as a result the subjective demand curve dd will slide down along the market demand curve DD. This process continue until the DD (along with dd) shift to such a position so that the dd facing each firm becomes tangent to the LAC (see fig.). At this situation firms will be making only normal profits. Hence there will be no tendency for the firms to enter the group and for the existing firms to expand there capacity. There the whole product group will also be in equilibrium.



Oligopoly

Meaning: Oligopoly is that form of imperfect competition in which there are only a few firms in the market producing either a homogeneous product or products which are close but not perfect substitutes for one another. The number of firms is more than one but is not so large that any one seller be in a position to take decisions regarding his price, output, products and selling efforts without taking any note of the reactions which his rivals may have to his actions. In case there are only two sellers in the market, it may be called **Duopoly**, but this is also a special form of oligopoly because from the point of view of price theory the nature of problem is the same whether there are two or a few sellers.

Characteristics

1. Interdependence: As the number of firms is a few, the product of a firm occupies a large part of the market. As a result decisions of a firm regarding price, products etc. also affects other firms.

2. Indeterminateness of demand curve: As firms are interdependent under oligopoly, a firm cannot assume that its rivals will keep their prices unchanged when it makes changes in its own price. As a result, the demand curve facing an oligopolistic firm loses its definiteness and determinateness since it goes on constantly shifting as the rivals change their prices in reaction to price changes by a firm.

3. Conflicting attitudes of firms: Under oligopoly, firms do not always have a co-operative attitude towards each other; rather the attitudes are conflicting. At one time, the rival firms may realise the disadvantages of hostile competition and may have a desire to unite to form a collusion so as to maximise their profits. After some time dissatisfaction of one firm or the other may lead to conflict and cut throat competition.

4. Price Rigidity and non-price competition: Oligopoly markets are characterised by rigid prices. Once a price comes to prevail, it continues for years as such in spite of changes in costs and demand. Firms tend to stick to the established price and limit their competitive effort to non-price competition.

Unit 10: National Income

Concept of National Income

Although the NI concept was started from 17th century, the NI process was first developed by Simon Kuznets in 1930s.

In common parlance NI means the total value of goods and services produced annually in a country from economic activities. It is total amount of income accruing to a country from economic activities in the duration of one year.

National income accounting is the science of measuring the aggregate output and income of an economy.

NI is generally believed to be the most important single index of the overall situation of a country. NI accounting helps the government to know the changes in the economic activities of the economy in one-year period of time. The NI accounting studies provide regular estimation of economy's total output, which serves to fulfil the main economic goals such as employment, price stability, economic growth, equitable distribution of income etc. The NI accounting studies helps government in – (i) framing economic policies, (ii) formulating economic planning, (iii) determining economic structure, (iv) enabling to study the inflationary and deflationary gaps, (v) preparing budgetary policies, (vi) allocating national expenditure, (vii) distribution of grants in aid, (viii) comparing the standard of living of people etc.

GDP: GDP is the total amount of final goods and services produced within a country during the period of one year.

GDP at market price: When we multiply the total output produced in a country (i.e. GDP) by their market prices prevalent during that year in a country, we get GDP at market prices. In other words it is the total market value of all final goods and services produced in a year within a country.

GDP at factor cost: GDP at factor cost is the sum of the money value of the income produced by and accruing to the various factors of production in one year in a country. GDP at market prices always includes indirect taxes levied by the government on goods and services, which raise their prices. But GDP at factor cost is the income, which the factors of production receive in return for their services alone. Therefore in order to arrive GDP at factor cost, we deduct indirect taxes and add subsidies (if any) to GDP at market prices.

$$\text{GDP at factor cost} = \text{GDP at market prices} - \text{Indirect taxes} + \text{Subsidies}$$

GNP: It is total amount of final goods and services produced within a country in one year plus net income from abroad. Net income from abroad is the difference between income earned by the nationals in foreign countries and income earned by the foreigners in that country.

$$\text{GNP} = \text{GDP} + \text{net income from abroad}$$

NNP: GNP includes the value of total output of consumption goods and investment goods. But the process of production uses up a certain amount of fixed capital. Some fixed equipment wears out, its other components are damaged or destroyed, and still others are rendered obsolete through technological changes. All this process is termed 'depreciation' or 'capital consumption allowance'. In order to arrive at NNP, we deduct depreciation from GNP. 'net' refers to the exclusion of depreciation from total output. **NNP at market prices** is the net value of final goods and services evaluated at market prices within one year in a country. **NNP at factor cost** is the net output evaluated at factor prices. It includes income earned by factors of production through participation in the production process such as wages and salaries, rents, profits etc. It is called National Income.

Personal Income: Personal income is the total income received by the individuals of a country from all sources before direct taxes in one year. It consists of wages and salaries, interest, rent and dividends received by individuals. It also includes mixed incomes of self employed-persons such as farmers, shopkeepers, doctors etc. Personal income is derived from NI by deducting undistributed corporate profits, profit taxes and employees' contribution to social security schemes. But business and government transfer payments and transfer payments from abroad in the form of gifts and

remittances, windfall gains and interest on public debt, which are a source of income for individuals, are added to NI. Thus

$$\text{Personal Income} = \text{NI} - \text{Undistributed corporate profits} - \text{Profit taxes} - \text{Social security contribution} + \text{Transfer payments} + \text{Interest on public debt}$$

Disposable Income: Disposable income or personal disposable income means the actual income, which can be spent on consumption by individuals and families. The whole of the personal income cannot be spent on consumption, because it is the income that accrues before direct taxes have actually been paid. Therefore in order to obtain disposable income, direct taxes are deducted from personal income.

$$\text{Disposable income} = \text{Personal income} - \text{Direct taxes.}$$

Per Capita Income: The average income of the people of a country in a particular year is called Per Capita Income for that year. It can be found out by dividing NI by population of the country in that year.

$$\text{Per Capita Income} = \text{NI/Population}$$

Real Income: Real income is NI expressed in terms of a general level of prices of a particular year taken as base.

$$\text{Real NI} = \text{NI for the current year} \times \text{Base year index (=100)} / \text{Current year index}$$

Measurement of National Income

NI is comprised of different components. The components of NI depend on the method used to measure NI. There are three methods of measuring NI and GNP – (a) Income method, (b) Expenditure method and (c) Product method.

(a) Income Method: In this method, NI or GNP consists of the remuneration paid in terms of money to the factors of production annually in a country. Thus GNP is the sum total of the following items:

- i) **Wage and salaries:** Under this head fall all forms of wages and salaries earned through productive activities by workers and entrepreneurs.
- ii) **Rents:** This includes rents of land, shop, house etc. and of the assets used by the owners themselves.
- iii) **Interest:** This includes income by way of interest received by the individuals of a country from different sources and the estimated interest on capital invested by the entrepreneurs. But it does not include the interest received on governmental loans, as it is only transfer of NI.
- iv) **Dividends:** This includes dividends earned by the shareholders from companies.
- v) **Undistributed corporate profits:** This includes profits, which are not distributed by companies and retained by them.
- vi) **Mixed incomes:** This includes profits of unincorporated businesses, self-employed persons and partnership.
- vii) **Direct taxes:** This includes taxes levied on individuals, corporations and other businesses.
- viii) **Indirect taxes:** This includes taxes like sales tax, VAT, excise duty etc.
- ix) **Depreciation:** This includes allowances for expenditure on wearing out and depreciation of machine, plants and other capital equipment.
- x) **Net income from abroad:** This is the difference between income earned from foreign countries and income earned by the foreigners in that country.

Adding all these components gives GNP at market prices and NI is calculated from this as follows:
 $\text{NI} = \text{GNP at market prices} - \text{depreciation} - \text{net indirect taxes.}$

(b) Expenditure Method: According to this method, NI is the sum total of expenditure incurred on goods and services by the society in a particular year in a country. In this method following are the component of GNP (or NI):

i) Private consumption expenditure: It includes all types of expenditure on personal consumption by the individuals of a country, e.g. expenditure on clothes, food, radio, school fee etc.

ii) Gross domestic private investment: Under this comes the expenditure incurred by private enterprises on new investment and on replacement of old capital, e.g. expenditure on house-construction, factory buildings, machinery, plants and capital equipments. It also includes depreciation.

i) Net foreign investment: It means the difference between exports and imports or exports surplus.

ii) Government expenditure on goods and services: It includes Government's expenditure on their employees, police and army and also the expenditure on contingencies like pen, paper, furniture, cars etc. which the government incur to run its offices. It also includes the expenditure on government enterprises. But expenditure on transfer payments is not added, because these payments are not in exchange for goods and services produced during the current year.

All these components added together gives GNP at market prices.

$$NI = \text{GNP at market prices} - \text{net indirect taxes} - \text{depreciation}$$

(c) Product Method: According to this method the total value of final goods and services produced in a country during a year is calculated at market prices. To find out the GNP the data of all productive activities are collected and assessed at market prices. Only the final goods and services are included and intermediate goods and services are left out.

The components in this method are:

i) Agriculture and mining: It includes farm products, animal husbandry, fishery, forest products, minerals from mines etc.

ii) Industry: It includes manufacturing, construction, electricity, gas, water supply etc.

iii) Services: It includes services made by banking, insurance, transport, trading, services of doctors, lawyers, teachers etc.

All these components added together gives GDP at market prices and we get NI from it by the following way:

$$NI = \text{GDP at market prices} + \text{Net foreign income} - \text{Net indirect taxes} - \text{depreciation}$$

Under this approach there are two methods in the estimation of NI.

i) Final product method: In this method NI is estimated by finding out the total market value of final goods and services produced in a country during a year.

ii) Value added method: In this method NI is estimated by finding the value added by industries at different stages of production. The difference between the value of material outputs and inputs at each stage of production is the value added. If all such differences are added up for all industries in the economy, we arrive at the GDP.

Difficulties in Measurement of National Income

1. Difficulty of defining the nation: National income does not only include income produced within the country but also income earned in other countries. Therefore, the definition of nation goes beyond the political boundaries.

2. Non-market services: National income is always measured in money, but there are a number of goods and services which are difficult to be assessed in terms of money, e.g. painting as a hobby by an individual, the bringing up of children by the mother etc. The difficulty is whether these services should be included in national income and how to measure their money value.

3. Difficulty of double counting: There always exist the fear of a good or a service being included more than once, because of the failure to distinguish properly between a final and an intermediate product. If it so happens, the national income would work out to be more than the actual.

4. Income earned through illegal activities: Income from illegal activities such as gambling or illicit extraction of wine etc. is not included in national income due to which national income works out to be less than the actual.

5. **Difficulty of including transfer payments in national income:** Individuals get pension, unemployment allowance, and interest on government loans. These earnings are a part of individual income, but they are government expenditure. Therefore these are not included in national income. But it is difficult to find out these earning accurately.
6. **Difficulty in estimating depreciation:** When we deduct capital depreciation from GNP, the resulting measure is NNP. But the problem of estimating the current depreciated value of a piece of capital whose expected life is (say) fifty years is very difficult.
7. **Self consumed production:** A substantial part of the output is not exchanged for money in the market, it being either consumed directly by producers or bartered for other goods and services in the unorganised sector.
8. **Difficulty of price change:** Another difficulty in calculating national income is that of price changes which fail to keep stable the measuring rod of money for national income. For example when the price level in the country rises, the national income also shows an increase even though the production might have fallen. To solve this difficulty, the statisticians have introduced the concept of real national income. But this does not solve this problem, because the index numbers which measure the price changes are just rough estimates.
9. **Difficulty in calculating contribution of public services:** It is difficult to calculate contribution of public services like police and military services, hospitals, schools etc.

Special Difficulties in UDCs

1. **Non-monetised sector:** There is a large non-monetised sector in a developing economy. This is the subsistence sector in rural areas in which a large portion of production is partly exchanged for the other goods and is partly kept for personal consumption.
2. **Lack of occupational specialisation:** This makes the calculation of national income by product method difficult.
3. **Non-market transaction:** People living in rural areas in a developing country are able to avoid expenses by building their own huts, tools, garments etc. and people in urban areas having kitchen gardens produce vegetables which they consume themselves. These products are not enter the market transactions and hence not included in national income.
4. **Illiteracy:** The majority of people in such countries are illiterate and they do not keep any accounts about the production and sales of their products.
5. **Non availability of data:** Adequate and correct production and cost data are not available in developing countries.