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Principles of Economics / Principles of Micro-economics

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Graduate Course

Paper IV / Discipline Course

Principles of Economics / Principles of Micro-economics

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TOPIC 1

INTRODUCTION

LESSON 1

PROLEMS OF SCARCITY AND CHOICE

Institutionalized behaviour pattern of man with regard to production, distribution and consumption of wealth or the material means of satisfying human desires, is the distinguishing mark of a particular economic system. But at the foundation of any such system, there will always be found a few universal economic conditions. Although each economic system has its own peculiarities, yet certain basic economic problems are common to all.

The Three Central Problems of an Economy

Any society, whether simple or complex, advanced or backward, free or controlled must somehow confront three fundamental, interdependent and central economic problems.

(1) What goods and services shall be produced and in what quantities?

(2) How will these goods and services be produced, i.e., by what method or technology and with what resources?

(3) How will the goods produced be allocated among the members who make up the society, i.e., whom are the goods produced for?

What, how and for whom to produce would not be problems if resources were unlimited, and an infinite amount of every good could be produced. The question of choice arises directly out of the scarcity of resources. The human wants that can be satisfied by consuming goods and services may be regarded, for all practical purposes, in today's world as limitless. In relation to the known desires of individuals (for better food, clothes, housing, schooling entertainment and the like), the existing supply of resources is highly inadequate.

Suppose a society possesses unlimited resources in the form of land, labour and capital equipment. There will then be no economic problem because the economy can produce enough goods and services to meet all the wants of persons, individually as well as collectively. There would then be no economic goods, i.e., no goods that are relatively scarce. And there would hardly be any need for a study of economics or economizing. All goods would be free goods, like air, sun-shine and rain water. But in reality, it is possible to produce only a small fraction of the goods and services that people desire.

Moreover resources call be used to produce more than one type of commodity. A unit of labour, for example, can be employed either on a piece of land for *agriculture*, or for a factory building or housing. But be point to note is that the same unit of the factor cannot be available simultaneously to all the activities for which it is useful, and therefore, the community must choose between the different activities. Choosing activity a means denial of activities B C & D. If a factor unit such as labour or combination of factors of production is used to produce one commodity, say steel, then you will have less of some other commodity, say, food grains. Similarly, if the community decides to consume more now, it will have less for the future, i.e., for the production of capital goods and machinery-which can produce more consumers goods in future. *The question what goods, to produce and what not to produce, therefore, concerns the allocation of scarce resources among alternative uses.*

For resource allocation, one needs two sets of information. One, the wants of the people should be known with their preference intensifies. In other words, for a rational allocation of resources a society must set priorities among their needs. Second, information regarding production possibilities of different commodities with the given resources ought to be available. Such information is summarized in the production possibility curve. (See appendix for details).

The second problem concerns the organisation of resources, i.e., choice of technique. This question arises whenever there is more than one technically possible way to produce goods. Agricultural commodities, for example, can be produced by farming a large area of land while using small quantities of inputs like fertilizers and machinery or by farming a small area of land intensively, using large quantities of inputs such as fertilizers, labour and machinery. Both methods can be used to produce the same quantity of some commodity. One method economizes on land and uses large quantities of other resources, the other makes use of a large area of land and economizes on capital. Similar possibilities are available in the industrial sector also. It is usually possible to have the same output by several different techniques, ranging from highly labour intensive techniques using large quantity of labour and a few tools, to those using a large quantity of highly sophisticated machinery and only a very small number of workers. But such a choice is open only to the extent one factor is substitutable for another.

The third problem concerns the distribution of the national product among the members of the community. Since an economy can produce only a limited amount of goods and services (because of the resource constraint), it is not possible to meet all the demands of all the people. This poses before the community the problem of choosing criteria for allocating this limited amount of goods and services amongst various individuals and groups. In other words, the economy has to decide as to who will share the limited output and to what extent, and who will go without it.

The problems which we have just stated are common to all economies but different1 economic systems try to solve them differently. In a primitive society, custom may rule every facet of behaviour. You can also imagine a dictator who by arbitrary decrees decides what, how and for whom to produce. On the other extreme there is the capitalist free enterprise economy where all the three questions are decided automatically by the price mechanism.

The Role of Price Mechanism

In a system of free enterprise economy, no individual or organisation is consciously concerned with any of the three central problems stated above. In such an economy, production and distribution are the outcome of millions of independent decisions made by consumer and producers, all acting through the market mechanism. Hundreds of thousands of commodities are produced by millions of people more or less of their own volition and without control, direction or any master plan. And yet it is not a system of chaos and anarchy. There is a certain order in it.

Immediately the question arises, “how does the automatic price mechanism operate?” The bare outlines of a competitive market system are simple to describe. Everything has a price. Every commodity and service and every factor of production base its own price, freely determined by demand and supply in the market. There are millions of prices in fact as many prices as there are goods and factors of production. It is these prices which collectively are called the price mechanism. Everybody receives money for what he sells and uses this money to buy what he wants.

In a free enterprise economy, the consumers have the final say because everything is done to satisfy them. What goods and services will be produced in an economy depend on consumer’s demand and the resources are allocated accordingly. If they prefer more or A and less of B, then factors of production will be diverted from the manufacture of B to the manufacture or A. And this wish of the consumer is communicated to the producers through the price mechanism. If consumers prefer more of coffee and less of tea, the price of coffee will go up while that of tea will come down. This will induce the

producers to divert resources from tea to coffee as coffee is now comparatively dealer than tea. Production of coffee will rise and that of tea will fall. Similarly, if more or a commodity becomes available, then people want to buy at a given market price, its price will fall as a result of competition amongst the sellers. At a lower price, producers will no longer produce so much. Equilibrium will thus be restored by the forces of supply and demand. Resources will be diverted to some other branch or economic activity. This happens because the foundation of a free enterprise economy is the profit motive. All activities are carried on with a view of earning profits. In such a society resources will be allocated to those activities which promise more profits to the entrepreneurs. In this way, 'what goods will be produced' is determined by the votes of consumers or their every day decisions to purchase various commodities.

What is true of the markets for consumers goods is also true of markets for factors of production such as labour, land and capital. Under competitive condition, only that producer who can adopt the most efficient method of production and keep the cost at the lowest, can hope to secure high profits. Thus every producer tries to produce in the cheapest possible mariner. The method that is cheapest at any time, will displace a more costly method. For example, motive power will be generated by atomic process rather than by steam, if the price of coal is high. But the most obvious choice is with regard to the use or capital and labour. If labour is cheaper than capital, as is the case in most of the underdeveloped countries, emphasis will placed on labour intensive techniques. On the contrary, highly sophisticated machines will be used with a minimum need for labour in developed countries where there is shortage of labour, but capital is in abundant supply. In agricultural sector, tractor-operated large farm will displace the family size farm if this leads to lower cost of production.

The price system, therefore, indicates to the producer which combination of factors of production should be chosen to make production cheapest, given the state of technology. The choice of technique will thus depend upon the relative availability of resources reflected through their respective prices.

The third problem, namely, the distribution of national product, is connected with the first. Goods and services will be produced for those who can afford to pay for them. This capacity to pay is reflected in the effective demand of the people for various goods and services. In other words, effective demand is dependent on people's income. The first problem and third, therefore, are like two sides of the same coin. If people demand more of luxury goods, more of them will be produced and given to those who can pay for them. In a capitalist economy, therefore, the distribution of goods and services will depend upon the effective demand of people which in turn will depend on their incomes. Income of a person is determined by the quantities or various factors of production he owns and their prices. Thus the distribution of national product depends on the prices of factors of production, given the pattern of ownership.

To sum up, we may say that in a capitalistic economy, there is no visible authority which controls and directs the economic system. However, the price mechanism solves and the economic problems- What goods will produced? How much will be produced? How will they be produced? Who will consume them?

Limitations or Price Mechanism

We have tried to show above how in a modern capitalist economy, every economic activity is controlled, directed and guided by the price mechanism. A writer called the price mechanism as the "Invisible conductor of the economic orchestra". There are million of prices and all of them are determined simultaneously in such a way that there is perfect co-ordination in the production, distribution and consumption of all these goods and services. Overproduction and underproduction of any commodity at a given time, will be set right by the price mechanism in course of time. Overproduction, for instance, will lead to a fall in price and curtailment of production by the producer, and underproduction will lead to a rise in the price and increase in production. The question now is, whether the price system is really so effective, as it is made out to be.

Does the price mechanism really represent the wishes of the people? In a capitalist economy, demand is made effective by those who have an income and are prepared to spend and not by those who need various goods, but do not have the necessary purchasing power. The fortunate few with large, incomes are able to influence producers to manufacture those goods which they like. The poor, on the other hand, have sometimes to go without even the bare necessaries of life. The capilialist system, thus, does not bring about an equal and fair distribution of goods and services among the people according to their needs.

Prices, wages and profits are supposed to be determined by demand and supply in a free market. But actually markets are not free and competition is not perfect. Prices are determined and influenced by a few powerful producers who are called monopolistic. A monopolist can fix a high price. As a result of imperfect competition, there can be divergence between demand and supply. Besides, the tastes and fashions may change suddenly and consequently, there may be overproduction in some industries and underproduction in others. It is possible that by the time the necessary adjustment in supply takes place, demand may have changed again.

The consumers, themselves may sometimes, be at fault. They may demand goods and services which do not yield real utility but which may be meant for show of power or prestige. Sometimes, they may even demand goods which are harmful. Many a time, a man will prefer a cheap detective novel to a good book. People may demand cheap films and drinks which tend to spoil their tastes and morals. In this connection, we can mention the possible adverse effects of advertisement on the consumers. It has been found that with the help of advertisement any commodity, however bad or inferior, can be sold. It is through the media of advertisement that many had and positively harmful drugs and medicines and other such goods are sold in a 'free' enterprise economy. Thus, though the capitalistic economy, may help in maximising national income, it is not necessary that this will automatically maximise national welfare.

Role of Government

The modern capitalist economy is not solely a price economy, but is a mixed system. The government attempts to control and direct production, distribution and consumption.

The Government Controls through Social and Labour Laws: In the first place, the, governments enact laws to protect the women and children in mines, factories and workshops against exploitation. Women and children are weak and are not able to survive in a competitive economy without help. The workers are generally weaker than the employers in the matters of bargaining. Factory laws are passed to protect the labourers, to assure them minimum wages and to protect them from exploitation, by the factory owners.

Through various laws, the government also tries to control the quality of products, to prevent adulteration of goods, to enforce standard weight and measures, to see that trade is fair and so on. Further the government passes laws to control the activities of monopolies and monopolistic organisations which tend to act against the interest of the consumers. Thus, modern governments| take all types of measures to restrict free enterprise and free play of self-interest and ensure perfect competition. To keep competition perfect means to create a situation in which all have equal opportunities to participate in the competition or the competition is amongst equals.

Re-distribution of National Income by Taxes: Again, government attempts to control economic activity through its tax and expenditure measures. For instance, progressive taxes on income and property reduce the incomes of the rich and thus their effective demand for goods and services. At the same time, through free education, free medical services, subsidised housing, recreational facilities, etc., the government can raise the real income of the masses. In these ways the government can influence and direct the volume of economic activity so as to promote the welfare of the community.

Welfare and Social Measures: Further, in all modern economies, the government undertakes to provide certain essential services which the community requires but which cannot be provided by the private businessmen. These services involve large investments which are beyond the capacity of private individuals and groups. For instance, the government provides water supply, education and other social services; it protects the people from foreign aggression and it maintains law and order within the country.

Government in certain countries have assumed responsibility of providing furl employment: In recent years the government has also taken the responsibility of maintaining full employment. The government helps people to secure jobs. During economic depression, the economy functions at a low level; there is a lot of unemployment. In certain countries, governments have gone far beyond all these. They undertake economic enterprises such as power projects, basic and heavy industries transport and communication, etc.

Thus in a modern capitalist economy the government has started playing a very important role in the field of economic activity. In the 20th century, some of the feature of capitalism such as private property, self-interest and free enterprise have been considerably modified by government regulations. Many economists have, therefore, started calling the modem capitalist economy as mixed system in which private enterprise has a free hand but within the overall control and direction of the state.

PRODUCTION POSSIBILITY CURVE

How much of goods and services can the economy produce? This will depend upon (a) the extent of resources the economy has in terms of land, labour and capital which it can devote to the production of these goods, (b) the quality or efficiency of these factors and (c) the nature of technology available to the community. It is possible over a period of time to bring in additional land under cultivation, to have more labour through an increase in population and to increase machines and other capital equipment by means of capital accumulation. The quality of these factors of production can also be improved and the state of technology can always be raised through innovation and invention. The total volume of goods will depend upon these conditions.

Every economy can produce a certain amount or goods with the help of its resources. Since the same factors of production can be used to produce more than one type of commodity, it is possible to have various combinations of different commodities, by transferring resources from the production of one commodity to another. Each combination represents a distinct production possibility.

Let us take a simple illustration to explain the production possibilities of wheat and cotton in India. Let us assume that India is using all its resources to produce cotton and wheat. Let us further assume that all these resources are such that they are equally efficient in the production of both these goods. The table below gives the alternative possibilities of producing wheat and cotton by allocating different areas to the two crops out of the total available land.

TABLE 1

Possibility	*Wheat (Million tons)*	*Cotton (Million bales)*
1st	0	100
2nd	20	80
3rd	40	60
4th	60	40
5th	80	20
6th	100	0

You may note the two extreme possibilities. The first possibility shows that India is able to produce 100 million bales of cotton and no wheat if whole of the area is devoted to cultivation of cotton. The sixth possibility shows that India can produce 100 million tons of wheat and no cotton if whole of the area is devoted to cultivation of wheat. Between these two extreme possibilities the economy can produce different combinations of cotton and wheat. For instance, the second possibility shows that the country can produce 80 million bales of cotton and 20 million tons of wheat; the third possibility shows the combination of 60 million bales of cotton and 40 million tons of Wheat and so on. The above table can be illustrated with the help of a diagram.

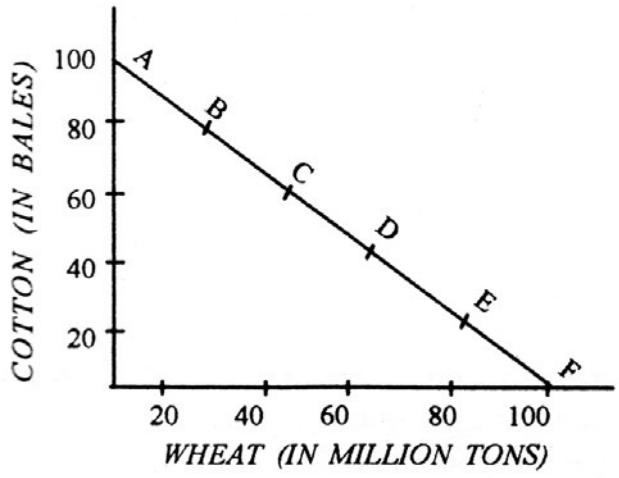


Diagram 1.1 *Production-Possibility Curve (straight line)*

Method of the drawing the diagram: First draw OX and OY line. The OX lines is known as the X-axis or the horizontal axis and the OY line is known as the Y-axis or the vertical axis. Wheat is represented on the horizontal axis and cotton on the vertical-axis. Starting from origin 0, the X-axis is divided, into equal parts, each part presenting 20 million tons of wheat. Similarly, the Y-axis is divided, each division representing 20 million bales of cotton. It is not necessary that the scales on both the axes should be the same which we have assumed for purpose of convenience. The first production possibility in this case is 100 million bales or cotton and no wheat. This is marked as A in the above figure. The second combination is 80 million bales of cotton and 20 million tons of wheat. Take a point against 80 on the Y-axis and 20 on the X-axis. This is point B For the other combinations, plot points C, D, E arid F. Connect all the points and you will have a downward sloping line AF. This line shows the production possibilities or two goods and is known as the production-possibility curve. It is also called the transformation curve, since the factors which can be used for the production of one commodity can be transformed to produce the other commodity. As we moved from A to B, resources employed in cotton production are being transferred to the production of wheat.

Go through the table and the diagram carefully. The downward shape of the AF curve shows that if the community wants more or wheat, it can have it only by reducing the quantity of cotton. Again in the diagram, AF is a straight line. This implies that addition of a certain amount or wheat will replace the same amount or cotton throughout due to the assumption that the factors of production are equally efficient in the production of cotton and wheat. In the given example, for every increase of 20 million tons in the production of wheat, the production of cotton has to be decreased by 20 million bales.

Normally, the production-possibility curve in real life is not a straight line but concave towards the point of origin. A more realistic production-possibilities table and curve will be as follows:

TABLE 2
Alternative Possibilities in the Production of Wheat and Cotton

Possibilities	*Wheat (in million tons)*	*Cotton (in million bales)*
1st	0	100
2nd	20	90
3rd	40	75
4th	60	55
5th	80	30
6th	100	0

For the above illustration, we do not assume that factors of production are equally efficient. Let us assume that some plots or agricultural land are more suitable for the production of cotton and some others are better suited for production or wheat. By using all the plots of land only for cotton, the community can produce 100 million bales of cotton. Now if the community wants to have 20 million tons of wheat, some plots or land which are less suitable for cotton will be put under wheat. But as the community wants to have more and more wheat, then the land allotted for cotton cultivation will also be used to produce wheat. As a result, the cost of producing wheat in terms of cotton will increase. For instance, to produce the first 90 million tons of wheat, the community has to sacrifice only 10 million bales of cotton but to produce the next 20 million tons of wheat, the community has to sacrifice 15 million bales of cotton and so on. Finally, in the case of the last 20 million tons or wheat, the community has to sacrifice 30 minion bales of cotton. This implies that land suitable for the production of cotton, which could produce as much as 30 million bales of cotton, when put under wheat can produce only 20 minion tons of wheat. It is clear from the above illustration that the cost or producing additional wheat in terms of cotton goes on increasing. The increasing cost of wheat in terms of loss or cotton is represented in the following table 3.

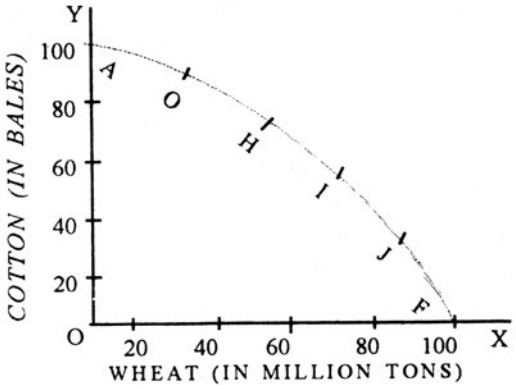


Diagram 1.2 *Production Possibility Curve (Concave)*

TABLE 3
Cost of Producing Wheat in Terms of Cotton

Possibilities	*Cost of producing each additional 20 million tons of wheat in term or bales of cotton*
1st	—
2nd	10
3rd	15
4th	20
5th	25
6th	30

Diagram 3 shows both types or production-possibility curves which we have illustrated separately so that you can easily compare them.

It may be observed that the curves have been constructed on the assumption that all the resources available for the production of wheat and cotton are being fully utilised. For any reason, if some of the resources remain idle, the production-possibility will not be indicated by the curve but will be anywhere below the curve. Secondly, if there is a quantitative and qualitative improvement in the factors of production available to the community to produce these goods and if there is an improvement in the technology of production, the production-possibility curve will be pushed outwards. This will indicate that both the goods can be produced in larger quantities, with the resources fully employed.

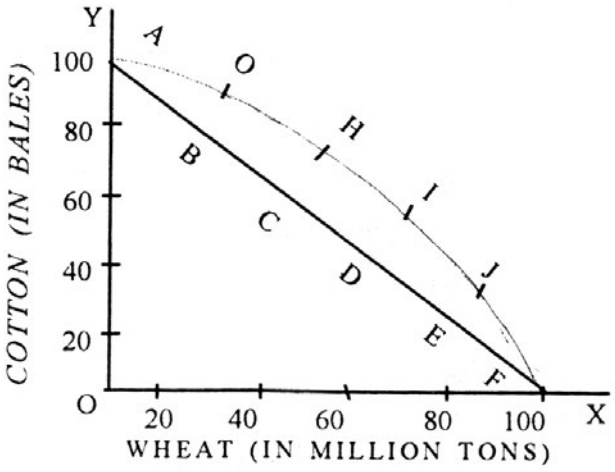


Diagram 1.3 *Production Possibility Curve (straight line and concave curve)*

The law of diminishing returns: From the production possibility curve and increasing cost of production of one commodity in terms of another, I would take you to the study of the law of diminishing returns. All human effort is subject to this law. Every economy makes continuous and persistent endeavour to overcome the operation of diminishing returns. It is a law of great importance in economics.

The law of diminishing returns states that whenever one factor of production is used more and more, the other factors remaining the same, the addition to total output goes on diminishing. Let us take an example to illustrate this law. Let us assume that we have a plot of land of 10 acres which is put under wheat cultivation through the application of labour only. There will be no produce if we do not engage any worker to cultivate the land. Suppose the output is 10 mounds of wheat if we employ one worker. We decide to employ one more worker on that plot of land and the total output increases to 18 mounds. The addition to total output in this case will be 8 mounds as compared to 10 mounds in the first case. Thus, if more and more of labour is applied to the same plot of land, the additional units of labour will not yield the same additional output but something less. This is illustrated in the following table and diagram.

TABLE 4
Output of Wheat Units of Labour are Increased

Case	*Land (acres)*	*Labour (units)*	*Total output (in toins)*	*Marginal output (addition to total output in mounds)*
1st	10	0	0	0
2nd	10	1	10	10
3rd	10	2	18	8
4th	10	3	24	6
5th	10	4	28	4
6th	10	5	30	2
7th	10	6	30	0

The information of the Table 4 can be represented in the following diagram.

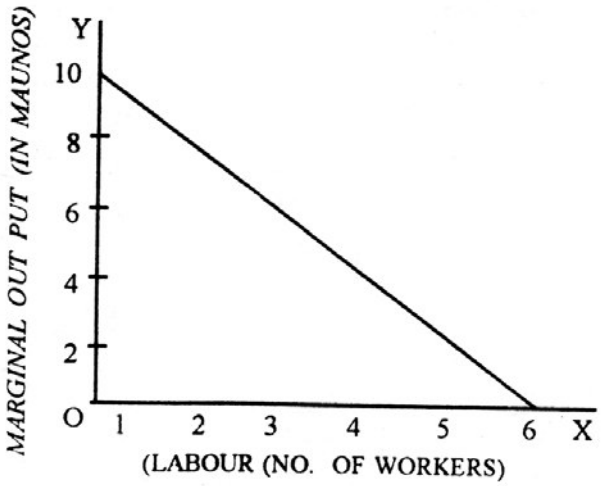


Diagram 1.4 *Law of Diminishing Returns*

Let us examine diagram 4 carefully. Labour units are represented on the X-axis and the marginal output on the Y-axis. Marginal output is the addition made to the total output by increasing labour by one unit. We can also describe the marginal output as the output added by the marginal worker. When we increase the employment from one to two workers, according to our illustration, the total produce increases by 8 mounds which is the marginal product. When three workers are employed, the third, worker is marginal and marginal output is 6 mounds. It is clear from the above table and diagram that as the number of workers is increased on the same plot of land, the total produce increases but at a diminishing. We can say, in general terms that if we increase one factor of production keeping the others constant, the marginal product will go on diminishing.

Universal application of the law of diminishing returns: Does the law of diminishing returns apply to land only? At one time, it was thought that the law was applicable to those industries only where land was predominant end labour and capital were of the secondary importance. Agriculture, mining, fisheries, forestry, etc., come under this category. These industries are, sometimes, called extractive industries. It was thought that in the manufacturing industries, capital and labour played a predominant role and land was comparatively insignificant. Therefore these industries were considered to be subject to the law of increasing returns. According to this view, if more of labour and/or capital are applied in a manufacturing industry, marginal output would go on increasing. But this is only partly true. It is now held that the tendency to diminishing returns is universal. In some industries, marginal output may increase upto a certain stage and the operation of the law of diminishing returns may be deferred. After a certain stage, however, diminishing returns are bound to set in. There can hardly be any exception to this tendency.

LESSON 1A

DEMAND AND SUPPLY

DEMAND AND SUPPLY ANALYSIS

Human wants are unlimited, but the resources which are required to satisfy these wants are limited. The scarcity of resources gives rise to economic problems which are termed as central problems. In a capitalist or free market economy these problems are solved with the help of what we call the price mechanism. Each commodity or service has a price. Earlier, goods were used to be exchanged for goods which was called the barter system of exchange. With the invention of money, the prices of goods and services are expressed in terms of money. Prices of all the goods and services collectively is known as price mechanism.

The price of a commodity is determined by its demand and supply. However, it is not the demand of a single buyer or the supply of a single seller which determines the price of a commodity in the market. It is the demand of all the buyers of a commodity taken together and the supply made by all the sellers selling that commodity taken together, which determine the price of that commodity in the market. The price of a commodity is determined when its demand is equal to its supply. This is called the equilibrium price . We shall now discuss in detail the demand and supply analysis and explain how these together determine the price of a commodity in the market.

1.1 DEMAND ANALYSIS

The Meaning of Demand

Demand, in economics, refers to the amount of a commodity which the consumers are prepared to purchase at a particular price per unit of time. Demand in economics, is therefore, is not the same thing as desire. You may have a desire to have a car but if you do not have sufficient money with you to purchase it and even if you have sufficient money with you but are not prepared to spend it on the purchase of the car, it will merely remain a desire and will not be called demand. Your desire to have a car will become demand when you have sufficient money with you and are willing to spend the money on the purchase of the car at the particular price per unit of time. The time may be one hour, one day, one week, one month and so on. It is meaningless to say that the demand of car in our country is 10,000 because this statement does not specify the price of car and the unit of time. Even it is not correct when you say that the demand of. car in India is 10,000 when price per car is Rs. 80,000, because it does not refer to the unit of time. The correct statement would be that the demand for car in India per year is 10,000 at the price of Rs. 80,000 per car. Thus desire becomes demand when the consumer has sufficient resources with him and is willing to spend those resources on the purchase of the commodity at a particular price and per unit of time. Even if you have, say, one lakh rupees with you but are not willing to spend the money on the purchase of a car at the price of Rs. 80,000 per car today, then you cannot say that you have a demand for a car.

Factors Determining the Demand

The demand for a commodity does not remain constant. It keeps on varying with changing conditions. We shall, therefore, now discuss the various factors which determine the demand for a commodity by a consumer or the family of the consumer i.e. household demand and the total demand of the whole market i.e., market demand of a commodity.

(i) Household Demand

The demand for a commodity by a consumer or a household depends upon the following factors:

(a) *Income:* The income of family is a very important factor determining its demand for a commodity. Other things remaining constant, if the income increases, normally the demand for goods will increase and vice-versa. With increase in income the demand for superior goods and goods of comforts and luxuries will increase and the demand for inferior goods will decline. But if the income declines the demand for superior goods and those of comforts and luxuries will decline.

(b) *Price of the commodity:* Normally there is an inverse relationship between the price of a commodity and its demand. Other things remaining constant, if the price of a commodity declines normally more of it will be purchased and if the price increases, lesser amount of the commodity will be purchased.

(c) *Taste and Preferences of consumers:* Taste, fashion and preferences of the consumers also affect the demand for a commodity. If people have developed a taste or preference for a commodity-its demand will increase but if a commodity has gone out of fashion, its demand will decline.

(d) *Price of related goods:* The changes in the price of related goods i.e., complementary and substitute goods also affect the demand for a commodity. Complementary goods are those goods where one commodity has utility and is demanded only when the second related commodity is also available. For instance scooter and petrol are complementary goods. If the price of petrol increases, it will reduce the demand for scooter. Similarly, change in the price of refills will affect the demand for ball-pens. Substitutes goods are those where one goods can be used in place of another. For instance, tea and coffee are close substitutes. One can use tea in place of coffee and vice-versa. If the price of coffee increases, people will start substituting tea for coffee and therefore the demand for tea will increase even though there is no change in the price of tea.

(ii) Market Demand

The above factors determine the households demand for a commodity. When we take market demand i.e. the total demand for a commodity in the market, in addition to the above four factors, there are two other factors which also determine the market demand. These two factors are: the size and composition of the population and distribution of income:

(e) *Size and composition of Population:* Large and increasing population increases the demand for various types of goods and vive-versa. Similarly the composition of population i.e., ratios of male-female, children-adult-old-age people etc., also affect the demand for different types of goods. For instance, if there are more children, the demand for goods such as toys, baby foods, biscuits etc., will be more.

(f) *Distribution of Income:* If there is an unequal distribution of national income and few people have large income while other have to do with small income, the demand for goods of comforts and luxuries will be more and that of the goods needed by the majority of people, who are poor, will be small. If there is an even distribution of income in a country, the demand for luxuries will be less and that of goods of mass consumption will be more.

Law of Demand

We have earlier explained that the demand for a commodity is always expressed with reference to a price. There will be different quantities of goods demanded at different prices. If the price of a commodity rises, normally less of its quantity will be demanded and vice-versa. This inverse relationship between the price of a commodity and the quantity of its demand is known as the Law of Demand.

We have explained that the price a commodity is only one of the various factors which determine the demand for a commodity. The other factors are the income of the consumer, their tastes, preference etc., prices of related goods, expectations about the future changes in the price of the commodity etc. the price of a commodity as well as these other factors keep on changing. We therefore, cannot find out the effect of the changes in the price of a commodity on its demand unless we assume that all other factors which also affect the demand for a commodity remain constant. For instance, suppose the price of a commodity has increased and therefore, normally its demand should decline. But if the same time, the income of the consumers has also increased, the consumers will demand more of the commodity even at a higher price because the increase in income may offset the impact of the price rise on his demand. Therefore, in order to find out the effect of the change in the price of commodity on its quantity demanded, we have to assume that there is no change in factors other than the price. We may say that 'other things being equal' normally more of a commodity will be demanded at lower price and less will be demanded at higher price. This is known as the Law of Demand. The Law of Demand is only a qualitative statement. It tells only the direction in which the quantity of a commodity will normally change in response to any change in its price. The Law of Demand does not say anything about the quantum or the amount of change in resporise to change in the price of a commodity.

We should like to emphasis, that the law of demand is always qualified by such phrases as 'in given conditions of demand' or' other things remaining equal or constant'. This relates to the assumption on which the law of demand is based. It means that law may not hold true if any of the factors, mentioned above, other than the price of a commodity in question is also changing. Law of Demand can be explained with the help of what is called a demand schedule and a demand curve.

Demand Schedule

If we put the different amounts of a commodity demanded at different prices in a tabular form, as given below in tables 1.1 and 1.2, it is called demanded schedule. Thus the demand schedule is a tabular statement which states different quantities of a commodity demanded at different prices. Demand schedule is of two types:

(i) Individual or Household demand schedule and (ii) Market demand schedule.

Individual or Household Demand Schedule: Individual Household demand schedule shows the different amounts of a commodity demanded by a consumer or a household at its different prices. Let us take an example. Suppose a consumer (or a household) demands 1, 2, 3 and 4 dozens of oranges at prices of Rs.3.00, Rs.2.50, Rs.2.00 and Rs. 1.50 per dozen of oranges respectively. When we put the different quantities of oranges demanded at different prices in a tabular form, as given in Table 1.1, we call it an individual (or household) demand schedule.

TABLE 1.1
Household Demand Schedule

Price of Oranges (Per dozen) Rs.	*Quantity Demanded (Oranges) (dozens)*
3.00	1
2.50	2
2.00	3
1.50	4

This demand schedule clearly shows that more of oranges are demanded at a lower price and vice-versa.

Individual or Household Demand Curve: If we represent the above demand schedule (Table 1.1) graphically we can get a demand curve as given in figure a 1.1 below:

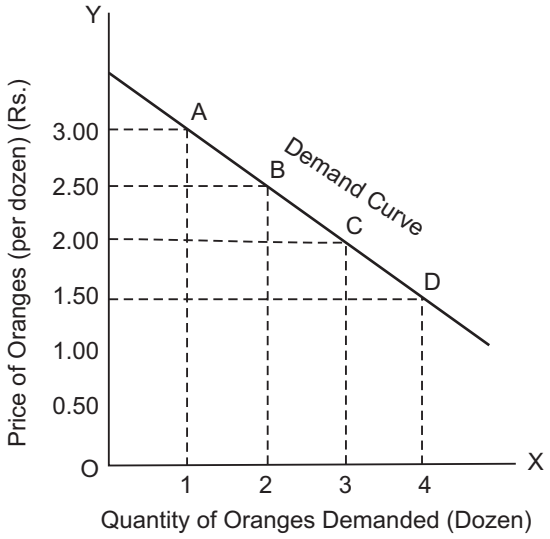


Diagram 1.1

In the diagram 1.1, the horizontal axis represents the quantity of oranges demanded and vertical axis represents the price of oranges per dozen. A, B, C, and D, show the different quantities of oranges demanded at different prices as given in the demand schedule, Table 1.1. By joining these points we get a curve which is called the demand curve. This demand curve shows the different quantities of a commodity demanded at different prices. It shows that at a higher prices, less is demanded and at a lower price, more is demanded, other things remaining equal.

The demand curve may be a straight line or a curve depending upon the changes in quantities demanded in response to changes in price.

Market Demand Schedule and Curve

Different consumers or household demand different amounts of a commodity at different prices. Therefore, if we add the demand schedule of all individuals or household, we can get the market demand schedule. Let us take an example. Suppose, for the sake of simplicity, say, there are only two consumers or household, say, A and B , that demand orange. Their demand for oranges at different prices are given in table 1.2. If we add the demand schedule of these two consumers, we can get the market demand schedule, as given below:

TABLE 1.2

Prices of Oranges (per dozen) *Rs.*	*Individual Demand Schedule* *Quantity Demanded (dozens)*		*Market Demand Schedule Total Market Demand for Oranges (A+B) (dozens)*
	A	*B*	
3.00	1	2	3
2.50	2	3	5
2.00	3	4	7
1.50	4	5	9

Thus the market demand schedules is the aggregate of the individual demand schedules. This also shows, as the individual demand schedule, that more of a commodity is demanded at a lower price and vice-versa.

If we represent the above table 1.2 on a diagram, we can get the market demand curve, as shown in diagram 1.2. The market demand curve DD as shown in figure (c) has been obtained by adding the individual demand curve D_1D_2 of consumer A as given in figure (a) and the individual demand curve D_2D_2 of consumer B as given in figure (b). For instance consumer A buys 4 dozens (A) and (B) buys 5 dozens (B) of oranges when the price is Rs. 1.50 per dozen. Therefore, the market demand for orange will be 9 dozens its (A + B = C). Market demand curve also shows the inverse relationship between price of a commodity and its quantity demanded i.e. more of a commodity will be demanded at a lower price and less will be demanded at higher price.

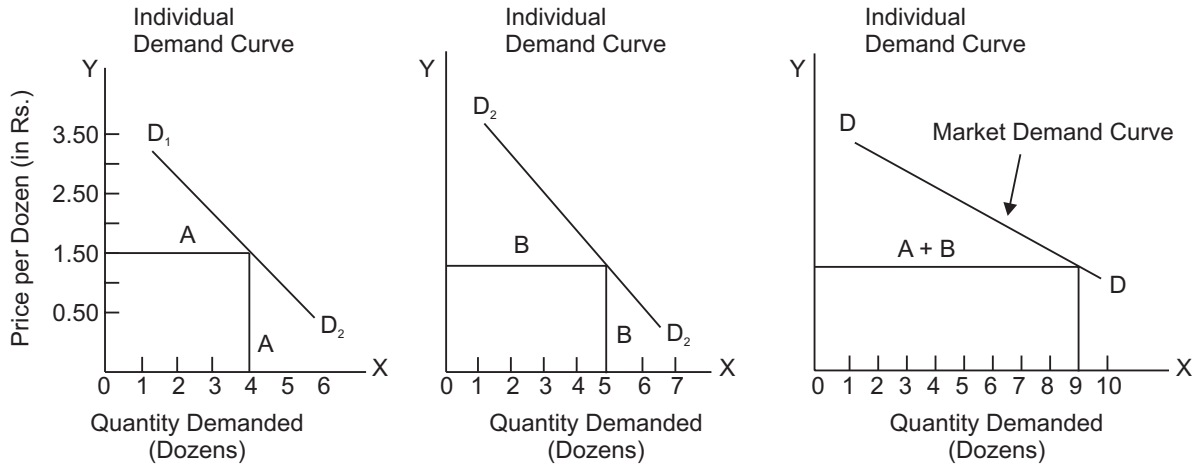


Diagram 1.2

In the examples of a market demand schedule and the market demand curve given above, for the sake of convenience we have assumed that there are only two consumers A and B of the commodity i.e. oranges. The market demand schedule and the market demand curve have been obtained by the addition of the individual schedules and the individual demand curves of the two consumers A and B. However in practice we find that there are many consumers of a commodity. In such a case it becomes very difficult and cumbersome to determine the individual demand schedule or individual demand curves of all the consumers of that commodity and then add them all together to find out the market demand schedule and market demand curve of the commodity. There is an alternative method of finding market demand schedule or market demand curve of a commodity. Of all the consumer of a commodity, one consumer of that commodity is taken as an average or representative consumer and find out the average consumer's demand schedule. Then we multiply the quantities being demanded by this average consumer at different prices by the estimated number of total consumers of this commodity. This will give us the market demand schedule of the commodity and on its basis we can draw the market demand curve of the commodity. For example, suppose at the price of Rs. 2.50 per dozen, an average consumer demands 2 dozens of oranges. Suppose there are 1000 consumers of oranges. In that case the market demand for oranges at the price of 2.50 per dozen will be 2000 dozens of oranges. Similarly we can find out the market demand for oranges at different price by multiplying with the total number of consumers of oranges i.e. 1000.

Both demand schedule and demand curve show the different quantities of a commodity which the consumers are prepared to but at different prices given in the market. It does not mean that at a particular time there are different prices of a commodity prevalent in the market. The demand schedule or demand curve is prepared on the basis of the past experience of a consumer/consumers. A consumer on the

basis of his past experience can say that if other things remain constant, what will be the different quantities of a commodity which he would be prepared to buy at different prices in the market. Therefore, a demand schedule or demand curve is imaginary.

Basis of Law of Demand

Why does a demand curve generally slope downwards from left to right: A demand curve generally slopes downwards from left to right or in other words it shows that more of a commodity is demanded at a lower price and less is demanded at a higher price. Why do people purchase more of a commodity at a lower price and purchase less at a higher price? In other words why does law of demand operate or demand curves slope downward? The law of demand operates or demand curves slope downwards due to the following reasons:

(*i*) *Operation of Law of Diminishing Marginal Utility:* The Law of Demand is based on the law of diminishing marginal utility. According to law of diminishing marginal utility, which we shall discuss in detail later on in section 4.1. As the consumer consumes more and more units of a commodity the marginal utility which he derives from the successive units will keep on diminishing. In the example of the individual demand schedule given in the table 1.1 the consumer demands one dozen of oranges when the price is Rs 3.00 per dozen. He is prepared to pay Rs 3 because as per the utility analysis, the marginal utility which he gets from the consumption of first dozen of oranges is worth Rs. 3.00 (As per the Marshallian utility analysis, the utility which a consumer gets from the consumption of a commodity can be measured in terms of money i.e., the maximum price which he gets from the second dozen will be less than what he had got from the first dozen of oranges and therefore he is prepared to pay to obtain that commodity). But when he consumes the second dozen, the utility which he will be prepared to buy second dozen of oranges only if price is less than Rs. 3.00. Suppose he gets marginal utility from the second dozen of oranges worth Rs 2.50 and therefore, he would be prepared to buy the second dozen of oranges, if price per dozen of oranges declines to Rs. 2.50. In other words, consumer will buy more of a commodity only at a lower price. A diminishing marginal utility curve can be converted into a demand curve. We shall discuss it in detail later on when we discuss the Marshallian utility analysis of demand. Similarly consumer will be prepared to buy 3rd and 4th dozens of oranges only at lower and lower prices.

(*ii*) *New Consumers:* The market demand for any commodity is made up of individual demands of numerous consumers. When the price of any commodity is sky high, only the rich few can afford to purchase such a costly commodity and the poor sections of the society have to go without it or do with the inferior substitutes. When the price falls, the commodity becomes accessible to some more consumers who are not very poor. And when the price falls, still further the commodity becomes accessible to still more persons. Thus, one reason why market demand for any good increases in response to a fall in its price, is that each fall in its price brings in new consumers for the commodity.

(*iii*) *Income effect:* The change in the price of a commodity also affects the real income or the purchasing power of the consumer. A fall in the price of a commodity in fact amounts to a rise in the real income or the purchasing power of the consumer. Therefore, he can afford to buy more of the commodity. On the other, a rise in price will reduce his purchasing power or real income and therefore he will be able to buy only less amount of the commodity. In other words fall or rise in the price of a commodity induces consumers to buy more or less of a commodity. The change in the demand for a commodity as a result of the change in real income (due to fall or rise in the price of the commodity) is called income effect of a price change.

(*iv*) *Substitution effect:* When the price of a commodity falls, besides, increasing purchasing power or a real income, it becomes relatively attractive to the consumers to substitute this commodity in the place of other commodity and therefore they buy more of it. For instance a fall in the price of tea will induce consumers to substitute tea for coffee and therefore the demand for tea will increase but conversely, a rise in the price of tea will induce consumers to substitute coffee for tea and will reduce the demand for tea.

Because of these factors, normally a demand curve slopes downwards from left to right i.e. more of a commodity is demanded at lower price and vice-versa.

Exceptions to the Law of Demand

Normally, the demand curve slopes downwards from left to right, showing that more is demanded at lower price and vice-versa. However, there are some exceptions to the law of demand in which case the fall in the price of a commodity will contract the demand and vice-versa i.e., the demand curve may slope upward to the right. These are as follows:

(*i*) *Goods which are expected to become scarce or whose prices are expected to rise in future:* In case of goods which are expected to become scarce in future the consumers may buy more of those goods even at a higher price. Similarly when the price of a good has increased but consumers expect that it will rise further in future, then they will prefer to buy more of the commodity even at a higher price at present. Conversely, though the price has fallen but the people expect that it will fall further in future, they prefer not to buy more of it even at lower price at present and will prefer to wait for the further fall.

(*ii*) *Goods carrying social status:* There are some goods e.g., diamonds, the possession of which carry social status and are bought by rich people because their prices are very high. If the prices of these goods become low, the consumers will buy less of them because the fall in their prices will reduce their prestige value. If their prices go up, their demand may also go up because of increase in their social prestige.

(*iii*) *Giffen goods:* The real exception of the law of demands is in case of giffen goods. If the price of inferior good falls, its demand may also fall. This is because the fall in the price of an inferior good increases the real income of the consumers and therefore they can afford to buy superior goods. They will start substituting superior good in place of an inferior good and therefore the demand for the inferior good will decline. Conversely, if the price of an inferior good reduces the real income of the consumers and they will also increase. The increase in the price of an inferior good reduces the real income of the consumers and they will be forced to spend more on the inferior good. This phenomenon was first of all observed by Sir Robert Giffen. In Great Britain, in early 19th century when the price of bread (considered to be an inferior good) increased, low paid British workers purchased more bread and not less of it. This was contrary to the law of demand. Giffen explained this paradox by stating that the bread was a necessity of life. Low-paid British workers consumed a diet of

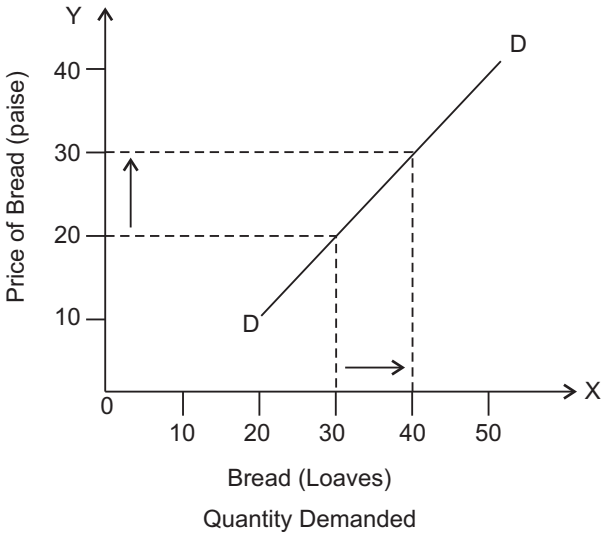


Diagram 1.3 Giffen Good

mainly bread. When the price of bread increased, they had to spend more on the given quantity of bread. They were left with little income to be spent on meat and therefore could not afford to buy as much meat as before. They substituted even bread for meat in order to maintain their total food intake. Therefore, increased price of bread resulted into the increased demand for bread. In other words there was a direct price-demand relationship. After the name of Robert Giffen, all such goods whose demands increase with increase in prices and whose demands fall with fall in their prices, are called 'Giffen Goods'. However, it should be noted that a 'Giffen Good' is an inferior good but every inferior good can not be called a 'Giffen Good'. There is a difference between an inferior good and a Giffen good. Only those inferior goods are called Giffen Goods, in whose case there is a direct price-demand relationship i.e., both prise and demand of the commodity move in the same direction as shown in diagram 1.3

In the figure, when the price per bread (loaf) is 20 paise each, a consumer buys 30 loaves of bread. But when the price of bread increases to 30 paise each, he buys 40 loaves of bread. It means that when the price of bread increases, a consumer buys more of it and vice-a-versa. In this case, there is a positive or direct relationship between the price of a commodity and its quantity demanded. Therefore, the demand curve will slope upward from left to right, as is shown by the demand curve DD in diagram 1.3 Here bread will be considered as 'Giffen' good. We shall discuss the case of Giffen Good in detail in the section on the Indifference Curve Analysis of the Demand. However, it is extremely difficult, if not impossible to find an example of a Giffen good in real life.

Difference between Expansion and Contraction of Demand of a Commodity and Increase and Decrease in Demand of a Commodity

(*a*) *Expansion and Contraction of Demand:* We have told you that the demand is affected by various factors. In explaining the law of demand we consider only the effect of the changes in the price of a commodity on its demand, assuming that there is no change in other factors e.g., income, taste and fashion of the consumers, prices of other goods etc. Change in the demand of a commodity due to changes in its price alone, are called extension and contraction in demand. It is also called 'change in the quantity demanded' or 'movement along the same demand curve'. When the quantity demanded of a commodity rise due to fall in its price alone, it is called extension of demand. On the other hand, if the quantity demanded falls due to rise in prices, it is called contraction of demand. Suppose, as a result of the fall in the price of oranges from Rs. 3.00 per dozen to Rs. 2.50 per dozen, the demand for oranges rises from 1 dozen to 2 dozens, it is called extension of demand. Conversely, if as a result of rise in price of oranges from Rs. 1.50 per dozen to Rs. 2.00 per dozen the demand for oranges falls from 4 dozens, it is called the contraction of demand. Here we have assumed that the rise or fall in the demand for a commodity has taken place only due to fall or rise in the price of oranges, assuming that there is no change in other factors which also affect the demand. We can explain them with the help of the diagram 1.4.

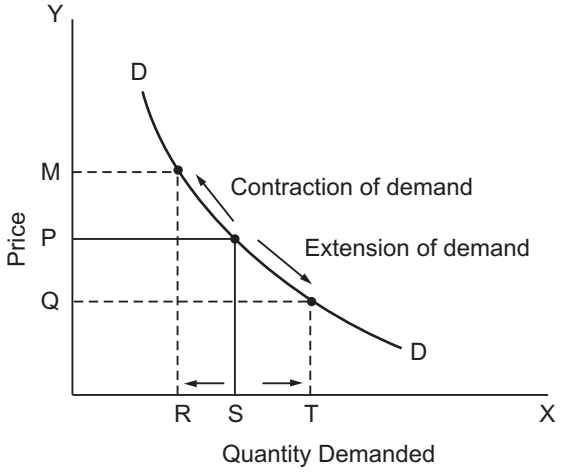


Diagram 1.4

We have drawn the demand curve DD which shows the different quantities of commodity X demanded at different prices, assuming that other factors which also effect the demand e.g. income, tastes and fashion of the consumers, prices of related goods etc. are constant. In the figure, when the price is OP, the quantity demanded is OS. If the price falls from OP to OQ the quantity demanded rises from

OS to OT. This rise in demand ST is called extension of demand. Conversely, it the price of the commodity X rises from OP to OM, the quantity demanded falls from OS to OR. This RS fall in the quantity demanded is called contraction of demand. Thus the extension and contraction of demand takes place only due to changes in the price of the commodity and are represented by the movement on the same downward sloping demand curve.

(*b*) *Increase and Decrease in Demand:* The changes in the demand for a commodity due to the factors other than the price of the commodity e.g., changes in consumer's income, tastes, fashion, prices or related goods etc., are called increase and decrease in demand. Suppose the income of the consumer has increased (assuming the price of commodity has remained constant) and therefore he will demand more of the goods. The rise in his demand for goods is called increase in demand. On the other hand if the income of the consumer declines he demands less of goods. This fall in his demand is called decrease in demand. Though the extension and contraction of demand can be represented on the same demand curve, but the increase or decrease in demand are represented by the upward or downward shifts in demand curve. This is explained in diagram 1.5.

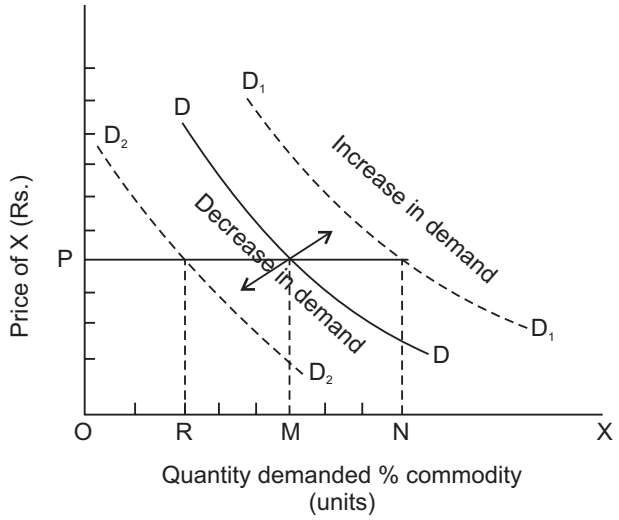


Diagram 1.5

Initially, DD is the demand curve. At price OP the quantity demanded of commodity X is OM. Suppose the price of the commodity has remained constant but the consumer's income increases or the fashion of a good has increased, the consumer is able to buy greater quantities of the good than before and therefore the demand curve DD will shift upward to right and the new demand curve is D_1D_1. The consumer will now buy ON quantity instead of OM quantity at the old price OP. This is called increase in demand. On the other hand, when the consumer's income declines or the fashion of a good has declined, the demand curve DD will shift downwards to the left and the new demand curve will be D_2D_2. The consumer will now be able to buy only OR quantity of the good at the old price OP instead of OM quantity and this decline in demand is called decrease in demand.

To sum up, extension and contraction of demand take place due to changes in the price of the commodity alone assuming other things being equal, and are represented by the movements on the same demand curve. Increase and decrease in demand take place due to changes in other factors e.g., consumer's income, tastes, preferences, fashion, prices of related goods etc., and are represented by upward or downward hifts in the demand curve.

1.2 SUPPLY ANALYSIS

The price of a commodity is determined by its demand and supply. We have so far discussed the demand aspect. We shall now discuss the supply aspect.

The Meaning of Supply

Supply refers to the quantity of a commodity which the producers are prepared to sell in the market at a particular price per unit of time. Like demand, supply is also expressed with reference to a particular price and time. The amount of goods available with the producers (i.e., stock) cannot be called supply because the producers may not be prepared to offer the entire stock of a commodity for sale in the market at a particular price and time. Only that amount of the goods which the sellers are actually prepared to offer for sale in the market at a particular price and time is called supply. Like demand, quantities supplied will be different at different prices. In case of demand, there is an inverse relationship between the price of a commodity and its quantities demanded i.e., more is demanded at a lower price and vice-versa. But in case of supply there is a direct relationship between the price of a commodity and its quantities supplied i.e., more of the quantities of a commodity will be supplied at a higher price and vice-versa.

Factors Determining the Supply

(*i*) *Price of a commodity:* The objective of the producer is to get maximum profits. Other things being equal, producers will supply more of a commodity at a higher price and less at a lower price. This direct relationship between the price of a commodity and its quantities which the producers are prepared to offer for sale in the market is called the Law of Supply.

(*ii*) *Prices of other goods:* If the prices of other goods have increased, whereas the price of the commodity which the producers have been producing has not increased or not increased to the same extent to which the prices of other goods have increased, it will become profitable for the producers to produce other goods and therefore the supply of the particular commodity which they have been producing will fall. The supply of one commodity, therefore, falls when the prices of other goods increase and vice-versa.

(*iii*) *Prices of Factors of Production:* Other things being equal, the changes in the prices of factors of production also affect the cost of production. The rise in the price of one factor or factors of production used in the production of a commodity will cause increase in its cost of production and reduces the profitability of the production of that commodity. The producer will reduce the supply of that commodity and increase the supply of other commodity.

(*iv*) *State of Technology:* There have been tremendous technological improvements during the last few years and are also taking place every day. There have made it possible to produce varieties of goods at low cost of production and therefore the supply of various types of commodities has increased.

(*v*) *The Goals of Producers:* The objectives of the producers is to maximize their profits. But if the producer of a commodity wants to sell as much as possible even if it costs him some profits, he will produce more of that commodity and therefore, its supply will increase. If the producers are prepared to take risk, the supply of the commodity whose production is risky, will increase.

The Law of Supply

Supply of a commodity directly depends upon the price of that commodity. Higher the prices, larger will be quantities supplied. This direct relationship between the price of a commodity and its quantities supplied is called the Law of Supply. We can define Law of Supply in this way-other things being equal,

more of a commodity will be supplied at higher prices and less at lower prices i.e., the price of a commodity and its supply is directly related. It is apparent from the fact that the objective of the producer is to maximize his profits, therefore, if the price of a commodity has risen, it is profitable for the producer to produce and supply more of that commodity. Lower prices will induce the producers to reduce the supply of that commodity.

Law of supply can be explained with the help of supply schedule and supply curve. Supply Schedule of a Firm

We have-said earlier that supply of a commodity is expressed with reference to a price and there will be different quantities of a commodity supplied at its different prices. Suppose a producer (firm) supplies 10, 14, 17 and 19 ball-pens per day when the prices of ball-pens are Re. 1, Rs. 1.50 Rs. 2.00 and Rs. 2.50 per ball-pen respectively. If we put it in a tabular form as given below in Table 4.3, showing the different quantities of a commodity which a producer is prepared to supply at its different prices, we call it a firm's supply schedule of that commodity.

TABLE 1.3

Supply Schedule of an Individual Firm

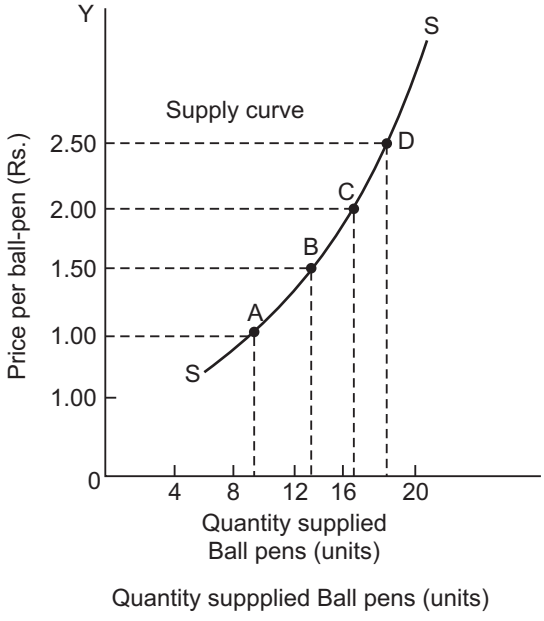
Price (per ball-pen) Rs.	*Quantity supplied Ball-pens (Units)*
1.00	10
1.50	14
2.00	17
2.50	19

The supply schedule clearly shows that more quantities of ball-pens will be supplied at higher prices and vice-versa.

Supply Curve of a Firm

If we represent the above supply schedule on a graph, we can get the supply curve of a firm, as given in diagram 1.6.

In diagram 1.5, vertical axis OY represents the different prices of ballpens and horizontal axis, OX, the quantities of ball-pens supplied. A, B, C, and D represent the different quantities of ball-pens supplied at different prices as given in the supply schedule Table 1.3. If we join A, B, C and D, we get a curve which is called the supply curve. Supply curve slopes upward from left to right. This supply curve shows that there is a direct relationship between the prices of ball-pens and their quantities supplied i.e., larger will be the quantities supplied at higher prices and smaller will be the quantities supplied at lower prices, assuming other things remaining same.



Quantity suppplied Ball pens (units)

Diagram 1.6

Market Supply Schedule and Market Supply Curve

In order to find out the market demand schedule and the market demand curve, we aggregate the individual demand schedules and individual demand curves. Similarly we can find out the market supply schedule and the market supply curve of a commodity by aggregating the individual supply schedules and individual supply curves of all the firms which are supplying that commodity. Suppose for the sake of simplicity, there are only two firms A and B which are supplying ball pens in the market. The table 1.4 below, gives the different quantities of ball pens supplied by the firms A and B at different prices.

TABLE 1.4
Market Supply Schedule

Price (per ball-pen) (Rs.)	*Quantities supplied Ball pens (dozens)*		*Market Supply (Total quantities supplied) (A + B)*
	A	*B*	
1.00	10	11	21
1.50	14	15	29
2.00	17	18	35
2.50	19	20	39

If we represent the supply schedule given above in table 1.4 on a diagram, we can find out the market supply curve of ball pens as shown in diagram 1.7:

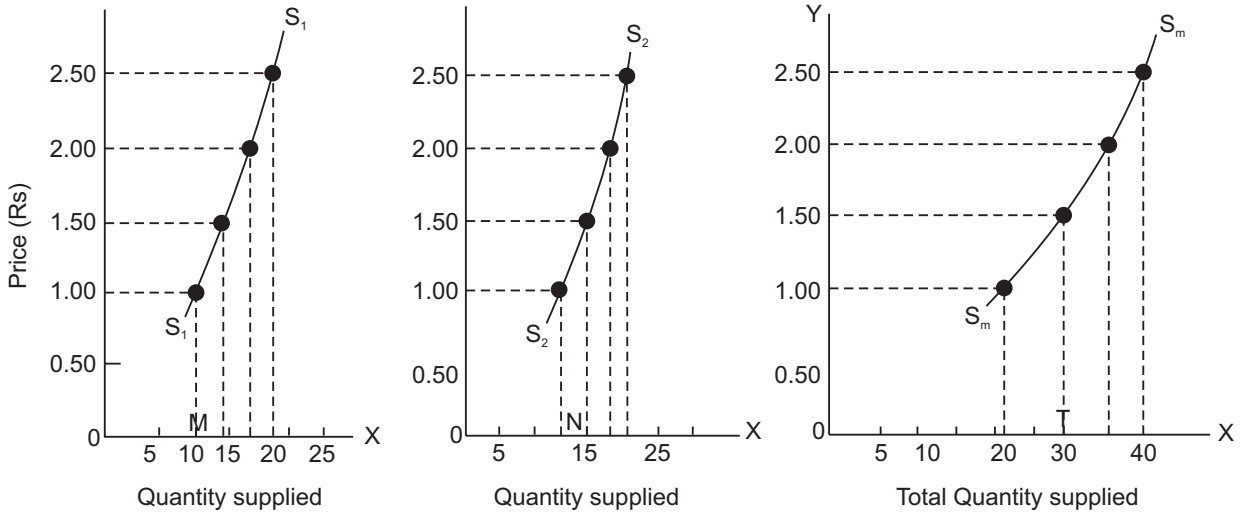


Diagram 1.7

In diagram 1.7 (c), the market supply curve Sm has been obtained by aggregating the supply curve of firms A and B and shown in figures (a) and (b) above respectively. For instance at price Rs. 1.50 per ball pen, firm A supplies 14 ball pens (OM quantity) and firm B supplies 15 ball pens (ON quantity). Therefore the total market supply will be 29 ball pens (OT quantity) at price Rs. 1.50 per ball pen. The market supply curve also shows the direct relationship between the price of a commodity and its quantities supplied. More of a commodity will be supplied at a higher price and less at a lower price.

Difference between a change in Quantity Supplied and an Increase or Decrease in Supply

(*i*) *A Change in Quantity Supplied:* If the quantity supplied is more or less due to the change in the price of that commodity alone, assuming all other factors which affect the supply of a commodity mentioned earlier, remains constant, we call it a change in the quantity supplied. In the example given earlier, when the price of a ball pen rises from Rs. 1.50 to Rs. 2.00 per ball pen, the supplier supplies 17 ball pens instead of 14 ball pens. This is called a change in the quantity supplied. This is represented by the movements along the same supply curve as given in diagram 1.6. With the rise in price from Rs. 1.50 to Rs. 2.00 per ball pen, we move from B to C on the same supply curve SS and with the fall in the prices, we move downwards along the same supply curve.

(*ii*) *Increase or Decrease in Supply for Shifts in the Supply Curve:* If the price of a commodity remains constant but the supply changes due to the changes in any of the other factors (factors other than price) affecting the supply of a commodity e.g., an innovation, discovery of cheap raw materials, prices of other goods etc., it is called an increase or a decrease in supply. If as a result of an innovation, the producers are willing to produce and sell more in the market, it is called an increase in supply. On the other hand, if as a result of an increase in the prices of factors of production the producers are willing to produce and sell less, this will be called a decrease in supply.

An increase in the Supply of a commodity is represented by a shift in its supply curve to the right and a decrease in the supply is represented by a shift to left of the original supply curve, as given in the following diagram 1.8

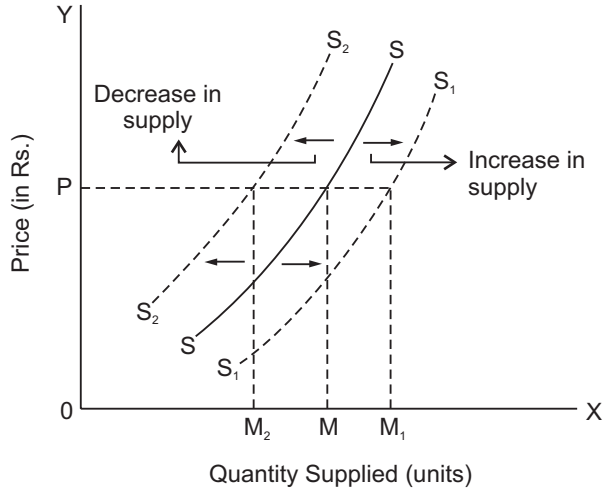


Diagram 1.8

If as a result of the change in factors other than the price, the supply of a commodity increases, the supply curve SS will shift to the right and the new supply curve will be S_1S_1. This shows that even if the price OP remains constant, the Supply of the commodity has increased from OM to OM_1. On the other hand, if as a result of the changes in factors other than the price, the supply has decreased, the supply curve SS will shift to the left and the new supply curve will be S2S2. This shows that price remaining constant at OP, the supply has decreased from OM to OM_2.

1.3 DETERMINATION OF EQUILIBRIUM PRICE

The price of a commodity in the market is determined jointly by its demand and supply. The price of a commodity is determined where its quantity demanded is equal to its quantity supplied.

Let us take an example. The following table 1.5 shows the market demand schedule and market supply schedule of ball pens i.e, the different quantities of ball pens demanded and supplied at different prices in the market.

TABLE 1.5

Price (Per ball pen) (Rs.)	*Demand schedule (quantity supplied) (Ball Pens)*	*Supply schedule Quantity supplied (Ball Pens)*	*Pressure On Price*
1.00	38	8	↑ upward
1.50	31	13	upward
2.00	25	17	upward
2.50	20	20	Equilibrium
3.00	16	22	Downward
3.50	13	23	↓ Downward

The table shows that as the price is increasing the quantity demanded is falling but the quantity supplied is increasing. At the price of Rs. 2.50 per ball pen, quantity of ball pens demanded (20) and supplied (20) are equal. Therefore, price of ball pen in the market will be Rs. 2.50 each. This is also called the equilibrium price. This can also be explained with the help of the diagram 1.9.

DD is the market demand curve and SS is the market supply curve which show the quantity of ball pens demanded and supplied at different prices. Demand and supply curves intersect each other at point. A showing the equality of demand (OM or 20) and supply (OM or 20) of ball pens. At this point the price is OP or Rs. 2.50 per ball pen. Therefore, the market price will be Rs. 2.50 (OP) per ball pen. It is not possible to have the price of ball pen in the market different (less or more) than that of Rs. 2.50 per ball pen and therefore this is also known as equilibrium price and the quantity demanded and supplied i.e., OM is known as equilibrium quantity. Suppose the price in the market is Rs. 3 per ball pen. At this price, 22 ball pens are supplied but 16 ball pens are demanded. The supply is in excess (22–16 = 6) of demand. The producers will be left with unsold quantity and will incur losses and therefore they will reduce the price. The consumers, finding glut of unsold quantity, will be prepared to purchase the commodity at a lower price. As a result, the price will decline and will ultimately come down to the equilibrium price. This hypothesis is shown by the arrow indicating a downward pressure to all prices above Rs. 2.50, On the other hand, let us take the example when the price is Rs. 2.00 per ball pen. At this price there is an excess demand; demand is for 25 ball pens

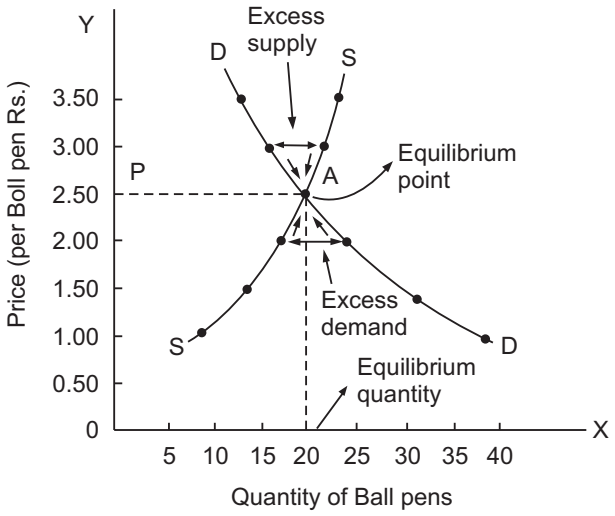


Diagram 1.9

and its supply is 17. The excess demand will increase the price. The consumers will offer higher price in order to get the commodity which is in short supply and the producers will also offer the commodity at higher price. As a result, the price will start increasing till it becomes equal to the equilibrium price. This is illustrated by the arrow indicating an upward pressure on all prices below Rs. 2.50 per ball pen. Therefore, if the price is above Rs. 2.50 per ball pen it will fall and if price is below Rs. 2.50, it will rise till it becomes equal to Rs. 2.50. At the price of Rs. 2.50, the quantity supplied is equal to the quantity demanded and there is no tendency for the price to change. Therefore, this price is called equilibrium price. The term equilibrium means a state of balance; such a state of balance occurs when consumers are prepared to buy the same quantity as the suppliers are prepared to offers for sale in the market. It is the equilibrium price which will ultimately prevail in the market. If at any time the price in the market is above or below the equilibrium, certain forces in the system will operate to bring the price to the level of the equilibrium price.

1.4 EFFECTS OF SHIFTS IN DEMAND AND SUPPLY CURVES ON EQUILIBRIUM PRICE

Since the price of a commodity is determined by its demand and supply, any change in its demand or/and supply will therefore affect its price. Let us now discuss the effects of the changes in demand-supply conditions on the price.

(a) Shifts of The Demand Curve and Equilibrium

(i) Leftward shifts of the Demand Curve (Decrease in Demand)

Normally, a leftward/downward shift of the demand curve, given any supply curve, tends to decrease the equilibrium price as well as the quantity bought and sold as shown in diagram 1.10.

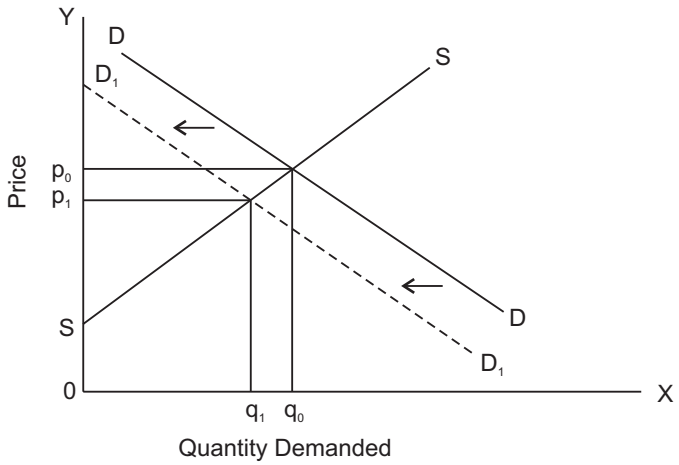


Diagram 1.10

In diagram 1.10 as a result of the leftward shift of the demand curve DD to D_1D_1, price falls from P_0 to P_1 and the quantity brought and sold falls from q_0 to q_1.

However, as shown in the diagrams 1.11, for a given leftward shift to the demand curve, the higher the elasticity of the supply curve, the greater the fall in price and lesser the decrease in the quantity bought and sold and vice versa. In the extreme case of a perfectly inelastic supply curve (diagram 1.11 A) the fall in price is the maximum while the quantity bought and sold does not change at all. On the other hand, in case of a perfectly elastic supply curve, (diagram 1.11 B) price does not fall at all and only the quantity bought and sold decreases. In the intermediate case, when supply is neither perfectly elastic nor perfectly inelastic (i.e., upward rising supply curve in diagram 1.11 C) the price falls and the quantity bought and sold decreases.

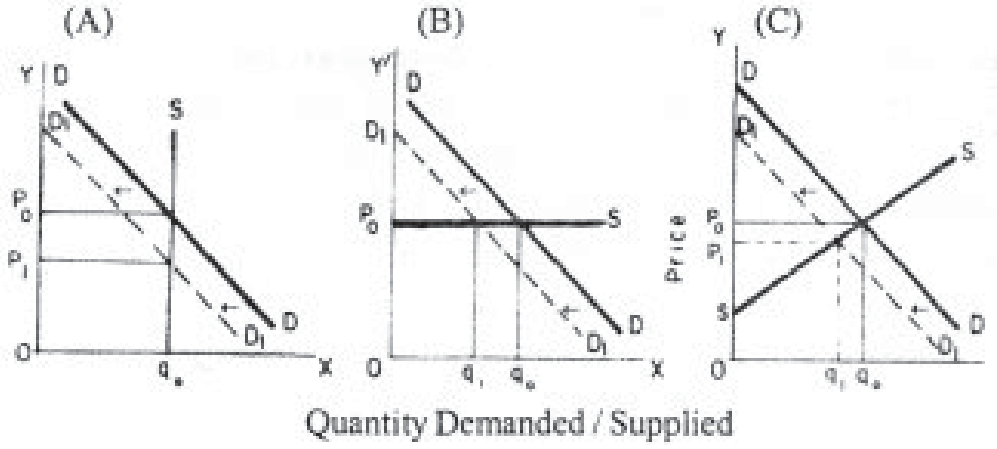


Diagram 1.11

In part A of the diagram above, as a consequence of a leftward shift of the demand curve DD to D_1D_1, price falls from p_0 to p_1 while quantity bought and sold remains constant at q0. In part B on the other hand, price remains constant at p_0 whereas quantity bought and sold decreases from q_0 to q_1. In part C, partly the price falls and partly the quantity bought and sold decreases.

(ii) Rightward shifts of the Demand Curve (Increase in Demand)

Normally, a rightward shift of the demand curve, given and supply curve, tends to increase the equilibrium price as well as quantity bought and sold as shown in the diagram 1.12

In the diagram 1.12, as a result of a rightward shift of the demand curve DD to D_1D_1, price increases from p_0 to p_1 and quantity increase from q_0 to q_1.

However, for any rightward shift of the demand curve, move elastic the supply curve, lower will be the increase in price and higher will be the increase in quantity. In the extreme case of a perfectly elastic supply curve, price does not increase at all and only the quantity bought and sold increases. On the other hand, when the supply curve is perfectly inelastic, only the price increases and the quantity remains unchanged. This is shown in the diagrams 1.13A and 1.13B.

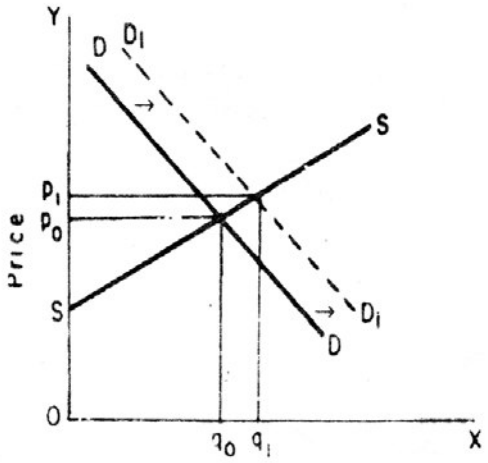


Diagram 1.12

Diagram 1.13 A shows that when the supply curve is perfectly elastic price remains unchanged at P0 and quantity increase from q0 to q1. Diagram 1.13B on the other hand, shows how quantity remains unchanged and only price increases from p0 to p, when the supply curve is perfectly inelastic.

(b) Shifts of the Suply Curve and Equilibrium

(i) Leftward shift of the Supply Curve (Decrease in Supply)

Normally, given and demand curve, a leftward shift of the supply curve tends to increase price and reduce quantity bought and sold as shown in the diagram 1.14.

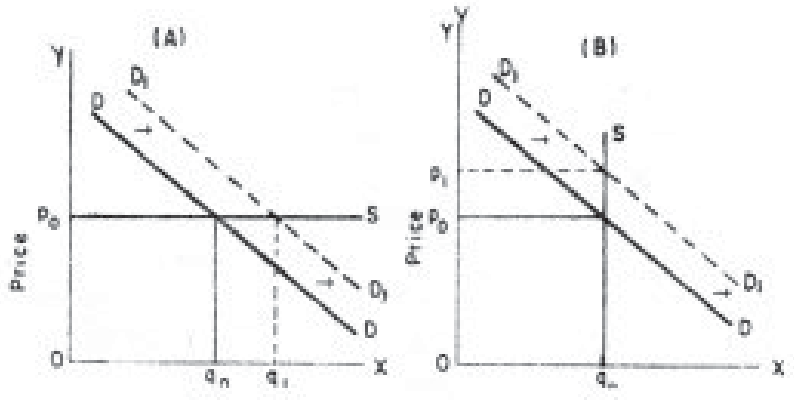


Diagram 1.13

In the diagram 1.14, as a result of a leftward shift of the supply curve from SS to S_1S_1, price rises from p_0 to P_1 and quantity decrease from q_0 to q_1.

However, for any given leftward shift of the supply curve, higher the elasticity of demand, lower the increase in price and greater the reduction in the quantity bought and sold and vice versa. If the demand curve happens to be perfectly elastic, equilibrium price remains unchanged and only the quantity bought and sold decreases. On the other hand, if the demand curve is perfectly inelastic, quantity remains unchanged while price increases. In the intermediate case partly price rises and partly quantity decreases. Diagrams below demonstrate extreme cases of perfectly inelastic demand curves.

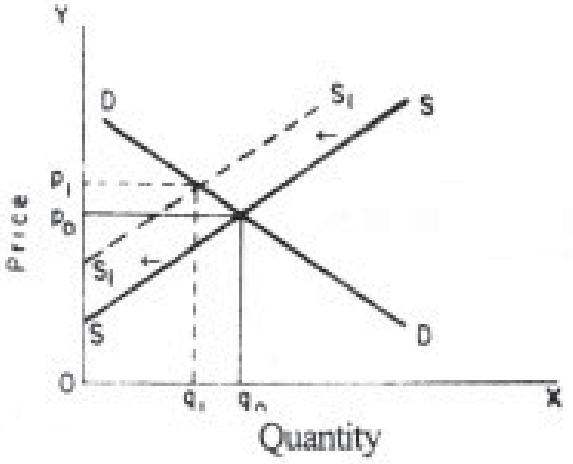


Diagram 1.14

Diagram 1.15 A depicts the case of a perfectly elastic demand curve in which case price remains constant at OP_0 but the quantity decreases from Oq_0 to Oq_1. Diagram 1.15B, on the other hand, shows the case of a perfectly inelastic demand curve in which increases from Op_0 to Op_1 while quantity remains unchanged at Oq_0.

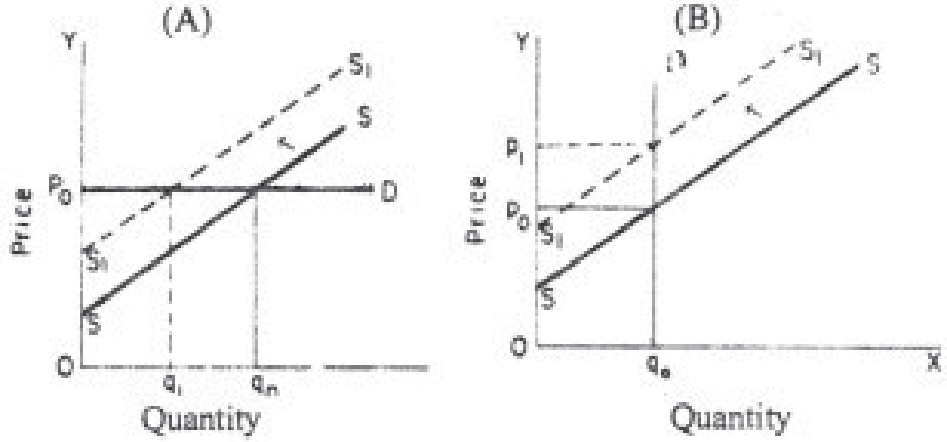


Diagram 1.15

(ii) Rightward shift of the Supply Curve-Increase in supply

In case of a rightward shift of the supply curve the results are exactly the opposite of what have been explained above. Normally, a rightward shift of the supply curve, given any demand curve, tends to lower equilibrium price and to increase the quantity. However, for a given rightward shift of the supply curve, more elastic the demand curve, lower is the fall in price and greater is the increase in the quantity bought and sold and vice versa. If the demand curve is perfectly inelastic, the quantity bought and sold remains unchanged and only the price falls. On the other hand, if the demand curve happens to be perfectly elastic, price remains unchanged while quantity increases. These cases are depicted in the diagrams 1.16A, B and C:

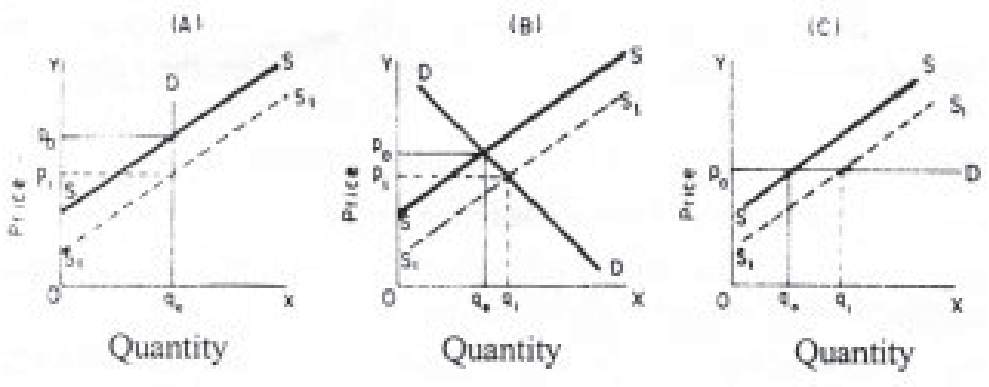


Diagram 1.16

Diagram 1.16A shows that if the demand curve is perfectly inelastic, only the price falls as a result of a rightward shift of the supply curve but the quantity remains constant. In case of a perfectly elastic demand curve (shown in diagram 1.16 C) the quantity bought and sold increase from q_0 to q_1, whereas price remains constant at p_0. In the intermediate case (shown in 1.16 B) there is some decline in.the price but the there is some increase in quantity.

LESSON 2

ELASTICITY OF DEMAND

2.1 INTRODUCTION

The demand for a commodity depends, as we have already discussed in detail, on a number of factors such as price of the commodity itself, prices of other commodities, incomes of consumers., their tastes and preferences, advertisement, taxes or subsidies, and a host of other factors including weather and expectations about movement of prices in future. For example, the law of demand tells us that, other things remaining constant, normally the quantity demanded of a commodity increases when its price falls and vice versa. Similarly, we known how quantities demanded of different goods vary in response to changes in the incomes of the consumers or prices of related goods. Or, to take another example the demand for ice varies with changes in temperature. However, these laws or tendencies only point tp the direction in which quantities demanded of various goods tend to vary in response to changes in certain factors but do no tell us the extent of changes in the quantities demanded.

The Concept

For analytical purposes and practical decision-making it is often necessary to know the degree of responsiveness of demand to each of the factors that may be influencing it as well as relative responsiveness of demand to one factor compared to another factor or a comparison of the relative responsiveness of demand for different goods to the same factor. *The concept of elasticity of demand is a device to measure the responsiveness of the quantity demanded to changes in any factor that may influence the demand for a commodity.*

In principle, it be possible to use the concept of elasticity of demand to measure the responsiveness of quantity demanded to changes in any factor that may influence the demand for various goods are quantifiable and it is, therefore, possible to measure responsiveness of demand to changes in them, some other factors cannot be quantified and responsiveness of demand to changes in them cannot possibly be measured. The concept of elasticity of demand is generally used to measure the responsiveness of demand to changes in (a) prices of the goods themselves, (b) changes in the prices of related goods and (c) changes in the incomes of the consumers. The measure of the degree of responsiveness of the quantity demanded of a good change in its price is described as ‘price elasticity of demand’. A measure of the degree of responsiveness of demand for a good to changes in the incomes of the consumers is described as the ‘income elasticity of demand’. And, finally, a measure of the degree of responsiveness of demand for a good X to changes in the price of another related good Y is called the ‘cross elasticity of demand’.

Price Elasticity of Demand (e)

Price elasticity of demand in defined as the degree of responsiveness of quantity demanded to change in the price of the commodity.

$$\text{Price elasticity of demand} = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$$

$$= \frac{\dfrac{\%\text{ change in quantity demanded}}{\text{original in quantity}} \times 100}{\dfrac{\text{change in price}}{\text{original price}} \times 100}$$

For example, suppose when the price of a good falls from Rs. 20 to Rs.19, the quantity demanded increases from 1000 units to 1100 units. In this example the percentage change in price is 5% (1/20 × 100 = 5) and percentage change in quantity demanded is 10% ($\frac{100}{100}$ × 100 = 10). Thus, value of elasticity in the case would be 10% 5% = 2.

Symbolically, if we write 'e' for elasticity of demand, 'Q' and 'P' for the original quantity demanded and the original price respectively and AQ and AP for absolute changes in quantity and price respectively, we can write the above formula in the form of the following expression.

$$e = \frac{(\Delta Q/Q)100}{(\Delta P/P)100}$$

$$= \frac{\Delta Q/Q}{\Delta P/P}$$

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

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

Normally e is negative because of negative relationship between price and quantity given other things. The value of e ranges from 0 to ∞. The shape of the demand curve will vary depending on value of e.

1. In the extreme case when there is no change in the quantity demanded in response to a price change, elasticity of demand is said to be equal to zero or demand is described as 'perfectly inelastic'. The demand curve is vertical as shown in diagram 2.1 (A).
2. On the other hand, when there is an infinite change in quantity demanded due to a change in price, elasticity of demand is said to be equal to infinity or demand for the good is described as 'perfectly elastic'. The demand curve is horizontal as shown in dig. 2.1 (B).
3. If the percentage change in quantity demanded is equal to the percentage change in price, elasticity of demand is said to be equal to be equal to one or demand for the good in question is described as of 'unit elasticity'. The demand curve is rectangular hyperbola as shown in diagram 2.1 (C),
4. It the percentage change in quantity demanded is greater than the percentage change in price, elasticity of demand is said to be greater than one or demand for the good in question is described as 'elastic'. The curve is flatter as shown in diagram 2.1 (D).

5. If the percentage change in quantity demanded is less than the percentage change in price, elasticity of demand is said to be less one or demand for the good in question is described as 'inelastic'. The curve is steeper as shown in diagram 2.1 (E).

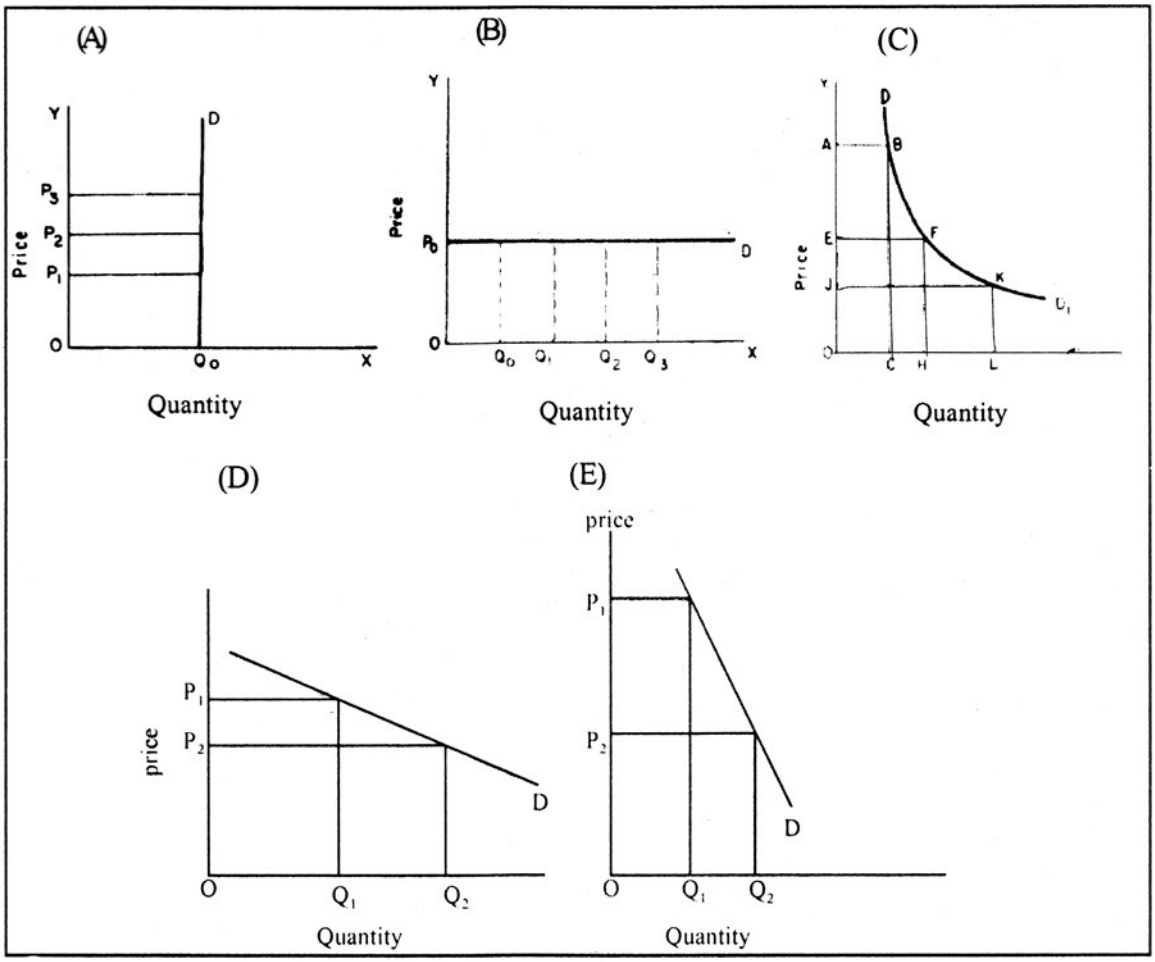


Diagram 2.1

2.2 THE PROBLEM OF MEASUREMENT

When we think of measuring elasticity of demand one method which at once suggests itself is to measure responsiveness of quantity demanded in terms of absolute changes in price and quantity demanded. However, from the nature of the problem it is evident that we cannot measure responsiveness of demand in terms of absolute changes in price and quantity demanded. For example, due to a one rupee fall in price the quantity demanded of rice may increase by 1000 quintals. But the units of measurement being different (e.g., price is measured in rupees and rice in quintals), there is no basis for comparing a rupee change in price with a 1000 quintal change in demand. On the basis of these figures we cannot say whether the change in quantity demanded is more than equal to or less than the change in the price. And, when it is a question of comparing the relative responsiveness of the quantities demanded of two or more than two goods, even equal absolute changes in their prices or quantities demanded as a measure of relative responsiveness may actually conceal more than what it reveals. For example, suppose that as a result of a Rs.5/- reduction in the prices of wheat and radios, the demand for the former expends by 10,000 quintal and the demand for the latter .expands by 500 units. Ignoring the question of incomparability of a quintal of wheat with a unit of radio, on the basis of the absolute changes in prices and quantities

we are temped to conclude that demand for wheat is more price-elastic than the demand for radios. But the given change in the prices of the two goods may not have the same significance for the consumers. Suppose the original price of wheat was Rs. 100 per quintal and that of radios was Rs.500 per set. A Rs.5 reduction out of Rs.100 is certainly a more significant price cut than the same reduction out of Rs.500. This simply means that the prices cut is 5% in case of wheat and only 1% in case of radios. Similarly, a given change in demand may be an insignificant change if the original quantity demanded was high and it would be a significant change if the original demand was small. Suppose, according to the above example, the demand for wheat expanded from 1,000,000 tons to 1,0010,000 tons and the demand for radios expanded from 10,000 to 10,500 units. This means that the demand for wheat expanded only by 1 % while the demand for radios expended by 5%. By comparing the percentage change in prices and quantities it turns out that due to a 5% fall in the price of wheat its demand expanded only by 1% whereas due to a 1% fall in the price of radios demand expanded by 5%. It is thus evident that the demand for radios is much more price-elastic than the its demand for wheat. A comparison of the absolute changes in prices and quantities had given us an entirely distorted impression. Therefore, elasticity of demand (and for that matter all elasticities) is always measured in terms of (i.e., percentage or proportionate) changes in prices and quantities demanded. These percentage changes are independent of the units of measurement. Merely by comparing the percentage changes in price and quantity demanded we can immediately say whether percentage change in demand is more than, equal to or less than the percentage change in price. *Because of the difficulties mentioned above elasticity is never measured in terms of absolute changes. It is always measured in term of relative (i.e., the proportionate or percentage) changes in price and quantity demanded. The purpose of all elasticity measures is to determine whether the percentage change in demand is more than equal to or less than the percentage change in price causing the change in the former.*

2.3 METHODS OF MEASUREMENT

We will discus three different methods of measuring elasticity of demand, namely-total outlay method, point method and arc elasticity.

(i) The Total Outlay Method

A variant of the above method is to compare the consumer's total outlay (i.e., expenditure = quantity bought x price) on the commodity after the price change with their original outlay and make qualitative statements about the value of elasticity as was done above. The logic behind this variant is very simple. When due to a price change the quantity demanded of a good change, this tends to change the total outlay of the consumers on the commodity. We know that if the percentage in the quantity demanded is greater than the percentage change in price, the total outlay of consumers will be larger than before in case of a fall in price and less than before in case of a rise in price. On the other hand if the percentage change in quantity demanded is less than the percentage change in price, the total outlay of consumers will be smaller than before in case of a fall in price and larger than before in case of a rise in price. And if the percentage change in quantity demanded is equal to the percentage change in price, the total outlay will remain constant. Making use of this simple arithmetical property economists have devised a variant of the percentage change method which is known as the *'total outlay method'*.

According to the total outlay method, instead of comparing the percentage change in quantity demanded with the percentage change in price, we simply compare the total outlay of consumers on the commodity after the price change with their original outlay and make following qualitative statements about the value of elasticity:

1. If the total outlay of consumers on the commodity after the price change (i.e.$Q_1 \times P_1$) is greater than the original outlay ($Q_0 \times P_0$) in case of a fall in price (and less than the original outlay

in case of rise in price), elasticity of demand is said to be greater than one or demand is described as'elastic'.

2. If the total outlay of consumers remains the same even after a rise or fall in price (i.e.$Q_1 \times P_1 = Q_0 \times P_0$) elasticity of demand is said to equal one or demand is described as of 'unit elasticity'.
3. If the total outlay of consumers after the price change is less than the original outlay in case of a fall in price ($Q_1 \times P_1 < Q_0 \times P_0$) and greater than the original outlay in case of a rise in price ($Q_1 \times P_1 > Q_0 \times P_0$) or the changes in the price and total outlay move in the same direction, elasticity of demand is said to be less than one or demand is described as 'inelastic'.

Let us explain the above method with a simple arithmetical example. Suppose, as the price of a commodity falls, the total outlay of consumers changes as shown in the table 2.1:

TABLE 2.1

Price	*Quantity demanded (Units)*	*Total Outlay*	*Value of elasticity*
Rs. 9	13	Rs. 117	
Rs. 8	15	Rs. 120	> 1
Rs. 6	20	Rs. 120	= 1
Rs. 5	23	Rs. 115	< 1

Elasticity of demand is said to be greater than one when total outlay on the commodity increases from Rs. l 17 to Rs. 120 due to a fall in price from Rs. 9 to Rs. 8. Alternatively, we can say that when price rises the total outlay decreases from Rs. 120 to Rs. 117. Therefore, elasticity of demand is greater than one.

Elasticity of demand is equal to unity when total outlay remains constant at Rs.120 as price falls from Rs. 8 to Rs. 6 (Or alternative when price rises from Rs. 6 to Rs. 8, the total outlay remains the same).

Elasticity of demand is less than one when due to a fall in price from Rs. 6 to Rs. 5 total outlay decreases from Rs. 120 to Rs. 115. (Alternatively, we can say that when price rises from Rs.5 to Rs.6 the total outlay increases from Rs. 115 to Rs. 120 elasticity of demand is greater than one.

Let us note that the outlay method enable us only to know whether elasticity of demand is greater than, less than or equal to one. This method does not give us the exact value of elasticity except in the unit elasticity case. The following two methods enable us to calculate the exact value of elasticity of demand.

(ii) The Graphical Method of Measuring Elasticity (Point Elasticity)

Actually this method is only a graphical version of the 'Percentage change method' discussed above. The demand curve is only a graphical representation of demand schedule. Therefore, the results obtained through the two methods must necessarily be identical. In order to illustrate how value of elasticity is measured with the help of a demand curve, we draw a straight-line demand curve such as TS in the diagram 2.2.

According to diagram 5.2 when price falls from AR to BD, quantity demanded increases from OA to OB. Thus, the change in quantity demanded (ΔQ) is equal to AB (or CD), the change in price (ΔP) is CR, while the original quantity demanded (Q) is OA and the original price (P) is AR. According to the percentage method the elasticity of demand,

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

In terms of the above diagram we have:

$$e = \frac{AB}{CR} \times \frac{AR}{OA}$$

$$= \frac{CD}{CR} \times \frac{AR}{OA} \text{ (because AB = CD)}$$

$$= \frac{AS}{AR} \times \frac{AR}{OA} \text{ (because RCD and RAS are similar triangles).}$$

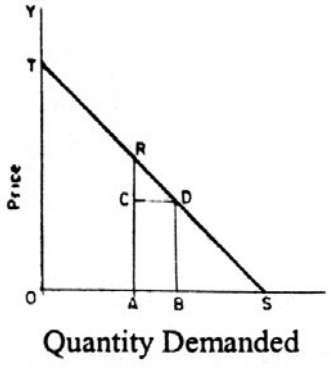


Diagram 2.2

Therefore,

$$= \frac{CD}{CR} \times \frac{AS}{AR}$$

$$= \frac{AS}{OA}$$

$$= \frac{RS}{TR} \text{ (because AR, being parallel to OT, divides OS and TS in the same ratio)}$$

Note that in the fraction $\frac{RS}{TR}$ the numerator RS is the lower segment and TR is the upper segment of the straight-line demand curve which meets the two axis in T and S. Therefore, for measuring elasticity at any point on a downward sloping straight-line demand curve which meets the two axis, we can devise a rule of thumb and say *that value of elasticity at any point on a downward sloping straight-line demand curve which meets the two axis is equal to the lower segment divided by the upper segment of the demand curve.*

(iii) 'ARC' Elasticity

We must study arc elasticity because of the problem of a sang in the elasticity expression ($e = \Delta Q/ \Delta P.P/ Q$) which was derived above. The fraction Q/ P is the rate of change of Q per unit change in P but it does not specify whether the change in P is small or relatively large. When ΔP is relatively large it creates a range of prices (and quantity demanded associated with each price) thus, giving birth to a number of P/Q; ratios. For example, in the diagram 2.3 opposite the fall in price from P_0 to P_1creates a number of P/Q ratios such as

$$\frac{P_0Q_0}{OQ_0}, \frac{P_2Q_2}{OQ_2}, \frac{P_3Q_2}{OQ_2}, \frac{P_1Q_1}{OQ_1}$$

etc. and so on. In other words, we have a different P/Q ratio at each point over the stretch

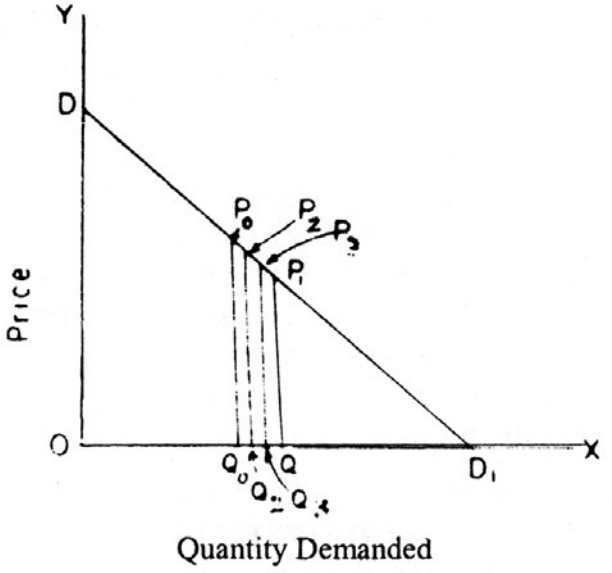


Diagram 2.3

of the demand curve P_0P_1. Which one of the several P/Q ratios occurring over the stretch P_0P_1 to choose for calculating the value of elasticity? This is one problem. Secondly, the fraction $\Delta Q/\Delta P$ will be the same for a finite as well as for an infinitesimally small change in P over a whole price range only when the rate of change of Q per unit change in P is constant over the relevant price range (i.e., when the given segment of the demand curve is a straight line) From the above the following conclusions follows:

A. In case of a straight line demand curve (so that $\Delta Q/\Delta P = dQ/dP$ throughout) value of elasticity ($e = dQ / dP. P/Q$) will normally vary from one point to another (because of the variations in the value of the ratio P/Q) except in the following two cases:

I. When $\Delta Q/\Delta P = dQ/dP$ = zero, i.e., in case of a vertical demand curve along which quantity demanded does not vary at all in response to price changes. The elasticity of demand will be zero (i.e., $dQ/dP \times P/Q$ = zero) at all points. Such a demand curve is described as 'perfectly inelastic'. It is vertical and runs parallel to the Y axis as shows in the diagram 2.4 (A).

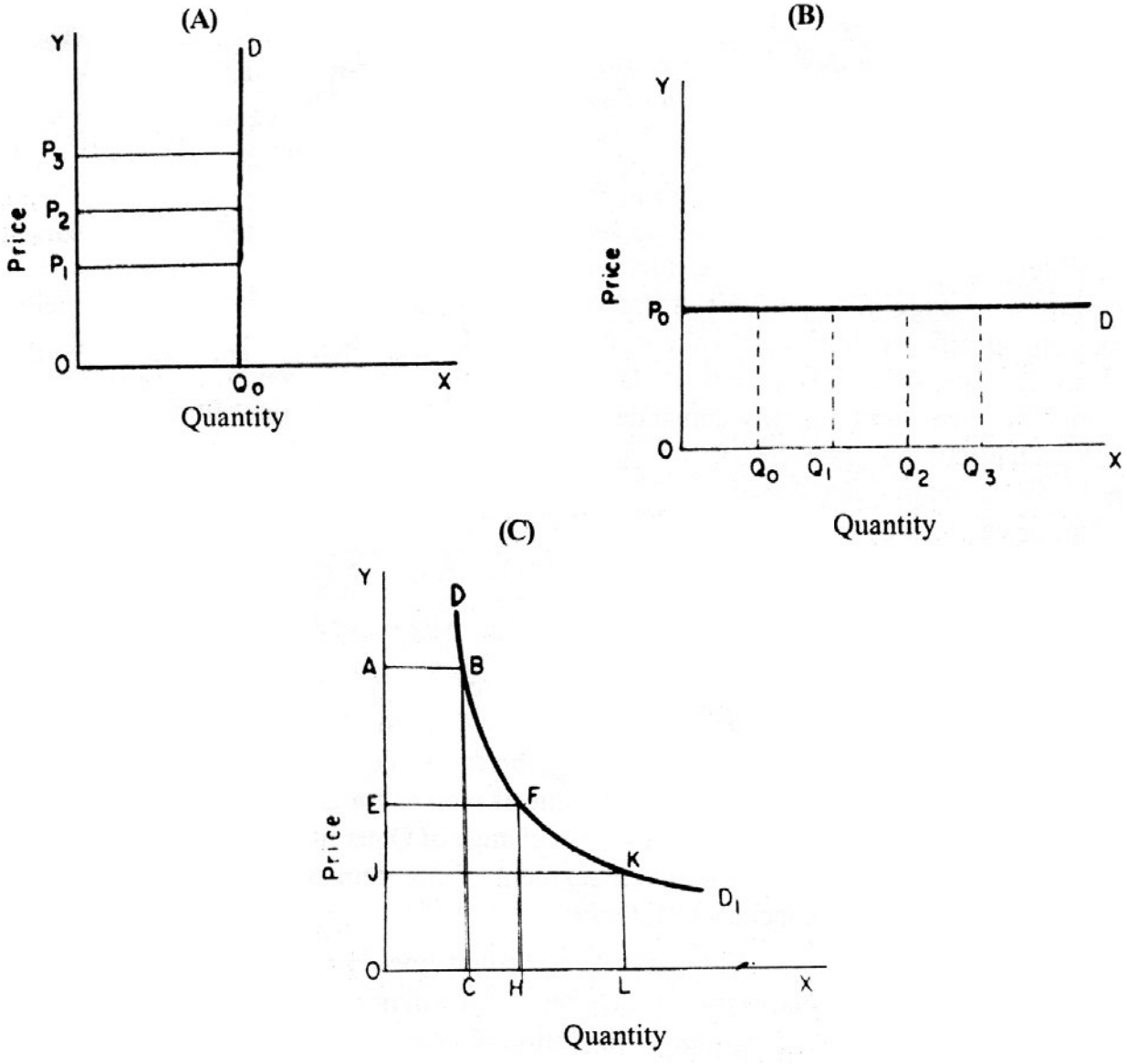


Diagram 2.4

According to this diagram quantity demanded remains constant a OQ_0 whether the price is zero or OP_1 or OP_2 or OP_3 or anything else.

II. When $\Delta Q / \Delta P = dQ/dP$ (infinity), i.e., in a case in which an infinite amount of a commodity is bought at a certain price and nothing at all at any slightly higher price. Such a demand curve will be horizontal and parallel to the X axis as P_0D in the diagram 2.4 (B).

According to diagram 2.4 (B), an infinite amount of the commodity is brought at P_0 price and nothing at all at any higher price. Such a demand curve is known as 'perfectly elastic'.

B. In case of a non-linear demand curve, in addition to the variations in the value of the ratio P/Q, the value of the ratio $\Delta Q / \Delta P$ will also be different for a relatively large (finite) change in P and for an infinitesimally small change in P. Therefore, in case of a non-linear demand curve value of elasticity will normally vary from one point to another except when dQ/dP . P/Q always equals 1.

A demand curve with unit elasticity at all points is of the shape of a rectangular hyperbola as shown in the diagram 2.4 (C).

It is the peculiar property of a rectangular hyperbola that the areas of all the rectangles subtended through different points on it are all equal. Thus, in the diagram above ABCO-EFHO-JKLO, etc. What do these rectangles represent? They only represent the total outlays. For example, the area the rectangle ABCO is calculated by multiplying OC (the quantity demanded) by BC (the price) which is nothing but the total outlay. Similarly the areas of rectangles EFHO and JKLO would represent total outlays at prices FH and KL. All these outlays are equal when the elasticity of demand is unity at all points along the demand curve.

In case of all other non-linear demand curves the value of elasticity varies from one point to another.

The Concept of Arc Elasticity

The moral of the above discussion is this: When there is a relatively large (finite) change in P, it creates a price range over which value of elasticity normally varies from one point to another except the special cases mentioned above. In such a case no unique value of elasticity can be taken as the elasticity of the whole price range (i.e., the given segment of the demand curve). In order to take care of this problem we use the concept of 'arc elasticity'. Arc elasticity is a measure of the average responsiveness of Q to relatively large (finite) changes in P (or average responsiveness to price change exhibited by a demand curve over a finite stretch such as P_0P_1 in the diagram 2.5).

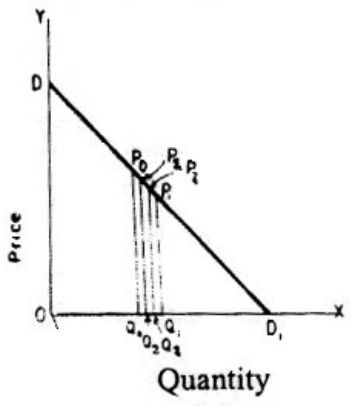


Diagram 2.5

Method for Measuring Arc Elasticity

For measuring arc elasticity, instead of picking up any particular P and the Q associated with it for the ratio P/Q, it is customary to fix $P = \frac{P_1 + P_0}{2}$ (i.e., the average of the two end values P_0 i.e, original price and P_1 i.e., changed price and similarly to fix $Q = \frac{Q_1 + Q_0}{2}$ (i.e., average of the two end values Q_0 i.e., the original quantity and Q_1 i.e., changed quantity. Hence arc elasticity is defined by the following expression:

$$\text{Are elasticity of demand} = \frac{\Delta Q}{\Delta Q} \times \frac{P}{Q}$$

$$= \frac{Q_1 - Q_0}{P_1 - P_0} \times \frac{\frac{P_1 + P_0}{2}}{\frac{Q_1 + Q_0}{2}}$$

$$= \frac{Q_1 - Q_0}{P_1 - P_0} \times \frac{P_1 + P_0}{Q_1 + Q_0}$$

Let us illustrate the method for measuring arc elasticity with a simple numerical example. Suppose, due to a fall in the price of a commodity from Rs. 10 to 8 per unit the quantity demanded of it increases from 1000 units to 1500 units. What will be the value of arc elasticity in this case? Let us translate these figures in symbols of the above expression.

According to the example $P_0 = 10$, $P_1 = 8$, $Q_0 = 1500$, ΔQ (i.e., $Q_1 - Q_0$) = 500 and ΔP (i.e., $P_1 - P_0$) = 2.

$$\text{Arc elasticity of demand} = \frac{Q_1 - Q_0}{P_1 - P_0} \times \frac{P_1 + P_0}{Q_1 - Q_0}$$

$$= \frac{1500 - 1000}{10 - 8} \times \frac{8 + 10}{1500 + 1000}$$

$$= \frac{500}{2} \times \frac{18}{2500} = 1.8.$$

Had we used either of the two end values of P and Q in the ratio P/Q (i.e., either P_0/Q_0 or P_1/Q_1) we would have obtained different results. For example, if we had calculated value of elasticity on the basis of the ratio P_0/Q_0 (i.e., 10/1000), ΔQ / ΔP remaining the same (1500 – 1000 / 10 – 8), its value would have equalled 2.5. $\left| \frac{1500 - 1000}{10 - 8} \times \frac{10}{1000} = \frac{500}{2} \times \frac{10}{1000} \right|$. On the other hand, if we had calculated value of elasticity on the basis of the ratio, P_1/Q_1 (i.e., 8/1500), ΔQ / ΔP remaining the same, its value would have equalled 1.33. $\left| \frac{1500 - 1000}{10 - 8} \times \frac{8}{1500} = \frac{500}{2} \times \frac{800}{1500} = 1.33 \right|$ Thus, we get different values of elasticity according to the ratio P/Q we choose. It is 2.5 when we calculate value of elasticity on the basis of P_0/Q_0 (= 10/1000), 1.33 when we calculate it on the basis of P_1Q_1 (8/1500) and 1.8 when we calculate the elasticity on the basis of $\frac{\frac{P_1 + P_0}{2}}{\frac{Q_1 + Q_0}{1}}$. The values 2.5 and 1.33 are the extreme values of elasticity of the price P_0P_1 (the arc or the given stretch of the demand curve). On the other hand, are elasticity (= 1.8 in the present case) does not measure responsiveness of demand with reference to a particular P/Q (at any particular point) but in fact represents the approximate average responsiveness of demand over a finite price range (or a given stretch) of the demand curve.

METHOD FOR MEASURING POINT ELASTICITY ON A NON-LINEAR DEMAND CURVE

The value of elasticity at any point on a straight-line demand curve is given by the fraction: right hand side segment of the demand curve from the given point divided by the left-hand side segment. Also,

as explained above, at the point of tangency of a straight-line tangent with a non-linear curve the values of the two terms P/Q and dp/dq are the same on the tangent as well as the curve. From this it follows that at the point of tangency the value of elasticity on the straight-line tangent as well as on the curve will be same. Therefore, in order to measure elasticity at any point on a non-linear demand curve, we draw a straight-line tangent to it at that point meeting the two axes at T and R. The value of elasticity on the straight-line tangent at the point of tangency is also the value of elasticity on the non linear demand curve at that point. For example, in the diagram 2.6 DD_1 is a non-linear demand curve and TR has been drawn tangent to it at P. The value of elasticity at P on DD_1 is given by the fraction $\frac{PR}{PT}$.

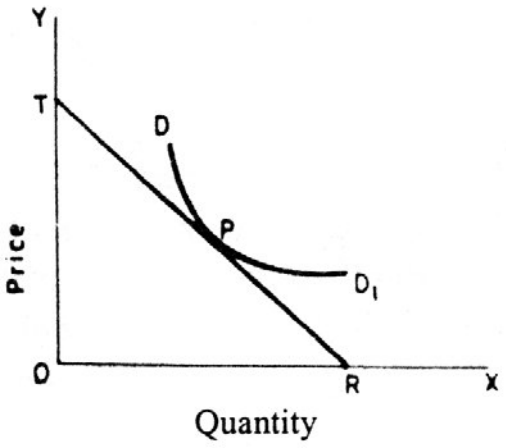


Diagram 2.6

Note Regarding the Sign of the Elasticity Coefficient

An important point about the sign of the elasticity coefficient needs to be mentioned here. Elasticity coefficient is calculate d by multiplying. According to the law of demand price and quantity demanded are inversely related, that is, the two move in opposite directions. When price falls quantity demanded increases, and vice-versa. From this it follows that if the change in one is a positive quantity the change in the other must be a negative quantity. For example, if due to a fall in price from Rs. 10 to Rs. 8 quantity demanded increases from 100 to 120 units, the change in price will be a negative quantity (–2) and the change in quantity will be positive quantity (+20). Hence in all normal cases the Q/P must be a negative fraction and as a result in all normal cases the elasticity coefficient must have a negative sign. Only in the unlikely case i.e. in case of 'giffen good', when price and demand move in the same-direction, however, elasticity coefficient will be a positive fraction. *Conventionally, however, when price and quantity behave in the normal manner (i.e., move in opposite directions in accordance with the law of demand) elasticity coefficient is taken to be a positive fraction and in the abnormal case (when price and quantity more in the same direction) elasticity coefficient is taken to be a negative fraction. Therefore, the sign of the elasticity coefficient should be carefully marked and its significance should be accordingly interpreted.*

2.4 FACTORS DETERMINING ELASTICITY OF DEMAND FOR DIFFERENT GOODS

The price-elasticity of demand varies from commodity to commodity. The demand for certain commodities is highly elastic while the demand for some other commodities is less elastic or highly inelastic. This is because a number of factors influence elasticity of demand for different goods. It is not possible to discuss all such factors here. Below we mention only some of the more important factors which determine elasticity of demand for different goods.

(*i*) *Availability of Close Substitutes:* One of the most important factors determining elasticity of demand for a good is the availability of close substitutes. Some commodities like tooth paste, shaving blades, soaps, shoe polish, etc., have a number of quite close substitutes (i.e., different brands). If the price of a particular brand of tooth paste (say, Forhan's) change, price of other brands of tooth paste remaining constant; it is likely to cause substantial substitution-a fall in price leading consumers to buy more of it and a rise in the price leading consumers to buy more of the other brands. Therefore, elasticity of demand for a good which has several close substitutes is bound to be high. On the other hand, elasticity of demand for goods which

have few or no satisfactory substitutes is bound to be inelastic. Salt, for example, has hardly any substitute for it. Therefore, elasticity of demand for salt is inelastic.

(*ii*) *Character of the commodity:* Elasticity of demand depends also upon the character of the good-whether it is considered a necessity or a luxury by the consumers. The demand for necessities of life is usually inelastic while the demand for luxuries tends to be highly elastic. The demand for a staple food is likely to be insensitive to price changes because when its price rises a consumer has no alternative but to continue buying it. On the other hand, luxury goods can be easily dispensed with when their prices are high. Therefore, demand for necessities of life is usually inelastic while the demand for luxuries is highly elastic.

(*iii*) *Level of Price:* At very high and at low prices elasticity of demand is usually very low. If the price of a commodity is very high or very low a slight change in it will not effect its demand significantly. Pencils, for example, which are already selling at low prices will not be purchased in larger quantities if prices fall still lower. On the other hand, slight fall in the price of cars, for example, will not bring them within the reach of average consumers. Cars will still be purchased only by the rich who, in any case, buy them whether the price is somewhat higher or lower. Therefore, elasticity of demand is usually low at very high and at very low prices.

(*iv*) *Importance of the commodity in the consumer's budget (i.e., the proportion of income spent on the commodity):* When a commodity claims only a small fraction of a consumer's income, he makes no great effort to look for substitutes when its price rises. For example, one normally spends a very small amount of money on goods like match boxes, salt, shoe polish, newspapers, etc. When the price of such a good rises it will not affect the consumer's budget significantly and consequently he is not inclined to change its consumption very much. The demand for such a good is bound to be relatively inelastic. On the other hand, when a good claims a fairly large fraction of a consumer's income, as for instance with most groceries, a rise in price will affect the consumer's budget significantly. This will compel him to look for some cheaper substitute and somehow cut down his expenditure on the commodity in question. Therefore, the demand for a good on which a consumer speeds a large proportion of his income is likely to be relatively more elastic as compared to another goods on which a consumer spends a small amount.

(*v*) *The possibility of new customers entering the market:* When the price of a commodity is high only the relatively rich people can afford to buy it. But as the price gradually falls, it becomes accessible to new customers who could not afford to but it when price was high. Thus, with each fall in price more and more new customers are induces to buy the commodity. Hence a fall in price which induces consumers in several income-groups to buy will result in a considerable elasticity of demand.

(*vi*) *Possibility of postponing purchases:* The elasticity of demand for a good also depends on whether or not its purchases can be postponed if the situation so demands. The demand for consumer durables such as furniture, refrigerators, television sets and less essential items can usually be postponed for better time in future. The demand for a good the purchase of which can be easily deferred to future is likely to be more elastic as compared to the demand for a good the purchase of which cannot be postponed. For this reason the demand for commodities such as medicines, education, necessities of life, etc. is usually very inelastic.

(*vii*) *The period of time under consideration:* In the event of a rise in price of a good a consumer's real income is reduced and he is compelled to readjust his consumption pattern. He does so by changing his consumption habits and by finding cheaper substitutes. Since it takes time to find suitable substitutes and to change one's consumption habits, elasticity of demand for

any good will tend to greater the longer the period of time allowed for these adjustments. Elasticity of demand for a good will tend to be lower shorter the period of time under consideration.

Finally, let us note that a number of factors may be in operation in making the elasticity of demand for a good what it is. For example, salt is a necessity of life, it has no substitute for it, is sells cheap and therefore, claims a very small fraction of one's income, its consumption cannot be postponed either. Thus, more than one factor account for the low elasticity of demand for salt. Therefore, in order to explain the magnitude of elasticity in any particular case, it is necessary to look for all the possible factors that may influence the demand for the good in question.

2.5 CROSS ELASTICITY AND INCOME ELASTICITY OF DEMAND

So far in our discussion we have been concerned with the responsiveness of demand to changes in the price of the good itself i.e. price elasticity of demand. However, the demand for a commodity depends on a number of other factors besides price of the good. The more important and quantifiable among these factors are price of related goods and incomes of the consumers. Just as we measure responsiveness of demand to change in the price of a good, similarly we can measure responsiveness of demand for a good to changes in the incomes of the consumers and to changes in the price of a related good. A measure of the degree of responsiveness of the demand for a good to changes in the incomes of the consumers is known as the "income-elasticity of demand". And a measure of the degree of responsiveness of demand for a good X to changes in the price of some other related good Y is described as the 'cross-elasticity of demand'.

Method for Measuring Income-elasticity of Demand

The same percentage or proportionate change method is used to measure income-elasticity of demand for a good. The formula is:

$$\text{Income-elasticity of demand for a good} = \frac{\%\text{ change in the demand for X}}{\%\text{ change in Income of consumer}}$$

Suppose, for instance that due to a 20% increase in the real incomes of the consumers the demand for television sets increases by 10%. In this example income-elasticity of demand for television sets equals 0.5 (i.e., 10% – 20 = 0.5). Normally, an increase in the consumer's incomes tends to increase the demand for most goods except what are known as 'inferior goods'. In case of inferior goods an increase in the incomes of the consumers tends to reduce demand for them and a decrease in incomes tends to increase demand for them. As a matter of convention value of income-elasticity of demand is taken to be positive when the demand for a good behaves in the normal manner in response to changes in income-increase in incomes leading to increase in demand and a decrease in incomes leading to a decrease in demand. In the abnormal case (i.e., in case of an inferior good) when incomes of consumer increase demand for a good decreases and vice versa, value of income-elasticity of demand is taken to be negative.

Method for Measuring Cross-elasticity of Demand

The same percentage change method is used to measure cross-elasticity of demand. Suppose X and Y are two related goods and we want to measure the cross-elasticity of demand for X with respect to changes in the price of Y. The formula for measuring cross-elasticity of demand is:

$$\text{Cross-elasticity of demand for X} = \frac{\%\text{ change in the demand for X}}{\%\text{ change in the price of Y}}$$

For example, suppose X and Y are two substitute goods and a 10% reduction in the price of Y causes the demand for X to increase by 15%. In this case the cross-elasticity of demand for X ' will equal 15% ÷ 10% =1.5. Goods may also be related to each other as complements. In case of complementary goods a reduction in the price of one will cause the demand for the other complementary good to increase. Thus, in case of substitute goods price of one good and the demand for the other good move in the same direction whereas in case of complementary goods they move in opposite directions. However, as a matter of convention value of cross-elasticity is taken to be positive when price and demand move in the same direction (as is the case with substitute goods) and value of cross-elasticity is taken to be negative when price and demand move in opposite directions (as is the case with complementary goods). In other words, value of cross-elasticity of demand is treated as positive in case of substitute goods and negative in case of complementary goods. Thus on the basis of the value of the cross elasticity of demand, we may find out whether the two goods are related to each other as substitutes or complements and what is the degree of substitutability and complementarily between them.

2.6 SOME INTERESTING ELASTICITY THEOREMS

1. Value of point elasticity varies from zero to infinity along a downward1 sloping straight line demand curve.

Proof:

$$e = dq/dp.\ P/O$$

DD being a straight line, its slope (dp/dq) and hence its reciprocal, the ratio (dq/dp) is constant at all points. The ratio P/Q varies from zero to infinity (α) along DD_1 . P/Q = zero at D1 where DD_1 meets the quantity axis and at D where it meets the price axis. Therefore, e = zero at D_1 (where P/ Q = zero) and at D (where P/Q = α) At the middle point A on the demand curve DD_1, the elasticity of demand will be unity (e = 1) because lower segment AD_1 of the demand curve is equal to the upper segment AD of the demand curve. On any point, say, B, above the mid-point A on the demand curve DD_1, the elasticity of demand will be more than one (e > 1) because BD_1 > BD. On the other hand, the elasticity on any point say C, which lies below the mid-point A on the demand curve DD_1, the elasticity of demand will be less than one (e < 1) because CD_1 < CD. In other words, as we move towards D_1, the elasticity of demand goes on decreasing because the lower segment of the demand curve becomes smaller and smaller and the upper segment will be increasing. At point D_1 the elasticity will become zero because at D_1, the lower segment will be equal to zero and the upper segment will be the whole DD_1.

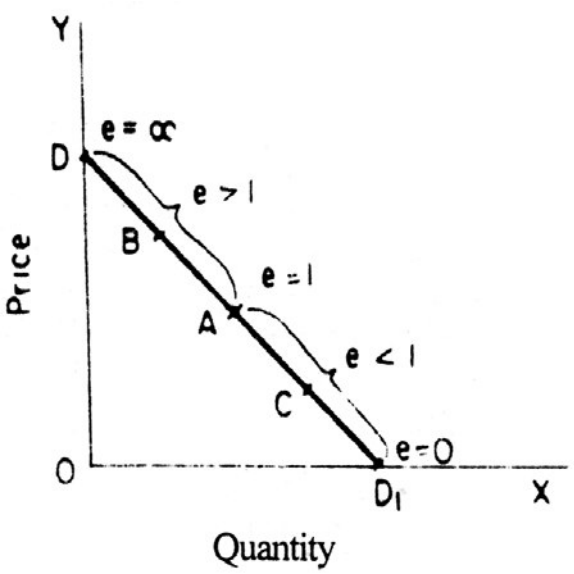


Diagram 2.7

2. Elasticity at different points along two (or more) parallel (i.e., having the same slope) demand curves.

A. Of the two (or more) parallel demand curves, the one farther from the origin is less elastic at each price than the one closer to the origin.

Proof: $e = \frac{dq}{dp} \times \frac{P}{Q}$

Being parallel the value of dq/dp is the same at all points along D_1D_2 and D_2D_2 but the ratio P/Q is smaller at each price on D_2D_2 than D_1D_1 e.g.

Therefore D_2D_2 is less elastic at each price than D_1D_1. From this also follows the conclusion that parallel rightward shift of a downward sloping demand curve makes it less elastic at each price and a parallel leftward shift makes it more elastic at each price.

B. The one farther form origin is more elastic at each level of demand than the one closer to the origin.

Proof: $e = dq/dp \cdot P/Q$

In the diagram 2.8, being parallel the ratio dq/ dp is the same at all point along D_1D_1 and D_2D_2. But the ratio P/Q is greater at each level of demand along D_2D_2 than D_1D_1 (e.g., $P_2Q/OQ > P_1Q/OQ$). Threrefore, D_2D_2 is more elastic at each level of demand than D_1D_1.

C. Have the same elasticity at points lying along a straight line drawn from the origin (0)

Proof: $e = \frac{dq}{dp} \times \frac{P}{q}$

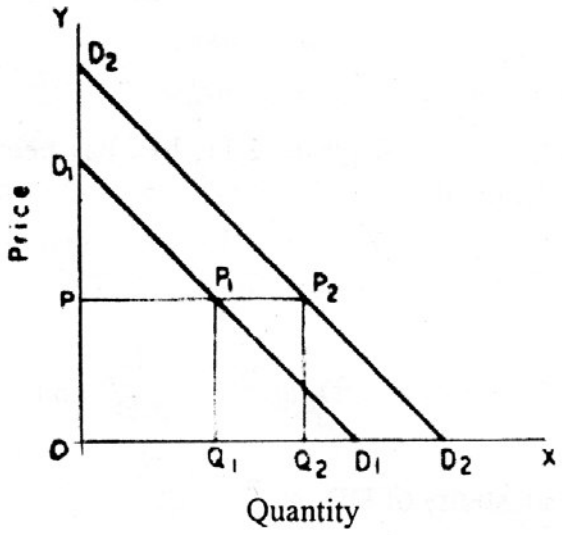


Diagram 2.8

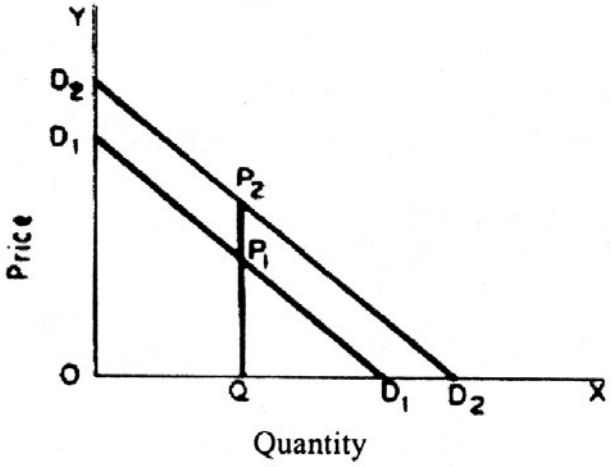


Diagram 2.9

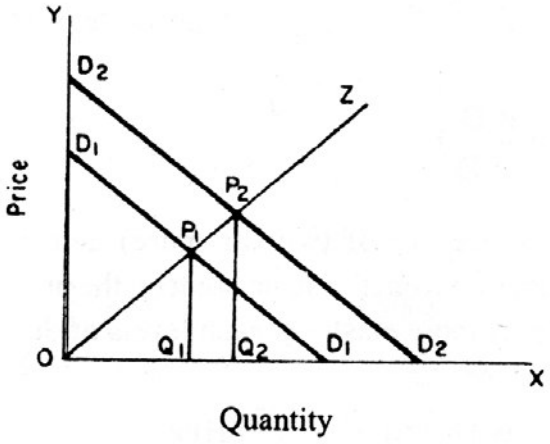


Diagram 2.10

In the diagram 2.9, being parallel the ratio dq./dp is the same at all points along D_1D_1 and D_2D_2. The ratio P/Q is also the same at all points along OZ because the two triangle OQ_1P_1 and OQ_2P_2 are similar and therefore,

the ratio = $\frac{P_qQ_1}{OQ_1} = \frac{P_2Q_2}{OQ_2}$

Therefore, elasticity of two (or more) parallel demand curves at points lying along a straight line drawn from the origin(0) is the same.

3. Value of elasticity of downward sloping straight-line demand curves originating from the same point on the price axis.

(i) Are iso elastic at each price

Proof: In the diagram 2.11, PP_2 has been drawn parallel to OD_2.

Therefore, $\frac{P_2D_2}{P_2D} = \frac{P_1D_1}{P_1D} = \frac{OP}{PD}$

Elasticity of DD_2 at P_2 = $\frac{P_2D_2}{P_2D}$ and

Elasticity of DD_1 at P_1 = $\frac{P_1D_1}{P_1D}$

Therefore, elasticity at P_2 and P_1 is the same.

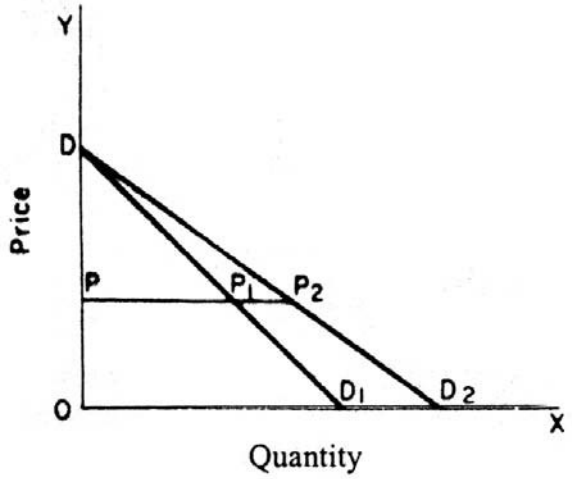


Diagram 2.11

(ii) The flatter is more elastic at each level of demand than the steeper one.

Proof: In the diagram 2.12 P_2Q being paralleled to OD, $\frac{P_1D_1}{P_1D} = \frac{QD_1}{OQ}$ and $\frac{P_2D_2}{P_2D} = \frac{QD_2}{OQ}$. Comparing the two ratios $\frac{QD_2}{OQ}$ and $\frac{QD_1}{OQ}$ we find that $\frac{QD_2}{OQ} > \frac{QD_1}{OQ}$.

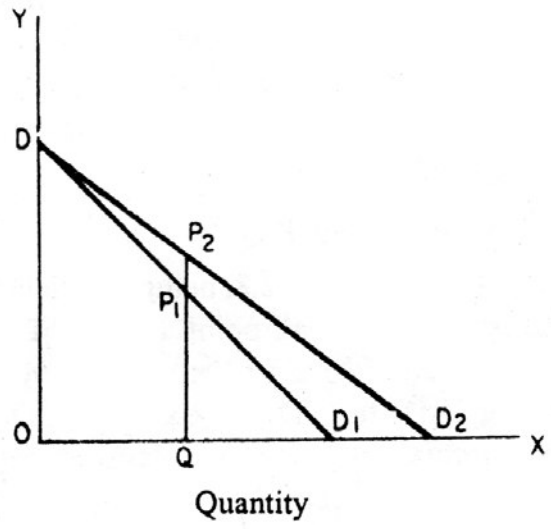


Diagram 2.12

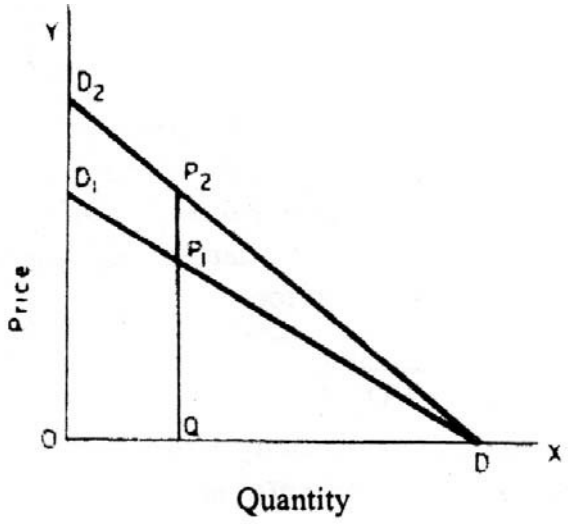


Diagram 2.13

Therefore, $\frac{P_2D_2}{P_2D} > \frac{P_1D_1}{P_1D}$. Hence value of elasticity at $P_2 \left(= \frac{P_2D_2}{P_2D} \right)$ is greater than value of elasticity at $P_1 \left(= \frac{P_1D_1}{P_1D} \right)$.

Therefore of two (or more) demand curves originating from the same point on the price axis, the flatter is more elastic at each levels of demand than the steeper one.

4. Downward sloping straight-line demand curves meeting the quantity axis at the same point have the same elasticity at each level of demand.

Proof: In the diagram 2.13 since P_2Q is parallel to OD_2 therefore, $\frac{P_2D}{P_2D_2} = \frac{P_1D}{P_1D_1} = \frac{QD}{OQ}$.

Elasticity at $P_2 = \frac{P_2D}{P_2D_2}$ and elasticity at $P_1 = \frac{P_1D}{P_1D_1}$. Hence elasticity at P_2 = elasticity at P_1.

Therefore, D_1D and D_2D have the same elasticity at each level of demand.

5. Of the two (or more) intersecting straight-line demand curves the flatter one is more elastic at the point of intersection, than the steeper one.

In the diagram 2.14, at P the ratio P/Q is the same for D_1D_1 as well as D_2D_2. Therefore, value of elasticity will vary only with the value of dq/dp along the two curves. Value of dq/dp is larger at each point along D_2D_2. (i.e the flatter curve) than along D_1D_1 (i.e., the steeper of two). Therefore elasticity of D_2D_2 at P is greater than elasticity of D_1D_1 at the same point p.

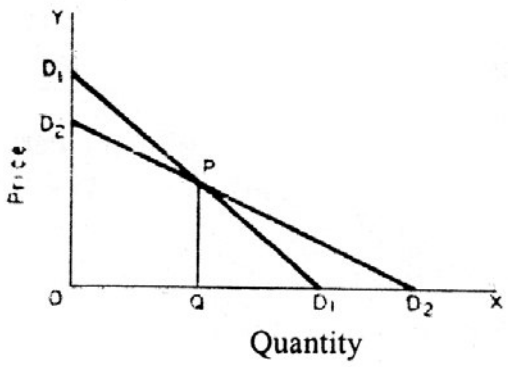


Diagram 2.14

2.7 ELASTICITY OF SUPPLY

Elasticity of supply is defined as the degree of responsiveness of quantity supplied to change in the price of the commodity. The percentage formula for measuring the elasticity of supply in given as

$$es = \frac{\text{percentage change in quantity suplied (Qs)}}{\text{percentage change in price (P)}}$$

$$= \frac{\frac{\Delta Qs}{Q} \times 100}{\frac{\Delta P}{P} \times 100}$$

$$= \frac{\Delta Qs}{\Delta P} \cdot \frac{P}{Qs}$$

Elasticity of Supply varies from 0 to ∞.

(1) If e_s is 0 then supply is perfectly inelastic. The supply curve is vertical in this case.

(2) If e_s is ∞ then supply is perfectly elastic and the supply curve is horizontal.

(3) If $e_s > 1$, then supply is elastic and the supply curve passes through price (vertical) axis.

(4) If $e_s < 1$, then supply is inelastic and the supply curve cuts the quantity (horizontal) axis.

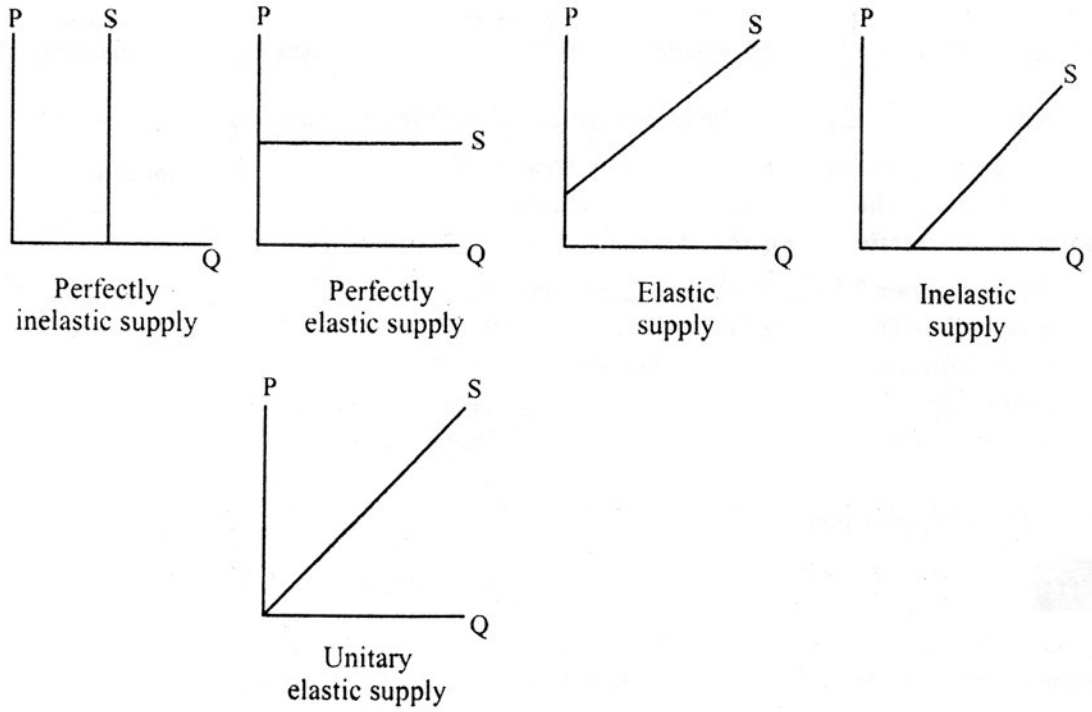


Diagram 2.15

(5) If $e_s = 1$, then supply is unitary elastic and the supply curve originates from the origin. See diagram 2.15 given above.

LESSON 3

SOME APPLICATIONS OF DEMAND & SUPPLY

3.1 PRICE CONTROL AND RATIONING

Often, in view of shortages due to natural or man made factors, government try to hold down prices of essential commodities by fixing 'price ceilings'. At present our government is trying to control the rate of inflation by imposing price controls on a wide range of commodities. What would you expect to be the consequences of fixing some prices by law rather than allowing them to be determined by the market forces of supply and demand?

The purpose of fixing a maximum price is to prevent price from rising above some desired level. However, it does not prevent it from falling below the desired level. It is evident that if the legally fixed maximum price is above the equilibrium price, it will have no effect either on the quantity or the price. This can be clearly seen from the diagram 3.1.

The equilibrium price is p_0. If the maximum price is fixed at a level higher than p0, say at p_1, there is nothing to prevent it from falling to the equilibrium level. In such a case, the market price will stay at its equilibrium level. On the other hand, if the maximum price is fixed at a level lower than the equilibrium level, say at p_2 then the equilibrium price will no longer be legally obtainable in the market. At this price suppliers will offer to supply q_1 quantity of the commodity whereas buyers will be willing to buy q_2 quantity. In other words, excess demand equal to the excess of q_2 over q_1 will emerge.

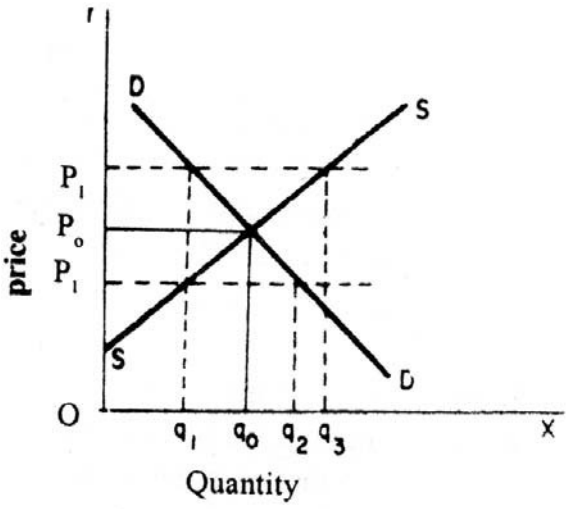


Diagram 3.1

In a situation of excess demand, unless the available supply is allocated to purchasers through some method of rationing, they will try "to compete away the limited supply by offering higher prices. Therefore, in the absence of strictly enforced rationing, a black market will develop in which the commodity will sell at a price higher than the legally fixed price. Normally, what happens is that even in the presence of strict rationing measures some of the limited supply is sold at the controlled price and some at the black market price.

3.2 RENT CONTROL—AN ILLUSTRATION

With the objective of ensuring residential accommodation at a reasonable rent, governments very often

pass legislation fixing maximum rents for private accommodation. For example in Delhi we have a Rent Control Act in operation. The peculiar feature of built houses is that in the short period their 'supply is fixed-completely inelastic-since once rental houses are built the owners have no alternative but to let them out for whatever rent is available. As shown in the diagram 3.2, in the short run the effect of rent control, which reduces market rent from p_0 to p_1, is to create a shortage because the quantity demanded increases from q_0 to q_1, whereas the supply remains unchanged.

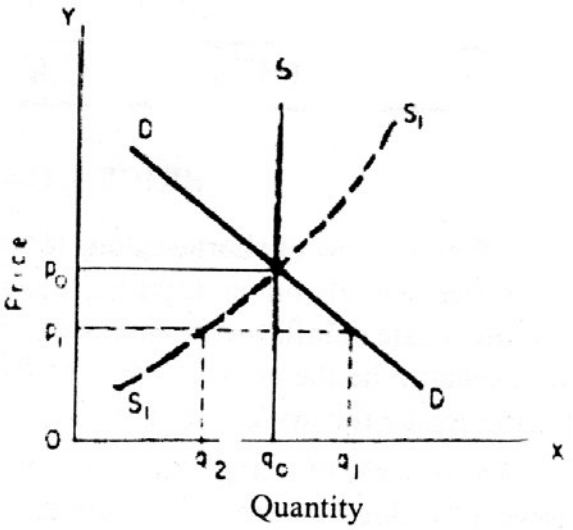


Diagram 3.2

However, with the passage of time, the lower return on rental housing will cause the supply to shrink. Because of the lower return, new rental houses will not be built and old houses will not be maintained properly. In fact, if the legally fixed rent is below the cost of maintenance, landlords may simply abandon their buildings to let them collapse with decay. As a result, the supply curve will become much more elastic as years pass by as S_1S_1, in the diagram above. When supply becomes elastic, supply adjusts to the new situation and becomes equal to q_2. As a result, shortage increases further from q_0 q_1 to q_2 q_1.

In a situation of shortage of houses, tenants would compete for the available supply by offering higher rents. Since this is not legally permissible, landlords find it convenient to charge lump sum amounts as 'entrance fee' (as pugree) from new tenants. When this becomes possible, there is also an incentive for the landlords to evict sitting tenants with the objective of charging pugree from new tenants.

3.3 MINIMUM PRICE LAWS

Sometimes, with a view to protecting the interests of certain sections of society, it becomes necessary for the government to pass laws fixing minimum price below which certain goods and services cannot be bought and sold. Minimum wages laws for different categories of labour, support prices in agriculture, resale price, etc. are some examples.

It is evident that the need for fixing minimum prices arises only when the free market price is considered to be lower than the desired price. Therefore, fixing a price lower than the free market price would be meaningless and ineffective. The free-market price in the case would be compatible with the minimum price law. On the other hand, when the minimum price is fixed above the free-market price, in that case the latter price is not legally obtainable in the results in the market. As already explained, in section I above, a price higher than the equilibrium price results in the emergence of excess supply-suppliers ready to offer for sale more of the commodity than purchasers are willing to purchase. In other words, there emerges a shortage of buyers and suppliers try to attract buyers in various ways such as price cutting, finding loopholes in laws or flouting them altogether. For example when minimum wages are fixed for certain categories of labour, it will create unemployment which will induce workers to offer their services for less than the legally fixed wage. Very often we hear complaints that private schools in Delhi pay much less salaries to teachers than what they are made to sign in the account books. It is a general practice in smaller establishments such as shops, small factories, workshops, etc.

3.4 INCIDENCE OF COMMODITY TAXES

Taxes on commodities, (or indirect taxes) such as sales taxes, excise duties, import and export duties,

etc., are major source of revenue for most government in capitalist economies. What does our price theory predict about the effects of such taxes on the quantities and prices of taxed goods? Who really pays the tax-the buyer or the producer?

The immediate effect of a commodity tax is to shift the whole supply curve upward vertically by the amount of the tax as shown in the diagram 3.3. In this diagram, consequent upon imposition of a tax equal to $p_0\ p_2$ per unit, the original supply curve SS shifts to S_1S_1. The new supply curve S_1S_1 shows that compared to the pretax position each quantity is now supplied at a higher price because a part of the price is now taken by the government as tax. The new supply curve S_1S_1 intersects the demand curve at new point determining p_1 as the price and q_1 as the quantity sold. Thus imposition of a tax on a commodity leads to partly a rise in price and partly to a reduction in the quantity bought and sold. It should be noted carefully that the price paid by the purchasers rise by less than the amount of tax (= p_0p_1) and the net of tax price received by the producers falls by p_0p_3. In other words, purchasers pay p0p1 part of tax per unit and the producers pay p_0p_3 part of the tax per unit. The term "incidence of a tax" means who actually pays the tax. In the present case the incidence of the tax is borne by the purchasers and the producers in the ratio of p_00_1 to p_0p_3.

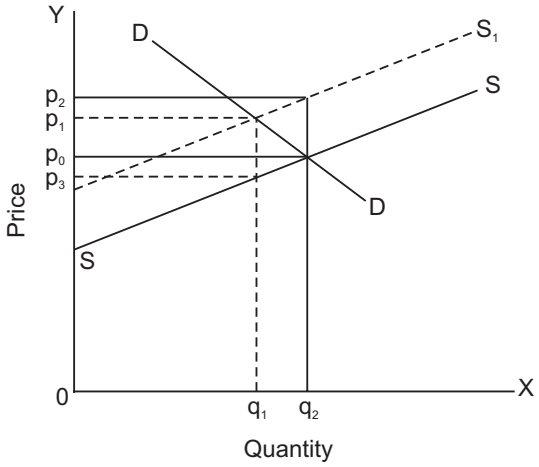


Diagram 3.3

Normally, we would expect the price to rise by less than the amount of the tax when the supply and demand curves are not perfectly inelastic or elastic. However, as discussed below, depending upon the relative elasticities of supply and demand curves, the result may be quite different.

3.5 INFLUENCE OF FLASTICITIE4S OF DEMAND AND SUPPLIES

Diagrams 3.4 A, B and C clearly bring out the role of elasticities in determining the post-tax price and consequently the distribution of the tax incidence.

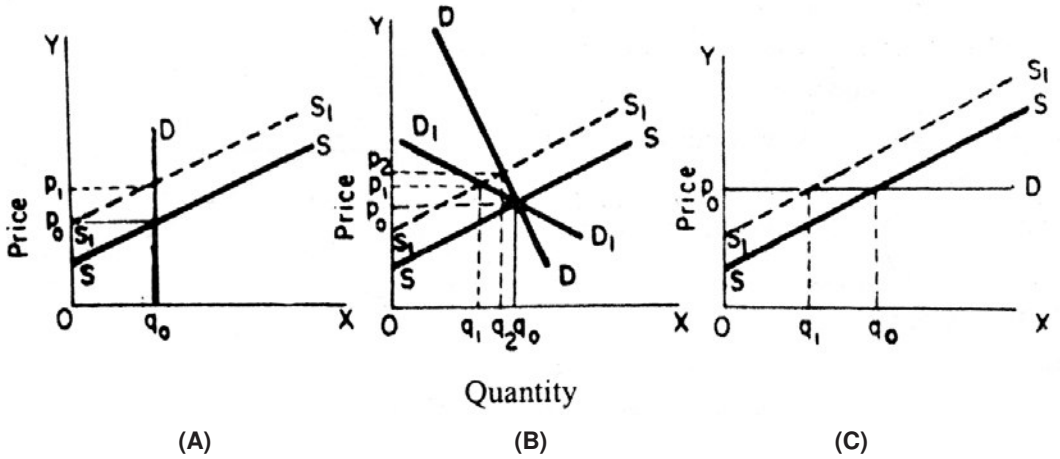


Diagram 3.4

The same supply curve SS has been drawn and as a result of an equal amount of tax per unit the upward vertical shift of the supply curve is also identical. The pre-tax price and quantity, determined by the intersection of the original supply and demand curves, are also identical in all these diagrams.

In order to bring out clearly the effect of elasticity of demand on the post-tax price and quantity (and hence on the distribution of tax incidence) demand curves with different elasticities ranging from zero to infinity have been drawn.

The diagram 3.4 A the demand curve is perfectly inelastic and as a consequence post-tax price p_1 is higher than the pre-tax price p_0 by the full amount of the tax. Note that the quantity bought and sold remain unchanged. Diagram C, on the other hand, depicts the other extreme case of a perfectly elastic demand curve. In this case price does not rise at all, only the quantity bought and sold decreases. In diagram B we have depicted the intermediate case of less than perfectly elastic demand curve. In this case the post-tax price is higher than the original price but by less than the full amount of the tax.

In the diagram 3.4 B we have drawn two demand curves with different elasticities. D_1D_1 is more elastic than DD. Consequently, rise in price due to the tax is greater in case of DD than D_1D_2. This leads us to the conclusion that more elastic the demand curve, less is the increase in post-tax price paid by the consumers and greater is the fall in the net-of-tax pfice received by the producers and vice versa. In the extreme case of a perfectly elastic demand curve, price does not rise at all and as a result the entire tax-incidence is borne by the producers. On the other hand, in case of a perfectly inelastic demand curve, price rises by the full amount of the tax and as a result the entire tax burden is borne by consumers.

3.6 PROBLEMS OF AGRICULTURE

Agriculture is a problem industry. Food is one of the basic necessities of life. Yet over the last two centuries or so, in most economies the percentage of people engaged in agriculture has been declining steadily and at the same time farm prices have been falling relative to non-farm prices. As a consequence, people who have remained in agriculture have been receiving incomes well below national averages. Governments, therefore, often feel compelled to intervene in a number of ways. In order to understand working and the implications of these schemes it is essential to bear in mind certain feature of agriculture which lies at the roots of its problem.

Features of the Supply of Agricultural Products

Compared to the supply of non-farm products, the supply of farm products taken as a whole is very inelastic for the following reasons.

In the first place, for agricultural production land is the most basic factor whose supply is almost fixed in all economies. Therefore, the possibility of increasing agricultural production by bringing more land under the plough is very limited, especially in the short run.

Secondly, time-pattern of agricultural production is inelastic in the sense that natural processes take their own time to complete. We cannot shorten or lengthen these processes much. Therefore, output cannot be increased or decreased during a given time period (say a year) by cultivating the same land greater number of times. In contrast, by using the same equipment more or less intensively, industrial output can be substantially increased or decreased during a given time period.

Thirdly, in the event of low prices (1) most of the farmer's costs continue any way and they do not save much by reducing output and (2) farmer's own efforts to increase output may in fact intensify as they make a desperate effort to maintain their family incomes. Because of these factors the supply of agricultural products is quite inelastic.

Another important feature of the supply of agricultural products is that their production is subject to large fluctuations due to natural factors completely beyond human control such as rainfall, floods, pests, frost, winds, etc. When conditions are exceptionally favourable production is much above the planned level, and, on the other hand, bad conditions cause output to fall much below it.

Thus, the supply of agricultural products is not only inelastic but also subject to violent year-to-year fluctuations due to its heavy dependence on natural factors beyond human control.

Features of Demand for Agricultural Products

The demand for most agricultural products is generally quite inelastic with respect to price changes as well as income changes. Most agricultural products are the basic necessities of life which have hardly any substitutes and whose consumption cannot be increased or decreased much in response to price changes. As a result the demand for them is quite-inelastic. Secondly, this is also established fact that as our incomes increase we expand out food consumption less than proportionately. Thus, not only price-elasticity but also income-elasticity of demand for agricultural products coupled with violent fluctuations in their output (because of agriculture's heavy dependence on nature) have certain far-reaching implications not only for the fanners but for the entire economy as well. We proceed to examine these in the following pages.

Short-term Fluctuations in Agricultural Prices and Incomes of Farmers

On the one hand, agricultural production is quite inelastic and, 'on the other hand, it is also subject to violent year-to-year fluctuations due to factors beyond human control. At the same time, demand for agricultural products is also quite inelastic. The combined effect of these factors is to make agricultural production and prices (and farm incomes) fluctuate in opposite directions as shown in diagram below.

In the diagram 3.5, the supply curve shows the different quantities farmers would plan to produce at different prices if their plans materialise. The demand curve DD shows the quantities that purchasers would offer to purchase at different prices. If production plans materialise, then p0 would be the equilibrium price and q_0 would be the equilibrium quantity supplied as shown in diagram above. Suppose between good and bad years actual production fluctuates between q_2 and q_1. In a bad year when output is q_2 market price rises to p_2 and in a good year when output is q_1 price falls to p_1. Thus, as a result of fluctuations in output, between q_2 and q_1 market price fluctuates p_2 and p_1.

Diagrams 3.5 and 3.6 bring out clearly the effect of the elasticity of demand on price fluctuations. As compared to the demand curve in diagram 3.5, the demand curve of diagram 3.6 is much flatter (more elastic over the relevant range). The supply curves in the two diagrams and range of fluctuations

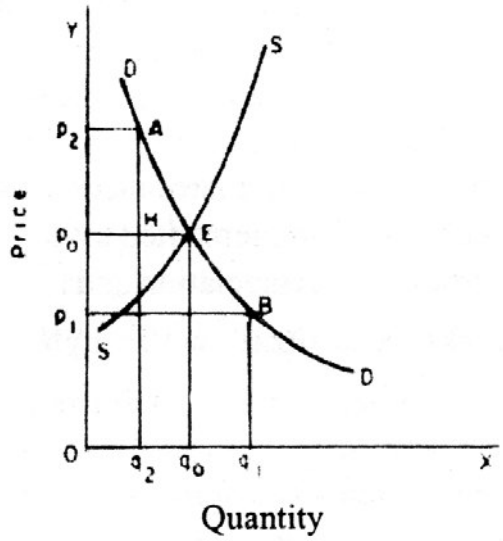


Diagram 3.5

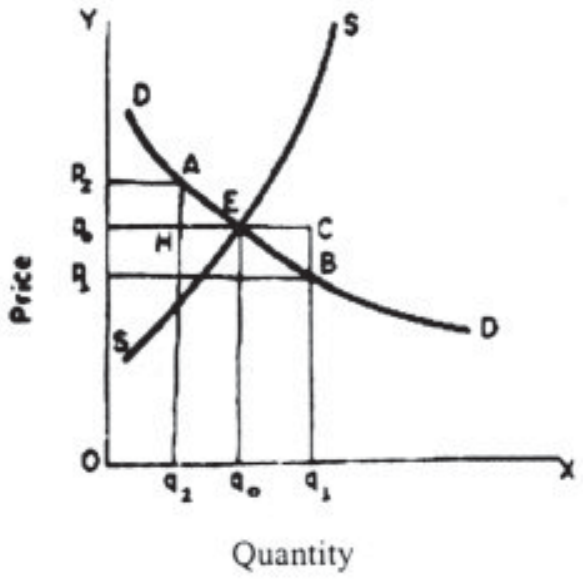


Diagram 3.6

in output are identical. As a consequence of the greater elasticity of the demand curve the range of price fluctuations in diagram 3.6 (between P_2P_1 is much shorter than what it is in diagram 3.5. The reason for this contrast is the difference between the elasticities of the two demand curves.

Earlier in the context of measurement of elasticity of demand we had noted that when elasticity of demand is less than one, total outlay of consumers falls in case of a fall in the price and increases in case of a rise in price. The expenditure of consumers on farm products becomes the income of farmers. It is a paradoxical situation that when nature is unexpectedly kind and produces a bumper crop, farmers find their incomes shrink, and, on the contrary, when nature is unkind and produces a scanty crop, farmers find themselves richer. Thus, in a free-market economy farm income and production tend to fluctuate in opposite directions. Interests of the farmers and those of the society at large seem to be at variance. It is for this reason that governments often feel compelled to intervene in the situation to bring about some measures of stability in agricultural prices and farm incomes.

Agricultural Stabilisation Programmes

Agricultural stabilisation programmes have two objectives, namely, (1) to reduce or eliminate price fluctuations and (2) to reduce or eliminate fluctuations in farm incomes. As the discussions will reveal, these objectives are not always consistent.

(1) Stabilisation Programmes through Producers'Association

A persual of the diagram 3.6 will show that one method of eliminating fluctuations in prices and f111 arm incomes could be to restrict the supply actually coming to the market to the average level of production inspite of fluctuations in production. This means that in a good year when production is q_1, the excess of production over the average level (i.e., q_0 q_1) will have to be stored unsold. On the other hand, in a bad year when production is q_2 the shortfall below the average level,(i.e. q_2 q_0 will have to be made good by sales out of the unsold stocks accumulated in good years. In this way if actual sales could be restricted to the average level of production (i.e., q_0) price level could be stabilized at p_0 and farm incomes at $q_0 \times p_0$ inspite of fluctuations in production. However, such a policy can be implemented by some collective agency of farmers such as a producers 'Cooperative or producers' Association and not be individual farmers.

Market Stabilization through Government Sales and Purchases

In practice market stabilization programmes are undertaken by governments through their sale and purchase operations. For this purpose a government has first to determine the average level of prices which, in its opinion, would prevail if production was always at its average level if there were no fluctuations in production. Having determined the appropriate price level, government buys in the open market at the pre-determined price and adds to its stocks whenever production during any year is above the average level. On the other hand, it sells out of its accumulated stocks at the predetermined price whenever production is below its average level.

However, while this policy succeeds in stabilizing the price level, it will not stabilize farm incomes. The simple reason for this is that once the government undertakes to buy or sell at a certain price, individual farmers are faced with perfectly elastic demand curves. Whatever the output produced, they will be able to sell it at the price fixed by the government. It is at once evident that if price is held constant and farmers sell their total output every year, their incomes will fluctuate in proportion to fluctuations in production as shown in diagram 3.7.

In a bad year when production is q_2 farm income would be equal to $q_2 \times p_2$ (i.e., the area of the rectangle Qq_2 Ap_2) but when government also sells q_2 q_0 quantity at p_0 price; farmers' income would actually equal $q_2 \times p_0$ (i.e., the area of rectangle Oq_2 Hp_0). In a good year, in the absence of government intervention market price would have fallen to p_1 and farmer's income would have been equal to p_1

$\times q_1$ (i.e., area of rectangle $oq_1 Bp_1$) but with government purchases price is maintained at p_0 and fanner's income equals $q_1 \times p_0$ (i.e., equal to the area of the rectangle $oq_1 Cp_0$). Thus, government policy succeeds maintaining the price level but fails to stabilize farm incomes. In the absence of government intervention bumper crops are associated with high incomes and bad crops are associated with high incomes. Thus, stable prices cause farm incomes to vary directly with production and free-market prices cause them to vary inversely with production.

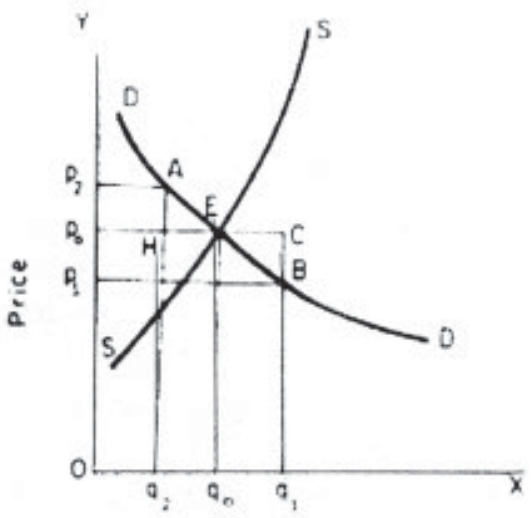


Diagram 3.7

How can a government stabilize farm incomes? You would recall that total outlay on a good remained unchanged when quantity sold varied inversely proportionate to the change in price. This implies that between good and bad years the government should vary the market price in such a manner that total farm income remains constant at the appropriate level, whatever may be amount production during any year.

Such a policy, if successfully implemented, will lead to (1) smaller price fluctuations than if prices were determined by free market forces of supply and demand, (2) stabilization of farm incomes and (3) no financial burden to the government as it will be buying cheap and selling dear. However, the problems with such a scheme arise from uncertainly and political pressure. In the first place, government do not know exactly the average level of production over any period and the appropriate level of farm incomes to be maintained. Very often under pressure from the farmers, governments err in the direction of stabilizing farm incomes at too high a level by fixing prices at a high level. Over a period, such a policy will result in accumulation of unsold stocks which will have to be disposed of by destroying, dumping in foreign market or sold at home at low price. In any case the tax-payer will have to bear the burden of the costs if price is fixed too high. On the other hand, if the government succeed in sticking to the appropriate level of prices and farm incomes, this policy may even be profitable because most of the time government will be buying cheap and selling dear.

Long-term Problem of Agriculture

Long term problem of agriculture is related to changes in productivity and shifts in the pattern of demand resulting from changes in real incomes due to increases in productivity.

Productivity has been steadily increasing over time in all spheres of production. In fact in agriculture it has increased at a rate faster in industry. Increase in productivity causes the supply curve to shift rightward. Increase in productivity also means increase in real incomes. What happens to the pattern of demand when real incomes increase? As already explained above, when people grow richer they tend to spend less than proportionately on farm products, and more than proportionately on non-farm products. As a consequence, the demand curve for farm products shifts less than proportionately to the increase in real incomes. Evidently, a shift of the supply curve (due to increased agricultural productivity) that outstrips the demand curve (due to higher real incomes) inevitably results in a downward trend of prices as shown in the diagram 3.8.

In the diagram 3.8, D_0 and S_0 are respective demand and supply curves relating to an earlier period. Then with the passage of time, due to increase in productivity, the supply curve shifts to S_1, and then to S_2. Increase in productivity means a proportionate increase in real income as will Increase in real incomes leads to increase in real demand. However, in case of farm products increase in demand is less than proportionate to the increase in real incomes. Consequently, the shift of the demand curve

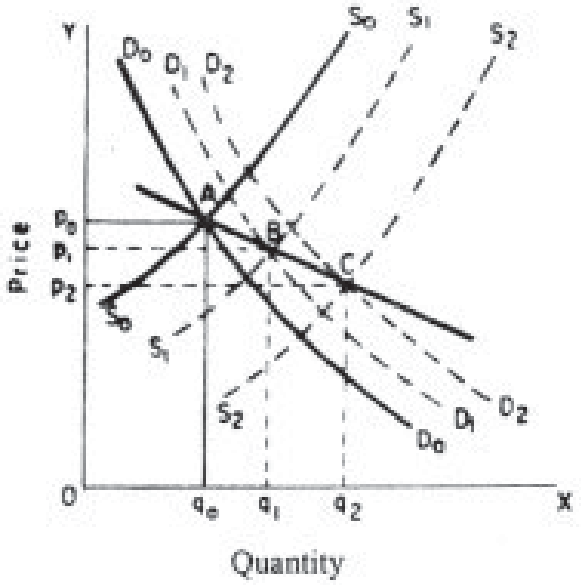


Diagram 3.8

from D_0 to D_1, is less than the shift of the supply curve from S_0 to S_1. Similarly, the shift of the demand curve from D_1 to D_2 is less than the shift of the supply curve from S_1 to S_2. D_1 and S_1, intersect at B thus determining Op_1 as the equilibrium price which is lower than Op_0. D_2 and S_2 intersect at C and thus determine Op_2, as the equilibrium price which is lower than even Op_1. What needs to be noted carefully is that the shift of the supply curve outstrips the shift of the demand curve and consequently the price falls. Lower farm prices mean lower farm incomes.

The crux of problem is that due to increase in productivity supply of agricultural products increases at a rate faster than the increase in their demand. This is a problem entirely different from the short-term problem of fluctuating farm prices and farm incomes. In the long run farm incomes can be maintained only through the transfer of surplus resources from agriculture to industry and other fields.

TOPIC 2

CONSUMER THEORY

LESSON 4

THEROY OF CONSUMER'S DEMAND

Every consumer has limited income but there is a large number of goods and services that he would like to purchase for his consumption. In quantitative terms one's income may be small or large but it is never sufficient to purchase all the goods and services that one would like to purchase. Perforce everyone has to make a rational choice of what to have and in what quantities and what not to have. His choice of spending his limited income on different goods and services would be rational when he spends it in such a manner that he gets maximum total satisfaction. The theory of consumer's demand, therefore, explains the economic principles underlying the allocation of the consumer's limited income over various goods and services in a manner that leads to the maximization of his total satisfaction. Therefore, you will study the economic principles a rational consumer should follow while spending his limited income over various goods and services so as to maximize his total satisfaction.

There are various alternative approaches to the theory of consumer's demand out of which, we shall discuss the two alternative approaches - one is known as the "Utility Analysis" and the other as the "Indifference Curve Analysis". The utility analysis is associated with the name of Alfred Marshal, a British economist and therefore is also known as 'Marshallian Utility Analysis.' J.R. Hicks, another British economist propounded "indifference Curve Analysis", as alternative to the marshallian utility analysis, to explain the consumer's behavior. The utilitarian analysis assumes that utility derived by a consumer from the consumption of a commodity can be measured in quantitative terms. But the indifference curve analysis refutes the basic assumption that utility can be measured and explains that quantitative measurability of utility is not necessary to explain the consumer's behavior.

4.1 MARSHALLIAN UTILITY ANALYSIS

Nobody ever offers to pay a price for something which has no utility for him. I purchase a book because it has utility for me. A vegetarian does not purchase meat simply because it has no utility for him. Price after all involves a sacrifice on the part of a consumer and nobody will sacrifice anything unless he gets some benefit in return.

According to the Marshallian utility analysis, the utility of a commodity for any consumer can be measured by the maximum amount of money he is willing to offer for a unit of the commodity rather than go without it. Suppose, you are willing to offer for an orange only 50 paise and no more, then the utility of that orange for you is worth 50 paise. Suppose for an orange your friend might offer to pay a rupee rather than go without it. The utility of an orange to your friend is worth one rupee. The utility of any good for any consumer can be measured indirectly by the maximum amount of money he is willing to offer for a unit of the good rather than to go without it. This is only an indirect way of measuring utility.

The Law of Diminishing Marginal Utility

As explained above, the utility of the same good may be different to different persons, and may even be different to the same persons in different circumstances. But one important aspect of utility is that at any given time, all the units of commodity that a consumer adds to his stock, do not give equal utility to him. Suppose the first orange that you consume gives you utility worth 50 paise, the second orange will give you utility worth less than 50 paise, and the third one still less and so on. This tendency of the marginal utilities of successive units of a good to diminish, when a consumer adds more to his stock at any given time, is known as the 'Law of Diminishing Marginal Utility,' and is considered to be universal true.

The Law of Diminishing Marginal Utility states that as a consumer consumes (acquires) more of a good at any given time, its marginal utility (or what is the same thing - the extra utility added by successive units) tends to diminish. This means that as you consume more oranges at any given time, utility derived from the successive oranges would diminish. Your total utility will not doubt increase but the total utility will increase at a diminishing rate. Let us examine the important law with the help of a simple example. Imagine a man is consuming oranges one by one and telling you exactly how much utility he gets form each orange. Table 4.1 below records his statement about the utility of each orange separately as he consumes 6 oranges, one by one:

TABLE 4.1

Marginal and Total Utility

No. of Oranges	*Marginal Utility*	*Total Utility*
1st	4	4
2nd	3	7
3rd	2	9
4th	1	10
5th	0	10
6th	(–)1	(–)9

Marginal utility means the utility of an "additional" unit. The first orange is the marginal orange and the utility from the first orange is the marginal utility. The second orange is the marginal orange and the utility from it is the marginal utility. "Marginal" is not fixed, it is moving. As all the units are identical, every unit consumed should be considered as the marginal unit and the satisfaction from that unit should be termed as marginal utility. It is clear from Table 4.1 that marginal utility of oranges to a consumer is going down. Marginal utility can decline to zero and can even become negative. Negative utility means that the consumer does not anticipate positive satisfaction but hopes to get only negative satisfaction.

Total utility is the utility derived from the consumption of all the units. It is the sum of marginal utilities.

The table 4.1 shows that the total utility goes on increasing, but at a decreasing rate, so long as the marginal utility is positive. When marginal utility becomes negative, the total utility also starts diminishing. Total utility is maximum when the marginal utility is zero. The same phenomenon can be shown with the help of the diagram 4.1.

In the diagram 4.1 the quantity of oranges are measured along the X-axis and utility along the Y-axis. The marginal utility curve (MU) has a downward or negative slope additional units of oranges

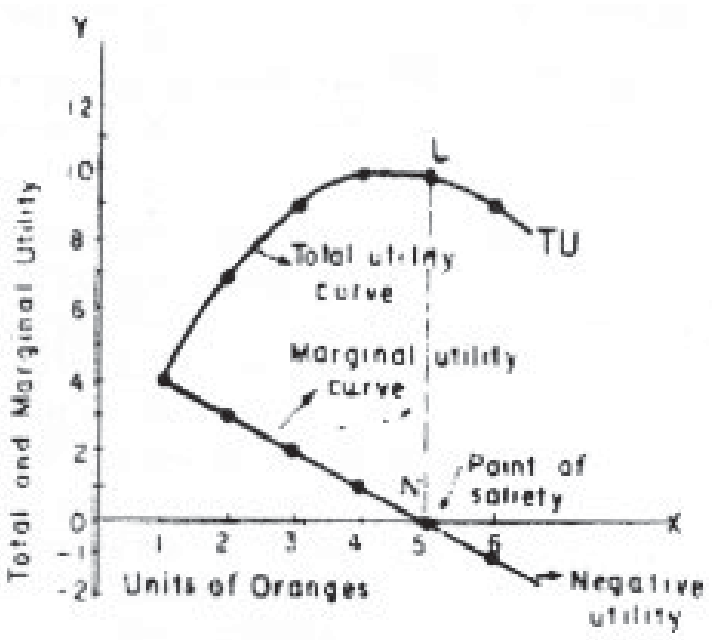


Diagram 4.1

give the consumer less and less utility. The consumer hopes to get only zero utility at point N from the fifth orange and negative utility from the sixth orange. The marginal utility curve declines and cuts through the X-axis at N. The total utility curve (TU), on the other hand, slopes upwards to the right to indicate that total utility increases with the consumption of additional units up to point L. The rate of increase in total utility is not constant but declines steadily. The total utility curve reaches a maximum point at L and then declines.

The relationship between marginal utility and total utility can be summarized as follows:

(i) When marginal utility declines but is positive.	Total utility increases but at diminishing rate.
(ii) When marginal utility reaches zero.	Total utility has reached maximum; and
(iii) When marginal utility becomes negative:	total utility declines from the maximum point

This, in substance, is the famous law of diminishing marginal utility. This law is based on the following assumptions:

(i) different units of a commodity are homogeneous or identical in all respects i.e., in size, quality, taste etc.;

(ii) there is no time interval between the consumption of two units of a commodity i.e., consumption of the different units of a commodity should be continuous;

(iii) tastes, fashions etc., of the consumer remain the same.

Exceptions to the Law of Diminishing Marginal Utility

The law of diminishing marginal utility is a basic law and is applicable to all people and all things. Really speaking, there are no exceptions to this law. Some, however, have spoken, of a few exceptions, as given below:-

(i) The law, according to them, does not apply to money. It is argued that the more money one has, the greater will be the desire to acquire still more money. This exception is sought to

be proved with reference to misers who are supposed to have unlimited desire to accumulate and hoard money. It is however, wrong to argue that the utility of the first rupee is the same as that of the hundredth rupee. If a person has only one rupee, he will be very careful while spending it. But if he has one hundred rupees he may not exercise any care while spending one rupee out of the 100 rupees. It means that the marginal utility of the hundredth rupee is less than the marginal utility of the first rupee. Even the miser has to spend some money on food and other items of necessity and not on acquiring additional wealth. This indicates that the utility of food and other items to the miser is greater than that of money which he spends to buy them.

(ii) It is argued that, in the case of liquor, the more a person drinks, the more he likes to have additional quantity of liquor. In other words, it is argued that the marginal utility of liquor is said to be orising and not falling. This is clearly wrong. Even for a drunkard, marginal utility of liquor will diminish and will be negative eventually. Had it not been so a drunkard would have continued to drink and get more utility; instead he does stop after a certain stage.

(iii) Another exception relates to hobbies such as collection of rare stamps and coins, pictures by famous artists etc. It is argued that the more stamps one collects, the greater is the desire to collect still more. People spend large amount of money to secure a rare stamp or a famous picture. Apparently, the law of diminishing marginal utility does not apply to hobbies pursued by some people. This however, is not correct. A stamp collector does not actually spend increasing amounts of money in acquiring one more stamp of the variety he already has. Rather, he is willing to spend large amount of money to add a new and rare stamp to his collection. When a collector acquires additional stamps of the same variety, the marginal utility from his additional collection will definitely diminish. In other words, the law of diminishing utility will apply to hobbies too.

In fact there are no real exceptions to the law of diminishing marginal utility. The marginal utility which a consumer gets from the additional units of a commodity eventually keeps on diminishing. Therefore, it is said to be universally true.

The law of Demand and the Law of Diminishing Marginal Utility

(Derivation of Demand Curve)

The law of diminishing marginal utility is the basis of law of demand which explains the inverse relationship between price and quantity of a commodity. According to the principle of diminishing marginal utility, a person gets less and less utility from additional units of a commodity, naturally he is prepared to buy more units only at a lower price. We can express the same idea in another way also. Marginal utility of a commodity diminishes as a person has more of it; accordingly and therefore, an additional unit will not be demanded unless it is available at a lower price. The marginal utility curve has a negative slope and therefore, the demand curve based on marginal utility curve also has a negative slope. Marshal goes one step further. He measures the marginal utility of a commodity in terms of money which a person is willing to pay; naturally, the marginal utility curve itself becomes the demand curve. This is explained in Table 4.2 and diagram 4.2.

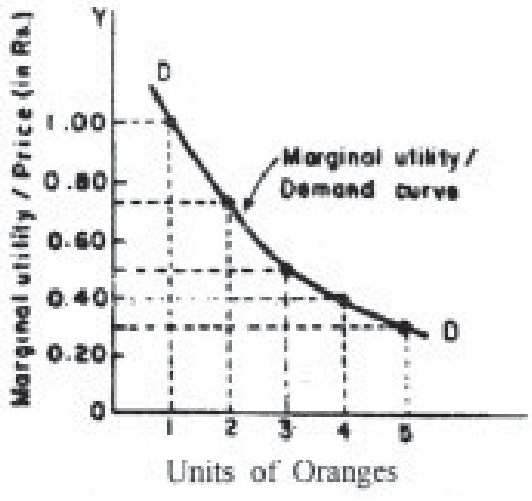


Diagram 4.2

TABLE 4.2

Marginal Utility Schedule for Oranges
(in money)

No. of Oranges	*Marginal Utility (Rs.)*	*Price the consumer is willing to pay (Rs.)*
1 st orange	1.00	1.00
2nd orange	0.75	0.75
3rd orange	0.50	0.50
4th orange	0.40	0.40
5th orange	0.30	0.30

The above table shows that the marginal utility of every additional orange is declining and therefore, the consumer will be prepared to buy additional units of oranges only if the price of orange declines in the market. In other words, a consumer buys more of a commodity if its price falls in the market. When we represent this table on a diagram we can get the diagram 4.2. DD is the marginal utility curve. If we represent price instead of marginal utility on Y-axis, DD curve can be called demand curve of the commodity.

Therefore, the downward sloping curve can be taken as marginal utility curve for oranges; it is also the demand curve for oranges.

Marshall derives the demand curve form the law of diminishing marginal utility on the basis of the following three basic assumptions:

(i) *The utility of a commodity is measurable quantitatively:* The assumption is basic to the law of diminishing marginal utility. We assume that utility can be calculated by adding marginal utilities; and that marginal utility of unit can be found out through subtraction - as for example the marginal utility of the 5th unit of a commodity is equal to total utility for 5 units minus total utility for 4 units.

(ii) *The utility of money remains constant:* The utility of a commodity is measured by Marshall in terms of money which is the measuring rod used in economics analysis. Like every measuring rod, money should have constant value. For instance, in table 4.2 we have said that the consumer gets or hopes to get utility worth of one rupee form the first orange and, therefore, he is willing to pay Rs.l for it. He hopes to get from the second orange utility worth of 75 paise and, therefore, he is willing to pay 75 paise to buy it. In all these cases money measures utility, and as such it must have constant value or utility to the consumer. This assumption implies that whatever be the volume of money with the consumer, its value or marginal utility will remain the same to him. In practice, however, money like any other commodity is also subject to the law of diminishing marginal utility.

(iii) *Each commodity is an independent commodity:* Marshall assumes away the interrelationship between goods and considers each commodity as an independent commodity and studies demand for it accordingly. In practice, this is not proper. Most of the commodities are related to each other either as substitutes or complements and therefore, the demand for one commodity will depend upon the price and availability of other related commodities. We can not properly study the demand for potatoes in isolation, without relating it to the demand for other vegetables in the market.'

Given all these assumptions, the law of diminishing utility is the basis for deriving the law of demand in Marshallian demand theory.

Law of Equi-Marginal Utility and Consumer's Equilibrium

In economic analysis, we assume that every consumer is rational and he spends his income in a rational manner with the object of maximizing hi s satisfaction.

The income of every consumer is limited but the goods and services that he would like to have for consumption are numerous. Income is limited in the sense that it is impossible for my consumer to purchase, with his given income, all the goods and services he would like to purchase. In quantitative terms a person's income may be less or more, but it is always in-sufficient for his innumerable wants. It is, in these circumstances of limited income and numerous wants, that a consumer is forced to choose between different goods and services rationally. Every consumer spends his limited income over various goods and services in such a way that he gets the maximum possible satisfaction in the given circumstances. Within the given conditions of his limited income, his tastes and the given market prices of different goods and services, when a consumer has selected that bundle of different goods and services which gives him the maximum possible satisfaction, we say that the consumer is in equilibrium. The notion of equilibrium simply emphasizes's the fact that any deviation form this position would make the consumer worse off, in terms of total satisfaction and certainly not better off. It means that he would be best off in equilibrium. Law of equi-marginal utility states that consumer will reach the stage of equilibrium, i.e., maximum total satisfaction when the marginal utilities of the various commodities that he consumes are equal.

At any given time a number of commodities complete for the limited income of the consumers. In terms of utilities, different goods offer different opportunities for him. For each rupee of his income the consumer always selects the best of the available opportunities. When each rupee of a consumer's income has been spent in its best available use, his total satisfaction (or utility) is maximized and the consumer is said to be in equilibrium. In order to elaborate this point let us take an example. Suppose the daily income of a consumer is Rs. 15 and with this income he wants to purchase his daily supplies of goods X, Y and Z, all of which sell at Rs. 1 per unit. Table 4.3 given below gives the marginal utility schedules of the three goods in question.

TABLE 4.3

Unit of Goods	*Marginal Utility Schedule of X (MUx)*	*Marginal Utility Schedule of Y (MUy)*	*Marginal Utility Schedule of Z (MUz)*
1	18 (1)	10 (5)	9 (7)
2	16 (2)	9 (6)	7 (11)
3	14 (3)	8 (9)	5 (15)
4	12 (4)	7 (1.0)	3
5	8 (8)	6 (12)	
6	5 (13)	5 (14)	
7	3	3	

The marginal utilities of different units of the three goods offer the different opportunities of spending his money to the consumer. In order to maximize his total satisfaction the consumer will look for the best available opportunity for each rupee of his income. The three goods offer three different opportunities in terms of utility for the first rupee of his income. The consumer can spend his first rupee on any of the three goods. If he spends the first rupee on X, then he will obtain 18 units of utility; if he spends it on Y, then he will get 10 units of utility; and if he spends it on Z, then he will get only 9 units

of utility. Out of these three alternative opportunities for his first rupee, which one do you think he will choose? Naturally, he will choose to spend his first rupee on X and not on Y or Z. If you examine the marginal utility schedules of the three goods carefully, you will find that for the first four rupees the best opportunities of spending are offered by the first four units of X which give him 18, 16, 14 and 12 units of utilities. Having spent first four rupees on the first four best opportunities, the next best opportunity is offered by the first unit Y, which offers 10 units of utility for the fifth rupee of the consumer. According to the next available opportunities, the consumer will spend sixth rupee on the second unit of Y or seventh rupee on the first unit Of Z. In this way the consumer proceeds step by step and spends each rupee of his income to its best available use. If a rupee spent on Y gives him greater utility than a rupee worth of X or Z, the consumer will spend his rupee on Y and so on. One by one the consumer exhausts all the best available opportunities and ultimately ends up in a situation where the last rupee brings in the same utility i.e., 6, whether spent on X or Y or Z. If the last rupee brings in the same increment of utility, when spent on any good, total utility for a given income is maximized and we say that the consumer is in equilibrium. In the example given above, the consumer will spend his income (Rs. 15) on the purchase of 6 units of X, 6 units of Y and 3 units of Z. If we add the marginal utilities which the consumer gets from the 6 units of X, 6 units of Y and 3 units of Z, he will get the maximum total utility, i.e., 139 as follows:

Total utility from X = 18 + 16 + 14 + 12 + 8 + 5 = 73

Total utility from Y = 10 + 9 + 8 + 7 + 6 + 5 = 45

Total utility from Z = 9 + 7 + 5 = 21

Total utility from X, Y and Z = 139

If the consumer spends his income on any other combination of X, Y and Z, his total utility will be less than 139. Suppose he spends his income on the purchase of 7 units of X, 5 units of Y and 3 units of Z. In this case, his total utility will be 76 + 40 + 21 = 137, which is less than the maximum he can obtain. Therefore, the fundamental equilibrium condition that has to be satisfied if a consumer is to be best off in terms of total utility, would be that he gets the same marginal utility for his last rupee when spent on any good. In the above example, the last rupee brings in 5 units of utility, whether spent on X, Y or Z. In other words, the consumer will be in equilibrium if

$MU_x = MU_y = MU_z$

MU_x, MU_y and MU_z are the marginal utilities of X, Y and Z commodities.

In the above example we have assumed the same price i.e., Rs. l per unit of the three goods. But in the real world different goods have different prices. However this does not affect our conclusion at all. By dividing the marginal utilities of the different goods by their respective prices, we find out ratios of marginal utilities to respective prices. These ratios of marginal utilities to prices are nothing but marginal utilities per rupee when spent on different goods. If we substitute MU_x, MU_y and MU_z for marginal utilities of the goods X, Y, Z respectively and Px, Py and Pz for their respective prices, then the equilibrium condition can be expressed either by the equality of

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \frac{MU_z}{P_z}$$

or by the equality of marginal utility per rupee when spent on X, Y and Z.

Limitations of the Law of Equi-marginal Utility

The law of equi-marginal utility is an important principle since it guides consumers how to spend their limited income on different goods so that they can get maximum satisfaction. But in practice, consumers may find it difficult to apply this principle. First of all, it is really difficult for consumers to know

the marginal utilities of different goods. Secondly, consumer are normally ignorant and cannot compare the marginal utilities of different goods. In other words, they may not know which goods give them greater satisfaction and which less. Thirdly, most consumers acquire certain habits-as for example, smoking beedies and cigarettes or drinking liquor. In such cases, they will buy and consume these goods even though they know that they can buy better goods and get more utility. Many a time, a worker will spend his daily wages on liquor though his wife and children may be starving. He knows food is more essential for his family but buys liquor instead, because he has become a victim of his habit.

Thus for various reasons, a consumer may find it difficult to spend his income according to the law of equi-marginal utility.

Weaknesses of the Utilitarian Analysis

1. *Utility cannot be measured:* The utilitarian approach to the theory of demand is based on the assumption that utility can be measured in quantitative terms. In order to determine the quantities of goods which an individual will buy at given prices, this theory implies that we must first know how much utility a consumer gets from each unit of different goods. But there exists no scientific method for measuring utility. Utility has been defined as the quality which makes commodities desirables to consumers. Utility is not an inherent or intrinsic quality of goods. It is purely a subjective phenomenon which depends upon the psychological ability of a person to appreciate a good. Such a purely subjective phenomenon, as the concept of utility is, cannot be measured in quantities. Utility actually is not a quantity but only an index of one's scales of preferences. As utility cannot be measured, the utilitarian explanation of theory of demand is arbitrary.
2. *Assumption of independent utilities is not valid:* According to the law of diminishing marginal utility, marginal utility and hence total utility from a good, depends upon the stock of the good in question alone and not at all on the stocks of other goods. This means that the total utility that a consumer gets form oranges depends upon the total stock of oranges alone and not on the stock of any other good. The law of diminishing marginal utility assumes that the utility from the stock of a good is completely independent of the stocks of other goods. But this assumption of independent utility on which the law of diminishing marginal utility is based, is true only in the case of completely independent goods. Most of the goods are related to each other either as substitutes or as complements. Tea and coffee are also substitutes (rival in consumption) whereas, car and petrol are complements in the sense that one is useless without the other. If you increase consumption of tea, marginal utility of tea for you will diminish but with this the marginal utility of coffee too will diminish, without there being any change in its stock or consumption. On the other hand, if you own two cars in place of one, and if your stock of petrol remains unchanged, the marginal utility of the second car will no doubt be less than that of the first car, but without there being any change in your stock of petrol, the marginal utility petrol will increase. Thus in the case of related goods their marginal utilities increase or decrease, not because of any change in their stock alone but also because of changes in the stock of the other related goods. This is a very serious criticism against the law of diminishing marginal utility. The utilitarian approach to the theory of consumer's demand, which derives its logical strength form the law of diminishing marginal utility, thus suffers from this weakness.
3. *Marginal utility of money is assumed constant:* The utilitarian approach also assumes that the marginal utility of money is constant. What is meant by the marginal utility of money being constant? Constant marginal utility of money implies that the law of diminishing marginal utility does not apply to one's stock of money (income). One's stock of money is one's income. This means that one's stock of money (income) increases or decreases, the marginal utility of money remains unchanged. If marginal utility of money remains constant, this would mean that a

consumer's demand for goods is completely independent of changes in his income. A fall in the price of one of the two goods X and Y, disturbs the equality between MU_x/ P_x and MU_y/ P_y ratioes by making and MU_x/ P_x greater than MU_y/P_y. Equilibrium is resorted by reducing MU_x (by increasing the stock of X) to the extent that the new MUx_x/ P_x ratio once again becomes equal to MU_y/P_y, but if marginal utility of money remains constant, even when money stock (income) increases or decreases, the equilibrium condition will not be disturbed because nothing happens either to the utility of the good or the utility of money and therefore, more of no good will be demanded. From this it follows that one's demand for goods is responsive to price changes but not to income changes. On the very face of it, this is a very absurd conclusion. You know it well that an important factor determining one's demand for goods is one's income. Higher the income, other things remaining constant, larger will be demand for most of the goods (except in case of inferior goods).

4.2 INDIFFERENCE CURVE ANALYSIS

The indifference curve analysis of demand was originally propounded by Slutsky but later on was scientifically developed and popularized by J.R. Hicks. The analysis was developed as an alternative to the utility analysis of consumer's demand. The basic defect of the utility analysis is that it is based on the cardinal number system which assumes that the utility of a commodity is measurable in quantitative terms. Utility, of a commodity can be added and subtracted and can be measured in terms of money. We have told you earlier that utility, being a subjective phenomenon cannot be measured quantitatively. Therefore, Hicks developed an alternative approach, known as 'Indifference Curve Analysis', which can explain the consumer's behaviour without measuring the utility which a consumer gets from the consumption of a commodity. Indifference curve analysis is based on the ordinal number system, in which we do not measure the utility in quantitative terms. It assumes that a consumer can express clearly his scale of preferences for any two or more goods. In other words, a consumer, without measuring the satisfaction, can say whether the various combinations of two commodities, say X and Y, give him more or less or equal satisfaction as compared to other combinations. The combinations giving him more satisfaction will rank higher in his order of preferences and he will be indifferent among those combinations which give him equal satisfaction. Let us take an example. Suppose there are two commodities X and Y and the consumer knows that the different combinations A,B,C,D, and E of two commodities X and Y, as given below in table 4.9, give him same satisfaction. Since the consumer is getting the same satisfaction form each of the combinations, he will be indifferent in choosing any of them. He can choose the 1st of these five combinations, i.e., 1 unit of X and 25 units of Y or the 4th combination i.e., 4 units of X and 13 units of Y or any other combination, i.e., 2nd or 3rd or 5th combination of X and Y gives commodities, because each combination of X and Y equal satisfaction. The consumer simply says that each of these five combinations of X and Y gives him the same satisfaction, but he does not say how much satisfaction he gets from each of the combinations. If we plot these various combinations of X and Y on a diagram, as shown in diagram 4.3, we will get a curve which is known as indifference curve.

TABLE 4.4
Indifference Schedule

Combination	*Commodity X (Units)*	*Commodity Y (Units)*
1st (A)	1	25
2nd (B)	2	20
3rd (C)	3	16
4th (D)	4	13
5th (E)	5	11

We represent commodity X on horizontal axis and Y on the vertical axis. Five different combinations, as given in table 4.4 are represented by points A, B, C, D and E on the diagram and by joining these points, we get a curve which is known as an indifference curve. All these combinations are alike to him as each gives him same satisfaction and therefore, the consumer will have no reason to prefer one combination to any other. In other words, the consumer is indifferent in choosing any of these combinations. An indifference curve may, therefore, be defined as the diagrammatic representation of all combinations (or collections) of the two commodities which give equal satisfaction to a consumer or among which the consumer is indifferent and has no reason for preferring one combination to any other combination.

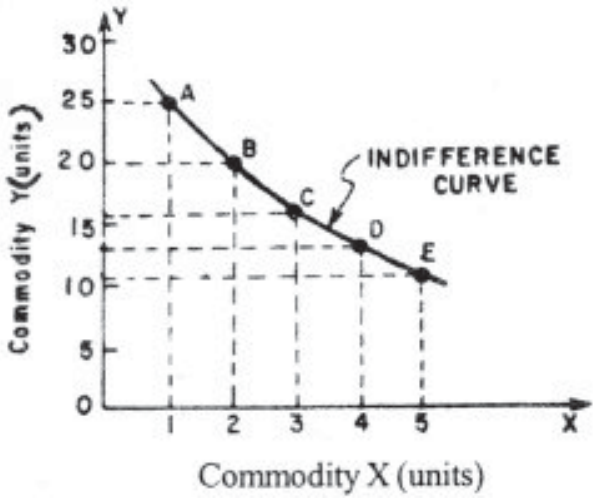


Diagram 4.3

Assumption of the Indifference Curve Analysis

Indifference curve analysis is based on the following assumptions:

1. *Rationality:* The consumer is assumed to be rational. Given his income and prices of the commodities, he aims at maximization of his satisfaction. He has full knowledge of the various combinations of two commodities which give him more or less or equal satisfaction i.e., he fully knows his scale preferences.
2. *Independence of Scale of preferences:* A consumer's scale of preference is independent of his income and the prices of the commodities and other consumers.
3. *Consistency or Transitivity of Choice:* The consumer is consistent in his choice. For instance, if he chooses commodities A over B, he will not choose B over A at any other time. Similarly, if combination A is preferred to B and B is preferred to C then A is a preferred to C.
4. *The Principle of diminishing marginal rate of substitution:* Marginal Rate of Substitution (MRS) is the rate at which a consumer can exchange a small amount of one commodity for a very small amount of another commodity without affecting his total satisfaction. In other words, MRS of X for Y (MRS_{xy}) will be the quantity of Y which will just compensate the consumer for the loss of marginal unit of X, MRS_{xy} can be expressed as the ratio between the change in commodity X (ΔX) and change in the commodity, Y(ΔY) without affection the consumer's level of satisfaction. It can be expressed as $MRS_{xy} = \Delta y/\Delta x$. In the example given in table 4.5, as we move form the first combination to the second, we find that the consumer adds one unit of X and gives up some units of Y, but gets the same satisfaction. Between the first and second combination –1 unit of X substitutes 5 units of Y; between the second and third combinations –1 unit of X substitutes 4 units of Y and so on. This is given in the table 4.5.

TABLE 4.5

Marginal Rate of Substitution

Commodity X (Units)	*Commodity Y (Units)*	*Marginal Rate of Substitution of X for Y (Units)*
1	25	IX = 5Y
2	20	1X = 4Y
3	16	1X = 3Y
4	13	IX = 2Y
5	11	

We find that the consumer substitutes X for Y but continues to get the same satisfaction. But for every increase of 1 unit of X, the consumer gives up lesser and lesser quantity of Y. Therefore, this is called the law of diminishing marginal rate of substitution. This follows from the law of diminishing marginal utility. As the consumer is substituting more and more of X for Y, the marginal utility which he gets form the additional units for X is declining and therefore he will be prepared to forego lesser amount of Y in exchange for X. The 3rd unit of X and therefore, the consumer less satisfaction as compared to what he has got from the 2nd unit of X and therefore, the consumer will be prepared to forego lesser amount of Y (4 units) to obtain 3rd units of X, as compared to what he was prepared to forego (5 units of Y) to obtain 2nd unit of X. The indifference curve analysis is based on the assumption of the operation of the law of diminishing marginal rate of substitution.

Properties of Indifference Curves

We can recognize indifference curves form their features (or characteristics or properties). Generally they have three properties-

(i) They always slope downward form left to right;

(ii) They are generally convex to the point of the origin of the two axes; and

(iii) They never intersect or touch each other.

(i) *Indifference Curves always slope downward form left to right:* Li other words, indifference curves are negatively sloped. Every indifference curve is based on the based on the assumption that the various combinations of two commodities give equal satisfactions to a consumer. In order to remain at the same level of satisfaction, the consumer will have to reduce the consumption of one commodity if he wants to increase the consumption of another commodity. In the example given earlier, if the consumer adds second unit of X he will have to give up some units of Y. If he adds second unit of X without giving up some units of Y, he will have more satisfaction, which is inconsistent with the assumption of indifference curve. In terms of a diagram, this means that a indifference curve will slope downward form left to right. This is explained in the diagram 4.4.

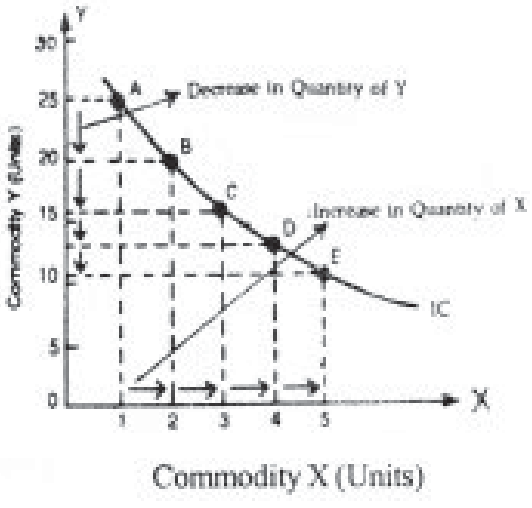


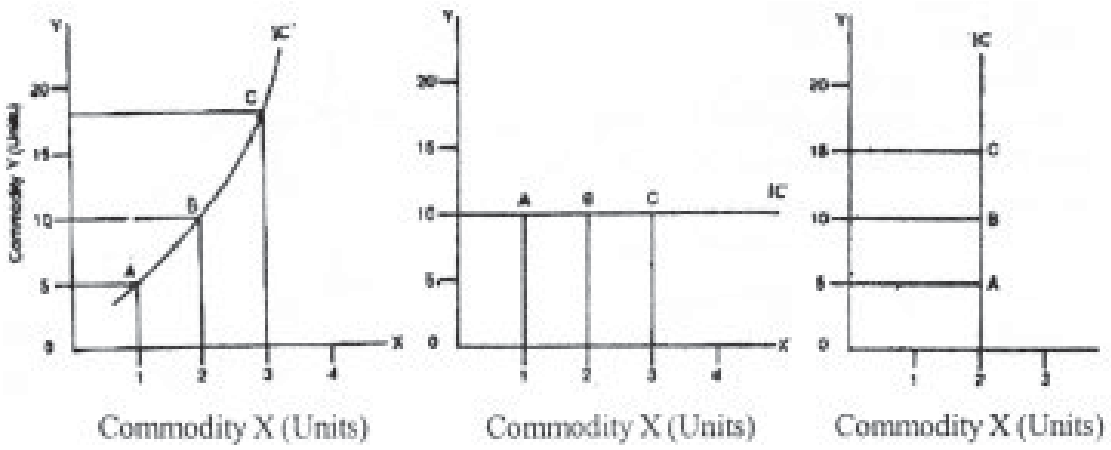
Diagram 4.4

In the diagram 4.4, as the consumer increases the consumption of X form 1 units to 2 units, he has to reduce the consumption of Y from 25 units to 20 units, so that he remains at the same level of satisfaction.

An difference curve can not be of any other shape, except that of the downward sloping form left to right.

(i) An upward sloping demand curve, as shown in the figure 4.5 (I) is impossible as it implies that more units of both the commodities represent the same level of satisfaction. In the figure, combination and B consists of 2x + 10y i.e. more of both the commodities X and Y, as compared to combination-A (1x and 5y). Therefore combination-B will give more satisfaction as compared to the combination A.

(ii) Similarly, horizontal or vertical indifference curve, as shown in the diagram 4.5 (II) and 4.5 (III), is also an impossibility since difference combinations with more of one commodity and the same quantity of another commodity can not yield the same level of satisfaction to the consumer. In the diagram 4.5 (II), The combination – B (2x + 10y), consists of more of X and same amount of Y, as compared to combination – A (1x + 10y), and therefore, the consumer will have more satisfaction from B as compared to A. Likewise, in the diagram 4.5 (III), combination B (2x + 10Y) consists of more of Y and same amount of X, as compared to combination A(2x + 5y), and therefore, the consumer will have more satisfaction from B as compared to A.



(I) (II) (III)

Diagram 4.5

From the above, it follows that an indifference curve can never be upward sloping or horizontal or vertical. It will always slope downward from left to right, because it is based on the assumption that the various points on an indifference curve, showing different amounts of two commodities give the same level of satisfaction to the consumer.

(ii) *Indifference Curves generally are Convex to the point of origin of the two axes:* An indifference curve is relatively steep at first, but becomes flatter as it extends to the right. In other words, an indifference curve is convex to the point of origin of the two axis as shown in diagram 4.6. In the diagram O is the point of origin of two axis

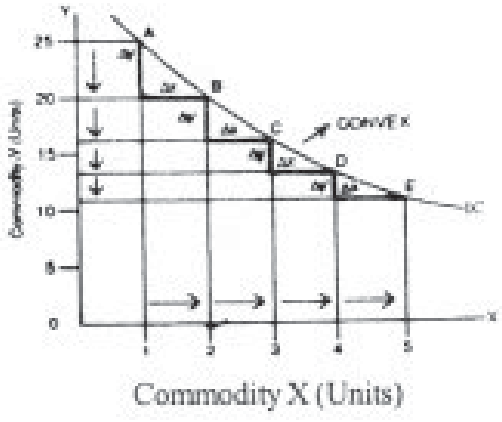


Diagram 4.6

– OX and OY and the indifference curve 1C is convex towards the point O. The convex slope of the indifference curve means that as we move on it form left to right, its slope diminishes. This is because of the operation of the principle of diminishing marginal rate of substitution about which you have already studied in detail. In the Table 4.6, as the consumer adds more of one commodity – X, he will be prepared to forego lesser and lesser amount of the other commodity –Y, for each successive unit of Y. In other words, the marginal rate of substitution of X for Y ($MRS_{xy} = \Delta y/\Delta x$) keeps on declining. Since an indifference curve is based on the diminishing marginal rate of substitution, it is of convex shape.

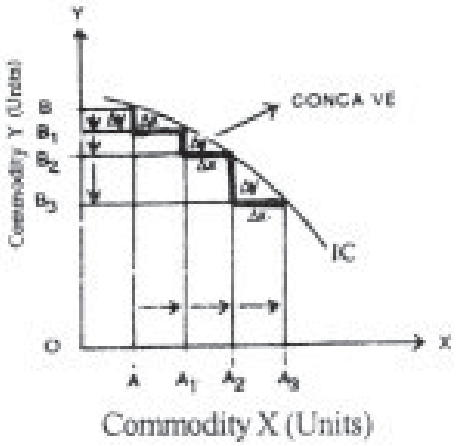


Diagram 4.7

Indifference curve can never be concave, as given in diagram 4.7, because such curves represent increasing marginal rate of substitution. In diagram 4.7 we find that $AA_1 = A_1A_2 = A_2A_3$ but $BB_1 < B_1B_2 < B_2B_3$. This is an example of increasing marginal rate of substitution. It shows that with increasing amount of X, the consumer is willing to give up more and still more units of Y. This is possible only if we assume that (a) marginal utility of X increases when the consumer has more of it; and that (b) marginal utility of Y decreases as he has less of it. This is clearly absurd. A concave indifference curve therefore is an impossibility.

The indifference curves are generally convex to the point of origin. But there are two exceptions (a) If the two commodities are perfect substitutes of each other, the marginal rate of substitution between these two commodities will be constant. In this case, the indifference curve will be a straight line making a 45° degree angle on the X and Y axis, as shown in the diagram 4.8. It shows that for one unit of X, the consumer is prepared to give one unit of Y, (b) If the two commodities are perfect complements of each other, as for example gasoline and a car, the indifference curve will consist of two straight lines with a right angle bent which is convex to origin, as shown in figure 4.9. Perfect complementary goods are those goods, which are used by the consumer in a certain fixed ratio. They can not be substituted for each other and therefore, the marginal rate of substitution between them will be zero.

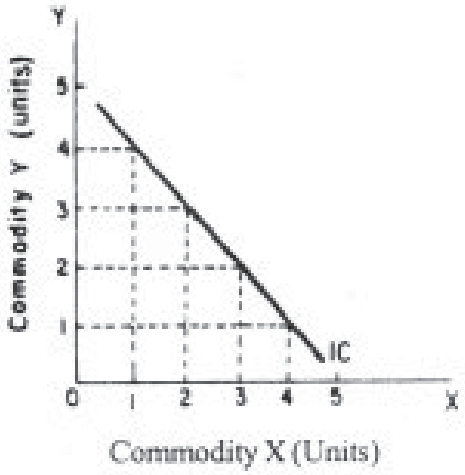


Diagram 4.8

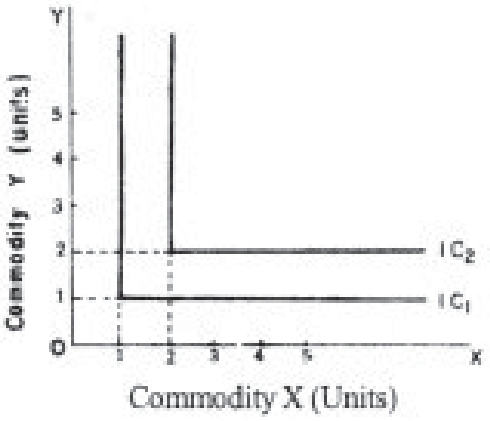


Diagram 4.9

However, perfect substitutes and perfect complementary goods are normally not found in practical life. They indicate more an imaginary situations, that the real one. Therefore, we may say that the indifference curves are generally convex to the origin.

(iii) *Indifference Curves never intersect each other:* Each in difference curve represents only one level of satisfaction. Different indifference curves represent different levels of satisfaction. One satisfaction level may be higher or lower than the other, but cannot be higher and lower as well as equal to the other at the same time. This is clearly absurd but this is what happens when two indifference curves intersect each other. Let us assume that two indifference curves intersect each other at A as shown in diagram 4.10 below:

In diagram 4.10 we have given two intersection indifference curves IC_1 and IC_2. On $1C_1$ we have taken two combinations represented by A and B – both represent the same level of satisfaction because both of these combinations are on the same indifference curve $1C_1$. On IC_2 we have taken two combinations again viz. A and C, both of which represent the same level of satisfaction as these are on the same indifference curve IC_2. Now we find that A = B and A – C; and therefore B = C. This is absurd as both represent different combinations of two commodities X and Y. B shows 4 units of X and 13 units of Y whereas C shows 4 units of X and 9 units of Y. Since B shows the same amount of X but more of Y as compared to C combination, therefore, the consumer will get more satisfaction form B combination as compared to C combination. Obviously two indifference curves representing two different levels of satisfaction can never intersect or touch each other.

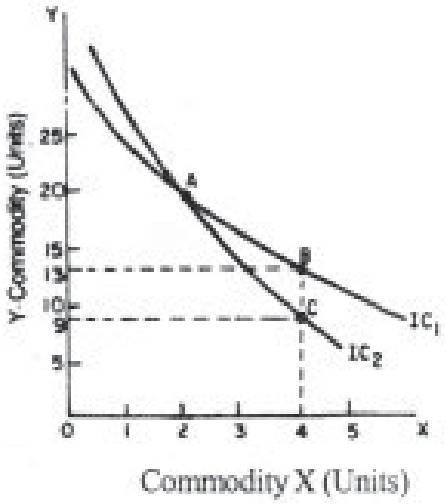


Diagram 4.10

Consumer's Equilibrium through Indifference Curve Analysis

When the consumer spends his income on different goods in such a way that he gets maximum satisfaction, he is said to have reached equilibrium position. According to the Marshallian utility analysis which was discussed earlier, a consumer reaches equilibrium position when the ratios of the marginal utilities of different commodities to their respective prices are equal. We shall now discuss how we can find out consumer's equilibrium with the help of indifference curves analysis.

In order to explain the equilibrium of a consumer with the help of indifference curve analysis, we require the following data:

(a) Consumer's different scales of preferences for the two goods, each scale is being represented by one indifference curve.

(b) The income of the consumer. It is assumed that he spends his income fully on both the goods and does not save anything.

(c) The prices of the two commodities are given in the market. It is assumed that the prices remain constant.

In other words, we must know scales of preference (which is also called an indifference map) and the price line of the consumer.

(i) Scale of Preferences of the Consumer or Indifference Map

There are various combinations of two commodities which give equal, more or less satisfaction to a consumer. The combination giving him more satisfaction will rank higher in his order of preference than the combinations giving him lower satisfaction. And if certain combination give him the same satisfaction all such combinations will find the same place in his order of preference. Proceeding in this way, we can thus arrange various combinations of the goods in order of a consumer's preferences - combinations giving more satisfaction finding accordingly higher places, combinations giving lower satisfaction finding accordingly lower places and all combinations giving the same satisfaction finding

the same place in his order to preferences. This kind of arrangement (in terms of higher, lower and equal levels of satisfaction) of all possible combinations of two goods constitutes what economists call a consumer's scale of preferences or an indifference map. A consumer's scale of preferences is a sort of map which shows how different combinations of various goods are arranged by him in order of higher, lower and equal levels of satisfaction.

In the Table 4.4 we took the example of 5 combinations of commodities X and Y .i.e. 1X + 25Y, 2X + 20Y, 3X + 16Y, 4X + 13Y, and 5X + 11Y, each of which give equal satisfaction to the consumer and therefore, the consumer is indifferent in choosing any one of them. On the basis of these combinations, we had drawn indifference curve in the diagram 4.3. All points on this indifference curve, showing different combinations of two commodities X and Y which yield equal satisfaction to the consumer. There may be many other combinations of two commodities X and Y which may give more or less satisfaction to the consumer as compared to the 5 combinations given above. Different combinations of X and Y, which give different levels of satisfaction to the consumer can not be shown by one indifference curve, but for this we have to draw different indifferent curves. In order to explain it, we take a simple as given in Table 4.6.

TABLE 4.6

A		*B*		*C*	
Indifference Curve I		*Indifference Curve II*		*Indifference Curve III*	
X	*Y*	*X*	*Y*	*X*	*Y*
1	18	1	25	1	31
2	13	2	16	3	25
3	9	3	16	3	20
4	6	4	13	4	17
5	4	5	11	5	15

When the various combinations given in the table are shown on a diagram, we can draw three indifference curves I, II, III, as given in the diagram 4.11. Any combination of X and Y given in the column (A) gives equal satisfaction to the consumer and therefore, can be shown by one indifference curve I. Similarly, any combination given in column (B) gives equal satisfaction to the consumer and therefore, can be shown the indifference curve II. The indifference curve III shows the combinations given in the column (C). Any combination given in the column (B) gives more satisfaction to the consumer as compared to any combination of X and Y given in the column (A), and therefore, the indifference curve II is higher than the indifference ins curve I. Similarly, any combination of X and Y given in the column (C) still gives higher satisfaction as compared to any combination given in columns (B), and therefore the indifference curve III is higher than the indifference curve II. Thus while one indifference curve shows one level of satisfaction different indifference curves show different levels

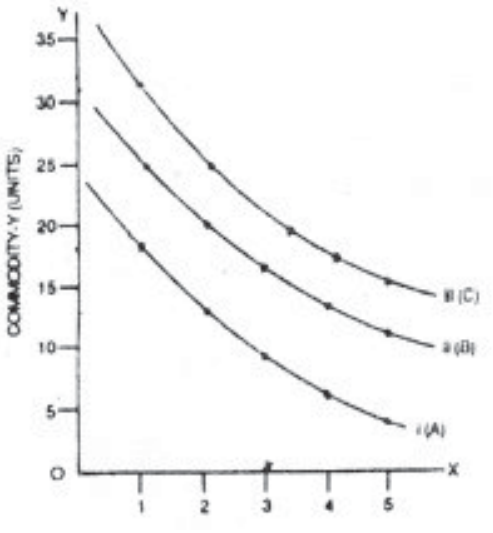


Diagram 4.11

of satisfaction. A higher indifference curve will show greater satisfaction as compared to the lower indifference curve. In the diagram 4.11 we have drawn only three indifference curves, I, II, III, on the basis of the different combinations of X and Y given in the table 4.6. There may be many more combinations of X and Y which can be shown by drawing different indifference curves. The diagrammatical representations of all possible indifference curves relevant to a consumer is called his scale of preference or his indifference map. Every consumer has his won indifference map, showing his tastes and preferences between the different combinations of two commodities. So long his tastes and preferences remain unchanged, his indifference map will be the same. If the consumer's tastes and preferences undergo a change, then and indifference map corresponding to new tastes and preferences will have to be drawn.

(ii) Budget Line or Price Line

We have explained that a higher indifference curve shows a higher level of satisfaction than a lower one. Since the objective of the consumer is to have maximum satisfaction, he will try to reach the highest possible indifference curve. But while a consumer tries to have a combination of two goods which gives him maximum satisfaction, but he is to work under two limitations: firstly he has to pay the prices of the goods and secondly, he has a limited money income. Therefore, how much a consumer can purchase, depends upon the prices of the goods and his money income.

On the basis of his given money income and given market prices of goods, we can draw a line on a diagram which is called the price line or budget line showing the limit upto which a consumer can reach. Suppose a consumer gets Rs 20. per week. He wants to spend this income on the purchase of rice and wheat which he needs. Suppose the market prices of rice and wheat are Rs.2 and Rs. 1 per kg. Respectively. If he spends his total income, i.e., Rs.20 on the purchase of wheat he can buy 20 kgs. of wheat and if he spends his -total income on the purchase of rice, he can buy 10 kgs. of rice. 5 With this information his budget line equation can be given on

$$20 = 1 \text{ (Wheat)} + 2 \text{ (Rice)}$$

Symbolically $M = P_xX + P_yY$

Where M = income, P_x = Price of X, X being wheat

Py = Price of Y, Y being Rice

Let us draw a diagram.

In the diagram 4.12 wheat is measured along the X-axis and rice along the Y-axis. If the consumer spends all his money income (i.e., Rs.20) on wheat alone, he can purchase 20 kgs. Or OB amount of wheat and if he chooses to spend his entire income on rice, then he can purchase 10 kgs. or OA amount or rice. We join points A and B. The slope of the line AB shows the market rate of exchange between rice and wheat or wheat for rice. Such a line is usually referred to as the price line or the budget line relevant for a consumer with given money income and given prices of goods. The price line or the income line may be defined as the line which shows all the possible combinations of two goods which a consumer with a given money income can choose from, at the given prices. The slope of price line (OA/OB) is equal to the ratio of the prices of two commodities (prices of X/price of Y). A price line is drawn of the basis of the given money income of the consumer and the price of the commodities. Therefore, a change in the consumer's income or the price/ prices of the commodities will cause a change in the price line. Suppose the prices of the gods remain constant but the money income of the consumer increases, the

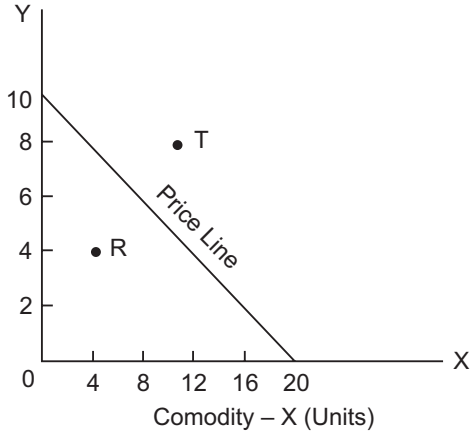


Diagram 4.12

price line will shift upward to the right parallel to itself and if the consumer's money income declines, the price line will shift downward to the left parallel to it. This is shown in the diagram 4.13:

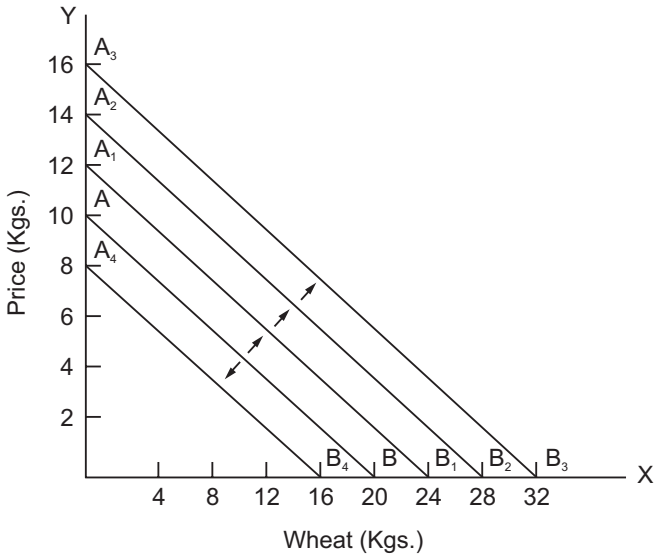


Diagram 4.13

When the money income of the consumer increases form Rs.20 per week to say Rs.24, the price line AB moves upward parallel to itself and takes the position represented by the line A_1B_1. Similarly A_2B_2 and A_3B_3 represent the price or the budget lines relevant to the consumer when his money income is Rs.28 and Rs.32 per week. If the consumer's income declines to, say, Rs.l6 per week, the price line AB moved downward to the left parallel to itself and takes the position represented by line A_4B_4.

If the money income of the consumer remains constant, but there is a change in the price of a commodity, it will result into a change in the price line of the consumer, as is explained in the diagram 4.14. Suppose the price of wheat falls from Rs.1 per kg. to 0.50 paise per kg. When the price of wheat was Rs.l per kg. The consumer with the given income of Rs.20 could buy OB amount of wheat (i.e., 20 kgs. of wheat) if he decided to spend the entire income on the purchase of wheat. But when the price falls to 0.50 paise per kg., the consumer with the same income can buy OB_1 amount of wheat (i.e., 40 kgs. Of wheat). Therefore his price line will shift to right to become AB1. On the contrary, if the price of wheat rises form Rs.l per kg. to Rs.l.25 per kg. He can buy a maximum amount of 16 kgs. Of wheat i.e. OB2 amount of wheat. Therefore the price will shift to the left and becomes AB_2.



Diagram 4.14

The function of the price line or the income line is to show the area of choice open of the consumer. Let us take diagram 4.12. The consumer will not like to choose a point say R, below the price line because any such combination of the two goods, represented by any point below the price line will

not exhaust his entire money income. Some of his money income will remain unspent in that case. The consumer cannot choose any point say T, which is to the right of the price line because he has not enough money to reach to such point. Therefore, the consumer has to choose a position along the price line.

Consumer's Equilibrium

We can find out consumer i.e., the combination of wheat and rice which given the consumer maximum satisfaction, by combining the indifference map. (i.e., scale of preferences) and the price line of the consumer i.e., by combining the diagrams 4.11 and 4.12. This is done in diagram 4.15.

The diagram 4.15 shows the price line AB based on the consumer's limited income (i.e., Rs. 20) and given market prices of the two goods (wheat Re. 1 per kg. and Rice Rs. 2 per Kg.) and indifference curves IC_1, IC_2, IC_3, IC_4, IC_5 and IC_6, show his scale of preferences or indifference map of the consumer. His aim is to reach the highest possible indifference curve but in doing so he will have to act within the limits imposed by his limited income and the market prices of the two goods as depicted by the price line AB. His area of choice is restricted to the triangle OAB. He can choose any point inside the area OAB but this he will not do so simply because in that case his entire income will not be utilized. He cannot move to any point beyond AB because his income does not permit him to do so. He will therefore choose a point along the price line AB only. But AB represents a number of combinations. Which one maximizes his satisfaction?

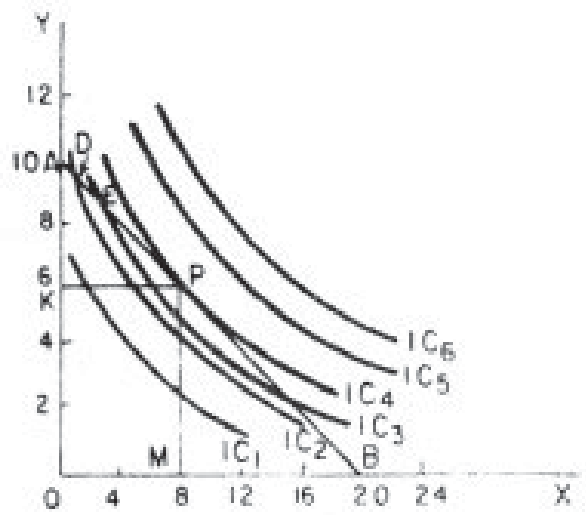


Diagram 4.15

Suppose in the process of trial and error the consumer selects the point D on the price line which also lies on indifference curve IC_2. Having selected D, he finds that by moving to point E on the price line he could be better off because E lies on indifference curve IC_3. He will therefore reject point D in favour of E. But at E he again finds that point P, which lies on indifference curve IC_4 is also open to him. Therefore, he rejects E also in favour of P. Now having reached P he feels as if he is at the top of a hill from where any movement in either direction leads him only to a lower level. The consumer will therefore, stick to position at P. At P, price line just touches the indifference curve IC_4 (is tangential to it) and does not cut it. He is maximizing satisfaction at P. He purchases OK of rice and OM of wheat (i.e., 6 kgs. of rice and 8 kgs. of wheat).

Now we are in a position to state the conditions in which a consumer would be maximizing satisfaction within the limits imposed by his monetary income and the market prices. We can say that the consumer will be maximizing satisfaction when he selects the point where the price line is tangent to the indifference curve. This is the point of maximum satisfaction attainable under the given conditions because any deviation form this position leads the consumer to a lower level of satisfaction. We hope you remember that the slope of an indifference curve at any point measures the marginal rate of substitution between the two goods. At the point of tangency (at point P in the above diagram) the slopes (OA/OB) of the indifference curve and the price line are the same. This simply means that at the point of tangency the marginal rate of substitution (MRS_{xy}) of the consumer, as indicated by his indifference curve, is equal to the price ratio of the two goods (P_x/P_y). We can, therefore, also express the equilibrium by saying that the consumer will be in equilibrium when his marginal rate of substitution between the two goods is equal to the price ratio between the two goods.

The tangency between the price line and the indifference curve or in other words, the equality between the marginal rate of substitution between the two commodities and their price ratio, is a necessary but not a sufficient condition for consumer's equilibrium. The another condition for consumer's equilibrium is that at the point of equilibrium, the indifference curve must be convex to the origin, or, in other words, the marginal rate of substitution of X for Y must be falling at the point of equilibrium, otherwise it will not be a stable equilibrium. This can be explained with the diagram 4.16. In the diagram the price line AB is tangent t the indifferent curve IC_1 at F and therefore F should be the consumer's equilibrium position. But F can not be a position of stable equilibrium because the satisfaction would not be maximum there. At point F, the indifference curve is concave to the point of origin, or, in other words, the marginal rate of substitution of X for Y is increasing. It means, that if the consumer moves in either direction – left or right, on the price line, he can reach a higher indifference curve and can have greater satisfaction. In the diagram, by moving on the price line AB, the consumer can reach at point P. Since at P, price line is tangent to indifference curve IC_2 and therefore, the consumer will have more satisfaction. At P, the price line AB is not only tangent to indifference curve IC_2 but IC_2 is also convex to the origin. Therefore, P represents a consumer's stable equilibrium position.

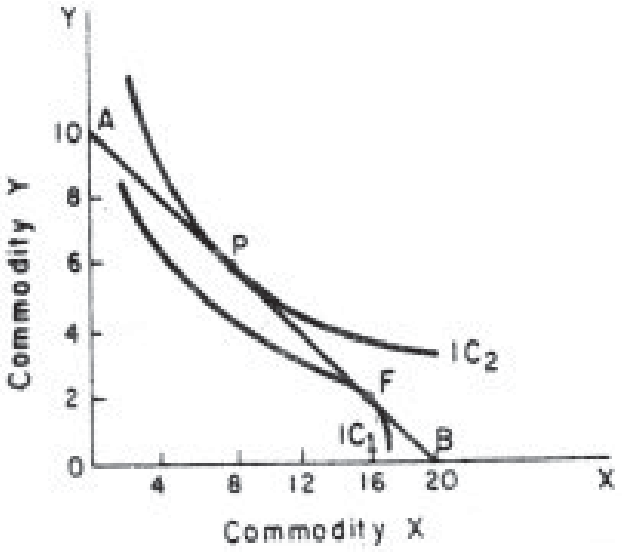


Diagram 4.16

Thus, there are two conditions which are required to be fulfilled for a consumer to be in equilibrium position:

(a) The price line must be tangent to an indifference curve, or marginal rate of substitution of X for Y must be equal to the price ratio between the two commodities.

(b) Indifference curve must be convex to the origin at the point of tangency.

Effect of the Changes in the Consumer's Income and Prices of Goods

So far we have discussed how a consumer decides which goods to buy and in what amounts, when his monetary income and prices of the goods are given. But the monetary income of the consumer and the prices of goods do not remain constant. The changes in consumer's money income and the prices of goods will affect the consumer's equilibrium position.

(i) Effects of the Changes in Income on Consumer's Demand: Income Effect

Let us first analyse the effects of the changes in the monetary income of the consumer on consumer's equilibrium assuming that the prices of goods remain constant.

What happens if the consumer has more or less money income with all other conditions remaining the same? Assuming that the prices of the two goods remain the same, a higher monetary income enables a consumer to go to a higher budget line and choose a combination of the two goods on a higher indifference curve. In other words, a higher monetary income enables the consumer to buy a larger quantity of one commodity or both commodities. The changes in demand for a commodity due to a change in monetary income of the consumer is known as the income effect on demand for that commodity.

In the diagram 4.17 we measure wheat on the X-axis and rice on the Y-axis. Suppose the consumer's monitary income is Rs.20 per week and the price of wheat and rice is Rs. 1 arid Rs.2 per kg. respectively.

If he spends his entire income on the purchase of wheat, he can buy OB amount (20 kgs.) of X and alternatively, if he spends his entire income on the purchase of rice, he can buy OA amount (10 kgs.) of rice. AB, therefore, is his price line. This price line is tangent to the $1C_1$ at point P. Therefore, this would be his equilibrium position. The consumer is spending his entire income (i.e., Rs. 20/-) in such a way that he purchases OM (i.e. 8 kgs.) amount of wheat and OK (i.e., 6 kgs.) of rice. Now suppose his monetary income increases to Rs. 24 per week, the prices of goods remaining the same. Therefore, as explained earlier, his price line will shift upwards to the right parallel to the original price line AB. A_1B_1 is the new price line. Now consumer can move to a higher indifference curve. What will be his equilibrium position? The new price line A_1B_1 is tangent to the IC_2 at P_1. There fore P_1 will now be consumer's equilibrium position. Previously when the consumer's monetary income was Rs. 20/- per week, he was buying OM (i.e., 8 kgs.) amount of wheat and OK (i.e., 6 kgs.) amount of rice. Now his monetary income has increased to Rs.24/- per week, prices of goods remaining constant, he buys OM1 (i.e. 10 kgs.) amount of wheat and OK1 (i.e.7 kgs.) amount of rice i.e. more of both wheat and rice. The shift in the consumer's equilibrium position form P to P_1 is called income effect which is positive. If we join P and P_1 we get a curve which is called Income Consumption Curve (ICC). The income consumption curve usually slopes upwards to the right.

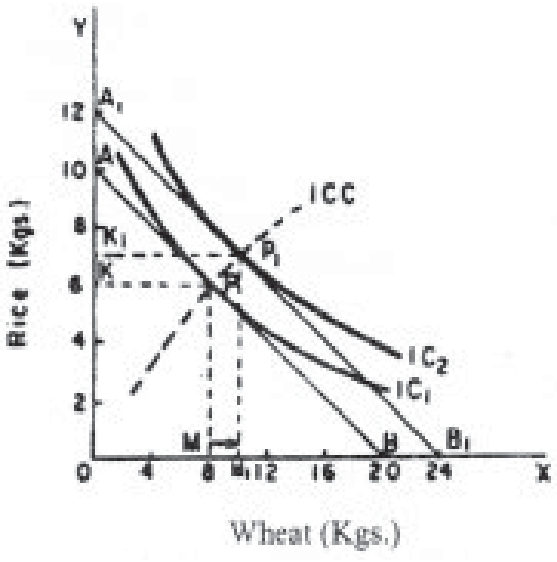


Diagram 4.17

We would like to tell you here that income effect can be positive as well as negative. If the increase in monetary income leads to an increase in the demand of a commodity the income effect is positive. But if the increase in monetary income results in a fall in the demand for a commodity, the income effect will be negative. Normally, income effect is positive. But while discussing the law of demand we have told you that in case of inferior goods the income effect is negative, i.e., the increase in the consumer's monetary income (or real income due to the fall in the price of the inferior commodity) will result in the decline in the demand for an inferior good and vice versa.

Case of Inferior Goods

Inferior goods are those goods which consumers demand when they have low incomes. When consumers have more monetary income, they would shift form inferior goods to superior ones. In other words, with increase in monetary income, the demand for inferior goods declines. The negative income effect, in case of inferior goods, can be explained with the help of a diagram 4.18.

In the diagram we measure X commodity which is an inferior commodity, on the X axis and Y commodity (which is not inferior) on the Y axis. AB is the price line. The consumer is at equilibrium at point P. He buys OM amount of the X commodity. Suppose his income increases and therefore the price line shifts upwards. A_1B_1 is the new price line which touches the IC_2 at point P_1 and therefore P_1 is the new equilibrium point. Now, the consumer buys OM_1 amount of the commodity X which is less than what he was buying earlier when he was at equilibrium point P. Previously he was buying OM amount of X but now he is buying OM_1 amount of X. In other words he buys less of X to the extent of MM_1 even though his income has increased. MM_1 is the negative income effect. Suppose the consumer's income increase further and price lines shifts upward and becomes A_2B_2 and P_2 becomes his new equilibrium position. The consumer now buys OM_2 amount of X which is less than what he

was buying when he was at equilibrium point P_1. In other words, as a result of further increase in his income, the consumer buys less of X, to the extent of M_1M_2. Again the income effect is negative. This negative income effect has taken place because we have assumed that the commodity X is an inferior commodity. Here you find that the income consumption curve (ICC) slopes backward to the left.

The income effect may also take place due to the changes in the price of a commodity, assuming the monetary income of the consumer remaining constant. A fall in the price of a commodity or commodities will result in an increase in the real income or the purchasing power of the consumer which will increase the demand for the commodity. We shall discuss this in detail below.

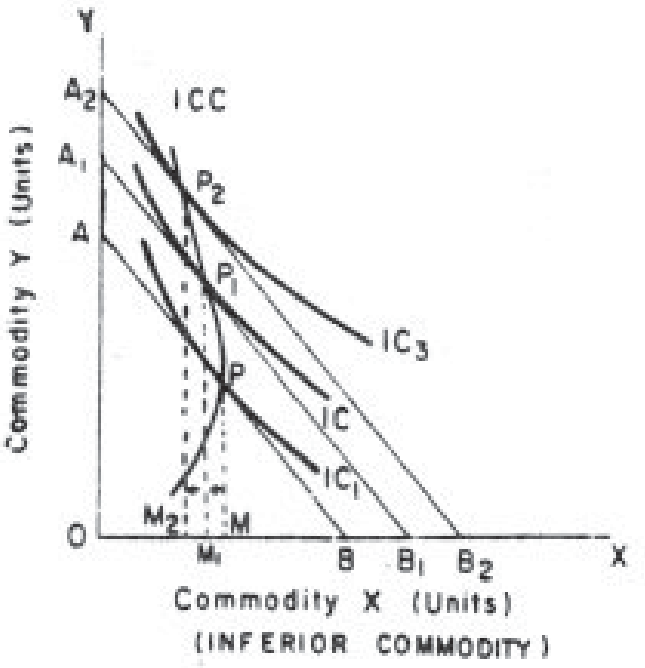


Diagram 4.18

(ii) Effects of Price Changes on Consumer's Demand: Price Effect

We have explained the effects of the changes in the money income of the consumer on his equilibrium position, assuming the prices of goods remaining constant. Let us now examine the effects of the changes in the price of one commodity on consumer's equilibrium, assuming that the price of the other commodity and the consumer's tastes and money income remain constant.

A change in the price of one commodity, say X, keeping the price of the other commodity, say Y, and consumer's money income constant, will result into a change in the price line. As already explained in the diagram 4.14. This will lead a change in the consumer's equilibrium position.

If the price of X alone falls, the price line will shift to the right and this will enable the consumer to reach on a higher indifference curve. On the other hand, if the price of X increases, the price line will shift to the left and therefore the consumer's equilibrium position will lie at a lower indifference curve. The total effect of the change in the price of a commodity on its quantity demanded is called the price effect. This can be shown by the diagram 4.19.

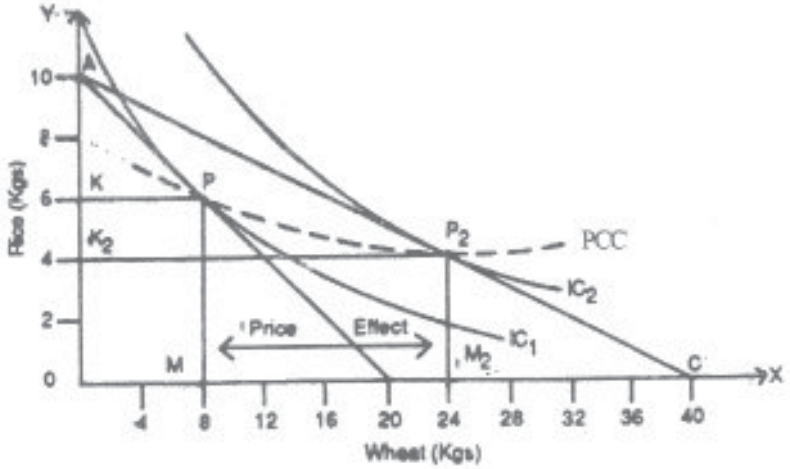


Diagram 4.19

Given the consumer's money income at Rs. 20, and price office at Rs. 2 per kg. and price of wheat at Rs.1 per kg. The price line AB is tangent to the indifference curve $1C_1$ at P and therefore, P will be the consumer's equilibrium position. The consumer will purchase OM amount of wheat and OK amount of rice. Suppose the consumer's money income and the price of rice remain constant, but the price of wheat falls from Rs. 1 per Kg to 0.50 paise per kg. Therefore, with the same money income, the consumer can now buy OC amount (i.e. 40 Kgs.) of wheat. Therefore, his price line will shift to the position of AC. The consumer can now reach on a higher indifference curve IC_2. The new price line AC is tangent to the indifference curve IC_2 at point P_2. Therefore, the P_2 will be the new equilibrium position. Instead of OM amount of wheat, the consumer now buys OM_2 amount of wheat. If we join points P and P_2, we get a curve, which is called Price Consumption Curve (PCC). The Price Consumption Curve traces the price effect. It shows how the changes in price of a commodity will affect the consumer's purchases of that commodity, assuming that the price of the other commodity and the consumer's tastes and monetary income have remained constant. In the figure 4.24, the demand for wheat has increased form OM to OM_2. In this case, the MM_2 i.e. increase in quantity demanded, is the price effect.

SEPARATION OF INCOME AND SUBSTITUTION EFFECTS

The effect of a price changes is in reality the result of the actions of two different forces and can legitimately be looked at in two parts, i.e., income and substitution effects.

(a) ***Income Effect:*** Firstly, as the price of one goods falls (price of other good and monetary income of the consumer remaining the same) the consumer becomes better off than before roughly by the amount of the saving which he would he able to make if he continues to purchase the old quantities of both the goods. Suppose the price of wheat falls from Rs. l per kg. to 75 paise per kg. and the price of rice stays at Rs. 2 per kg. At the old prices the consumer was purchasing 6 kgs. of rice and 8 kgs. of wheat. If after the price fall the consumer continues buying 6 kgs. of wheat then he will save Rs. 2, because at the lower price 8 kgs. of wheat will now cost him Rs. 6 instead of Rs. 8 as previously. This saving in money i.e., Rs. 2 is comparable to an increase in the consumer's money income which he can spend on either or both goods. Thus income effect can be defined as the change in the quantity of a commodity demanded due to change in its price, given the money income as constant. This is called the income effect of a price change. The effect of a price rise will be just the opposite.

(b) ***Substitution Effect:*** Secondly, the fall in the price of one good makes it cheaper relatively to the other good whose price has remained constant (or whose price has fallen but not to the same extent to which the price of other good has fallen) and therefore the consumer will tend to substitute the cheaper good for the dearer one, and as a result the demand for the cheaper good will tend to increase. A change in the demand for a commodity as a result of a change in the relative price of two commodities (one commodity becoming cheaper as compared to the other commodity) is called the substitution effect.

Any change in the relative prices of two commodities brings about a change in the slope of the price line. The consumer remains on the same indifference curve. In other words, he remains on the same level of satisfaction. But because of the changes in the relative prices of the two commodities, consumer rearranges his purchases by substituting cheaper commodity in place of the relatively dearer one. This will result in a change in the quantity of the two commodities bought and therefore, his equilibrium position will shift on the same indifference curve. In other words, the substitution effect implies a movement form one point to another on the same indifference curve.

Thus price effect may be defined as the extent of the change in the demand of a commodity as a result of the changes in price of that commodity. The price effect is composed of two separate effects i.e. income effect and substitution effect and the resultant effect of price changes on the demand for

goods (i.e., price effect) will be the net effect of these two forces. This can be shown by a diagram 4.20.

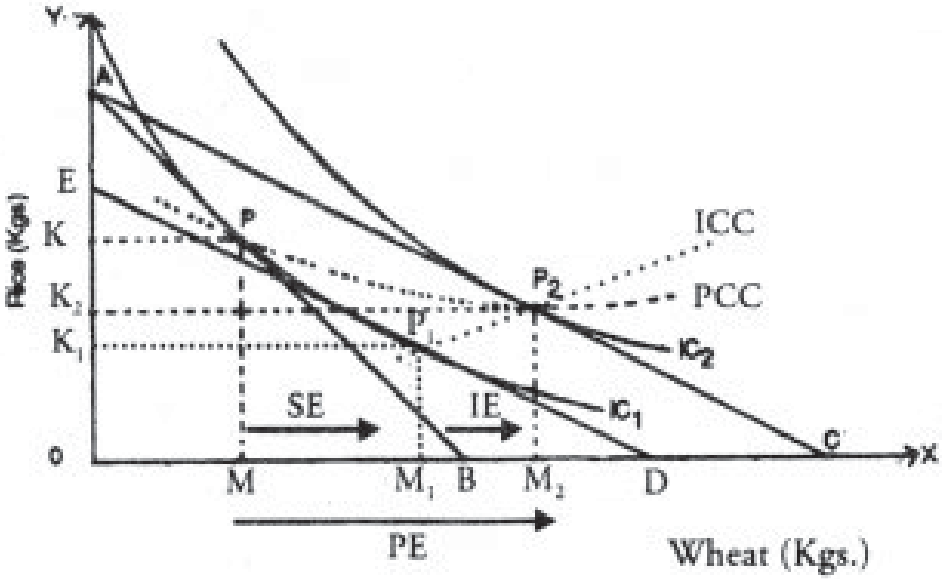


Diagram 4.20

In the diagram 4.20 we measure wheat along the X-axis and rice along the Y-axis. At the old price line AB, the consumer was in equilibrium at point P and has purchased OM of wheat and OK of rice. As a result of the fall in the price of wheat, (from Rs. l per kg to 0.50 paise per kg.) the consumer can now purchase (with the same money income) OC amount of wheat if he spends his entire income on purchase of wheat, but since the price of rice is unchanged, he will keep on purchasing only OA amount of rice if he spends his entire income on the purchase of rice. Now AC becomes the ne\v price line. At the new prices the consumer attains equilibrium at point P_2 and starts buying OM_2 of wheat and OK_2 of rice. If we join points P and P_2, we get a curve which is called Price Consumption Curve (PCC). You will notice that at the new prices the consumer starts buying more of wheat (OM_2 is greater than OM) and less of rice (OK_2 is less than OK).

This increase in the demand of wheat (i.e., price effect), as a result of the fall in its price, has taken place because of two effects i.e., income effect and substitution effect. Let us now find out how much of this increase in the demand for wheat is due to income effect and how much is due to substitution effect. In order to bifurcate income effect and substitution effect, we draw a price line ED which is parallel to the old price line AB and which is tangential to the indifference curve IC_2 at P_1. Because ED has been drawn parallel to the old price line, therefore, this too represents the old price ratio between the two goods. ED only shows that had the money income of the consumer increased, as indicated by the price line, and prices kept constant, the consumer would have attained equilibrium at P_1. But as prices have actually changed the consumer cannot afford to stay at P_1 and has to move to P_2 where the new price line AC is tangential to indifference curve IC_2.

Thus in diagram 4.20 the movement form P to P_1 is due to the substitution effect and the movement form P_1 to P_2 is due to the income effect. You will notice that substitution effect acts in favour of wheat and against rice and consequently consumption of wheat increases by MM_1 and consumption of rice falls from OK to OK_1. But the income effect acts in favour of consumption of both the commodities, i.e, wheat and rice increases (amount of wheat increase by M_1M_2 and rice by K_1K_2) We can summaries it, as a result of the fall in the price of wheat, its demand has increased by MM_2 (price effect). Out

of this increase, the increase to the extent of MM_1 is due to substitution effect and increase to the extent of M_1M_2 is due to income effect.

Thus we see that the effect of a change in the price of a good can legitimately be looked upon as consisting of two separate effects namely, the income effect and the substitution effect and the total price effect on demand is the sum of these two effects. As far as the substitution effect is concerned, it is always negative. Normally income effect is positive i.e., it will tend to increase the demand for good. But in case of inferior goods, income effect is negative. However in case of an inferior good, if the good in question plays a fairly small part in the consumer's total budget so that the negative income effect is not very strong, the demand for the good will increase due to the relatively stronger positive substitution effect. Only in case of an inferior commodity, on which a consumer spends a major portion of his total income, the negative income effect may be stronger than the positive substitution effect and, therefore, the demand for that commodity will fall. Such type of goods are called Giffen goods, after the name of Sir Robert Giffen. Thus there is a difference between an inferior good and a Giffen good. A Giffen good is necessarily an inferior good, but all inferior goods need not be Giffen goods. A Giffen good means an inferior good on which the consumer spends a major portion of his income so that the negative income effect is more that the positive substitution effect, with the result that the price effect becomes negative. In other words, in case of a Giffen goods, a fall in its price will reduce its demand and a rise in the price will increase its demand. This can be explained with the help of **diagram 4.21**. Suppose commodity X is a Giffen good which is represented On X-axis . With a given monetary income (line AC) and prices of the two commodity X (Giffen good) and Y the consumer is at equilibrium point P on indifference curve $1C_1$. The consumer buys OM quantity of X. Suppose the price of X rises and the consumer's price line shifts to AB. Price line AB is tangent to indifference curve IC_2 at P_2. At this new equilibrium point P_2, the consumer buys OM_2 amount of X. Thus as a result of the rise in the price of X (Giffen good), the consumer increases the consumption of X from OM to OM_2. In other words, the demand for X has increased to the extent of MM_2. This is price effect. This price effect is composed of income effect and substitution effect. In order to find

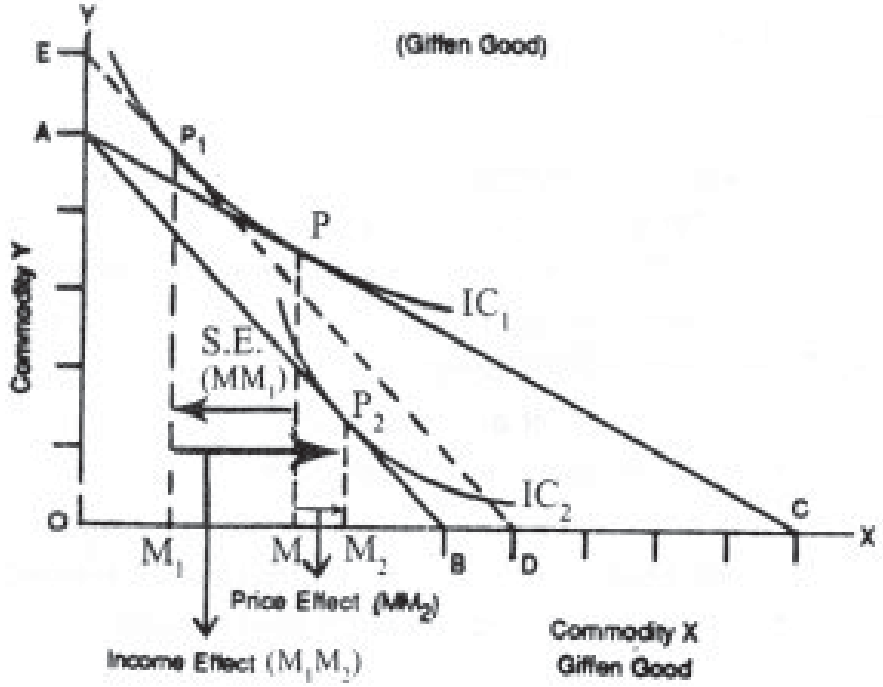


Diagram 4.21

out these we again draw an imaginary price line ED, which is parallel to the price line AB. The price line ED is tangent to the indifference curve IC_1 at P_1. This shows the substitution effect which is equal to MM_1. The substitution effect induces consumer to buy less of commodity X to the extent of MM_1 since price of X has increased. But the income effect acts in opposite direction and is greater than the substitution effect. The income effect here is M_1M_2. Therefore, the net effect i.e. price efffect is MM_2, i.e. with the rise in the price of X, its quantity demanded increased by the amount MM_2.

Thus if a good is Giffen good, a fall in its price reduces its quantity demanded and a rise in its price will increase the quantity demanded. In other words, in case of a Giffen good, there is a direct relationship between its price and quantities demanded, i.e., both vary in the same direction. It means that in case of Giffen good, the law of demand does not operate. If a commodity is a Giffen good, its demand curve will slope upward from left to the right. Such a situation is also referred to as Gifen's Paradox. However, a Giffen good is rarely found.

To sum up, the effect of a change in the price of a good can be stated in the form of the following three propositions:

(1) More of a good will be demanded when its price falls, in all cases when the commodity is not an inferior one, because both the income effect and the substitution effect are positive and act in favour of an increase in the amount of the good demanded.

(2) Even in case of an inferior good, so long as the proportion of total income of the consumer spent upon the inferior good is small, so that the negative income effect is small, the demand for the good will increase after a fall in its price because of the stronger positive substitution effect.

(3) Only in the case of a Giffen good i.e., an inferior good which plays an important part in the budgets of its consumers, so that the negative income effect out weights the positive substitution effect, fall in the price will diminish the amount demanded.

Derivation of Individual's Demand Curve (Price Consumption Curve and Demand Curve)

We can derive a demand curve with the help of the indifference curve analysis. What is the difference between Marshall's demand and the price consumption curve (PCC) which Hicks has popularized? The conventional price-quantity demand curve tells us as to how much quantities of a commodity, a consumer will demand at different prices of a commodity. The PCC explains the same thing how a change in the price of a commodity brings about a corresponding change in the consumption or demand of the commodity. Further the demand curve and the PCC are based on the same assumptions, viz.,

(a) There is no change in the preferences, tastes etc., of the consumer.

(b) The monetary income of the consumer remains the same.

(c) 'The price of one commodity alone changes.

(d) The price of all other goods are constant.

Under these assumptions, normally consumers generally demand more at lower prices and less at higher prices.

The basic difference between the demand curve and the PCC is their shape and this essentially follows form the fact that they have been constructed in different ways. The conventional demand curve is drawn with quantity of a commodity demanded on the horizontal axis and the price of that commodity on the vertical axis. The PCC, however, is drawn with one commodity on the horizontal axis and other commodity or monetary income on the vertical axis.

As a result in case of the usual demand curve the price of the commodity is clearly mentioned on the vertical axis and quantity demanded on the horizontal axis i.e., the various prices and the corresponding quantities which will be demanded at those prices. On the other hand, the PCC does not mention the price of commodity directly; instead, the slope of the budget line indicates the ratio of prices between the two goods. The PCC does not directly sell us the different quantities demanded at different prices.

The essential function of the conventional demand curve is to show the price effect. It cannot show separately the income effect and the substitution effect. On the other hand, the PCC shows separately the income and substitution effects of a fall in the price of a commodity.

The comparison between Marshall's demand curve and Hicks' PCC brings out clearly that each has some merits of its own. The demand curve establishes a direct relationship between the price and the quantity demanded while the PCC helps in dividing the price effect into income and substitution effects. It is, however, possible to derive the usual demand curve from the PCC. This is shown in diagram 4.22 given below:

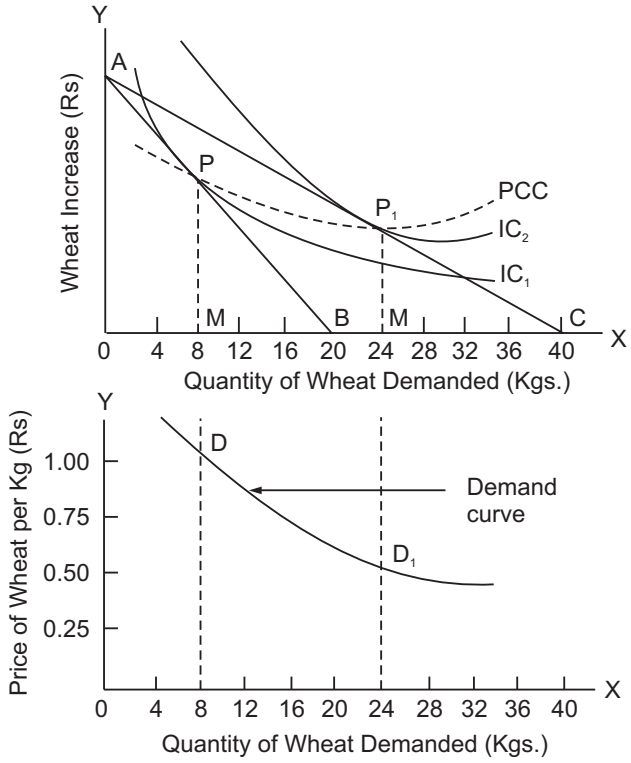


Diagram 4.22

In the top portion of the diagram 4.22, the price consumption curve for wheat has been constructed, In the top portion, the X-axis represents the quantity of wheat and the Y-axis represents the monetary income of the consumer. The monetary income is Rs. 20 which is constant. When the price of wheat is Rs. 1. per kg., the price line is AB, which is tangent to the $1C_1$ at P. Therefore P is the consumer's equilibrium position. The consumer buys OM amount of wheat (i.e., 8 kgs.). When the price of wheat falls to 0.50 per kg., the price line shifts to AC which is tangent to IC_2 at P_1 becomes the new equilibrium position of the consumer. The consumer now buys OM_1 amount of wheat (i.e., 24 kgs.) By joining these two points P and P_1, we can draw the price consumption curve (PCC). The PCC shows that consumer demands OM (8 kg.) and OM_1 (24 kg.) amounts of wheat when the prices are Rs. 1 and 0.50 paise respectively. This price-quantity relationship has been represented in the lower portion of the figure. In the lower portion of the figure, the horizontal axis represents the quantity of wheat demanded and

the vertical axis represents the price of wheat. Point D shows that the demand for wheat is OM (8 kg.) when the price is Rs. l per kg. Point D_1 shows that when the price is 0.50 paise per kg. The demand for wheat is OM_1 (24 kg.). By joining these point D and D_1 we get a curve, which is known as the demand curve. This demand curve shows the different quantities of wheat demanded by a consumer at different prices. This is how a demand curve can be derived form the price consumption curve.

Evaluation of the Indifference Curve Analysis

Let us now assess to what extent the indifference curve analysis is free from the defects of the Marshallian utilitarian analysis. In the first place, in order to know what quantities of a good a consumer will buy at given market prices the utilitarian analysis implies that we must know how much utility the consumer derives form each unit of a good. But according to the indifference curve analysis we need only know that a consumer prefers such and such sets of good to such and such sets. We need not know by how much one set is preferred to the other. Thus according to the indifference curve analysis quantitative measurement of utility is not necessary in order to explain the consumer's behaviour.

Secondly, the utilitarian analysis implies that the utility which the consumer derives form each commodity purchased, depends upon the stock of that commodity alone, and the total utility of the whole collection of goods is simply the sum of these separate utilities. We have already explained to you the implications of this assumption with examples. Indifference curve analysis admits interdependence of utilities. If utility of one good is partly influenced by the utility of another good it will be reflected in the marginal rate of substitution.

Finally, the utilitarian analysis ignores income effect by assuming marginal utility of money as constant. With the help of indifference curve technique the income effect and the substitution effect are brought out very clearly.

Limitation of Indifference Curve Analysis

The indifference curve analysis has two important limitations. The first limitation relates to the assumption that consumers are familiar with their preference schedules, as for example between apples and oranges, coffee and cigarettes, shirts and shoes and so on. For each pair of goods, the consumer is supposed to have full knowledge of all the different combinations and of all the marginal rates of substitution, of the total satisfaction to be realised, etc. It is possible to arguer that a consumer may know that 8 cups of coffee and 16 cigarettes, will give him as much satisfaction as 10 cups of coffee and 14 cigarettes because these are the combinations which he may buy often. But he cannot really compare the desirability of 10 cups of coffee and 5 cigaretters with that of 6 cups of coffee and 8 cigarettes. Thus the basic limitation of the indifference curve approach is its assumption that an average consumer knows about all possible combinations of any two goods.

Secondly, the indifference curve analysis deals with only simple cases of consumer's choice between two goods and his expenditure on them. In practice, these situations may not be of much significance. For one thing, consumer often buy more than two goods. If they buy three goods, geometry fails altogether. Lastly, the indifference curve technique can handle goods between which there is some rate of substitution. The analysis fails in the case of complementary goods between which there is no substitution.

Despite these limitations, the indifference curve analysis has become very popular not only in the theory of demand but also in the theory of production, international trade etc.

Notes

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B.Com./B.A. (Programme) I Year Economics

Paper IV : Discipline Course
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Principles of Economics/Principles of Micro-economics

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TOPIC 3

PRODUCTION AND COSTS

LESSON 5

PRODUCTION

Introduction

Traditional economic theory centers around the working of a capitalist economy (which is also termed as free enterprise or free market economy). As observed earlier too, all the three central problems (viz. (1) what goods to produce and in what quantities, (2) how to produce them, and (3) how to distribute the net output amongst the members of society) are solved basically through the price mechanism in a capitalist economy. Price mechanism is nothing but the sum total of all prices (both of goods and factors of production) prevailing in the economy and determined jointly by the forces of demand and supply in the respective markets. You have had an elementary view of the price mechanism in a previous set, but for a thorough understanding, it is necessary to go deeper into what lies behind the forces of demand and supply in a capitalist economy. Set 4 gave you a fair idea of the major factors underlying demand and how changes in them influence the latter. We now propose to take up supply or production for a detailed analysis. Only after examining what lies beneath the forces of demand and supply, will you be equipped to analyse the working of price mechanism in a capitalist economy in all its aspects.

While analyzing the behaviour of a consumer (i.e., the basic decision-taking unit in the theory of Demand) and determining his equilibrium, it was assumed that the consumer, being a rational human being, always tries to maximize his utility. In the field of production economics, firms - the basic decision-taking units - are assumed to have profit maximization as their objective. The common-sense relationship between rationality and maximization of utility (utility being defined as the capacity of a good to yield satisfaction) is more obvious and justifiable than the rationality of the goal of profit maximization in the context of firms. Still, the latter is basic to the traditional economic analysis of a private enterprise economy. It follows from this basic premise that a firm will always try to operate at that level of price and output at which the difference between its total revenue and total cost is the largest. We take up the cost aspect first, postponing the discussion of revenue conditions of a firm to the next set of lessons. The cost of production of a commodity depends upon two things: (i) the quantities of various factors of production used and their physical productivities, and (ii) prices per unit of the factors of production. The former specifies purely technical relationships while the latter has to be taken into account by the firms when taking economic decisions. We shall consider the technical relationships first.

5.1 PRODUCTION FUNCTIOMN: THE CONCEPT

Your know that various inputs are required to produce a particular product. For example, land, water, seeds, fertilizers, plough, bullocks etc., are required to produce wheat. Similarly, a firm planning to produce cloth requires a factory, workers with requisite skills, cotton yam, machinery, fuel, tools and implements etc. Economists divide inputs into certain broad categories on the basis of similar economic features and call them ‘factors of production’. The outcome of the process of production using these factor inputs is called output which may be a final consumption good (e.g.. bread, cloth), a service (e.g., teaching), an intermediate good (e.g. coal for a steel furnace or power for a cloth mill) or a durable-use capital

good (e.g. factory building, blast furnace). Now the production function describes the technical relation that may exist at any time between the quantities of factor inputs and the resulting output, given the prevailing state of technology. It describes the laws governing transformation of factor inputs into products per unit of time. In other words the production function represents the technology of a firm or industry or the economy as a whole. Thus, with technological progress, the production function necessarily undergoes a change.

Let us note that a production function includes only technically efficient methods of production, that is, methods which produce maximum possible output for a given quantity of factor inputs (or, which is the same thing, which use the minimum quantity of inputs for a given output). Moreover, a production function may describe the alternative combinations of the various factor inputs (i.e. alternative methods of production) for producing a given output or it may describe the response of total output either (a) to changes in all factor inputs in the same or different proportions (a long run possibility) or (b) to changes in the amounts of some variable factor (or factors) while keeping the amount of other factors constant (a short run possibility).

A production function can be expressed either as a schedule (or a table) or as a graph (or a curve) or in the form of an algebraic equation (or as a mathematical model). Production function in one form can be converted in any of the alternative forms. Real life production functions include a wide range of independent variables (i.e., factor inputs) such as land, labour, raw materials, fixed capital, entrepreneurial-organizational efficiency, scale factor, etc. However, for keeping exposition of the subject matter simpler, we have reduced the number of factor inputs to two only, namely, labour and capital.

5.2 DISTINCTION BETWEEN THE SHORT-RUN AND THE LONG-RUN PRODUCTION FUNCTIONS

There are three possible ways of increasing the level of output. Output can be increased either by changing the amounts of all factors by the same proportion or by increasing their amounts in different proportions or by increasing the amounts of some factor(s) while keeping the amounts of other factors fixed. While the first two alternatives are available only in the long run, the third alternative is available in the short run. This brings us to the important question of the distinction between the short run and long run and the analytical significance of this distinction in the present context.

The Fixed and Variable Inputs

In order to produce any commodity, a producer needs two kinds of factor inputs which can be described as ‘variable inputs’ and ‘fixed outputs’. The amounts of some factor inputs can be varied easily in accordance with the requirements of production as and when necessary, while the amounts of some factors cannot be so adjusted over certain periods. The inputs of the first type are known as ‘variable inputs’ and the inputs of the other type are known as ‘fixed inputs’. Raw materials, direct labour, fuel, power, lubricants, ordinary repairs and maintenance, etc,, are examples of variable inputs. Their amounts can be adjusted according to the level of output without any difficulty. If production stops, these inputs can be completely dispensed with. On the other hand, fixed inputs include durable-use capital goods such as machines, building, land, tools and equipment which, if looked after and maintained, properly, can aid production over long periods. The use of such equipment does not finish with a single act of production but extends over a number of years. In other words, the returns from such durable use capital goods are spread over the whole of their productive lives. Therefore, while planning to install such equipment, the producer has necessarily to base his plan on the expected average level of sales over the whole of its productive life.

The planning of a firm consists in deciding the ‘size’ of the ‘fixed’ factors, which detremine the size of the ‘plant’ because they set limits to its production. (Variable factors such as lab our and raw materials are assumed not to set limits on ‘size’ because the firm can acquire them easily form the market without any time lag). A businessman starts his planning with a certain figure for the average level of output which he expects selling over the relevant period and will choose the plant size which

will enable him to produce that level of output most efficiently over the whole of its productive life. Before an investment is decided, the producer is in the long-run situation in the sense that he is free to choose any plant size from among the different available plant sizes. Once, However, the investment decision is taken and funds are tied up in a given plant, the producer's long-run freedom of choice ceases. So long as the productive life of the installed plant lasts he cannot discard it and choose another plant simply because of the heavy costs involved. During this period he can meet fluctuations in demand only by working the given plant more or less intensively (i.e., by applying larger or smaller amounts of other variable inputs with the given plant), but cannot choose a different plant. Executives, managers, supervisors and other permanent staff, constituting what is known as the 'management of the firm', are also of the nature of fixed inputs. Their services also cannot be adjusted in accordance with the requirements of output. The configuration of the durable use capital goods and the management, known as 'plant', represents affixed cost for the producer because he cannot escape these costs even if he stops production completely. That is the reason why the costs of such inputs are called 'fixed costs'.

We will discuss this aspect latter in greater detail. At this point it should suffice to say that in the short run a producer can increase or decrease the level of output only by increasing or decreasing the application of 'variable' inputs with a fixed amount of some other factors (i.e., the plant). On the other hand, in the long run (when the producer is free from short-run commitments) all factors are variable and he can vary the level of output by varying the amounts of all factors. Short run may be defined as the period which is too short to permit firms to adjust amounts of all factors in accordance with the requirements of production but long enough to permit adjustment of output by applying larger or smaller amounts of variable factors with the fixed equipment of the firm. Long run, on the other hand, refers to the time period which is long enough to permit firms to adjust amounts of all factors to suit long-run requirements. Short and long runs do not refer to any definite time period . Short and long periods vary from industry to industry. For example, the short run from the standpoint of steel industry may range over five to seven decades, whereas it may be just a few months for fishermen who do not use much fixed capital except their fishing nets.

Corresponding to the distinction between short and long runs, we have short-run and long-run production functions. The short-run production function describes the technical relation between the quantities of some variable input(s) and the resulting output when amounts of some factors are fixed. On the other hand, the long run production function describes the technical relation between quantities of factor inputs and the resulting output when amounts of all factors are variable in the same proportion or different proportions.

5.3 THE SHORT-RUN PRODUCTION FUNCTION

In the preceding section we explained in some detail the basis of the distinction between the long-run and the short-run. Short-run is a period during which the durable-use capital equipments (and also the management) of a firm are invariable and changes in output can be brought about only by working the given equipment more or less intensively, that is, by applying larger or smaller amounts of the variable factor(s) with the given equipment. When a firm tries to increase its output in this way, it evidently changes the proportion between the fixed and the variable factors. The production function in this case is described by the Law of Variable Proportions or what is more popularly known as the 'Law of Diminishing Returns'.

Assuming that there is only one variable factor (consisting of homogeneous units) and constant technology, the Law can be stated as follows:

'Other things remaining constant, when more and more units of a variable factor are used with a fixed quantity of other factors, eventually the marginal product of the variable factor starts diminishing'. Marginal product refers to the addition made to total output due to the use of an additional unit of a variable factor, the amounts of all other factors remaining constant. For example, if due to the employment of 11 labours instead of 10 the total output increases form 100 units to 115 units per day, in that case

the marginal product due to the eleventh labourer will be 15 units. The operation of the Law of Variable Proportions (or The Law of Diminishing Marginal Returns) is illustrated with a simple example. Suppose a small production unit producing shoes obtains the following results when it engaged more and more labourers with the given equipment.

Table 5.1

Unit of Variable Input Labour	*Total Product*	*Marginal Product*	*Average Product*
(1)	(2)	(3)	(4)
1	15	15	15
2	60	45	30
3	123	63	41
4	200	77	50
5	285	85	57
6	372	87	62
7	455	83	65
8	530	75	66
9	596	66	66
10	640	44	64
11	660	20	60
12	660	Zero	55
13	650	(–)10	50

We see in the table 5.1 above that total output increases continuously with every increase in the variable input i.e., labour- in this example. Only when the 12th Unit of labour is employed does the total product remain constant at 660. And with the employment of the 13th labourer total output diminishes from 660 to 650. However, the increase in total product corresponding to each addition to labour is not the same. Column (3) is derived by finding the addition to total product made by each successive unit of labour. This is calculated by finding the absolute difference between every two consecutive figures of total product and is called Marginal Product. The law of variable proportions states that as the input of a factor increases, with all other factor inputs remaining constant, the marginal product of variable factor starts diminishing after a point. In the present example, marginal product increases upto the employment of sixth unit of labour where it is maximum and decreases continuously after that till it becomes (–)10 for the last unit of labour employed.

Just as we have derived marginal product form the total product, we can also derive average product from the latter. This can be done by dividing each figure of total product by the number of units of labour employed i.e. by dividing each element in column (2) by the corresponding element in column (1) average product, as the name indicates, represents the average productivity of the variable input (i.e, output per unit of input) at each point. Looking at column (4) we observe that average product also increases in the beginning. In fact, the raising phase of the average product is even longer than that of the marginal product. Marginal product starts declining with the employment of the seventh unit of labour while average product continues to rise upto the eighth unit after which it also falls. The relationship between the average and the marginal values is as expected. If a marginal value is above the average value, it pulls the average up while a marginal value below the average value pushes it down. Since both marginal and average values use up to a point and then fall, it stands to reason that the highest point is different for both. The marginal value reaches its highest point before the average reaches its maximum. The reason is that for some lime, the marginal value, though falling, is above the average which, as a consequence rises. But the average starts fallings as soon as the marginal value becomes lower than the average. As a result, the marginal and average values are equal at the point where the average reaches its highest point, in the example given above, this happens when the ninth unit of labour is employed. You may also observe that the marginal product falls at a much faster rate

compared to the average product which experience a relatively gradual decline. As for the reason for first rising and then falling average product we may say that there exists an optimum proportion in which fixed and variable inputs can be combined. When the variable input is combined with the fixed factors in this particular proportion, average product attains its highest value or output per unit of input is the maximum. Before this point, the variable input is spread too sparsely over the fixed factor inputs and every increase in the variable input leads to a more than proportionate increase in total product, thus raising the average product. After this point, the variable input is used too intensively and further increases in this input result in less than proportionate increase in total product, thus lowering the average product.

The law of variable proportions can also be illustrated with the help of a diagram. In part (a) and (b) of diagram 5.1 below, we draw the total product and marginal product curves respectively. In order to keep the diagram simple, we do not draw the average product curve. However, you are expected to remember the relationship between average and marginal values and draw the average product curve as an exercise.

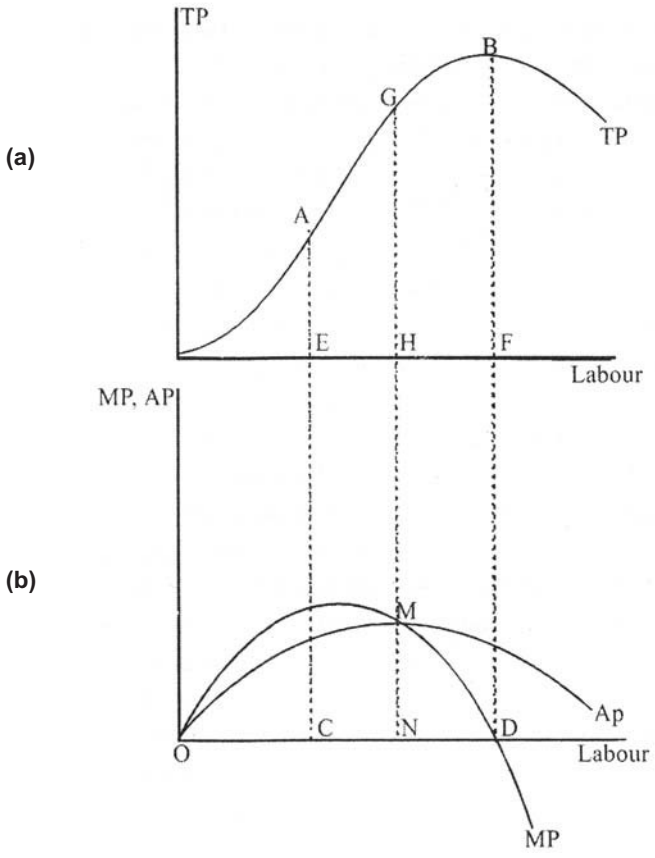


Diagram 5.1

The law of variable proportions states that as successive additions are made to the input of a particular factor, keeping all other factor inputs constant, the marginal product falling after a point.

In part (a) of diagram 5.1 above, curve TP is the production function specifying the relationship between the variable input (i.e. labour) on the one hand and total output on the other. It must be clear to the students familiar with elementary' mathematics that the slope of the curve rises form the origin to point A. As the slope of the curve signifies marginal product of the variable factor, we can say that marginal product of labour on this stretch is positive and increasing . In mathematical notation, both the first and the second derivatives of the production function with respect to labour input are positive.

The same phenomenon is shown in part (b) where the marginal product curve MP lies in the first quadrant and rises form point O to point C which is the highest point. Curve TP in part (a) keeps on rising even after point A but its slope falls. At point B, the curve attains its highest point and starts falling after that. In other words, the slope of curve TP, though remaining positive, declines continuously between point A and point B and approaches zero. It however, changes its sign after point B and becomes negative. Hence the behavior of curve MP between point C and point D in part (b) and beyond that. The average product (AP) curve as shown in part (b) above rises till point M and falls after that. Unlike MP, the AP never becomes negative because both TP and Labour units arc positive amounts. There is no need to emphasis here that no rational producer will venture to go beyond point B on the total product curve or point D on the marginal product curve i.e., the range of diminishing total output or negative marginal productivity of the variable factor. This statement holds good irrespective of the price of the product or that of the variable factor. The reason is obvious. Any addition to the quantum of the variable factor detracts form the total output rather than adding to it. Therefore, on the basis of technical efficiency alone, no producer will employ an amount of the variable factor greater that OF (=OD). What about the range of increasing marginal productivity? As application of each successive unit of the variable factor results in successively higher additions to total output, it is not rational on the part of the producer to stop short of point A on the total product curve or point C on the marginal product curve and leave unutilized the potential for increasing productivity further. Therefore, we can say that on purely technical grounds, the ranges of the production function depicted in Figure I before point A or after point B are ruled out as irrational. A rational producer will neither operate in the range of positive and increasing marginal productivity nor in that of the negative marginal productivity of the variable factor. By the method of elimination, we observe that the range of rationality lies between point A and B on the total product curve (where the latter rises, but at a failing rate) or between point C and D on the marginal product curve (where the variable factor has positive, but decreasing marginal productivity). In order to know where exactly in the rational range will the producer operate, we require additional information regarding prices. But at the moment, we are only concerned with technical relationships and not with efficiency in the economic sense.

5.4 THE LONG RUN PRODUCTION FUNCTION

As explained in section II above, long run is the period during which all the factors are variable. In the long run total output can be increased or decreased by changing all factor inputs by the same proportion or by different proportions. We will, however, concentrate only on the first case, that is, the changes in the level of output in response to changes in all inputs in the same proportion. The term ‘returns to scale’ refers to the response of total output to changes in all inputs by the same proportion. The laws of "returns to scale’ refer to the effects of scale relationships. However, before studying the laws of ‘returns to scale’ let us explain and important tool of analysis- the concept of an ‘isoquant’ (’iso’ meaning equal and ‘quant’ meaning quantity). An ‘isoquant’ or an ‘iso-product curve’ is a graphical depiction of the alternative combinations of two factor inputs (i.e. methods of production) to produce a given level of output.

The Concept of Isoquant

Usually, it is possible to produce a commodity using different combinations of factor inputs (or what is the same thing, methods of production). For example, it may be possible to produce one unit of a commodity X by the following combinations of capital and labour:

	Method A	*Method B*	*Method C*
Units of Capital	5	4	3
Units of Labour	2	3	4.5

These three alternative processes or methods of producing one unit of X are shown in the Diagram 5.2 below:

In this diagram we measure units of capital along the vertical axis and units of labour along the horizontal axis. Point A represents method A which combines 5 units of capital with 2 units of labour. Point C represents method C combining 3 units of capital with 4.5 units labour. The three points represent three alternative methods of producing the same output-one unit of X, Therefore, a curve, such as ABC in the diagram, is called 'an isoquant' or 'iso-product curve because it represents alternative methods (i.e., combinations of factor inputs) for producing the same output ('iso' meaning equal and 'quant' meaning quantity).

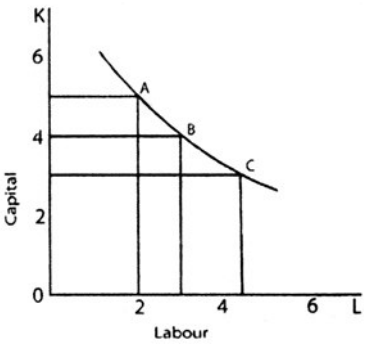


Diagram 5.2

As is evident form the above diagram, method A combines the largest number of units of capital with the smallest number of units of labour while it is just the opposite with method C and method B lying in between. The "isoquant' ABC represents a production function which includes 3 alternative methods of producing a given output. It is a long- run production function in the sense that these alternatives exist only so long as an investment decision is not taken. There cease to be available the moment a producer selects one of them and sinks his funds in it.

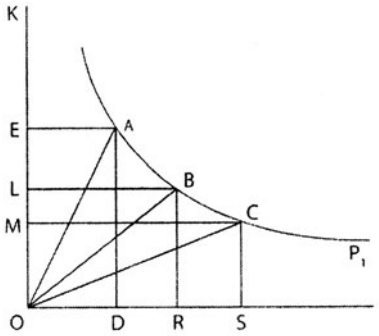


Diagram 5.3

To sum up we can say that the production function is the sum total of ail technically efficient methods of production available to produce a given output at any time given the prevailing state of technology. It we measure two factor inputs (viz., capital and labour), as in Diagram. 5.2 above, the locus of ail such points as A,B,C, etc; representing different combinations of capital and labour, for producing the same output, is the production function. We show it in Diagram 5.3.

The smooth curve P, in Diagram 5.3 is the locus of all points like A,B,C. which represent alternative technically efficient processes using different combinations of labour and capital to produce a give output. Isoquant P, is the production function prevailing at a particular point of time, i.e., representing a particular state of technology.

It is necessary' at this stage to clarify that we do not consider technically inefficient method i.e., those methods which compared another method, use the same number of units of one factor and a larger number of unit of the other or a larger number of units of both the factors. In the example given below, method B is inefficient compared to method A as it uses the same amount of capital (3 units) with a higher amount of labour (3). This simply means that the extra unit of labour used in method B makes no contribution to output and as such its use is wasteful. Method C is still more inefficient using more

	Method A	*Method D*	*Method B*	*Method C*
Units of Capital	2	3	3	3
Units of Laour	3	3	4	2

both labour and capital compared to method A. Method B and C are also technically inefficient compared to method D. Therefore, method B and C are rejected straightway as technically inefficient. But it is not possible to compare method A and method D from the viewpoint of efficiency. Both are technically efficient as each one of them uses a higher amount of one factor with a lower amount of another but it is not possible to determine which one is economically efficient without bringing in the factor prices. While technical efficiency is concerned with only quantities of factor inputs, economic efficiency is concerned with total cost in terms of money. Therefore, you should clearly grasp the difference between

technical efficiency and economic efficiency. A technically efficient method may turn out to be economically inefficient with one set of factor prices and the dame method may become efficient with a different set of prices. But a technically inefficient method can never turn out-to be economically whatever be the factor prices. We illustrate this point with a simple example. Let us suppose that in order to produce a unit of X the following three methods are available:

	Method A	*Method B*	*Method C*
Units of Capital	5	4	3
Units of Labour	3	4	5

It we assume per unit prices of capital and labour to be Rs. 5 and Rs. 3 respectively, then method C is the most efficient. However, if the per unit prices of capital and labour are Rs. 3 and Rs. 5 respectively, in that case method A turns out to be the cheapest. Thus, technical efficiency and economic efficiency are not the same thing. Production function describes not only a single isoquant, but the whole array of isoquants, each representing a different level of output. It shows how total output responds when a mounts of both inputs are multiplied. Diagram 5.4 shows that doubling of output from 100 × 200*x* requires only a 50% increase in both inputs-from 4K plus 6L to 6K. plus 9L. It also shows that doubling of both inputs from 4K plus 6L to 8K plus 12L results in trebling of output from 100 × 300*x*. In other words, the response of total output to charges in both inputs is more than proportionate.

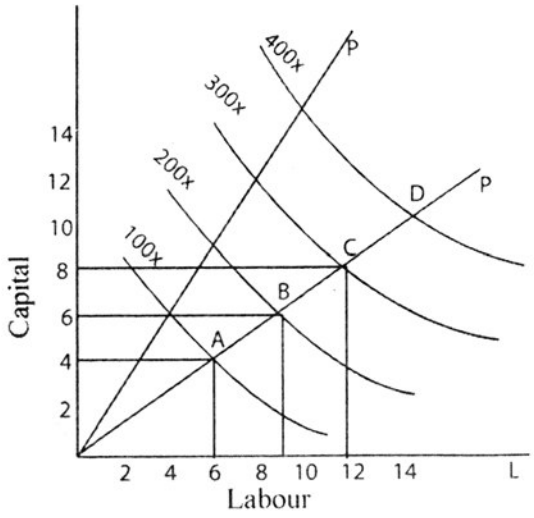


Diagram 5.4

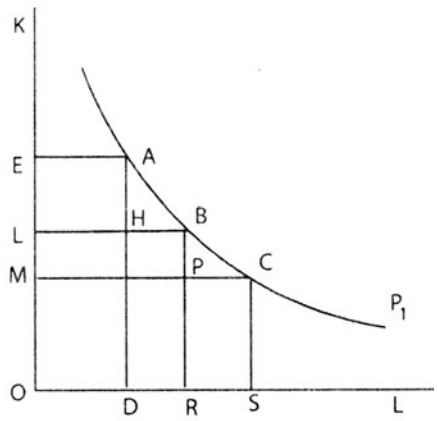


Diagram 5.5

What does a movement from one point to another on the same isoquant imply? It implies that total output remaining constant, labour is being substituted for capital. For example, in diagram 5.5 above point A represents OE of capital of OD of labour and point and point B represents OL of capital and OR of labour. A movement from point A to point B means that the reduction in the amount of capital (=EL=AH) is just being compensated by an increase in the amount of labour (=DR=HB). In other words, HB of labour is being substituted for AH amount of capital. By dividing AH by HB we get the amount of capital that a unit of labour can substitute, total output remaining constant. This rate at which one factor can be substituted for another, at the margin is called the Marginal Rate of Technical Substitution (MRTS). MRTS at any point is measured by the slope of the curve at that point. The slope of a curve at any point equals the slope of the tangent at that point. MRTS measures the degree of substitutability of the two factors or the ease with which one factor can be substituted for another. Suppose point A in the above diagram represents 10 unit of capital and 2 units of labour while point B represents 8 units

of capital and 3 units of labour. In this case the reduction in the amount of capital (=2 units) is just being compensated by one unity increase in the amount of labour so that the total output remains the same. In other words, the MRTS of labour for capital in this case is(–)2/1 = (–)2.

Depending upon the degree of substitutability between the two factors isoquants can also have other shapes as shown in the diagrams 5.7 to 5.9.

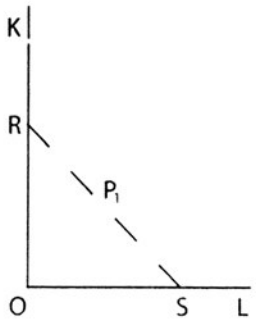


Diagram 5.6

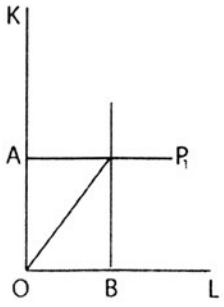


Diagram 5.7

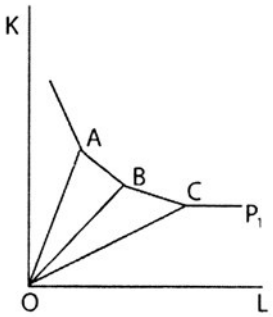


Diagram 5.8

Isoquant P_1 in Diagram 5.6 is Linear (i.e. a straight line) implying that one input can be substituted for the other at a constant rate. This type of isoquant assumes that the factors are perfect substitutes of each other. In other words, it is possible to produce the given commodity with either factor alone or with any combination of two factors at the given constant rate of substitution. The extreme cases are represented by processes R and S using OR of capital with zero labour and OS of labour with zero capital respectively. In Diagram 5.7, the production isoquant P_1 is a right angle meaning thereby that there exists only one method of production or process using OA of capital and OB of labour to produce one unit of output. It also implies zero substitutabitity of the factors of production which are strictly complementary. The linked curve P, in Diagram 5.8 exhibits that there are only a few specific methods (A.B and C) available for producing the commodity in question, it is possible to substitute one factor for the other only at links (points A.B and C in the diagram). In other words, this type of isoquant assumes limited substitutability between the two between the two factors shown on the two axis.

Just as curves TP and MP in the last section can be compared to the total utility curve and marginal utility curve respectively of the Theory of Demand, production isoquants can be linked to consumer indifference curves. However, in the case of consumer indifference curves, two different products are measured on the axis while in the case of production isoquants (which may be called 'producer indifference curves' by analogy), the axis measure quantities of the two variable factor inputs. While various points on an indifference curve represent the same level of utility (which is a psychic entity about the measurability of which economists have difference of opinion), various points on a production isoquant represent the same level of output (which lends itself to unambiguous and precise measurement). Just as an indifference

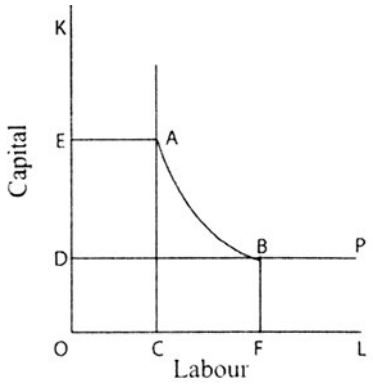


Diagram 5.9

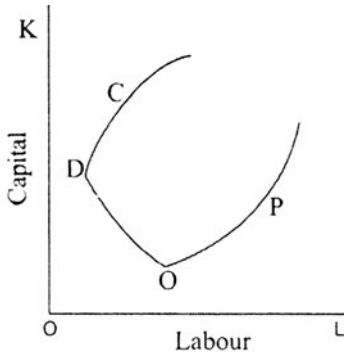


Diagram 5.10

curve shows various combinations to two commodities yielding the same total satisfaction to the consumer, a production isoquant represents various combinations of two factors yielding the same total output to the producer. As far as the shape is concerned, the two curves look exactly alike, i.e, both slope downwards and both are convex to the origin. Just as downward slope of the consumer indifference curves implies positive marginal utility of each of the commodities considered, downward slope of the production isoquant means that both the factor inputs considered have positive marginal productivity. Let us explain this with the help of diagrams.

In Diagram 5.9 above, production isoquant P shows various techniques of producing a given level of output, say 100 units. These techniques are nothing but different combinations of labour and capital inputs. You can observe that choosing a point above point A on the isoquant means combining a given quantity of labour (= OC) with a higher and higher input of capital, compared to that at point A, for producing a given level of output. This entails marginal productivity of capital equal to zero. Similarly, choosing a point to the right of point B on curve P involves combining a given amount of capital (= OD) with larger and larger inputs of labour compared to that at point B for producing a fixed output. This implies zero marginal product of labour. In other words, the stretches of isoquant P above point A and to the right of point B represent techniques which are technically inefficient. Thus we rule out parts of production isoquants parallel to any of the axis as irrational. In Diagram 5.10, points to the right of points A and B (e.g., point C and point D) mean that more of both the inputs (compared to points A and B) are used to produce a given level of output. The implication is that the marginal productivity of both the factors is zero on these stretches. Thus we can say that parts of production isoquants with positive slopes are also not in the range of rationality. This leaves us with stretches like those between points A and B in Diagram 5.9 and 5.10. These parts of production isoquants which slope downwards represent methods of production which are technically efficient. Having established the downward slope of the production isoquant we are further faced with three alternative shapes; a straight line, a concave and a convex curve and a convex curve as shown in diagram 5.11,5.12 and 5.13 below:

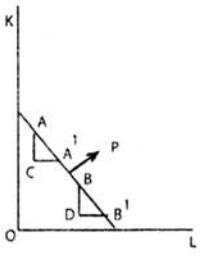


Diagram 5.11

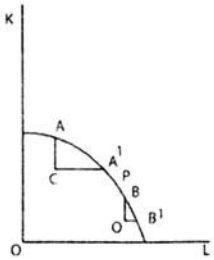


Diagram 5.12

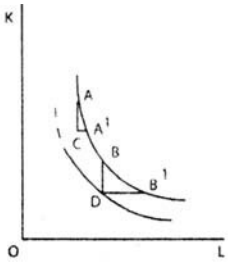


Diagram 5.13

As you see, all these isoquants have negative slopes, but different shapes. It is but proper to spell out the implications of these shapes. A straight line, by definition, has constant slope. Now the slope of the production isoquant is nothing but the marginal rate of substitution of the factor measured on the X axis (i.e., labour) for the factor measured on the Y axis (i.e., capital). Analogously, the slope of the consumer indifference curve measures the marginal rate of substitution of commodity X for commodity Y. Slope of an isoquant at a particular point can be expressed as the numerator showing the decrease in the input of capital and the denominator measuring the increase in the input of labour. But we know that total output remains the same. This means that the increase in output on account of additional input of labour just equals the decrease in output on account of a smaller input of capital. In other words, $K.MP_K = L.MP_L$, (where MP_K and MP_L stand for the marginal productivity of capital and labour respectively).

If $$\Delta K.MP_K = \Delta L.MP_L$$

Then $$\frac{\Delta K}{\Delta L} = \frac{MP_L}{MP_K}$$

Thus, we see that the slope of the isoquant equals the ratio of the marginal products of labour and capital. A straight line production isoquant means that whatever the factor intensity of the method of production (in other words whether the point chosen is nearer the Y axis or the X axis) one unit of capital has to be replace by the same amount of labour in order to maintain the given level of output (or remain on the same isoquant). In diagram 5,11, distance CA' = DB' while AC (=BD) represents one unit of capital. In other words, we can say that a straight line isoquant characterises the situation when the two factor inputs are perfect substitutes for each other and each successive unit of one factor has to be replaced by a constant amount of the other factor. This is the case of constant marginal rate of substitution and also constant ratio of marginal productivities of two factors. Technically, this is all right, but in real life factors are seldom perfect substitutes of each other. A concave production isoquant like the one shown in a diagram 5.12 has a constantly increasing slope as we move along the curve form the left to the right. In other words, as we substitute labour for capital, successively decreasing amounts of labour are required to replace the same quantity (say, one unit) of capital. While AC = BD in diagram 5.12, DB' <C'A>. This means that as techniques using less and less of capital (and more and more of labour) are adopted, there is a continuous increase in the efficiency of labour as a result of which smaller and smaller amounts of labour are required to replace each successsive unit of capital. This is the case of increasing marginal rate of substitution of labour for capital and also increasing ratio of the marginal productivity of labour to that of capital.The common sense meaning of all this is that as more and more of labour is used, it proves to be a better and better substitute of capital and the same holds good for capital. The obvious implication is that a rational producer should never choose a method using both the factors. We shall take it up again in the context of the optimum, combination of factors in section IV.

Now we consider a convex production isoquant as shown in diagram 5.13. This is the way it is usually drawn in the textbooks on economics. Obviously, it is a curve with constantly decreasing slope as one moves along it form left to the right. The decreasing slope signifies that as more and more labour intensive methods are used to produce a given level of output, larger and larger quantities of labour are required to replace each successive unit of capital. (In diagram 5.13, AC = BD while D'B>C'A). The same can be said about the substitution of capital for labour. This, in other words, means that the factors are imperfect substitutes of each other. This case of decreasing marginal rate of substitution (and thus decreasing ratio of the marginal productivities of the factors) is also consistent with the law of diminishing returns. (Refer back to the law of Variable Proportions explained in Section 5.3.).As more and more labour is used with less and less of capital, the marginal product of labour falls on two accounts. One because a larger amount of labour used with fixed amount of capital results in a fall in the marginal product of labour on account of the law of diminishing returns. Two, because the amount of capital combined with larger input of labour is not fixed in this case, but in fact, declines, thus resulting in a sharper fall in the marginal product of labour. Hence the decline in the ratio of marginal productivity of labour to that of capital i.e. $\frac{MP_L}{MP_K}$ (Note that apart form the numerator falling the denominator also increases as less and less of capital is used). Just as convexity of the consumer indifference curves implies diminishing marginal rate of substitution of goods (based on the law of diminishing marginal utility), convexity of the production isoquant also implies diminishing marginal rate of substitution of factors and is consistent with the operation of the law of diminishing returns to a variable factor. To the extent that increasing or constant marginal product of a variable factor (combined with a given amount of fixed factor) is conceivable, the production isoquant may have straight line or concave stretches. But it is always technically efficient to operate on a convex stretch of the isoquant just as it is rational to operate on that part of the total product curve which is characterized by positive but declining marginal productivity of the variable factor.

While concluding the discussion on the shape of production isoquants, we may add that just as higher and higher indifference curves signify higher and higher levels of satisfaction, higher and higher

production isoquants represent larger and larger volumes of output. Moreover, just as no two indifferences curves but each other, no two isoquants cut each other. (If there do so, absurd conclusions can be shown to follow. Do it as an exercise). If however, a particular isoquant shifts to the left (as the broken curve shown in diagram 5.13). It means that the same output can be produced with less of both the inputs. This happens when technical progress takes place. Having equipped ourselves with the concept of a production isoquant (a special form of the production function), we now proceed to make use of this concept in describing the laws of production.

Important Concepts

Apart from the concept of production function we also have to explain some related concepts. First of all, we take up the concept of the 'marginal productivity' of a factor of production and explain it with the help of a simple diagram showing total product curve corresponding to inputs of a variable factor (labour). A movement form point R to unit S on curve P_1 involves an increase in the input of labour equal to BD resulting in CA of additional output. Dividing this additional output (=CA) by additional input of labour (=BD). we get additional output due to additional unit of labour or what is called in economics, 'the marginal productivity' of labour. To repeat, marginal productivity of a factor is the addition to total output that results form a small increase in the input of this factor, all other factor inputs remaining the same. Geometrically, marginal productivity of labour in Diagram 5.1 is represented by the slope of the total product curve TP. Obviously, the slope of TP is different at every point of the curve. In fact, after point A, it decrease continuously with every increase in labour input. The curve TP in Diagram 5.1 implies decreasing marginal productivity of labour after point A or diminishing returns to labour (which is the variable factor in this case). Going back to diagram 5.5 what does the slope of curve P1 signify in this case? Well, each point on this curve represents a particular combination of the two inputs measured on the X axis and Y axis (i.e, labour and capital respectively). Therefore, any movement to the right signifies substitution of labour for capital and vice versa. For example, a shift form point B to point C on curve P1 in Diagram 5.5 means a decrease in the input of capital form OL to OM (= LM=BN) accompanied by an increase in the input of labour form OR to OS (=RS=NC). Dividing BN by NC, we get the amount of labour which is required to compensate for a small decrease in the input of capital so that total output remains the same. Thus, the slope of isoquant P_1 signifies the rate of technical substitution or the 'marginal rate of technical substitution' of factors. As is evident from the downward slope of curve P1 in diagram 5.5, the MRTS is negative (because the changes in the two inputs have opposite signs) and falls continuously as we move to the right on this curve (because the curve is convex to the origin). The marginal rate of substitution measures the degree of substitutabilitv of the two factors or the ease with which one factor can be substituted for another. But it suffers form a serious defect. It depends on the units of measurement of the factors in question. In order to make it independent of the units of measurement, we divide the percentage change in the capital -labour ratio (a shift from one point to another on the isoquant P1 involves obviously a change in the capital-labour ratio) by the percentage change in the MRTS. The resulting ratio, independent of the units of measurement, i.e, a pure number, is called the 'elasticity of substitution' (Compare it with the 'elasticity of demand' which is the ratio of percentage change in quantity demanded to the percentage change in price). The elasticity of substitution tells us what is the relative magnitude of a change in the capital-labour ratio consequent upon a small change in the MRTS. You will know later on that under perfect competition, the marginal rate of substitution equals the ratio of factor prices. In other words, the elasticity of substitution tells

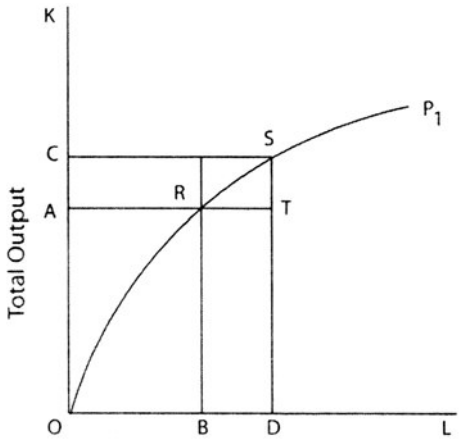


Diagram 5.14

us how producers respond to a small change in relative factor prices by changing the relative factor inputs. The capital-labour ratio K/L (i.e. the input of capital uivided by the input of labour) characterizing a particular process can also be described as the 'factor intensity' of that process. Thus, the factor-intensity at point B on curve P1 in Diagram 5.5 is the ratio of Y co-ordinate to X co-ordinate (i.e., OL/OR). Similarly, the factor intensities of different processes in that figure are measured by the slopes of the respective lines through the origin. As lines OA, OB and OC have constant slopes by virtue of being straight lines, the factor intensity (or the factor proportion) represented by each of these lines remains constant. For example the factor-intensity of process. A equals 3/1 or in other words, process A uses 3 units of capital per unit of labour. Obviously, the exact value of this ratio depends upon the units of measurement. We shall have occasion to refer back to the concepts explained above in later sections.

5.5 RETURNS TO SCALE AND RETURNS TO A FACTOR

Distinction between 'Returns to Scale' and 'Returns to a Factor'

We have explained in detail (in section II above) the distinction between the long-run and the short-run production function. In the long-run all factors are variable and there fore, a firm can achieve expansion of its output by increasing all factor inputs in the same or different proportions. The term 'returns to scale' refers to the response of output when a firm increases ail factor inputs by the same proportion. On the other hand, in the short run a firm increase the amounts of its fixed capital equipment (and also top management) and consequently it is coerced to increase its output by applying larger mounts of the variable factor (s) with the given capital equipment and management. The response of output in this case describes the law of variable proportions. Lest you should confuse the two terms, let us clarify that the term 'returns to scale' is used to describe the response of output when the magnitude (or size or scale) of all factors increases by the same proportion whereas the term 'return to a factor' is used to describe the response of output to changes in the amounts of a single factor, the amounts of all other factors remaining constant.

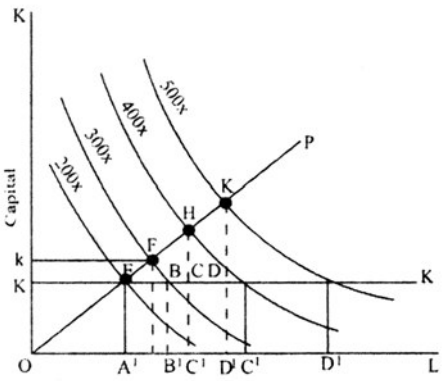


Diagram 5.15

The distinction between 'returns to scale' and 'returns to a factor' is brought out very clearly in the diagram 5.15.

Along the straight line OP the proportion between the two factors (K/L) remains constant throughout. Therefore, this line can be used to measure changes in the amounts of the two factors combined in a fixed proportion. In the long run a firm can achieve the expansion of its output by moving along OP(-that is, by increasing both factors by the same proportion), in the short run, however, the firm cannot increase the capital equipment and management at its disposal (equal to K), It can expand its output along KK – that is, by applying more operative labour with the fixed amount of other factors.

If it were possible for the firm to increase both inputs (which is a long-run possibility), it owould move form point E to point F (i.e, by increasing the amounts of both factors) to expand output from 200*x* to 300*x* per day. This is, however not possible in the short run because the capital equipment of the firm (=K) is not variable for some time. The firm can expand its output by moving along K.K. form point E to point B. Movement along OP characterises 'returns to scale' whereas movement along KK describe 'returns to a variable factor'.

Returns to Scale

As stated earlier, the term 'returns to scale' refers to the response of output as all factors change by the same proportion. Obviously, there are three possibilities the change in output may be proportional, less than proportional to the increase in the inputs. For instance, in response to a 10% increase in the quantities of all factor inputs (–factor proportion remaining constant) output may (increase by exactly

10%, or less than 10% (say, 5%) or more than 10% (say, by20%). Now if the change in output is proportional to the change in inputs, we say that there are constant returns to scale. If the change in output is less than proportional we say that we have decreasing returns to Scale, And if the change hi output is more than proportional to the change in inputs, we say that we have increasing returns to scale. The three possibilities are summarized below:

Percent changes in Inputs	*Percent change in output*	*Returns to scale*
10%	= 10%	Constant
10%	< 10%	Decreasing
10%	> 10%	Increasing

Alternatively, we can exhibit returns to scale with the help of diagram 5.16. Let us measure units of the composite input. (i.e. all inputs combined in a fixed proportion) along the horizontal axis and output along the vertical axis.

The total product curve originating form point O will show the response of total output to changes in the amounts of the composite input. If the total product curve is a straight line, it will represent constant returns to scale. A movement along this line means a proportional change in output in response to changes in the level of the composite input. For instance, a doubling of the composite input (form OA to OA) results in doubling of the output (from OD to O) and so on. However, if the total product curve is like the curve OR in the diagram 5.16, whose slope is constantly increasing, it will represent increasing returns to scale. A movement along this curve means a more than proportional change in output in response to changes in the level of the composite input. In this case, a doubling of output (from OD to OD) requires less than doubling of the composite input (from OB to OB). On the other hand, if the total product curve has a constantly decreasing slope (it will lie to the right of the straight line product curve), it will represent decreasing returns to scale. In this case for doubling the output from OD to OD requires more than doubling of the composite input (OC>twice OC).

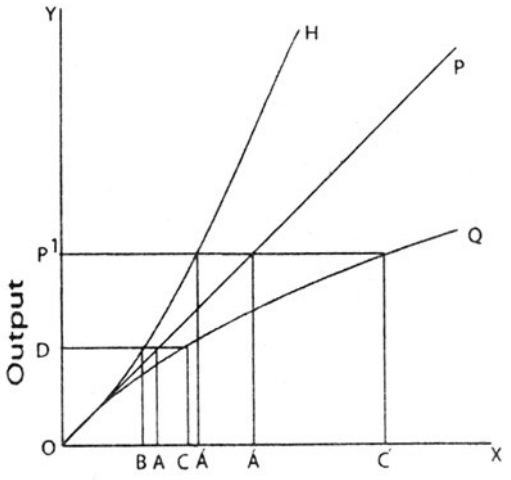


Diagram 5.16

Returns to scale can also be described with the help of production isoquants by drawings inferences regarding the relative positions of the successive 'multiple-level-of-output' isoquants, that is, isoquants that show levels of output which are multiples of some base level of output, e.g., x, $2x$, $3x$, etc.

A straight line passing through the origin such as OP measures the amounts of the composite input (factors combined in a fixed proportion). Such a line is usually called a product line but it may also be called 'constant factor proportion line'. The distances between the successive 'multiple isoquants' on such a line will indicate whether the input requirements for the successive additions. If the distances between the successive 'multiple isoquants' along a product line are equal, in that case we have constant return.to scale. For example, in -the diagram 5.17 the distances between the successive 'multiple isoquants' along the product line OP are equal (OA = AB = BC = CD, etc.), In case the distances between the successive 'multiple isoquants' along a product line OP increase implying that for successive additions to output the input requirement is increasing, it would be a case of decreasing returns to scale.

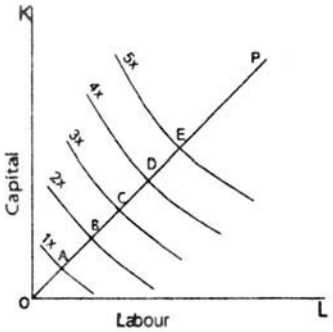


Diagram 5.17

In diagram 5.18 the distance between the successive 'multiple isoquants' is increasing as we move along the product line OP. On the other hand, when the distances between the successive 'multiple isoquants' along a product line tend to decrease, we have increasing returns to scale. In diagram 5.19 the distances between successive multiple isoquants are decreasing (ED < CD < BC < AB). Increasing returns to scale mean that for doubling the output the inputs have to be less than doubled or (which means the same thing) doubling of inputs results in output being more than doubled. On the other hand, in case of decreasing returns, for doubling the output, the inputs have to be more than doubled or (which is the same thing) doubling of inputs results in output being less than doubled.

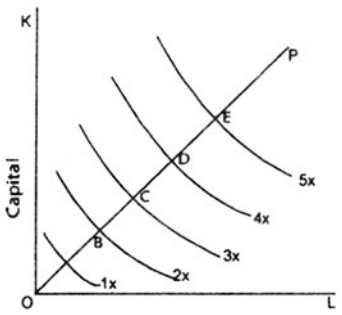


Diagram 5.18

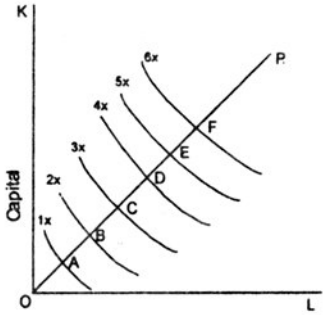


Diagram 5.19

In our discussion above, we have shown constant, increasing and decreasing returns to scale separately. However, it is quite likely that a firm may be faced with different returns to scale over different ranges of output. It may happen that in the beginning a firm may obtain increasing returns to scale as the firm is able to reap technical and managerial economies with increase in its scale of production. For example, efficient mass production methods with higher degree of specialization can be-adopted only when the level of output is sufficiently large. Then there may be purely dimensional returns. (Doubling the diameter of a pipe will more than double the flow through it). Indivisibility may also give rise to increasing returns to scale. For example, certain equipment may be available in minimum size or in definite ranges of sizes. Such equipment may be used more fully at a higher scale of production. Then, alongwith an increase in other inputs, a larger amount of managerial talent may result in more efficient functioning through increased specialization. This phase may be followed by constant returns to scale when reaching a 'multiple isoquant requires replication of the plant accordingly. For example, output may be doubled by building and operation another plant which is exactly like the previous one. Decreasing returns to scale are generally explained through indivisibility of the factor of production called 'entrepreneurship'. It is argued that the entrepreneur and his decision-making are indivisible and incapable of augmentation. Therefore, as the scale increases, mounting difficulties of coordination and control lead to decreasing returns. But the use of the term 'scale' here is suspect as at least of the factor inputs has been assumed to be fixed while increase in scale implies a proportional increase in all the inputs.

Are Increasing or Constant Returns to Scale Consistent with Diminishing Returns to a Factor?

In section 5 above we have explained the difference between 'returns to scale' and 'returns to a factor' and also illustrated this difference with production isoquants. You would recall that diminishing returns to a factor account for the convexity of the production isoquants. (Refer to the discussion regarding the shapes of production isoquants). Given the convexity of production isoqunats, it can be shown that constant or diminishing returns to scale cannot prevent diminishing returns to a factor. For this purpose we first demonstrate the case of constant returns to scale in the diagram below:

Diagram 5.20 shows that whereas output can be doubled form l00*x* to 200*x* by doubling both inputs (because constant returns to scale obtain), doubling of labour input alone from 1L to 2L, keeping capita!

constant at k, results in diminishing marginal product of labour (=50 units of *x*). If however, the firm wants to double its output along this line, it has to operate on point E which lies on P(200), where the input of labour is L which lied on P (200), where the input of labour is L which is more than 2L. Thus we have demonstrated that not only in there no contradiction between constant returns to scale and decreasing returns to the variable factor (or diminishing marginal productivity), the former, in fact, implies the latter, It follows logically that if constant returns to scale entail diminishing marginal productivity of the variable factor, decreasing returns to scale will mean, faster diminishing returns to the single variable factor. This is shown in diagram 5.21. Since returns to scale are decreasing, with 2 L of labour and 2 K of capital, output reaches level C which is on a lower isoquant that 200*x*. Further, if only labour input is doubled while keeping capital constant, output reaches only level D which is on a still lower isoquant. If, however, the production function shows increasing returns to scale, two opposite influences work on the returns to a single variable factor, increasing returns to scale pulling it up while diminishing marginal productivity pushing it down. The net effect depends upon the relative intensities of the two effects. The returns to the single variable factor(labour in this case) will be diminishing (see diagram 5.22 below) unless the increasing returns to scale are so strong as to more than offset the diminishing marginal productivity of the variable factor (see diagram 5.23).

Thus we can conclude that diminishing returns to a single variable factor are in-built into constant and decreasing returns to scale and may also co-exist with increasing returns to scale in certain cases.

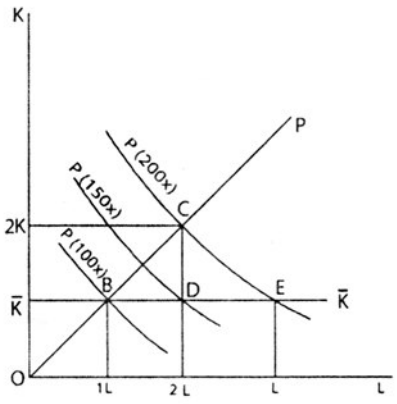


Diagram 5.20

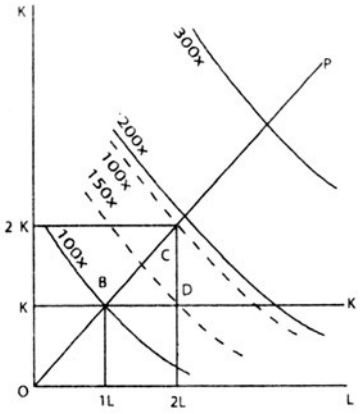


Diagram 5.21

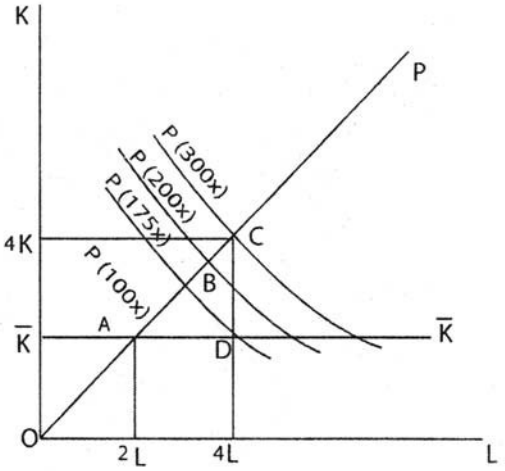


Diagram 5.22

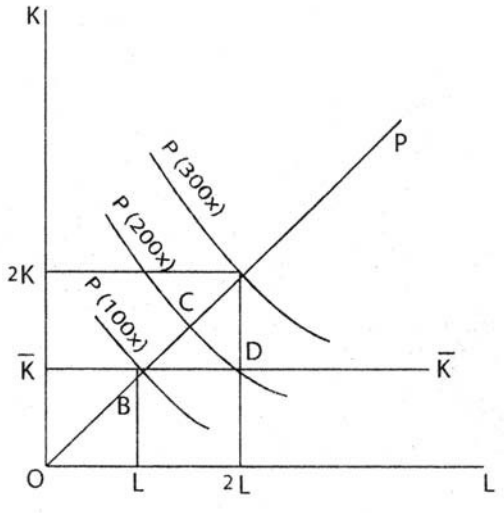


Diagram 5.23

5.6 OPTIMUM COMBINATION OF FACTORS

Till now, we have considered only technical relationships and tries to delineate the area of a firm's choice on the basis of technical efficiency only. But, as you saw, the range of rationality on the production

function is quite wide (e.g., the stretch of the total product curve with positive, but decreasing slope or the convex stretch of the production isoquant). The question that now arises is: where does the firm attain equilibrium with regard to the use of factors? Or what is the optimum combination of factors for the firm? You can immediately see that in order to answer this question, knowledge of the technical relationships alone is not sufficient and prices have to come into the picture. We shall discuss below how the knowledge of the production function combined with that of prices enables a firm to choose the optimum combination of factors. We shall first consider the case of a single product firm, i.e., a firm engaged in producing a single commodity. At the end of this section, we shall consider the case of a firm producing two commodities, which can easily be generalized for a multi-product firm. While considering the case of a single-product firm, we shall first discuss its equilibrium in the short run and then go on to the long-run equilibrium. The essential difference between short run and long run (assuming perfect knowledge of the future and thus ruling out uncertainty) is that the firm has to work under one constraint or the other in the short run while most of the constraints disappear in the long run and the firm can take decisions regarding the level of output more freely. Whatever the time period under consideration, we assume that the objective of the firm is maximization of profit. As we stated earlier, profit is the difference between revenue and cost i.e., the excess of what a firm receives from the sale of its output over how much it spends for producing the output which includes all costs. We confine our analysis to the case where a single firm is too small to influence the price of the product it sells or the prices of the factors it buys. Therefore, the firm has to take the product and factor prices as given and find the optimum position accordingly. This is the implication of perfect competition for an individual firm.

One possible situation is that the amount of total resources at the disposal of the firm is given. In other words, the firm has to operate within the framework of a cost constraint. The goal of the firm, as stated earlier, is to maximize profit. If we denote profit by 7c revenue by R and cost by C, we can write the problem as:

$$\text{maximise } \pi = R - C$$

Now the revenue of the firm depends upon the level of its output and the price of the product. In other words, $R = P_X . X$ where X is the output of product X and P_X is the price per unit of X. As both P_X and total cost assumed to be constant, the problem boils down to:

$$\text{maximise } \pi = P_X . X - C$$

The bar over P_X and C signifies that these are constants. Thus we are left with X as the only variable on the right hand side of the above equation. In ordinary language, it means that the firm has to maximize its output with the given amount of resources at its disposal if it wants to maximize profit.

Let us see how the firm goes about it. We conduct the analysis with the help of production isoquants (described in detail in Section 4) and isocost lines. We shall first explain what an 'isocost line' means. !n Section 4, we compared an isoquant to a consumer indifference curve. In the same way, we can compare an isocost line to the price line (or budget line) of the consumer. Just as consumer's budget line shows various combinations of two factors which have the same total cost (equal to the firm's resources assumed to be given). As you can see in Diagram 24 below, an isocost line looks exactly like a budget line. Given the prices of the two factors (P_1 and P_k), the producer can spend all his resources (=C) on capital and purchase OA of it or exhaust all his resources in buying OB of labour or buy any combination of labour and capital on line AB (e.g. combinations represented by points such as C,D, etc.) Evidently. $OA=C/P_k$ (in words, the amount of capital which a producer can buy is equal to the resources at his command divided by the price per unit of capital) and $OB= C/P_1$. As you know, line AB is a downward sloping straight line and its

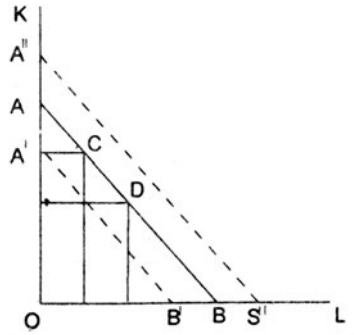


Diagram 5.24

slope = OA/OB. Substituting for the value of OA and OB, we find that slope of line AB= OA/OB

$$= C/P_k - CP_1 = \frac{C}{P_k} \times \frac{P_1}{C} \times \frac{P_1}{P_k}$$

Thus, you see that the slope of the isocost line represents the ratio of factor prices. (You remember that the slope of consumer's budget line equals the ratio of commodity prices). To take the analogy further, the position or location of an isocost line depends upon the firm's cost or outlay just as the location of a budget line depends upon the level of consumer's income. Line A B in diagram 5.24 represents a lower level of cost or outlay compared to that relating to line AB, while A B signifies a higher cost level. Since we are considering the case of a given cost level, there is only one relevant isocost line as shown in diagram 5.25 below. We super impose the isoquant map of the firm on this to determine the point of equilibrium. As explained above the objective of the firm is to maximize output, i.e., to reach the highest possible isoquant. But there is the cost constraint defined by AOB which represents the area of feasibility of the firm. Any point below line AB will imply less than full utilization of the firm's resources while any point above line AB is clearly beyond the reach of the firm, (as it costs more than the given outlay). Thus the highest attainable production isoquant (P_2 in diagram 5.25) is that which is just touched by the given isocost line. The point of equilibrium in digaram 5.25 is point M on isoquant P_2 which is attained by using OK of capital and OL of labour. (You can see that the analogy with the theory of consumer's demand is complete. The point of tangency between the budget line and the highest attainable indifference curve represented consumer's equilibrium).

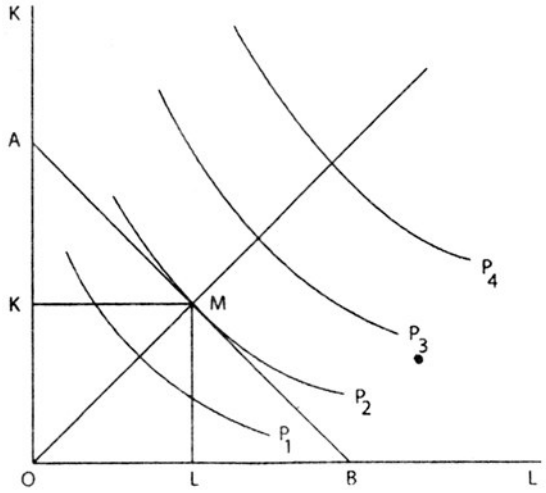


Diagram 5.25

Another situation can be that a firm has decided on a particular level of output taking into consideration various relevant factors e.g. demand for the product, price output policies of other producers (the current situation as well as the expected future trends regarding these factors) etc. Alternatively the level of output may be determined for the firm by an outside agency e.g. the firm may get a contract for a particular job (for building a bridge, road, or tower) or a specific order. In this case, the problem is to maximize profit, given the output constraint i.e.,

Maximise $\pi = R - C$

$= P_X . X - C$

Since both the price of the product (px) and the level of output (X) are given, the only variable left on the right hand side is C i.e. total cost or outlay. Since C has a negative sign in the above equation, maximisation of profit π is equivalent to minimisation of cost C. Therefore the goal of the firm is to minimise C for the given level of output. A given level of output means, diagrammatically, a given production isoquant as shown in diagram 5.26 below. We superimpose on this isoquant various isocost line parallel to each other. With given factor prices, different iso-cost lines are parallel to each other, though at different positions dependent upon the level of total cost. (If factor prices remain constant various isocost lines have the

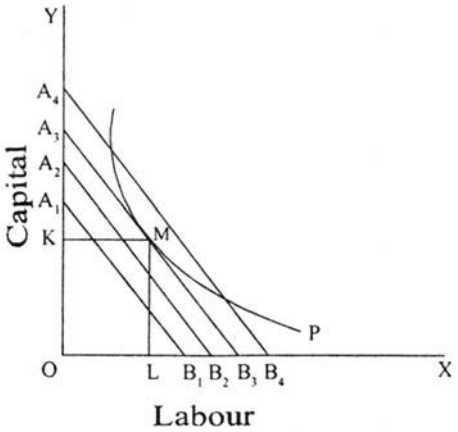


Diagram 5.26

same slope though different positions depending upon the level of total cost or outlay). The firm will be in equilibrium at the point where the given production isoquant touches the lowest possible isocost line. Such a point is represented by point M in diagram 5.26 where the firm produced output given by isoquant P, using L of labour and K of capital so that the total cost at given factor prices is the minimum for this level of output. You must have noticed that whether the firm works under cost constraint and wants to maximize output or it operates under output constraint and aims to minimize cost, the point of equilibrium in both the situations is the point of tangency between a production isoquant and an isocost line. You know that the two curves have the same slope at the point where these are tangent to each other. Now the slope of the production isoquant signifies the marginal rate of (technical) substitution between the factors while the slope of the isocost line signifies the ratio of factor prices. Thus we can say that the firm achieves equilibrium where the marginal rate of substitution of labour for capital equals the ratio of the price of labour to that of capital, that is $MRTS_{l,K} = P_l/P_k$. As we know, $MRS_{l,K}$ is nothing but the amount of capital required to compensate for one unit of labour in order to maintain a given level of output. In other words, $MRS_{l,K} = \Delta K/\Delta L$ (We may remind you that ΔK and ΔL have opposite signs, but we are concerned with their absolute values at the moment). Therefore, we can wirte,

$$MRS_{l,k} = \Delta K/\Delta L = \Delta P_E/\Delta P_R$$

or $$\Delta K.P_K = \Delta L.P_1$$

This means that on the margin, the cost of capital replaced just equals the cost of additional labour employed. You can see intuitively that if $\Delta L \,.\, P_1 < \Delta K.\ P_K$, it is profitable for the firm to substitute labour for capital. If, however, $\Delta L \,.\, P_1 > \Delta K.\ P_k$, a profit maximizing firm should replace labour by capital. Thus, a firm stops substituting one factor of the other and attains equilibrium where the cost of additional capital replaced is equal to the cost of additional labour employed at given factor prices. To conclude, we can say that the point of tangency between the given isocost line and the highest attainable production isoquant or the given isoquant and the lowest possible isocost line indicates to the firm the optimum proportion in which it whould combine the two factors.

Expansion Path

We now assume away all constraints on the firm relating to cost or output and see how it behaves in order to maximize its profit in the long run. This kind of unconstrained profit maximization boils down to the choice of optimal expansion path over time. We first consider the case when all factors are variable thus there is no limitation, technical or financial, on the expansion of output. The objective of the firm is to choose the optimal way of expanding its output so as to maximize its profits. As you must have guessed, with given factor prices and production function, the optimal expansion path is determined by the points of tangency between successive isocost lines and successive production isoquants as shown in diagram 5.27.

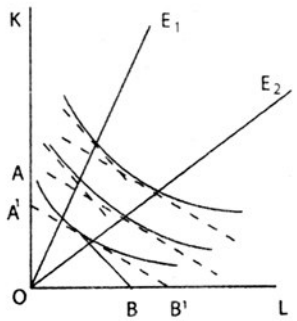


Diagram 5.27

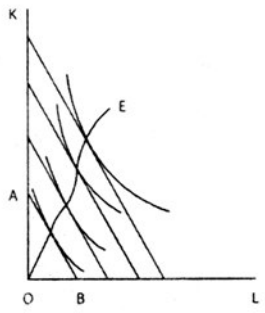


Diagram 5.28

If the production function is homogeneous, the expansion path will be a straight line through the origin like OE_1 or OE_2 as shown in diagram 5.27, (Homogeneity means that if we increase both the

factors by the same proportion 'k' i.e., form L and K to KL and kK respectively, the resulting new level of output is such that k can be factored out. For example, if both the factor inputs are doubled, the resulting level of output $P = 2v.P_0$ where P_0 is the initial level of output and v is the degree of homogeneity. When v = 0. there is no change in output, when v=l the output doubles with the doubling of inputs and the function is called linear homogeneous or homogeneous of degree 1. Obviously v > 1 signifies increasing returns and v < 1 decreasing returns to scale). As already explained, the slope of this line will determine the optimal K/L ratio. The slope will, however, depend upon the prevailing factor prices. A higher ratio of factor prices P_1/P_k signified by the steeper isocost lines (likes AB and lines parallel to it in comparison to relatively Hatter A'B' and lines parallel to it) will result in an expansion path closer to the Y axis (OE, compared to OE; in diagram 5.27). Expansion path OE_1 which has a higher slope than OE_2. Obviously, a change in the ratio of of factor prices leads to a change in the optimal expansion path. If however, the production function is non-homogeneous, the optimal expansion path will not be a straight line even if the ratio of factor prices remaines constant. It is curvilinear like OE in diagram 5.28.

LESSON 6

ECONOMIES OF SCALE

Increasing returns to scale are cause economies of scale Economies of scale can be internal or external. The former arise due to change in the size of the firm and the latter on account of expansion of the industry, i.e., number of firms. In each case, however, the economies accure to the firm (though in the case of external economies, for no action of its own). A firm can increase its production only by increasing its outlay or expenditure on various factors of production. It can do this either by keeping the factor proportions constant i.e., by increasing the amount of each factor used by the same proportion (e.g., doubling or trebling all the inputs) or by increase the factor quantities, but varying at the same time the proportions in which various factors are used. When various factor are varied in level, but kept constant in proportion, the relationship between the change in composite input and that in output is characterized by 'returns to scale'. If all the factor inputs are multiplied by a and the resulting output is β times the original output, increasing, constant and decreasing returns to scale can be defined according to whether $\beta>\alpha$, $= \alpha$ or $<\alpha$ respectively. If the firm decides to increase the number of plants identical to each other (e.g., building another plant in order to double the output). It can at least achieve constant returns to scale. The process is known as 'replication'. Returns to scale may increase or decrease or remain constant if, however, the firm increases the size of the plant but keeps the factor proportions constant. However, the firm may find it more profitable to change the proportion in which factors are combined, i.e, to change the technique of production to achieve a higher level of output. The economies which accrue to the firm in some of the above-mentioned cases are 'real economies' as these originate from the technical relationships. In contrast, 'pecuniary economies' arise due to lower prices paid by a firm for the factors of production it buys while increasing its level of output. The former are associated with lower physical quantities of resources required per unit of output while the latter with lower prices per unit for the factor/factors. We shall first discuss real economies in some detail.

Seal Economics of Scale

When production takes place on a large scale, all the advantages of 'division of labour' can be reaped. Division of labour or specialization signifies a process which breaks up a job into many parts, each part to be done by a different person. Thus, every person becomes an expert in doing his part of the job and can do it very quickly and efficiently. This acquisition of dexterity leads to considerable increase in labour productivity. It also leads to saving in time as a person does not have to keep on shifting from one job to another and wasting time in the process in order to warm up to the new job. The tools required for each job are used constantly and do not lie unused as would happen when the worker is engaged in different jobs. Break up of a job into many separate parts encourages inventions and innovations. Machines are used to perform simple, repetitive parts with precision, thus increasing further the productivity of labour. This process of mechanization implies more specialized capital equipment as well as more investment, thus resulting in high overhead costs. These methods of production with high overhead costs and lower variable costs become profitable only at large scale of production. The total unit cost keeps

on falling as output rises due to 'indivisibility' of capital. ('Indivisibility' implies the existence of a minimum size of plant which can produce a specific output at. the minimum cost. This plant can be duplicated, but cannot be halved at the same level of productivity).

When a new product is introduced, certain initial costs have to be incurred on research and development, market exploration, designing etc. Once these initial, fixed costs are incurred, a range of output can be produced without an increase in these costs. Obviously, the larger the scale of output the smaller this fixed cost per unit. In certain industries, multipurpose machines are used for performing different functions, but for each specific function, the machine has to be 'prepared' which involves set up costs. For performing a different function, re-setting of the machine is required which again involves some cost. Obviously, the larger the scale of production, the smaller the set up cost per unit and the lesser the frequency of resetting.

Some technical economies arise due to pure dimensional relationships. For certain processes, tanks, chambers and pipes are required. The material and labour costs of constructing such structure are proportional to the surface area that they occupy while their capacity varies with the volume which increase more than proportionately with the area. Thus the technical cost of installing plants with such structures falls as the level of output rises. If firms want some reserve capacity to maintain a smooth flow of output in case of break down of machinery, again firms with larger output stand to gain. A small firm has to spend a proportionately larger part of its investment in fixed capital to maintain some reserve capacity while the cost of reserve capacity to a big firm is lower. Similarly, in order to meet random changes in the supply of inputs, especially raw materials, and demand, a firm needs to keep stocks of raw materials and finished product. But the required size of inventories does not increase proportionately with the size of output. A bigger firm can maintain its flow of input and output with proportionately smaller inventories of raw materials and output.

Under monopolistic competition, all firms whether old or new need to advertise their products. But advertising costs do not increase proportionately with the size of output. The advertising budget is decided on the basis of availability of funds, profits of the firm, existence of close substitutes of the product, advertising activities of the competitors etc. Therefore, selling costs per unit generally fall with increase in output. The expenditure on other types of selling activities (e.g. number of salesmen, distribution of samples, agreements with distributors etc.) also increases less than proportionately with the size of output. A change in the model or style of the product involves considerable expenditure on research and development, new materials and equipment, sales promotion etc. The spreading of such overheads is lower per unit if the size of output is large. To sum up, we can say that whatever the social and economic role of advertising, selling cost per unit of output does fall with scale of output upto a point at least due to existence of marketing economies.

Large size of a firm makes possible division of managerial tasks relating to production, sales, finance, personnel etc. This division of labour increases managerial efficiency and reduces cost per unit of output. But small firms cannot reap the advantages of such specialization. Moreover, with decentralization of decision making, the efficiency of management increases. Large firms can also afford to apply highly mechanized and efficient techniques of management, e.g., telephones, telex machines, closed circuit televisions, computers etc. The use of such aids increases managerial efficiency and reduces cost per unit of output. However, many economists think that after a point the management of a large enterprise becomes extremely complex and difficulties of supervision and coordination give rise to managerial diseconomies, thus leading to an upward turn in the average cost curve.

There are economies of large scale with respect to storage and transport also. Storage and transport costs are incurred both on the production side and selling side. As the construction of store-houses follows the geometrical relationship between area and volume, the cost of storage per unit falls with size of output. Increasing the number of floors of storehouses will be still more economical. Similarly, the unit cost of transport will fall upto the point of full capacity of the firm's means of transportation. Use of larger vehicles at a larger scale of output would also lead to a fall in unit cost of transport. However, with public transport, the unit costs will normally increase with distance unless there are concessional

freight rates for bulk transport.

Pecuniary Economies of Scale

Firms engaged in large scale operations can generally obtain 'discounts' or concessions on many accounts. They can purchase raw materials at lower prices, get loans at lower rates of interest (and other favourable terms), advertise their products at concessional rates and transport their goods at lower rates. All these concessions are given due to the large size of operations. Big firms can also sometimes hire workers at lower wages due to their monopsonistic power. (A monopsonist is one who controls a major part of the demand for a commodity or a factor of production). Due to all such pecuniary economies, the average cost falls with size of output. The economists do not, however, agree on whether there is continuous reduction in unit costs with increase in output or the average cost curve rises after a certain point due to diseconomies (mainly managerial) of scale. Only a sufficiently large number of empirical studies, conducted scientifically, can resolve this issue.

DISECONOMIES OF SCALE

Decreasing returns to scale are caused by diseconomies of scale which many result due to following factors-

(i) Managerial inefficiency caused by excess burden of work on managers

(ii) Fall in availability of non-renewable resources due to continous consumption overtime. Live stock and fisheries do have gestation period during which there may not be an adequate supply.

(iii) Taxation by government may drive a firm out of business.

LESSON 7

COST

Introduction

It bears repetition to say that we are analyzing the behaviour of a rational producer who is assumed to produce each level of output at the minimum possible cost under the given set of conditions and to sell the output produced to obtain maximum total revenue. This implies that the producer has perfect knowledge regarding technical aspects of production (physical input/ output relationship), factor prices (and hence the optimum factor combinations) and the demand conditions for this product. This is a purely theoretical construct aimed at simplifying the analysis. That the producer (or the so called 'entrepreneur') has no such knowledge in a capitalist economy and the consequences arising out of the lack of knowledge are discussed in Set VIII of this paper. Till then we will continue to assume that the producer has perfect knowledge of the magnitudes relevant for his decision-making.

7.1 COMPONENTS OF TOTAL COSTS; FIXED AND VARIABLE COSTS

Whatever costs a firm incurs in order to produce a certain output (including implicit costs) constitute total costs of that output. However, when we carefully examine the nature of various inputs used in production, we find that while some inputs can be varied as and when desired, some others cannot be varied at will over certain period, which restrict the firm's freedom of choice of alternative production possibilities over the relevant period.

Fixed Costs

Firstly, in order to produce a certain level of output a firm has to equip itself with a certain amount of durable-use capital goods such as machines, buildings, tools, equipment, etc., which if property maintained aid production over a long period of time. Their use is not confined to a single act of production but extends over time into the future. The returns form such capital goods are spread over the whole of their productive lives. Therefore, while planning to install them a producer has necessarily to take into consideration the whole stream of returns obtainable form over the whole of their productive lives. A producer would install such capital goods only if they are expected to yield a normal return (at least equal to the rate of interest) over the whole of their productive lives and not merely on the basis of short-run prospect. Also such capital goods generally take considerable time to build. Because of these constraints the amounts of such durable use capital goods cannot be varied over short periods. In other words, their amounts are fixed in the short run. The only alternative available to the firm for meeting short run fluctuations in demand is to produce a larger or a smaller output by applying more or fewer units of other factors with the fixed equipment of the firm. Executives, managers, supervisors and other permanent staff, constituting what is called the 'management of the firm', are also of the nature of fixed factors. This configuration of the fixed capital equipment and management is designed to produce a certain output at the minimum average cost. This, however, does not mean that the given fixed equipment

cannot produce a larger or a smaller than the optimum output. It is possible to produce a larger or a smaller output by using given equipment more or less intensively (by applying more or fewer other variable inputs) but in that case average cost would be more than the optimum level. *The costs of factors whose amounts cannot be increased or decreased over certain periods are called fixed costs*.

Variable Costs

There are certain other inputs whose amounts can be varied in the short run according to production requirements. The costs of such inputs are called variable costs. Costs of operative labour, raw materials, power, fuel, lubricants, transport, etc., are some examples of various costs. For example, if a spinning mill decides to produce more yarn, it will need more cotton, more labour, more power, fuel, lubricants, etc. On the other hand, if it decides to produce less it will need less of such items. And if the mill stops production completely, it will require no amount of such items and consequently its variable costs will be zero. *Thus, we see that (a) variable costs need to be incurred only when some output is produced and (b) their total varies directly with variations in the level of output produced.*

7.2 ANALYTICAL SIGNIFICANT OF THE DISTINCTION

What is the analysis significance of the classification of costs into the fixed and variable components? By definition, fixed costs are independent of the short run changes in the level of output. In the short run, whether a firm produces a larger or a smaller output, the total of fixed costs remains unaffected. Having once committed its resources in such factors, the firm has no alternative but to bear the loss represented by the total fixed costs even if the firm produces no output at all. On the other hand, a firm needs to incur variable costs only when it undertakes some production. It will not incur any variable costs at ail when production is suspended. But the burden of fixed costs will continue even when production is suspended in the short run. It short, while variable costs are 'avoidable' fixed costs are 'unavoidable' and have to be borne even if no output is produced. From this it follows that the costs relevant for short-run production decisions of a firm are the variable costs and not fixed costs.

If the firm stops production completely, its maximum loss would equal the amount of Total Fixed Costs (TFC). If it decides to produce some output, it will have to incur some variable costs as well. If, in the short run, the price of the product does not cover even the variable costs, the firm will not undertake production because by producing some output under these conditions, it will incur a loss on variable cost, also (besides the loss represented by the fixed costs) and thus, will further add to the loss represented by the fixed costs. But the loss on variable costs is avoidable. Therefore, under such conditions the firm will prefer smaller loss (=TFC) to a greater loss. On the other hand, if the price of the product covers the variable costs and also leaves a margin which goes to meet at least a part of the fixed costs (though not the w hole of the fixed costs). It would be rational for the firm to undertake production because by doing so it would be minimizing the loss which, it has to bear even in case of stoppage of production. From this it follows that fixed costs have no bearing on the short run production decisions of a firm. Whether or not a firm will undertake any production in the short run, will depend on whether or not the price of the production covers the average variable cost. If the price covers the average variable cost and leaves some margin, the firm will undertake production other wise it will not. *It is in this sense that fixed costs are irrelevant form the stand point of short-run production decisions*.

The bearing of variable costs on the short run production decisions of a firm is clearly brought out with the help of hypothetical figures given in the Table below. We assume that total of fixed costs (TFC) of the firm is Rs. 10,000 and for producing 1000 units of output it has to incur Rs. 5,000 as variable costs so that total cost (total of variable and fixed costs) of producing 1,000 units amounts to Rs. 15,000. Four alternative price situations are considered in the table below.

TABLE 7.1

	Px	*AVC*	*TFC*	*TVC*	*TC*	*TR*	*Losses*
1	–	–	10,000	–	10,000	–	11,000
2	4	5	10,000	5,000	15,000	5,000	10,000
3	5	5	10,000	5,000	15,000	5,000	10000
4	6	5	10,000	5,000	15,000	6,000	9,000

In the table above;
Px stands for the market price of the product.
AVC stands for average variable cost per unit of output.
TFC stands for total fixed costs.
TC stands for total cost whihc equal TFC + TVC.
TR stands for total revenue form the sale of 1,000 units, and Losses equal TC – TR.

In the above Table, figures in the first row relate to the situation when the firm undertakes no production at all in the short run. Total loss of the firm in that case would equal to Rs. 10,000. Figures in the second row relate to the situation when the market price of the commodity produced does not cover even the variable costs and consequently the firm's total loss would amount to Rs. 11,000 if it produces output in that situation. If this were the cost-price-situation confronting the firm, it will stop production. (it will prefer a smaller loss of Rs. 10,000 to a greater loss of Rs. 10,000 to a greater loss of Rs. 11,000). Figures in the third row relate to the situation where price of the product just covers the variable costs. Firm's total loss in this case is the same as it would be when no output is produced (situation I). Therefore the firm would be indiffernet whether or not to undertake production in this situation. It may or may not undertake production in this situation. Figures in the fourth row relate to the situation when the price of the product covers the variable costs and leaves a margin of Rs. 1 per unit of output whihc goes to meet a part of the total fixed costs, thus reducing the losses of the firm to Rs. 9000. It is, thus, evident that though even in this situation the firm is producing at a loss but the loss in this case is smaller than what it would be in the event of stoppage of production.

We thus, reach the following conclusions:

1. *Fixed costs have no bearing on the short run production decisions of a firm. Costs relevant for decision making in the short run are variable costs and not fixed costs.*
2. *In the short run a firm will not undertake any production if the price of the product does not cover even the variable costs (price<AVC). Production will be undertaken when price more than covers the variable costs even if it does not cover the full costs (price > AVC but <AC). It will be indifferent when price just covers the variable cost (price = AVC).*

All Costs are Variable in the Long Run

The distinction between the short run and the long run is based on the invariability of certain factors over certain periods. *Short run may be defined as the period which is too short to permit firms to adjust quantities of all factors in accordance with the requirements of production hut long enough to permit them to adjust their outputs by applying more or fewer units of other variable factors with their given fixed factors. Long period, on the other hand, refers to the time period which is long enough to permit firms to adjust quantities of all factors to suit their requirements*. The distinction between short and long runs does not refer to any definite time period. Short and long periods vary form industry to industry, For example, the short run form the stand point of steel industry may range over a few years, where as it may be just a few months for fishermen who do not use much fixed capital except their fishing nets and boats.

In the long run all costs are variable. It is difficult to think of a factor input whose quantity cannot be varied, given sufficient time for producing it and for allowing old ones to decay and thus, go out of use. Thus, in the long run firms can vary the quantities of all factors as desired. From this it follows that if in an industry a firm is not able to cover its full costs (variable as well as fixed), in the long

run (i.e.as soon as it is free from its short run cost commitments) it will leave that industry for better prospects elsewhere. In the short-run a firm is compelled to undertake production even at a loss (i.e., price > AVC but <AC) because of its short run commitments. But in the long run a firm free form all commitments and can choose to stay in the industry or to leave it. It follows that in the long run a firm will not stay in an industry where the price of the product does not cover the average cost including both the fixed and variable components. We may express the same thing by saying that in the long run a firm will continue prodution only if the price of the product is at least equal to AC (including both fixed and variable components). As summary of out discussion of the fixed and variable costs and the corresponding short and long runs, we may state the following:

1. *In the short run a firm will undertake production only if price of the product at least covers AVC.*
2. *In the long run a firm will undertake or continue production only if price of the product at least covers AC(inclusive affixed and variable components).*

7.3 TOTAL, AVERAGE AND MARGINAL COST CONCEPTS

Total Cost (TC): Total Cost of inputs (purchased from other as well as those supplied by the owners themselves) used for producting a certain output constitute the total cost of that output. Since there are two components of total costs, the variable costs and the fixed costs, therefore, total costs equal the sum of total fixed costs and total variable costs.

Thus:

TC = TFC + TVC

Average Cost (AC): Total costs incurred for producing a certain output divided by the number of units produced is the average cost per unit of output. Since total costs equal the sum of total fixed costs (TFC) and total variable costs (TVC), it follows that average cost will also equal average fixed cost (AFC) plus average variable cost (AVC). AFC equals TFC divided by the number to units of output produced and, similarly, AVC equals TVC divided by the number of units of output produced.

Thus:

TC = TFC + TVC
AFC = TFC ÷ units of output produced
AVC = TVC ÷ units of output produced

Therefore, AC = AFC + AVC.

For example, if for producing 100 units of output a firm incurs Rs.5,000 as variable costs over and above its total fixed costs amounting to Rs. 10,000, the three average cost concepts explained above will be as given below.

TFC = Rs.10,000
TVC = Rs.5.000
TC = Rs. 10,000 + Rs. 5,000 = Rs. 15.000
AFC = Rs. 10,000 ÷ 100 = Rs. 100
AVC = Rs 5,000 ÷ 100 = Rs. 50
AC = Rs. 100 + Rs.50 = Rs.l50

Marginal Cost

The addition made to total costs of a firm due to the production of an additional unit of output (e.g., 101 units instead of 100) is called the marginal cost (MC) of the additional unit. For example, if the total costs of a firm increased from Rs. 15,000 to Rs. 15,200 when it produced 101 units instead of 100, the MC of the l0l the unit would be Rs. 200. In general we can say that MC of the nth unit of output equals TC of n units minus TC of (n–1) units.

Thus:

MC = TCn – TCn–1

As explained above, TFC does not change in the short run with variations in the level of output produced. In other words, the addition to TFC due to the production of additional units equals zero in the short run. Therefore, MC on account of fixed costs equals zero: MFC = zero. From this it follows that MC is essentially MVC, i.e., equals the change in total variable costs due to the production of an additional unit of output.

Thus:

MC = MFC + MVC

MFC = zero

Therefore,

MC = MVC

MCn = TVCn – TVC(n–l)

Thus, in calculating MC we can completely ignore fixed costs. MC can be calculated directly from variable costs. However, the result would be the same whether MC is calculated as a change in TVC or TC.

Relationship between Average and Marginal Cost

MC is the addition made to TC due to the production of an additional unit of output. AC is TC divided by the number of units produced. Naturally, MC, which affects TC, will immediately affect AC as well. For example, if the MC due to the production of an additional unit is greater than the AC of the other units, it will push up the latter. Suppose, the AC of 100 units is Rs. 150 and the MC to the 101th unit is Rs.251 (i.e. greater than the earlier AC of 100 units), AC of 101 units will equal Rs. 151 (150 × 100 + 251 = 15,251 ÷ 101 = 151). On the other hand, if the MC of the additional unit is less than the AC of the earlier units, the AC of all the units taken together would fall. In the example above, if the MC of the 101th unit were only Rs. 49 (instead of Rs. 251), AC of all the 101 units taken together would fall to Rs. 149 (i.e 150 × l00 + 49 = 15, 049 ÷ 101 = 149). And finally, if the MC of the additional unit happens to equal the AC of the other units, AC of the units taken together would remain unchanged. In the example above, if the MC of the 101th unit were Rs. 150, the AC of 101 units would have remained constant at Rs. l50 (i.e., 150 × 100 + 150 = 15150 ÷ 101 = 150).

Table 7.2 below gives some figures of AC, TC and MC which clearly bring out the relationship between AC and MC.

TABLE 7.2

Units of output (n)	*AC of (n)*	*TC of (n)*	*MC of (n+l) th unit*	*TC of (n+1) unit*	*AC of (n+1) unit*
1	2	3	4	5	6
1	10	10	9.0	19	9.5
2	9.5	19	8.0	27	9.0
3	9.0	27	7.0	34	8.5
4	8.5	34	6.0	40	8.0
5	8.0	48	8.0	48	8.0
6	8.0	40	8.0	56	8.0
7	8.0	56	8.0	64	8.0
8	8.0	64	8.0	72	8.0
9	8.0	72	18.0	90	9.0
10	9.0	90	20.0	110	10.0
11	10.0	110	22.0	132	11.0
12	11.0	132	24.0	156	12.0

The first four rows of the above Table show that so long as MC is less than the preceding AC, the successive AC falls. The next four rows show that so long as MC equals the preceding AC, the successive AC will remain constant. The last four rows shows that so long as MC is greater than the preceding AC, successive AC will rise.

Regarding the relationship between Me and AC (and for that matter between any marginal average value) it should be very carefully understood that what maters is the absolute value of MC and not its rise or fall or constancy. For example, the necessary condition for the AC to rise is that the MC should be greater (in absolute terms) than the former, whether MC is rising, falling or constant is immaterial. Thus whether MC is rising, falling or constant, so long as it is higher than AC the latter will rise. Similarly, the necessary condition for then AC to fall is that MC should be less than the former, whether the latter is rising, falling or constant is not material. *Thus in conclusion we may say that rising, falling or constant MC is compatible with a rising AC provided the former is higher (in absolute terms) that the latter, Similarly, rising, falling or constant MC is compatible with a falling AC provided the former is smaller (in absolute terms} than the latter. What matters in the relationship of MC with AC is the absolute value of MC and not its rise, fall or constancy parse.*

7.4 BEHAVIOURS OF VARIOUS COSTS WITH CHANGES IN OUTPUT: BEHAVIOUR OF AFC

Whether level of output produced is small or large (or even zero) TFC remains constant. From this it follows that higher the level of output, smaller accordingly will AFC tend to be because the given total of fixed costs will be spread over a larger and larger number of units. For example, if the TFC of a firm is Rs. 10,000, AFC will equal Rs. 1,000 if only ten units are produced, it will be Rs. 100 when 100 units are produced, and so on. *Thus, larger the number of units produced, smaller accordingly, will AFC tend to be. The AFC curve will form a rectangular hyperbola as the one drawn in the diagram below*.

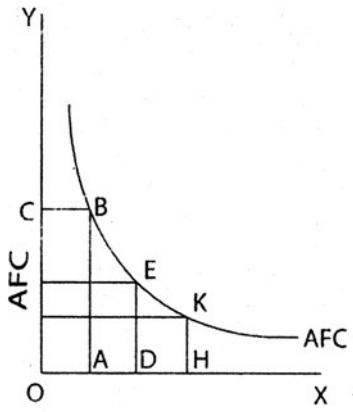


Diagram 7.1

The geometrical property of a rectangular hyperbola is that areas of all the rectangles subtended from different points on it are all equal. The area of a rectangle subtended from any point on the rectangular hyperbola in the above diagram represents the given TFC. For example, the area of rectangle OABC equals OA (units of output) *x* OC(AFC), that is, TFC, though AFC will fall continuously with increases in the level of output produced but it will never be zero because AFC multiplied by the number of units of output has to equal the given TFC.

The Behaviour of Variable Costs

The behaviour of variable costs will depend upon (a) the physical input output relations and (b) the prices of the factor inputs used in production. We, there fore, start with the former aspect first. As explained in detain above, in the short run a firm cannot achieve the vest combinations of factors appropriate for different level of output because amounts of certain factors cannot be varied for sometime to come. Reasons for this fixity of certain factors have been explained above. The fixed combination of factors, known as the plant of the firm, is designed to produce a certain output at the minimum cost. This is called the optimum output of the plant. However, this does not mean that the given plant cannot produce a larger or a smaller than the optimum output. Within certain limits, a larger or a smaller than the optimum output can be produced with the given plant by applying more or fewer units of the variable inputs. Thus, in the short run when a firm cannot vary the amounts of all factors to achieve optimum results, the second best alternative available to it to meet short run situations is to produce larger or smaller quantities of output by applying more or fewer units of other variable factors with the given plant. What happens to output when the given plant is used with increasing amounts of the variable inputs is described by the Law of Diminishing Returns or the Law of Variable Proportions as discussed earlier in section.

It should be carefully noted that the phases of increasing and diminishing MP and AP are entirely the results of technical conditions of production. Increasing and diminishing returns describe the physical relationships of inputs to output. Increasing (physical) returns obtain because the increasing employment

of the variable factor with given fixed factors (i.e. plant) makes better organisation of production possible and consequently the efficiency of all the units increases. For example, higher level of employment of labour offers better scope for the division of labour which improves skills of workers in production and management. With improved skills of workers in production and management. With improved skills wastes of raw materials and other input are reduced. In short, so long as the given fixed equipment is not fully utilized, application of more and more units of a variable factor results in improving the efficiency of the productive organization and consequently total output increases more than proportionately. However, beyond the point of optimum utilization, further application of the variable factor results in a less than proportionate increase in total output because marginal product of the variable factor starts diminishing. For example, when the same machines are worked longer hours per day, more frequent break-down of machinery occur. Similarly, when labourers work longer hours per day, their efficiency declines and due to over work, wastes of raw materials and other inputs also increase. As a result of these and similar other factors, the efficiency of the whole productive organization falls and total output starts increasing at a diminishing rate.

Summing up out discussion of the production possibilities open to a firm we can say that so long, as the given fixed equipment of the firm is not fully utilized, increased application of variable factor leads to a progressively better and better utilisation of the given productive capacity and as a result increasing returns obtain. However, beyond the point of optimum utilization of the fixed equipment, further application of variable factors results in diminishing returns, not because the units of the bariable factor are less efficient than others, but for the simple reason that different factors are not perfect substitutes of each other. Variable factors can be substituted for the fixed factors but not without loss of efficiency. Once this basic tact is recognized, diminishing returns follow as a matter of logical necessity.

Given the short run production possibilities open to a firm. How will the variable costs behave with variations in the level of output? Assuming that the price of the variable factor is given for the firm, we can say that so long as the MP of the variable factor increases. MC must necessarily fall and when MP diminishes, MC must necessarily rise. Similarly, we can say that so long as AP rises, AVC must fall and when AP falls AVC must rise. Regarding the behaviour of TVC we can say that so long as AVC fall, TVC will rise at a diminishing rate and when AVC rises, TVC will rise at an increasing rate. Assuming that the variable factor in question is available to the firm at a constant price of Rs. 100 each. Table 7.3 below which is based on the hypothetical output figures of Table 7.2 above, describes the behaviours of AVC and MVC with changes in the level of output produced.

TABLE 7.3

Units of labour employed	*TVC (Total wage BillRs.)*	*Total ouput (In kgs.)*	*AP (In kgs.)*	*AVC (Rs. per kg.)*	*MP (In kgs)*	*MC (Rs. per kg)*
1	100	50	50	2.00	50	2.00
2	200	110	55	1.82	60	1.67
3	300	174	58	1.72	64	1.56
4	400	236	59	1.69	62	1.61
5	500	285	57	1.75	49	2.04

A careful comparison of the AP and MP figures with the AVC and MC figures of the above Table will show the following.

1. MP rises up to the employment of 3 units of labour and thereafter it starts diminishing. In contrast MVC falls up to the employment of 3 units of labour and thereafter it starts rising.
2. AP rises upto the employment of 4 units of labour and thereafter it starts diminishing. In contrast AVC falls upto the employment of 4 units and thereafter starts increasing.

The conclusion is obvious. Rising productivity means falling variable cost per unit of output and declining productivity means increasing variable cost per unit of output. This applies to AP and MP equally.

Diagrams 7.2, contrast the behaviours of AP and MP with that of AVC and MC with changes in the level of output of a firm.

The upper diagram depicts the behaviours of AP and MP with changes in the level of employment of the variable factors. The lower diagram depicts the behaviours of AVC and MVC with changes in the level of output associated with changes in the level of employment of the variable factor in question. The two diagrams clearly show the following:

1. So long as AP rises, AVC fails, when AP is the maximum, AVC is the minimum and when AP falls, AVC rises.
2. MP and MC also behave in the same manner as do AP and AVC.

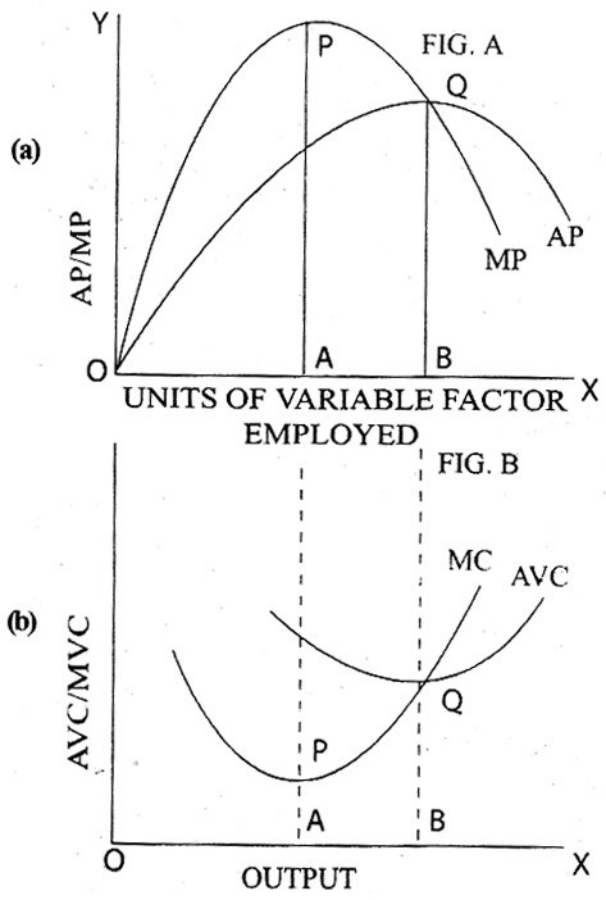


Diagram 5.1

Summing up our discussion of the behaviours of AVC and MC we can say that both are 'U-shaped', i.e., fall upto a point, reach the minimum and then start rising. The minimum points of MVC and AVC are different. The relationship between the two has been described in detail above. It may be noted that over the range AB, even though MVC is rising, AVC is still falling. This will happen so long as the rising MVC is still below the AVC. Thus, we have U shaped AVC and MVC curves.

The Behaviour of AC (i.e., AFC plus AVC)

The behaviour of AC naturally depends upon the combined behaviour of its components -the AVC and the AFC. AFC, as explained above, falls continuously as output expands but AVC falls only upto a

point and then starts rising. Assuming the TFC of a firm to be Rs. 500/-, the Table 7.5 brings out the behaviours of AC and MC with variations in the level of output produced by putting the two components together.

TABLE 7.4

Units of output production	*Fixed Costs*			*Total Cost*			*Variable Cost*		
	TFC	*MFC*	*AFC*	*TVC*	*MVC*	*AVC*	*TC*	*MC*	*AC*
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	100	zero	100	40	40	40	140	40	140
2	100	zero	50	70	30	50	170	30	85
3	100	zero	33	90	20	30	190	20	63.3
4	100	zero	25	136	46	34	236	46	59
5	100	zero	20	200	64	40	300	64	60
6	100	zero	167	300	100	50	–400	100	66.7
7	100	zero	14.3	434	137	62	534	134	76,3

In the Table above, TFC remains constant at Rs.100, therefore, MFC is always zero and AFC falls continuously. TVC increases at a diminishing rate upto 3 units of output and thereafter it increases at an increase rate. MVC falls up to 3 units of output and thereafter it starts increasing. AVC keeps falling upto 3 units and then starts increasing. TC is total of TFC and TVC. MC is essentially MVC. AC is the sum of AFC and AVC. MC falls upto 3 units and thereafter starts increasing. But AC falls up to 4 units and thereafter it starts increasing.

Diagrams 7.3 show the derivation of AC by adding AFC on top of AVC.

In figure B of diagram 7.3, we have drawn the AC curve by adding AFC figures corresponding to each level of output on top of the AVC curve. Regarding the behaviour and shape of AC curve we can clearly identify the following four phases:

1. *So long as both, the AFC and the AVC fall, AC too must fall. Upto the output level OA both AFC and AVC are falling. Therefore, AC is also falling.*
2. *Beyond output level OA, AVC starts rising but AFC continues falling. However, so long as the absolute fall in AFC is greater than the absolute rise in AVC, AC continues falling. In the diagram this happens over the output range AB.*
3. *For a while the absolute fall in AFC is exactly offset by an equal absolute rise in AVC. Therefore, during this phase AC becomes constant (i.e., neither falls nor rises).*
4. *Then a stage comes when the absolute rise in AVC far exceeds the absolute fall in AFC and consequently the AC starts rising.*

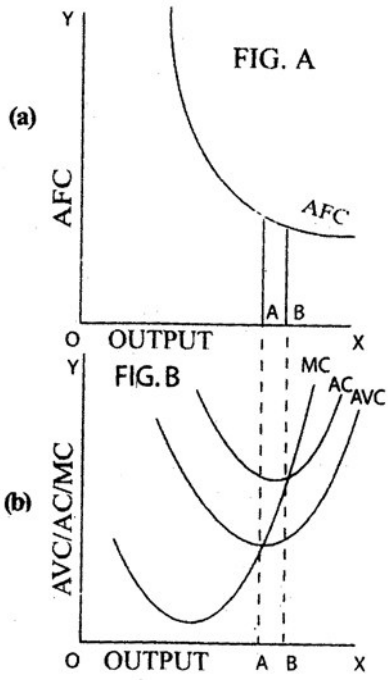


Diagram 7.3

The relationship between the AC and MC can be explained as follows:

1. So long the MC is less than the AC, the AC will fall. In the diagram up to the level of output OB, the MC curve lies below the AC curve and as a result AC falls.
2. If MC equals AC, as at point P in the diagram, AC remains constant.
3. If MC is more than AC, will rise. Beyond point P, the MC curve lies above the AC curve and as a result AC keeps rising.

Conclusion

Thus, finally we have the 'U-shaped AC curve as we have a 'U'-shaped AVC curve. With variations in the level of output, the AC curve behaves in exactly the same manner as the AVC does. Just as the AVC curve initially falls over a certain range of output and then starts rising, the AC curve too falls over a certain range of output and then takes an upward turn, tracing a 'U' shape in the process. The gap (i.e the vertical distance) between the two curves, as drawn in the diagram above, is accounted for by AFC corresponding to each level of output.

7.5 LONG RUN COSTS

Derivation of Long Run Average Lost-(LAC):

In the long run all costs are variable. So there is no need to make distinction between variable and fixed costs. The average cost in the long run can be derived from short run average costs (SACs) when the firm changes its plant size in order to reduce average cost of producing more more output. So LAC curve is the locus of reducing SACs. Initially LAC may fall as output expands due to increasing returns to scale. But when decreasing returns occure the LAC curve will increase. At the minimum point LAC exhibits constant returns to scale. This makes LAC curve 'U' shaped as it envelops the SACs. See diagram 7.4 below.

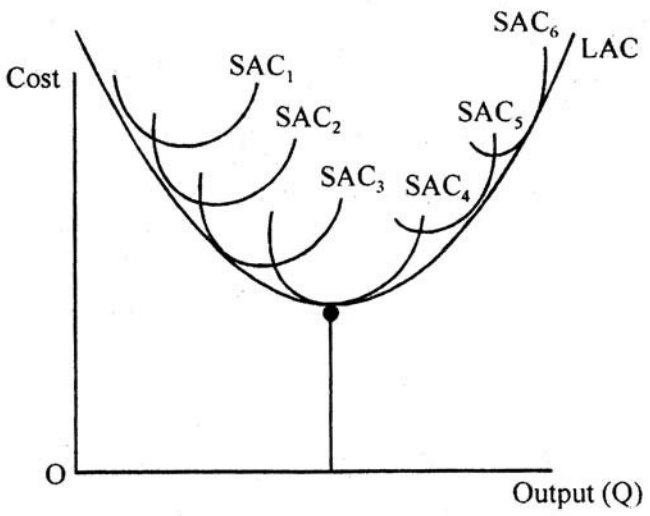


Diagram 7.4

In the diagram above LAC is derived by joining those points on various SAC curves such as SAC_1, SAC_2, SAC_3 and so on which give the lower possible cost of producing the particular amount of output. Infact the plant size has to be changed in the long run becuase all factors are variable. This is shown by changing SACs from SAC_1 to SAC_2, SAC_3 and so on. Due to economies of scale that cause increasing returns the successive points on shifting SACs keep coming below the previous one thus making the locus of LAC downward sloping till a minimum point, say, M is reached. After that LAC increases due to decreasing returns. At point M which is the minimum point the plant size is optimum giving constant returns to scale.

Long Run Marginal Cost (LMC):

LMC is derived in the following way (See diagram 7.5):

(i) First drop perpendiculars on the output (horizontal) axis from all those points on LAC where LAC = SAC. In the diagram they are shown AQ_1, BQ_2, CQ_3 and DQ_4 etc.

(ii) Locate the points of intersection of these perpendiculars with respective short run marginal cost curves (SMCs). These points are shown as A_1, B_1, C, D_1 etc in the diagram

(iii) Join these points through minimum of LAC to get LMC curve.

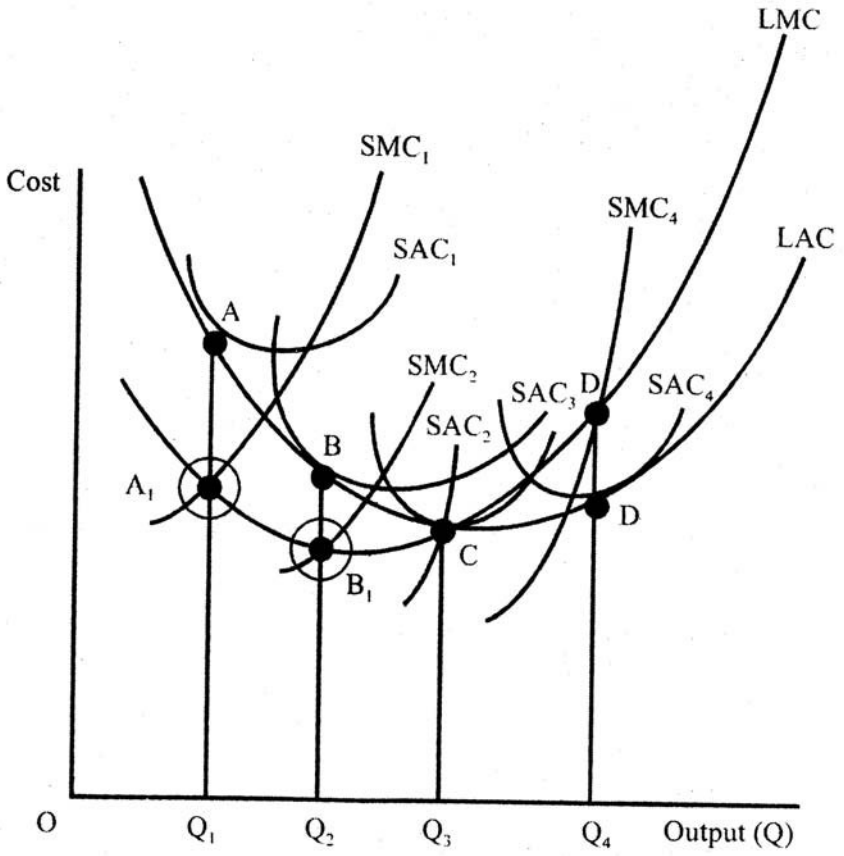


Diagram 7.5

REVENUE

Introduction

A capitalist firm is assumed to produce with a view to selling its output on the market. By selling the product firm realizes its revenue and it pockets the excess of its total revenue over total costs as its profits.

DIFFERENT CONCEPTS OF REVENUE

Total Revenue

Whatever revenue a firm gets by selling its output in the market constitutes its total revenue (TR). TR, naturally, depends on how much the firm sells and at what price it sells. We are assuming that the firm sells its entire output at a single price.

Therefore,

TR = Output price

Average Revenue

What buyers pay as price per unit in the market constitutes average revenue (AR) per unit when looked at from the firms's point of view. Thus, price and AR are one and the same thing, TR, thus, equals

output sold multipled by AR. Or, AR equals TR divided by the number of units sold. For example, if a firm's TR form the sale of 1000 unit is Rs. 15,000, naturally, its AR per unit is Rs. 15 (15000/1000=15).

Thus,

AR = TR ÷ Number of units sold.

Marginal Revenue

Marginal revenue (MR) refers to the contribution (i.e., addition) made to the TR of a firm due to the sale of an additional units of output. For example, a firm's TR rises from Rs. 15000 to Rs. 15500, when it sells 101 units of its output instead of 100. Obviously, according to this example, the contribution of the additional unit lo the total revenue of the firm is Rs.500. Therefore, Rs.500 will be said 10 be the MR of the additional unit. In general, MR of any nth unit of output (where n stands for the number of units) will equal TR of n units minus TR of (n-1) units. For example MR form the 20lh units will equal TR of 20 units minus TR of 19 units.

Thus:

$MR_n = TR_n - TR_{n-l}$

Relationship between AR and MR

The relationship between AR and MR is essentially the same as between AC arid MC explained earlier. So long as AR falls, MR must be less than AR. For example, suppose a firm's AR falls from Rs.100 to Rs.98 when it sells 21 units instead of 20. In this case MR of the 21st unit will equal TR of 21 units (i.e., 98 × 21 = 2058) minus TR of 20 Units (i.e., 100 × 20 = 2000), which comes to Rs.58. MR in this case is less than AR 58 (<98). On the other hand, when AR rises, MR must be more than AR. For example, if the firm's AR had risen from Rs. 100 to Rs. 102 when it sold 21 units instead of, the MR. of 21st unit would have been Rs. l42 (i.e., 102 × 21 – 100*x* = 142). MR, Thus, is greater than AR in this case (142>102). Finally, if AR remains constant when a firm sells larger output, MR must equal AR. For example, if the firm could sell 21 units instead of 20 at same price Rs. 100–MR from the 21st unit would have been Rs. 100.

Thus, we see that technically MR will be less than AR if the latter is falling, MR will equal AR if the latter is constant and MR will be greater than AR if the latter is rising. However, it should be carefully noted that a rising AR curve (i.e., demand curve) is not a normal phenomenon. It is a very rare occurrence. Normally, individual as well as market demand curve for most commodities are downward sloping. However, under certain specific market conditions to be explained in the following section, a firm may behave as if the demand curve for its product is horizontal, imply ing that it can sell any amount at a constant price.

(See the diagrams of AR and MR in different market situations in following lessons).

TOPIC 4

MARKET STRUCTURES

LESSON 8

FEATURES OF DIFFERENT TYPE OF MARKETS

Market demand curves for most commodities are downward sloping indicating that larger quantities of a commodity can be sold in the market only at lower and lower prices. However, what matters for a profit maximizing firm is not the total market demand for the commodity, but that part of it which flows to it. If a firm happens to be the only producer of a commodity, then the market demand for it is the demand for the firm's product. In such a case the firm will know that by increasing or decreasing its sales it will affect the price of the product. In contrast to this, consider a situation in which the market demand for a commodity is met by such a large number of firms that an individual firm meets a negligibly small fraction of it. In such a case, the firm can never imagine that it can influence the market price by increasing or decreasing its scale of operation. Besides the question of number of firms in the market, there are other variables such as availability of close substitutes, their prices, preferences of buyers, advertisement, and so on; which have a considerable bearing on the demand for an individual firm's product. It is beyond the scope of this paper to consider all market situations and analyse their effects on firm's revenue. We will consider only two extreme market situations, viz., perfect competition and monopoly in addition to imperfect competition.

8.1 PERFECT COMPETITION

Perfect competition refers to a theoretical market situation in which a single price, determined by the market forces of supply and demand for a commodity, ruling in the market is a datum for individual buyers and sellers and when firms in the industry, in the long run, are able to earn no more than normal profits (i.e., normal earnings of management) which are assumed included in the firm's average (total) cost as an element of fixed cost. In other words, *perfect competition prevails when (a) individual buyers and sellers of the commodity are price takers and not the price-sellers (i.e., are unable to influence the given market price in the slightest degree by increasing their sales or purchase} and (b) when in the long run TR of a firm equals its TC which includes normal profits (or alternatively when AR equals AC).*

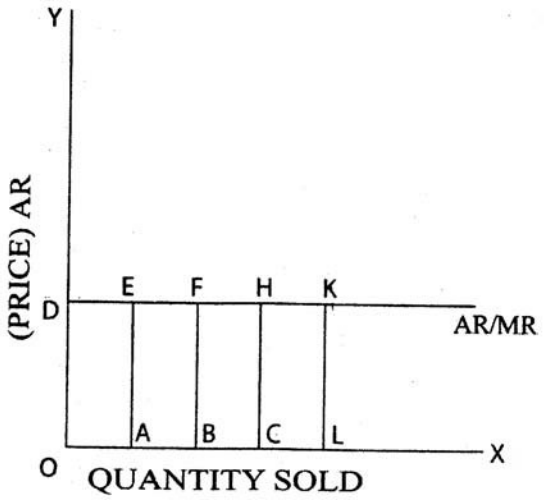


Diagram 8.1

What are the conditions necessary for perfect competition to prevail? The first requirement of perfect competition is that no individual buyer or seller is able to influence the market price by his own actions, i.e. by increasing or decreasing his sales or purchase. For a Finn this condition implies that it can sell any amount of the commodity that it is feasible for it to produce,

without perceptibly influencing the market price. In other words, the demand curve for an individual firm's output is perfectly elastic as the one shown in the diagram below.

The horizontal demand curve in the diagram above shows that whether the firm sells OA or OB or OC or OL, output price (or AR) remains constant at OD(OD = AE = BF = CH = LK). Similarly, for an individual buyer this implies that he can purchase any amount of the commodity at the going market price. In other words, supply of the commodity to an individual buyer is perfectly elastic. What are the conditions necessary for such a market situation? A moment's reflection would show that, given the assumption of rationality on the part of buyers and sellers, the following three conditions are essential for this state of the market.

(1) Large Number of Buyers and Sellers

There must be a large number of buyers and sellers of the commodity in the market so that no one is able to influence the market price by increasing his sales or purchases. Imagine the impact of a small wheat producer's actions on the market, who is one among a large number of wheat producers in the country. Can he, by increasing or decreasing his scale of operations, influence the market price in a perceptible manner? The answer is 'No', for the simple reason that, compared to the total wheat output in the country, his contribution is no more than a drop in the ocean. He produces such a small fraction of the total wheat output in the country that by producing 10% or 20 % more or less wheat he cannot influence the market price of wheat in the slightest manner. Therefore, he would passively accept the ruling market price as a datum. Perfectly elastic demand curve for an individual producer's output does not imply that if he could multiply his output a thousand fold even then the market price will not be affected. *What price taking actually implies is that an individual producer s productive capacity is so small that he cannot effect such big changes in his output which may exert some influence on the market price of the product*.

(2) Homogeneous Product

The second condition necessary for the price-taking position of individual buyers and seller to prevail is that the commodity produced by different firms should be perfectly homogeneous. This means that no producer should be able to influence the buyers of the basis of some real or imaginary quality' of his product. In other words no producer should be able to contend that his product is, in any manner, different form other. Similarly, buyers should not be able to distinguish between the products of different producer X or producer Y or producer Z. In short, products of different firms should be perfect substitutes of each other.

(3) Perfect Knowledge

Without perfect knowledge about the market conditions assumption of rationality does not work. For example, unless buyers know the prices charged by different sellers, they will not be able to buy form the seller who sells the cheapest. With perfect knowledge of the market conditions, buyers will switch over their purchases from sellers who charge a higher price to those who sell cheaper. Only this mobility of buyers can ensure a single price in the market.

Normal profit in the Long Run

The second condition necessary for perfect competition is that in the long run price must equal average (total) cost. For this to prevail, the following are the pre-conditions.

(1) Freedom of Entry and Exit of Firm from the Industry

This implies that there are no legal or institutional or technical barriers to entry (and exit) such as legal restriction, threats of price wars or sabotage form the existing firms, or possibility of boycotting buyers, monopoly of raw materials or of some other inputs, patents of products or processes, huge economies of scale making for large size of plants and huge initial investment, etc.

(2) Perfectly Elastic Supply of Factors

This requires that factors should be perfectly mobile in response to price incentives. Perfect mobility assumes perfect knowledge of the available alternative opportunities without which perfect mobility is not ensured. In addition to these, it is also necessary that factor owners have unique expectations about how the range of opportunities and the reward that each promises, will vary in the future.

The above mentioned conditions ensure that (a) individual firms are price takers and (b) in the long run they are able to earn only normal profits and no more. What are called normal profits, let us recall, are included in AC as an element of fixed costs.

Firm's MR Curve Under Perfect Competition (see diagram 8.1)

The demand curve or the AR curve of a firm under perfect competition is horizontal (or perfectly elastic). A horizontal AR curve implies that the firm can sell any amount at the going market price. How will firm's MR curve behave in this case? In the preceding sub-section we have explained that when AR remains constant, MR equals AR, For example, if a firm can sell 21 units instead of 20 at the same price, say Rs.25 per unit, naturally, MR will also be Rs.25. By implication, it follows that under perfect competition firm's MR curve will coincide with its AR curve. *In other words, the horizontal AR curve is also the firms MR curve. In fact the horizontal AR/MR curve can be said to be the hall mark of perfect competition to distinguish it form all other market situations*.

8.2 FEATURES OF MONOPOLY

In theory monopoly refers to a market situation in which a single firm controls the entire supply of a commodity which has no substitutes and when entry of new firms into the industry is not free. There may be some barriers which make entry of new firms into the industry extremely difficult (or even impossible) or entry may be prohibited by law. Barriers to entry of new firm may take several forms.

Entry of new firms into an industry may be legally prohibited because of certain social, political or economic considerations. For example, normally private firms are not allowed to enter the field or strategic defence production. Entry of new firms may be restricted through licensing or grant of exclusive patent rights to existing firms for the production of particular products or for certain processes of production or monopoly of some essential raw material, etc. Foreigners may be excluded outright or by raising prohibitive tariff walls. Sometimes economies of scale in some fields of production may be so large that, keeping in view the size of the market for the product, it may not be advisable to allow more firms to enter. The so-called public utilities in transport, communications, radio and television networks, post and telegraph, electric and water supplies, etc., are examples of this type.

Sometimes though entry of firms may not be legally prohibited, because of technical reasons: the minimum size of plant in an industry may be so large that the existing demand for the product may discourage new entrants. Because of its existing big size a firm may have acquired some distinct cost advantages which may not be available to new entrants. For example, new firms may not be able to mobilize the quantum of capital necessary to enter a field or may have to pay a higher rate of interest.

Sometimes entry of new firms may be made impossible by the existing firms through underhand methods such as deliberate price cutting, sabotage, threats of boycot by buyers, mergers, price leadership, and so on. Such tactics are often used to prevent entry of new competitors. Sometimes ignorance about actual profits earned or about the technical know how needed to enter a particular field may perpetuate an existing monopoly. For example, published accounts very often conceal actual profit figures and give very low profit figures. Or the technical know-how may be kept as a closely guarded secret an existing firm.

Just like perfect competition, monopoly, as rigourously defined in theory, too is merely a theoretical construct made to simplify analysis and not a real world phenomenon. It is difficult to think of a commodity which has no more or less perfect substitute, For example, alternative sources of energy such was coal, diesel, petrol, kerosene, steam, etc., are substitutes of electricity. Similarly, private taxi service, bicycles,

tongas, scooters, etc., are substitutes for state transport. The basic fact is that different commodities compete for the limited incomes of the consumers and are, therefore, more or less perfect substitutes of each other. Therefore, in the real world there is no pure monopoly as rigourously defined by the economist. Real world monopoly refers to a market situation in which a single producer controls (almost) the total output of a commodity which has no 'very close' substitutes. In other words, the cross elasticity of demand for the commodity in question is quite low. In conclusion, let us carefully note that monopoly and competition are matters of degree rather than kind. Most real world market situations are characterized by monopoly and competition blended in different degrees rather than pure extremes represented by monopoly and competition.

Average and Marginal Revenue Curves under Monopoly

Being the only producer of a commodity, the firm is the industry. The downward sloping market demand curve is the demand curve facing the monopolist. A downward sloping demand curve implies that larger amounts of the commodity in question can be sold in the market only by lowering the price. When this is the case, as we have already explained, MR (i.e., addition to total revenue made due to the sale of and additional unit of the commodity) is always less than the market price (AR).To take a very simple example, let us suppose that when a monopolist sells 101 units of his product instead of 100 the market price falls from Rs.25 to Rs.24.90. In this case, even though the additional unit sells in the market at Rs.24.90 but at the same time the monopolist suffers a loss in revenue of 10 paise per unit on the earlier 100 units. Therefore, the actual contribution of the additional unit to the total revenues (i.e., MR) will equal the lower price minus the loss suffered on the earlier sales. Thus, in this case MR form the 101th unit will be Rs. 14.90 (i.e., Rs. 24.90–10 = 14.90) and not Rs.24.90. In terms of AR and MR curves this situation implies that the AR curve (or the price curve) facing a monopolist will be downward sloping and the corresponding MR curve will lie below it as shown in the diagram 8.2.

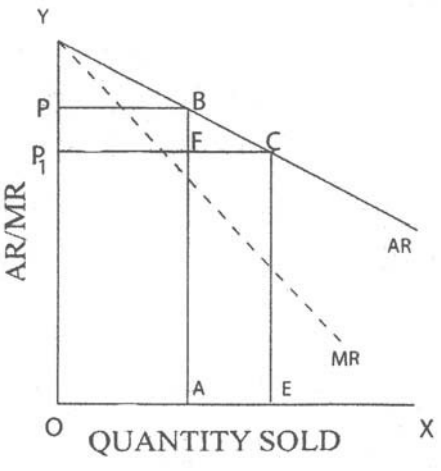


Diagram 8.2

As shown in the diagram 8.2, the monopolist can sell OA amount of the commodity if price is OP and he can sell OE amount only when price falls to OP_1. When he sells OA amount his total revenue equals the area of the rectangle OABP and when he sells OE amount his total revenue equals the area of the rectangle $OECP_1$.

It is evident form the above diagram that the actual addition to the monopolist's earlier total revenue equals the area of the rectangle AECF (i.e., additional amount sold x lower price) minus the area of the rectangle PP_1FB (old quantity sold .v reduction in price, i.e., loss in revenue on earlier sales). Therefore, marginal revenue curve will always lie below the monopolists" downward sloping AR curve as shown in the diagram 38.

Monopolistic Competition Features

Perfect competition and monopoly rigourously defined are far removed form the real world market situations. These two extremes are only theoretical constructs made to simplify analysis. Competition and monopoly are matters of degree rather than of monopoly and competition in different degrees. Price taking (i.e., complete absence of individual influence on the market price) and full freedom of entry and exist of capital form the industry are the two basic features of perfect competition. The conditions necessary to ensure the above mentioned features have already been explained in sufficient detail. Whenever, one or more of the conditions necessary for perfect competition are violated, competition becomes imperfect. For example the number of buyers and sellers may not be very large and as a result an individual

buyer or seller may be able to exercise some "influence over the market price of the product by increasing or decreasing his sales or purchases. Number of producers may be small due to a variety of reasons such as economies of scale, initial cost disadvantage, difficulties in mobilising the required quantum of capital, and so on. Secondly, the products of different sellers may not be identical in the eyes of the buyers (i.e., there may be real or imaginary differences between the products of different producer). Thirdly, buyers may not have perfect knowledge about the price offers of different producers. Or they may be aware of the price offers of different sellers but because of transport costs involved due to the locations of different sellers or simply because of inertia or irrational preferences), they may be reluctant to shift their purchases form one seller to another. Finally, quite apart form inertia ignorance, customers have a number of good reasons for preferring one sellers to another. Different customers are affected differently by factors such as the guarantee of quality provided by a well known name or brand, difference in facilities provided by different sellers quickness of service, good manners of salesmen, length of credit, attention paid to individual wants, advertisement, etc. Thus, there can be several reasons for imperfection of competition.

Average and Marginal Revenue Curves under Imperfect Monopolistic Competition

The essential feature of imperfect competition is that an individual producer exercise some control over the market price of his product but this control is not as much as under monopoly. In other words, the elasticity of demand for the product of an individual producer at any price is higher compared to the elasticity of market demand. The entry and exist of firms into and out of the industry is assumed to be free under imperfect competition but. because of various reasons explained earlier, the number of firms cannot be large enough to eliminate completely an individual firm's control over price. Thus, as under monopoly, under imperfect competition also the AR curve of firm will be downward sloping and the MR curve will lie below it. However, compared to a monopolist's AR and MR curves, the AR and MR curves of a firm under imperfect competition will slope downwards less steeply for the simple reason that by lowering its price the firm can always attract some customers from its rivals, whereas, by definition, a monopolist has no rival sellers at all. Freedom of entry and exit of firms under imperfect competition implies that in the long run price of the product will equal average cost and the firms in the industry will earn only normal profits i.e., Normal earnings of management already included in average (total) cost as an element of fixed costs. The AR and MR curves of a firm under imperfect competition are shown in the diagram below.

In the diagram above, the AR curve shows the different quantities that can be sold in the market at different prices. The MR curve, on. the other hand shows the additional revenue that the firm gets by selling an additional unit of the commodity. For example, for output OA, while the price (or AR) is equal to AC, MR is only equal to AB. Similarly, for output OD, while the price (or AR) is DF, MR is only equal to DE. Thus, the MR curve lies below the AR curve throughout its length.

8.3 DIFFERENT DEGREES OF MARKET IMPERFECTION

Competition and monopoly are matters of degree and not of kind. Perfect competition and monopoly, as rigorously defined by the economist, are far removed form real world market situations. Pure competition and pre monopoly represent theoretical extremes of the complete absence of monopoly power on the one hand and complete absence of competition, on the other. Real world markets present a blend of monopoly and competition in varying degrees. Economics now classify imperfect markets into various categories. In the following we give a broad classification of imperfect markets.

1. Oligopoly

Oligopoly literally means competition among the few. It refers to a market form in which there is such a Small number of firms producing the same or a slightly different product that an individual firm realizes

the fact that any change in its price, sales, quality of its product, selling activities, etc. is likely to evoke retaliation form its rivals. In such a situation, naturally, the policies of a firm will depend on what it thinks how rival competitors will react to its moves. It is this inter-dependence in decision-making as between different competing firms (producing the same or a differentiated product) which distinguishes oligopoly form all other market forms.

2. Duopoly

Duopoly is the limiting case of oligopoly when there are only two firms in the market producing the same or a slightly differentiated product.

3. Bilateral Monopoly

Bilateral monopoly refers to a market situation in which a single seller (i.e., a monopolist) faces a single buyer (i.e., a monoposonist). For example, if a single trade union controls the whole supply of a particular kind of labour (say, doctors) and if the employer was also one (say the government), the labour market would be called a bilateral monopoly market. Under bilateral monopoly price is, indeterminate. We will discuss price determination under bilateral monopoly in Set VIII in the context of factor pricing under different market situations.

4. Discriminating Monopoly

Refers to a market situation in which a firm sells the same product to the same or different customers at different prices. Doctors, lawyers, business consultants, for example, often charge their customers different fees according to the customer's abilities to pay. Similarly, cinema houses charge different admission fees for the same show. Railways charge different freight rates per ton-mile for different types of goods. Electric supply undertakings charge different rates for domestic and commercial uses and even different rates for different amounts for the same use.

Price discrimination becomes possible when goods sold in one market (or to a customer or for a particular use) cannot be transferred and resold in the other market and when elasticity of demand in different markets is different. Price determination under discriminating monopoly is discussed in the Appendix to this act of lessons.

5. Monopolistic Competition

Refers to a market form which closely approaches perfect competition in terms of a large number of buyers and sellers, freedom of entry and exit of firms form the industry, profit, maximization objective, technology and factor prices given perfect knowledge of cost and demand conditions, etc. with the single important difference that products of different firms are not homogeneous but differentiated and yet close substitutes of each other for example, similar brands of soap, tooth pastes, blades, etc, produced by a number of competing firms. Thus, except for the difference of product differentiation, competition is perfect in all other respects.

Product differentiation may be real or imaginary. What is importants is that with product differentiation demand for a firm's product is determined not only by the price but also the style of the product, its packing, brand name, services associated with the product, etc. The result of these factors is that the firm has some influence over the price of the product. The firm is not a price-taker but has some monopoly. It faces keen competition of close substitutes offered by the rivals. If it raises its price, it will loose some but not all of its customers. Similarly if it lowers the price, it will attract customers form rival sellers. All these factors give rise to a downward sloping demand curve for the firm's product.

LESSON 9

EQUILIBRIUM OF THE FIRM UNDER DIFFERENT MARKET SITUATIONS

Introduction

The objective of a capitalist producer is to earn the maximum profits, given the cost and revenue conditions for his product.

While the sale of an additional unit of output yield some additional revenue to the producer, it also adds something to his total cost. The addition made to the total revenue (TR) of a producer due to the sale of an additional units of output is called marginal revenue (MR) and addition made to his total costs (TC) is called marginal costs (MC). Whatever be the market structure or the time period under consideration, in deciding whether or not to produce an extra unit of output, a rational producer would always compare MR with MC. If MR of any unit is greater than its MC, its production will increase the producer's profits by the excess of MR over MC. On. the other hand, if the MC of any unit is greater than its MR, its production will reduce profits by the excess of MC over MR. Thus, when MR>MC the producer will increase profits by increasing the level of his output and when MC>MR, he will increase profits by reducing the level of his output. From this it follows that profits would be maximum when the firm chooses that level of output at which:

(1) MC = MR and

(2) Beyond which MC>MR.

Equality of MC and MR, though a necessary condition, does not by itself ensure maximum profits. If beyond the point of equality between MR and MC, the MR>MC, the firm will tend to increase the level of output to increase profits further and equilibrium will not be stable at the point of the equality of MC and MR. This can be shown with a simple diagram such as the following.

In diagram 9.1. the MC curve intersects the MR curve at points Q and R. Thus, MO = MR at both these points. However, the equality of MC with MR does not maximize profits at Q simply because beyond this point MR exceeds MC and consequently the firm will increase its profits by increasing the level of output further. Therefore, the firm will tend to increse the level of output beyond Q till MC once again equals MR at point R. Beyond R. however, MC exceeds MR and as a result the firm will reduce its profits if it extends the level of output beyond that point. *Therefore, equilibrium of the firm requires the simultaneous fulfillment of two conditions, i.e. (I) MC = MR and (2) MOMR beyond the point where MC–MR.*

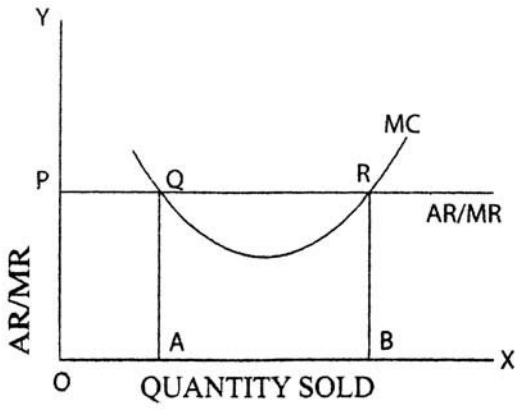


Diagram 9.1

Once again we emphasize the point that these are two

basic conditions for the determination of a firm's equilibrium, whatever be the market structure or the time period under consideration. Let us also warn that while the equality of MC with MR determines the equilibrium level of output (profit maximizing output) but it says nothing about the price of the product. Given the level of output determined by the equality of MC and MR, price will be determined by demand curve of the firm. With this background knowledge of the profit maximizing conditions (i.e., equilibrium conditions), we are in a position to analyse firm's equilibrium under specific market structure in the short and long runs.

9.2 PRICE DETERMINATION UNDER PERFECT COMPETITION

Firm's Supply Curve: An individual firm under perfect competition is a price taker and not a price setter, it cannot perceptibly influence the market price by its own actions, i.e., by increasing or decreasing the level of its output. The market price is determined by the forces of market demand for and supply of the product. Thus, a perfectly elastic demand curve for the firm's product may be said to be the hail mark of perfect competition. As a result, MR always equals AR and thus, the horizontal AR curve of the firm is also its MR curve. The equilibrium condition of the equality of MC with MR, in case of perfect competition also implies the equality of MC with AR (i.e., price). *Therefore, under perfect competition a firm only adjusts the level of its output so as to equate its MC with the given market price*. Thus, under perfect competition price always equals MC as shown in the diagram below.

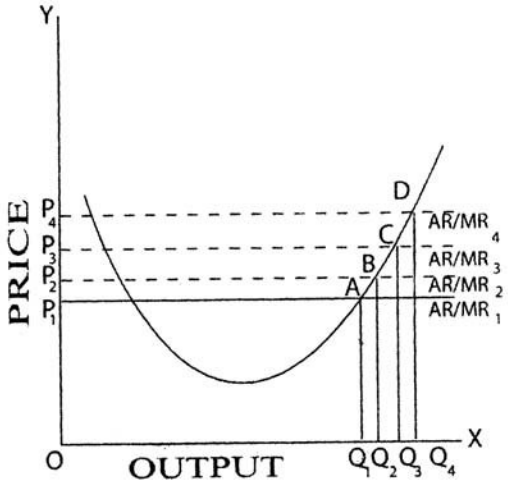


Diagram 9.2

In diagram 9.2, when the market price is OP_1 the firm produces OQ_1 amount of the commodity which equates its MC with the given price at A, When the market price is OP_2, the firm produces. OQ_2 amount which equates its MC with the given price at B. Similarly, the firm would produce OQ_3 and OP_4 amounts respectively when the market price rises to OP_3 and OP4 respectively. *Thus, the firm adjusts its level of output so as to equate its MC with the given market price.*

The equality of the firm's MC with the given market price of the product enables us to derive the firm's supply curve. How much a firm will supply at any given price is determined by the point of intersection of the given AR/MR curve and the MC curve. *In other words, the upward rising portion of the MC curve of the firm determines the different amounts the firm will supply at different market prices. Therefore, the upward rising portion of the MC curve is firm's short run supply curve.*

Market Supply Curve: The lateral summation of the individual supply curves (i.e., MC curves) of all the firms given us the short-run market supply curve of the product. Since the individual firm's supply curve (i.e., the MC curves) are upward rising, the market supply curve will also be upward rising. Given the market supply and demand curves of the product, the market price is determined by the intersection as shown in the diagram below.

In diagram 9.3 A, SS is the market supply curve (i.e., the lateral summation of the individual MC curve of all firms) and the DD is the market demand curve of the product. The two curves intersect at B, thus determining OP as the equilibrium price at which amounts demanded and supplied are both equal to OA. *The price thus determined becomes a datum for the individual firm which it cannot influence by its own actions.* The firm only adjusts its level of output so as to equate its MC with the given price as shown in Figure B. The form produces OA amount which equates MC with the given price at point Q. OA is the profit maximizing output for the firm under the given costs and demand conditions.

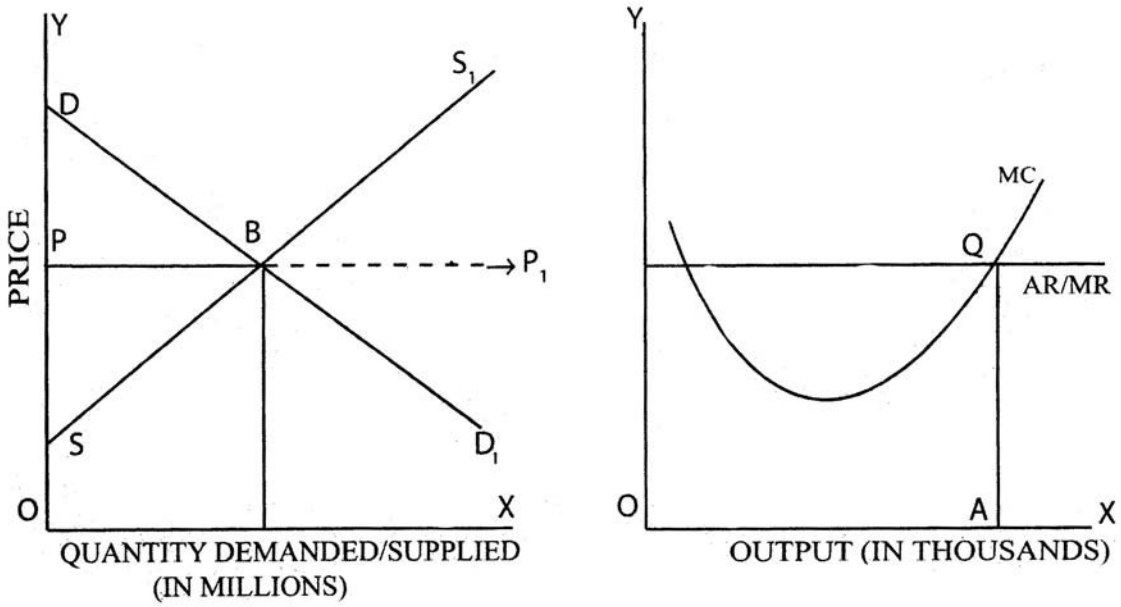


Diagram 9.3

9.3 EQUILIBRIUM OF THE FIRM UNDER PERFECT COMPETITION

(1) Short-Run Equilibrium

Given the horizontral AR/MR curve of a firm and the usual U-shaped AC and MC curve, equilibrium take place at a point where the horizontal AR/MR curve cuts the rising MC curve. This is subject to the only qualification that equilibrium cannot take place if the horizontal AR/MR curve cuts the MC curve below E, the 'shut down point as shown in figure 9.4B below.

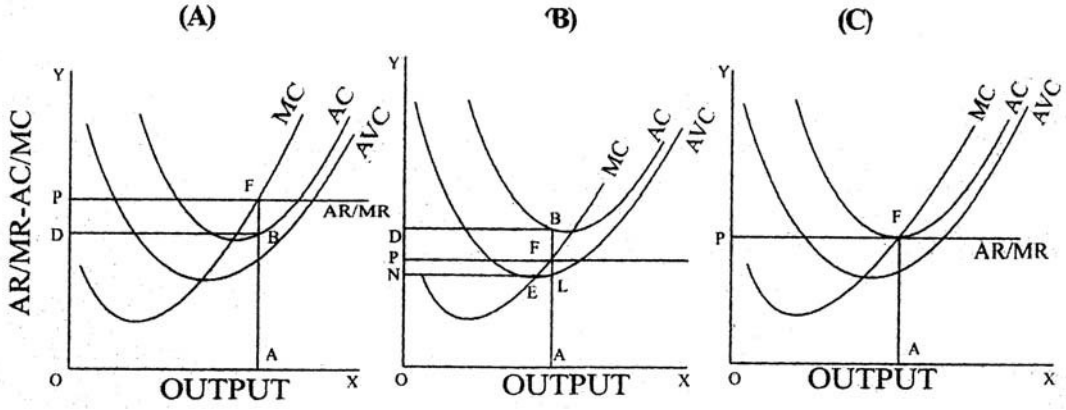


Diagram 9.4

The diagrams 9.4 depict three possible short-run equilibrium positions of a firm under perfect competition. In each case equilibrium take place at point F where the horizontal AR/MR curve cuts the rising MC curve. Figure A depicts an equilibrium position in which the firm is eqrning abnormal profits. While the given market price (as indicated by the horizontal AR/MR curve) is AF, average cost is only AB and thus, the firm earns abnormal profit equal to BF per unit of output. Total abnormal profits earned by the firm are represented by the area of the rectangle PFBD. Figure B, on the other hand, depicts an equilibrium position in which the firm is incurring losses equal to the area of the rectangle PDBF because price in the case (OP = AF) falls short of average cost AB. Loss per unit of output equals BF, Figure C depicts an equilibrium position in which the firm is neither earning abnormal profits nor

incurring any loss. The AR/MR curve is tangential to average cost curve at F and thus, price just covers the average cost.

The rationale behind a firm's decisionto continue producting even at a loss in the short run (as depicted in Figure B) lies inthe fact that by doing so, in fact, it is minimizing its loses which would be greater in case it stopped production. What will be the maximum loss if the firm stopped production completely? In the given cost-price situation, if the firm decided to stop production, it would have to bear losses equal to the full amount of total fixed costs. However, even though n the gven cot-prce tuaton the price does not cover the full average cost (i.e., average variable cost plus average fixed cost), nonetheless, it does not cover the average variable cost (=AL) and also a part of average fixed cost of average fixed cost (= LF). The uncovered part of average fixed cost is BF. *Thus, by producing output OA in the given cost price situation, the firm, in fact is minimizing its short run losses which would amount to the total fixed costs in the event of complete stoppage of production.*

(2) Long-run Equilibrium

Freedom of entry and exit of firms in the long run is the characteristic feature of the perfect competition. Therefore, equilibrium position with abnormal profits or losses, as shown in figure A and B above, are sustainable only in the short run but not in the long run. Short run is a period too short to permit adjustment of productive capacity to the desired level. In the short sun firms in the industry can produce more or less only by using their given fixed equipments more or less intensively (i.e., by applying more or fewer units of the variable factors with the given fixed equipment) but cannot increase or decrease their given fixed equipments. For the same reasons, new firms also cannot enter into the industry in the short run. Long run may to defined as the period which is long enough to permit variations in the amounts of all factors. In the long run, existing firms have the freedom to remain in the industry and to choose whatever factor combinations are most profitable or to quit the industry if future prospects are bleak. Similarly, new firms can enter the industry if future prospects are bright. Thus, in the long run all factors are variable and no factor remains fixed. It is difficult to think of any factor whose amount cannot be adjusted to the requirements, given sufficient time to do so. The long run however, is not any precise period of time which is the same for all industries. It varies from industry to industry. While for the steel industry it may extend over several years, for fishermen it may extend over just a few weeks. Once, however, a firm chooses a particular field of production and fixed equipment is purchased and installed, its freedom of choice is circumscribed by these factors.

When a firm chooses a particular industry and the size of its plant it expects to earn over the long period at least as much as it can earn elsewhere in the economy. These are called "normal profits". We have included them in average cost as an element of fixed costs. This is the position when the firm makes its long run planning decisions. However, these expectations may or may not come true. If the firm fails to earn normal profits and expects this situation to persist in the long run, it will revise its earlier decisions and may decide either to leave the industry or to adjust the size of its plant in the light of its revised expectations. On the other hand, if the existing firms in the industry earn more than normal profits (i.e., abnormal profits) and expect this situation to persist over the long period, they will expand the size of their plants to suit their revised long run expectations. The same considerations will induce new firms to enter the industry. *In short, long run prospects of earning more than normal profits (i.e., the chance of earning abnormal profits) in the industry induce new firms to enter the industry and old firms to expand induce new firms to enter the industry and old firms to expand their productive capacities*. As a result total output of the commodity increases and given the demand conditions, market price falls. When price falls abnormal profits are reduced. This process of the entry of new firms into the industry (and the expansion of the productive capacities of the old firms) continues till the total output of the commodity increases so much as to bring down its market price into equality with the average cost. When price equals average cost, abnormal profits are wiped out and firms earn only normal profits which are included in average cost. When firms earn only normal profits, there is no incentive

left for the entry of new firms into the industry or for old firms to expand their productive capacity. *In other words, the total productive capacity in the industry (in terms of number of firms and the size of their plants) will neither tend to increase nor to decrease. In such a state the firms in the industry are said to be in their long run equilibrium and so is the industry.*

The opposite process of the exit of old firms form the industry and /or contraction of the size of their plants sets in when firms in the industry fail to earn normal profits and expect this situation to continue in the long run. In the event of losses being incurred by the existing firms, some or them leave the industry while some adjust their productive equipment to the long run expectation. Total output of the commodity decreases and consequently market price rises. When market price rises, the losses of firms are reduced. This process comes to an end when total output of firms are reduced. This process comes to an end when total output of the commodity is reduced so much as to increase its price to equality with the average cost. When price once again equals average cost the remaining firms start earning normal profits. *Thus, under perfect competition, freedom of the entry and exist of firms ensures equality of price with average cost in the long run.*

Diagram 9.5 shows how in the event of abnormal profits the process of entry of firms and expansion of their productive equipment by the old firms bring about long run equilibrium of the firms and the industry.

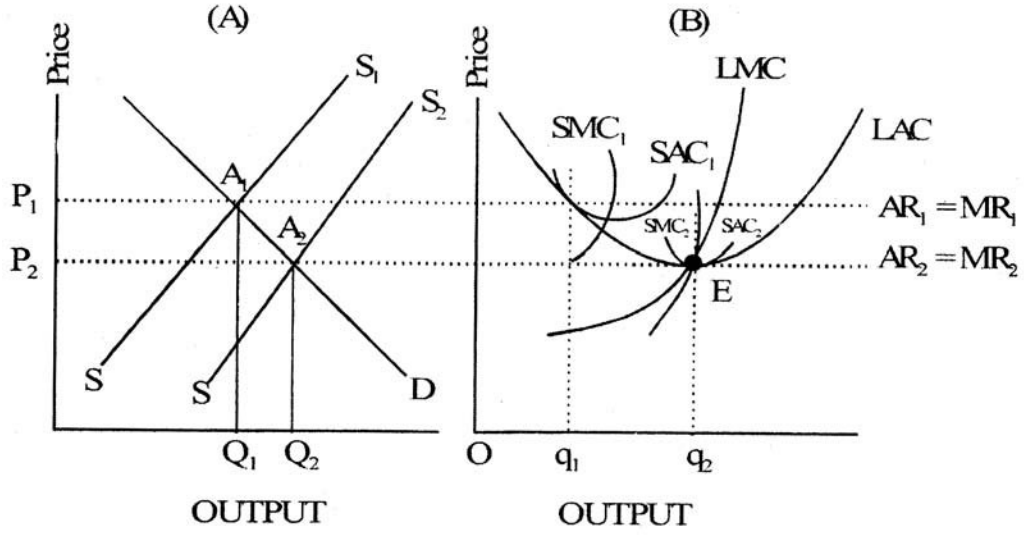


Diagram 9.5

Put B of the diagram depicts the position of an individual firm while part A depicts price determination by the interaction of the market forces of demand and supply of the commodity. With OP, (in figure B) as the given market price, the firm is earning abnormal profits because average cost is less than the price. New firms start entering the industry (and old ones expand their productive equipment), and consequently total output of the commodity increases, causing the market supply curve SS1 (in figure A) to shift right ward to SS2. The supply curve SS2 intersects the given market demand curve at A2, thus determining OP2 as the equilibrium price and OQ2 as the equilibrium output. The fall in the market price form OP1 to OP2 causes the horizontal AR1/MR1 curve of the firm (in figure B) to shift downward to AR2/MR2 which cuts the MC curve at E. This process of the entry of new firms into the industry (and expansion of their productive equipment by the old firms) comes to an end when the increased total output of the commodity (i.e., rightward shift of the supply curves) has depressed the market price so much that it only covers average cost. In figure A when the market supply curve shifts to SS2 and brings down market price to OP2, the corresponding AR2/MR2 curve (in figure B) becomes tangential to the U shaped average cost curve at E, the firm earns only normal profits. When firms in the industry

earn only normal profits, the influx of new firms comes to an end. Firms in the industry are said to be in their long- run equilibrium when they earn only normal profits that is, when price (minimum of) equals (minimum of) average cost. The industry is said to be in its long run equilibrium when there is no tendency on the part of new firms to enter the industry or on the part of old firms to leave the industry.

9.4 THE LONG-RUN INDUSTRY SUPPLY CURVE (LRS) (Perfect Competition)

The long-run industry supply curve shows the relation between equilibrium price and the output which the firms are willing to supply after ail the desired entry or exit has taken place. Entry takes place in response to increase in product price due to increase in the demand for the product. Entry will continue until the excess profits due to higher price are wiped out and all firms are once again just covering average total costs. On the other hand exit of firms from the industry starts taking place when price falls due to decrease in industry demand. If price falls below average total cost but remains above average variable cost then exit will occur as old capital wears out and is not replaced. If price fall below average variable cost then exit will occur very quickly because some existing capacity is scrapped or shifted to other uses.

The long run supply curve then becomes the locus of various long run equilibrium positions after all such demand induced changes have occurred.

The shape/slope of the long run supply curve depends on the manner in which the changes in factor prices take place in the competitive industry. We can identify three types of industry on this basis-(i) constant cost (ii) increasing cost and (iii) decreasing cost.

(i) Long-run supply curve in constant cost industry:

The industry in which input prices do not change as industry output expands or contracts, is called constant cost industry. This also leaves the long run cost-curves of the existing firms unchanged. This implies that more output can be supplied at the same price on the supply curve. So the supply curve looks horizontal. Diagram 9.6 shows this situation:

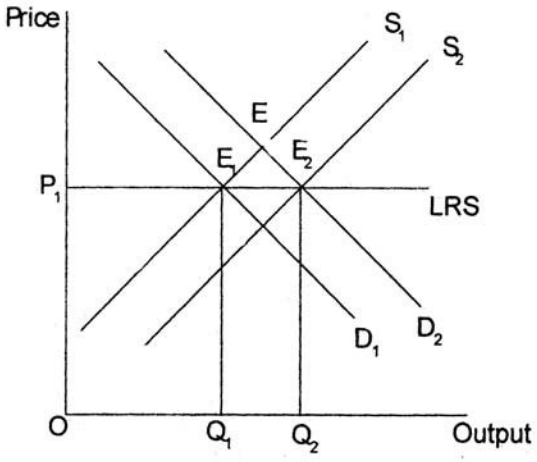


Diagram 9.6

(ii) Long-run supply curve under increasing cost industry

The industry in which input prices increase with expansion of industry output (and decrease with contraction of industry output) is called increasing cost industry. This happens because the costs of production per unit of output increase with increase in output. This implies that more output can be supplied at higher price. So the long run supply curve looks upward sloping. (Diag. 9.7)

(iii) Long run supply curve in decreasing cost industry

The industry in which input prices decrease with expansion of industry output and vice versa is called decreasing cost industry. The long run cost per unit of output falls with

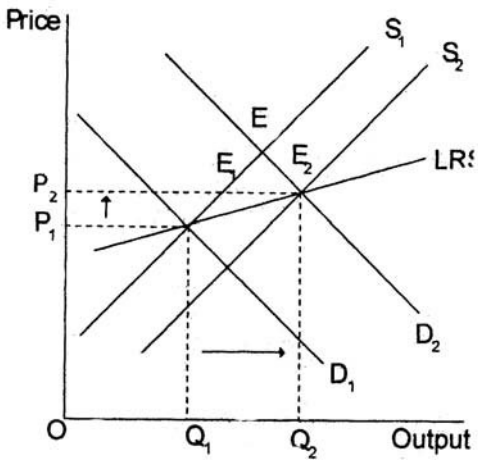


Diagram 9.7

increase in production. As a result the long run supply curve looks downward sloping. This means that higher output can be supplied at lower price. This may happen due to external economies say, e.g. if the industry which supplies inputs to the competitive industry in question, enjoys increasing returns to scale then it is possible that the competitive industry in turn experiences decreasing costs.

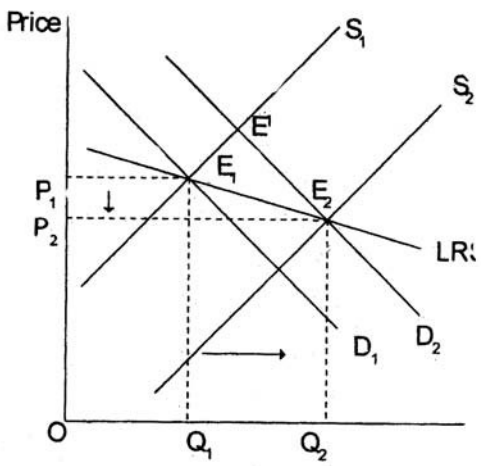


Diagram 9.8

Description of diagram 9.8—The initial equilibrium point of the competitive industry is at E_1 where original demand D_1 equals original supply S_1. The initial equibrilium price and quantity are P_1 and Q_1 respectively. Let demand for product increases so that D_1 shifts right to D_2. With supply unchanged at S_1 position the new equibrilium occurs at E where price of the product is more than original price P_1. This prompts the firms to supply more in anticipation of higher profits. As a result the industry output increases and accordingly the supply curve S_1 shifts to right to S_2. So price falls from E. Finally the equibrilium with new demand D_2 and Supply S_2 occurs at point E_2. Join E_1 and E_2 to get the long run supply curve.

Note that in constant cost industry as in diagram 9.6, the shift in supply is equal to shift in demand so that the ($S_1S_2 = D_1D_2$) locus E_1E_2 becomes horizontal. This is because of the fact that the price which earlier increased to E due to increase in demand now falls back to original level P_1 due to equal increase in supply. So LRS curve is horizontal.

In diagram 9.7, in case of increasing cost industry, the long run supply curve E_1E_2 is upward sloping because the increase in supply in this industry is less than the increase in demand ($S_1S_2 < D_1D_2$) due to higher cost of output.

In diagram 9,8, in case of decreasing cost industry the long run supply curve E_1E_2 downward sloping because the increase in supply is more than the increase in demand ($S_1S_2 > D_1D_2$) due to decreasing costs of output.

9.5 ALLOCATIVE EFFICIENCY UNDER PERFECT COMPETITION

Allocation efficiency refers to the situation where allocation of resources lead to maximum gain to the society reflected in maximization of the sum of consumers and producers surplus.

Consumer surplus is the difference between the total value which the consumers are willing to place on all the units consumed of the product and the actual payment that they make on its purchase.

Producers surplus is the difference between the value the producers receive by selling the product at its equilibrium price at which demand and supply of the product are equal and the value of the product at its minimum supply price which is its transfer earning.

Sum of consumers and producers surplus is maximized when price equals marginal cost of the product which actually occurs under perfect competition. We know that price reflects the value that household place on a good and marginal cost reflects the opportunity cost of the resources needed to produce the good. This implies that as long as price exceeds marginal cost then society gains by producing more of the good and when price falls below marginal cost society gains by producing less. Hence maximum gain takes place when price equals marginal cost which is referred to as allocative efficiency.

The left hand panel of diagram 9.9 gives equibrilium of competitive firm showing price P_0 = MC at point e. The price P_0 is market clearing price at which market demand AD equals supply BS at point E as shown on right hand panel of the diagram. For equilibrium quantity Q_0, the maximum price consumers are willing to pay is at point A so that consumers surplus is the area P0AE. Similarly minimum supply price being at point B the producers surplus is the area BP_0E. The total surplus is the area BAE which

is maximum possible for quantity Q_0 because the total surplus is reduced if quantity is either below or above Q_0.

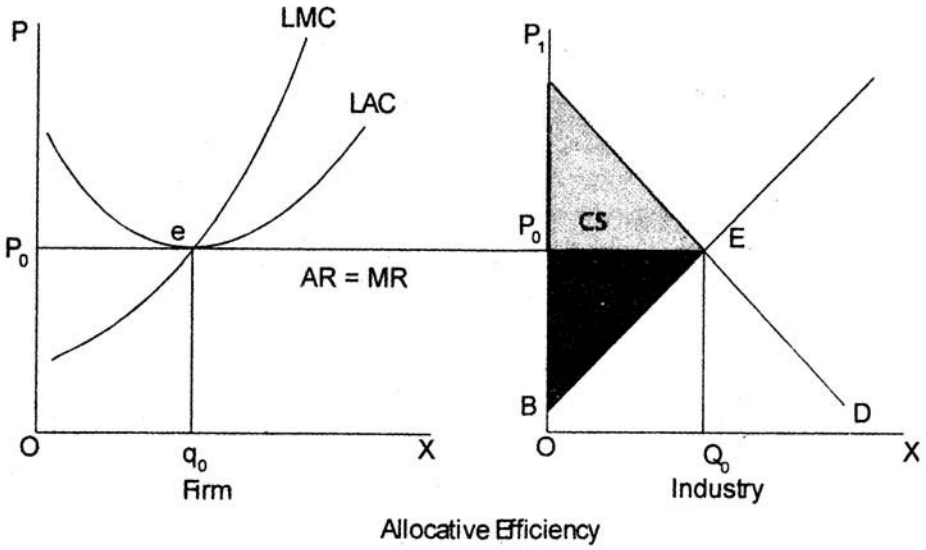


Diagram 9.9

9.6 EQUILIBRIUM OF THE FIRM UNDER MONOPOLY

Under perfect competition an individual firm is a 'price taker' and not a 'price maker'. As a result a competitive form is faced with a horizontal AR/MR curve. In contrast, a monopolist is a price-setter. A monopoly firm is faced with a downward sloping AR curve (demand curve), that is, it can sell larger amounts only at lower prices. Therefore, MR is always less than AR (price) and as a result the MR curve lies below the AR curve throughout its length. All this has been explained in detail in section 8.2 above.

While AR and MR depend upon the market situation faced by a firm, cost curves are assumed to be independent of the market condition. Therefore, we have the same set of cost curves to deal with under all market situations. This assumption is not wholly true but for simplifying our analysis we are making this assumption.

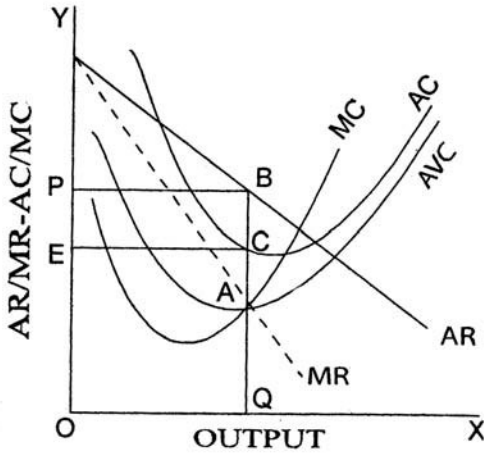


Diagram 9.10

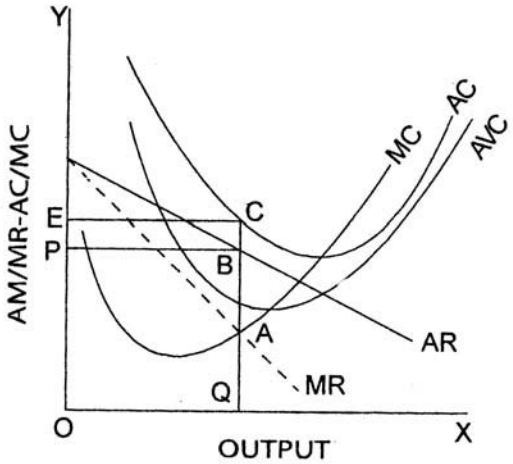


Diagram 9.11

Given the cost and revenue curves, equilibrium under monopoly, like perfect competition, is determined at the level of output where;

(1)MC = MR

(2) MC > MR beyond the point of equality of MC and MR. Diagram 9.10 depicts the equilibrium of a firm under monopoly.

In the above diagram, intersection of the MC and MR curves at A determines the firm's equilibrium. In equilibrium the firm produces OQ output and sells it at OP price. In this equilibrium position the firm is earning abnormal profits equal to the area of the rectangle EPBC because price OP (=QB) is greater than average cost (=QC). Depending upon the demand conditions, it is possible that a monopoly firm also may have to produce at a loss in the short run. Diagram 9.11 depicts an equilibrium position in which a monopoly firm produces at a loss in the short run.

In the diagram 9.11 the firm is producing OQ amount and incurring losses equal to the area of the rectangle PECB because price in this case(=QB) falls short of average cost (which equals QC) by BC. The rationale behind the firm's decision to continue producing in the short run even at a loss has been explained earlier. By producing in this situation the firm is minimizing its losses because the price not only covers the average variable cost but also a part of average fixed cost. A smaller loss is preferable to a larger loss.

Monopoly being the only firm in the industry is also the industry. Therefore, there is no separate theory of industry under monopoly.

Long Run Equilibrium under Monopoly

Existence of abnormal profits provides incentive for the entry of new firms into the industry. However, under monopoly entry of firms into the industry is not free. There are legal, institutional or technical barriers to entry into the monopolized industry. Therefore, abnormal profits earned by a monopoly firm will persist so long as monopoly is intact. Under perfect competition short-run equilibrium differs form the long-run equilibrium because entry and exit of firms wipes out abnormal profits or losses. There is no such possibility under monopoly. Therefore, so long as a firm is able to preserve its monopoly power, it will continue to earn abnormal profits even in the long run (diagram 9.5).

9.7 DPRICE DISCRIMINATION (DISCRIMINATING MONOPOLY)

Price discrimination occurs when a producer sells the same product at different prices to different or the same customers at the same time for reasons not associated with cost of production. Doctors, lawyers and other professional consultants, for instance, very often charge different consultation fees from different customers for the same services according to their abilities to pay. With a view to capturing foreign market, goods are very often sold at lower prices in foreign markets than the home market (a practice known us 'dumping'). Railways charge different freight rates per ton mile for different goods. Electric supply undertakings sell electricity at different rates for different amounts even for the same use. These are some examples of price discrimination.

When is price discrimination possible? Price discrimination becomes possible when (1) the producer has control over the supply of the product so that customers may not purchase the product from other producers and (2) there are separate markets between which transfer or resale of the product is either impossible or costly and (3) the elasticity of demand for the product is different in different markets. Markets may be separated form one another just because of ignorance on the part of customers, or by laws that prohibit the movement of the product form one market to the other or because of the nature of the product itself, or through other devices.

Why should a producer sell the same product at different prices at the times? Given the objective of profit maximization, with a simple example it can be shown that if price discrimination is possible it is more profitable than selling at a single price. Suppose a person is willing to pay Rs. 10/- for the first unit of a commodity, Rs.8/- for the second unit and Rs.6/- for the third unit. It is evident that

if the seller offered to sell the three unit at a single price, the buyer would purchase them at Rs. 6 each and thus, the total revenue of the producer would be Rs. 1 8. However, if the seller could some how arrange to sell the 3 units at the maximum price the buyer would be willing to pay for each rather than go without then, the seller's total revenue would be greater than the revenue by selling at a single price. Cost of production being a function of the output produced irrespective of whether it is sold at a single price or at different prices, it is evident that increase in total revenue resulting from price discrimination will increase seller's profit by that amount. Therefore, price discrimination is more profitable for a producer than selling at a single price.

Producer's Equilibrium with Price Discrimination

Whatever the market form and whatever the number of markets where a firm sells its product, its profit would be maximum when its MC is equated with MR. Our analysis of the behaviour of costs has shown that costs (total, average and marginal) are function of the total output produced. Therefore, MC remains unaffected whether the output produced is sold at a single price or a different prices. The equilibrium condition of the equality of MC with MR tells us that the profits of the firm would be maximum when its MC (of the aggregate output) is equated with MR in each market. This is nothing but an application of the principle of equi-marginal returns in case of several market. If MR in one market were higher than MR in another market, the producer would increase his profits by selling more units in the higher MR market. and less in the lower MR market until he got the same MR in each market. Therefore, equilibrium under price apportioned to different markets in such quantities that the MR in each market is equated with the MC associated with the aggregate output. Graphically, the determination of prices and outputs for different markets is demonstrated in the diagrams below for a two market model.

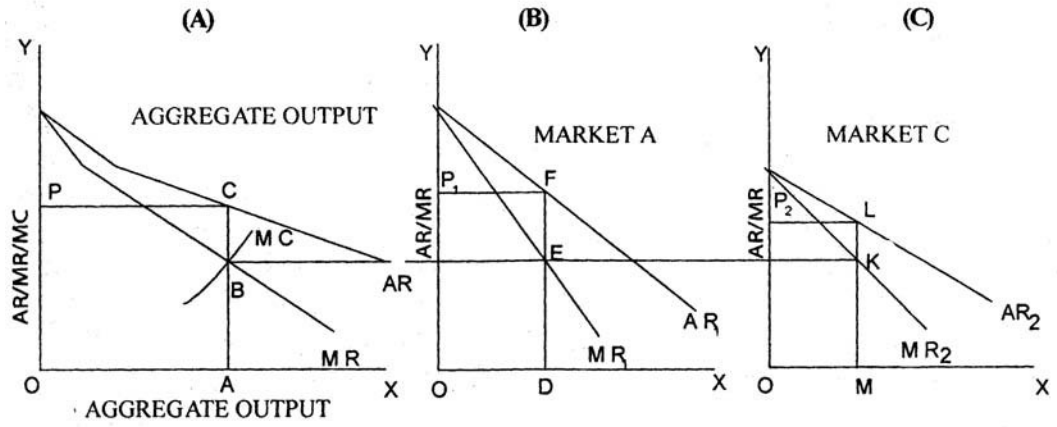


Diagram 9.12

In the diagram 9.12 above, figs. B and C depict the separate demand condition in the two markets (A and B) and dig. A depicts the aggregate AR, MR and MC curves. The intersection of the MC and MR curves at B (in dig. A) determines OA as the equilibrium output to be produced. If the firm were to sell the aggregate output at a single-price, OP would have been the equilibrium price. Equilibrium with price discrimination requires that the aggregate output OA is apportioned to the two markets in such quantities that the producer gets the same MR (= AB in dig A) in the two markets. This apportionment is obtained by drawing a line BEK parallel to the X axis which intersects MR_1 at E and MR_2 at K. Thus, OD part of the aggregate output will be sold in the market A (fig. B) and OM in the market B (fig. C). The elasticity of demand for the product being different in the two markets, price corresponding to output OD will be DF in market A (fig. B) and the price corresponding to output OM will be ML in market B (dig. C).

Thus, we conclude that equilibrium under price discrimination is determined by the equality of MR in each market with the MC of the aggregate output produced.

9.8 ALLOCATIVE INEFFICIENCY AND DEAD WEIGHT LOSS UNDER MONOPOLY

We have just said that under perfect competition price equals marginal cost. Because of this perfect competition is allocatively efficient. On the same basis it can be argued and proved that monopoly is allocatively inefficient because under monopoly, as seen just now, price exceeds marginal cost. Since consumers pay higher price under monopoly as compared to perfect competition, there is loss of consumers' surplus.

Since producer's equilibrium takes place at the point of equality between marginal revenue (MR) and marginal cost (MC) to determine the quantity and since MR is less than average revenue (AR) under monopoly the monopoly quantity is obviously less than competitive quantity where AR = MR. So lower quantity and higher price under monopoly results in gain to the monopolist at the cost of consumers. As a result the sum of consumers and producer's surplus is reduced resulting in social loss or dead weight loss. The measure of deadweight loss is given by the following.

Deadweight loss = Gain in Producer's surplus
(–) loss in consumer's surplus

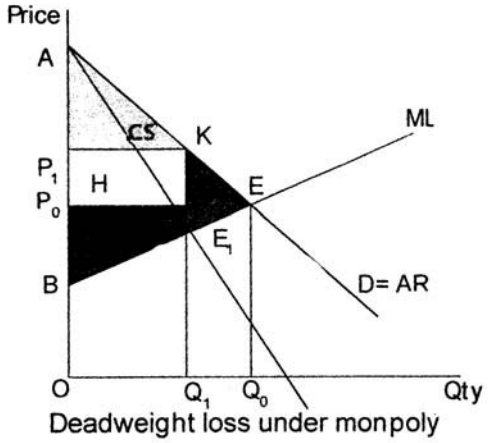


Diagram 9.13

Diagram 9.13 shows this situation

As shown in the diagram 9.13 the equilibrium of the monopolist is at the point E_1 where MR=MC. AR curve is above MR curve. The monopoly quantity corresponding to point E_1 is Q_1 and price is P_1 on AR curve. Competitive price would have been P_0 which is equal to MC at point E and competitive quantity is Q_0. See that $P_1 > P_0$ and $Q_1 < Q_0$. Since price is P_1, the consumers surplus for quantity Q_1, is area P_1AK. This is less than the area P_0AE which would have been consumers surplus under perfect competition. So loss in consumers surplus is equal to area P_0AE-area P_1AK i.e. area (H+I).

Similarly by producing Q_1 below Q_0 the producer looses area J but by selling at price P_1 the monopolist gains area H. So net gain in producers' surplus is area (H–J).

Hence Dead weight loss :

= area (H – J) – area (H + I)
= (–)area(I + J) or E_1KE.

The minus sign indicates loss. Area (I + J) is the triangle E_1KE which is deducted from the area BAE which is the total surplus under perfect competition so that the surplus under monopoly falls to area $BAKE_1$. Hence area E_1KE is social loss or deadweight loss of monopoly power.

9.9 EQUILIBRIUM OF A FIRM UNDER IMPERFECT COMPETITION

Monopoly and perfect competition are two extreme market forms. As pointed out earlier pure monopoly and perfect competition do not represent the real world market situations. Real world market situations are characterized by a blend of monopoly and competition in different degrees. Like monopoly, imperfect competition also is typically characterized by a downward sloping AR curve. The corresponding MR curve lies below the AR curve.

We have the same set of cost curves whatever the market situation.

Short Run Equilibrium

Given the cost and revenue curves, equilibrium requires the satisfaction of the same condition, that is:

(1) MC = MR
(2) MO > MR beyond the point of their equality.

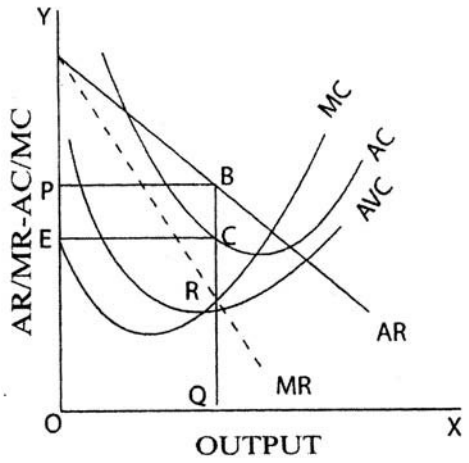


Diagram 9.14

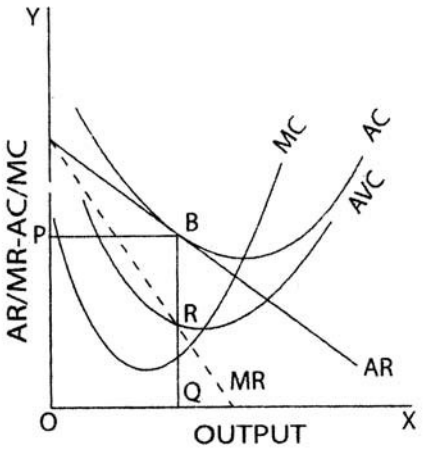


Diagram 9.15

Diagrams below depict two possible short-run equilibrium positions of a firm under imperfect competition.

In the above diagrams 9.14 and 9.15 the intersection of MC and MR curves determines the firm's equilibrium at point R. Figure A depicts an equilibrium position in which the firm is earning abnormal profits equal to the area of the rectangle PEBC because price OP = (QC) is higher than average cost (=QB). Figure B, on the other hand depict an equilibrium position in which the firm is incurring losses equal to the area of the rectangle PEBC because price OP (=QC) falls short of the average cost (= QB) by BC. BC represents the loss per unit. Price being greater than the average variable cost provides justification for continuing production in this case. Equilibrium with abnormal profits or losses are possible short-run situations.

Long Ron Equilibrium

Unlike monopoly freedom of entry and exit of firms from the industry is the distinguishing feature of imperfect competition. Therefore, equilibrium positions with abnormal profits or losses are sustainable only in the short run but not in the long run. If the firms in the industry are earning abnormal profits and if this situation is expected to persist in the long run, this will attract new firms into the industry. As more firms enter the industry, the given market demand for the product will be shared by a larger number of firms so that each will have a smaller share of the market demand. As a result, at nay given price an individual firm will be able to sell less than before. In other words, as a results of the influx of new firms into the industry each firm's AR curve (i.e., the demand curve shift leftward. This process will continue so long as there are any abnormal profits to be earned in the industry. Ultimately the firm's AR curve becomes tangential to the U-shaped average cost curve at some point on its falling portion. When AR curve becomes tangential to the average cost curve, price equals cost and thus, abnormal profits are completely wiped out. Diagrams below show how, because of the influx of new firms into the industry firm's AR curve is pushed leftward and ultimately becomes tangential to the average cost curve.

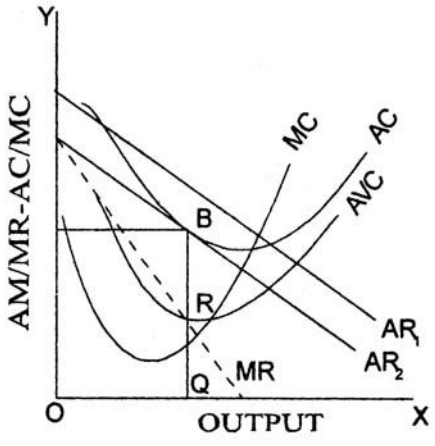


Diagram 9.16

Figure 9.14 depicts a possible short run equilibrium position in which the firm is earning abnormal profits equal to the area of the rectangle PECB. Because of the influx of new firms into the industry, the firm's AR curve is pushed leftward and ultimately (as shown in Figure 9.16) becomes tangential to the average cost

curve at B. At B price average cost and the firm earns only normal profits. When firms in the industry earn only normal profits, there is no incentive left for new firms to enter into the industry.

On the other hand, if firms in the industry are incurring losses, and when this situation is expected to persist in the long run, firms starts leaving the industry for better prospects elsewhere. With the exist of some of the firms from the industry the given market demand for the product comes to do be shared by fewer firms-their AR curves shift rightward. The process of the exit of firms form the industry and the resulting rightward shift of the AR and MR curves continues till ultimately the AR curves becomes tangential to the U-shaped average cost curves on their falling portions. When AR curve becomes tangential to the average cost curve and a firm earns only normal profits, it is said to be in its long run equilibrium. When all firms in the industry earn only normal profits, there is no incentive for firms to leave this industry and the number of firm neither tends to increase nor to decrease. When this situation obtains, the industry is said to be in its long run equilibrium.

9.10 EXCESS CAPACITY UNDER IMPERFECT COMPETITION

We saw that the firms under both perfect as well as imperfect competition earn normal profits in the long run by selling at a price equal to the long run average cost (LAC). However the difference is that while price under perfect competition equals minimum of LAC where output is larger, the price under imperfect competition is determined at a point where LAC is still falling. This means that the LAC is not minimized under imperfect competition at equilibrium. Minimization of LAC is called productive efficiency. So by not minimizing LAC and producing on the falling portion of LAC the imperfectly competitive firm produces less than competitive output by not utilizing its plant capacity. So imperfectly competitive firm is productive inefficient while competitive firm is productive efficient. This is also referred to as excess capacity of imperfect competition which is measured as the difference between output produced at the minimum point of LAC i.e. competitive output and the output produced at some point on the falling portion of LAC even though it corresponds to equilibrium between MR and MC under imperfect competition.

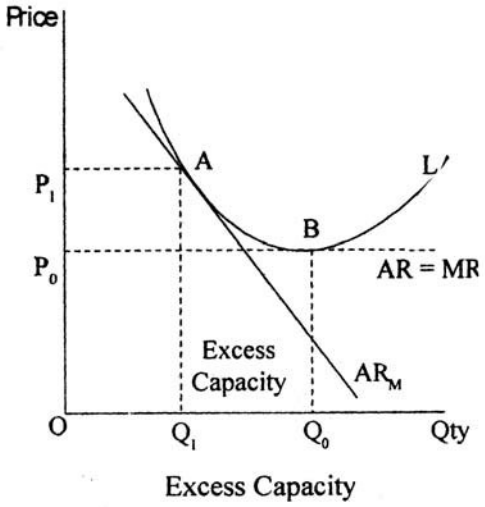


Diagram 9.17

Diagram 9.17 shows the situation of excess capacity.

In the diagram 9.17 the long run average cost curve is shown as LAC. Firm under imperfect competition produces at point A on LAC where LAC is still falling and tangent to its demand curve ARM. The output of imperfectly competitive firm is Q1. On the other hand a competitive firm produces Q_0 at the minimum of LAC curve. The range AB on LAC curve showing the difference in output as Q_0–Q_1 is the measure of excess capacity.

9.11 PERFECT VS IMPERFECT COMPETITION : A COMPARISON

A horizontal AR/MR curve of an individual firm may be said to be the hall-mark of perfect competition. On the other hand, a downward sloping AR curve of an individual firm characterises all other market forms. The MR curve corresponding to a downward sloping AR curve is also downward sloping and lies below the former throughout. The differences in the equilibrium quantities (prices, output, MC/price relationship, etc.) under perfect competition and under other market forms arise because of the differences in the shapes of the AR and MR curves. Briefly these differences are the following.

(1) Equality of MC and MR determines the equilibrium of a firm under all market conditions. However under perfect competition, by definition, AR always equals MR. By implications, therefore, MC = MR = AR (price) in equilibrium. Thus, under perfect competition, price equals MC. On the other hand, under imperfect competition, MR being always less than AR (price), price is necessarily higher than MC as well as MR.

(2) Under perfect competition a single price prevails in the market and all firms equate their MCs with the market price. By implication, the MCs of all firms in the industry are equal. Equality of MCs ensures efficiency in the industry. However, under imperfect competition there is no single price ruling in the market and the AR and MR curves of different firms differ in their shapes and locations. Therefore, MCs of different firms are normally different. This is said to be an indicator of inefficient use of resources.

(3) Under perfect competition as well as under imperfect competition long-run equilibrium of a firm requires (1) MC = MR and (2) AC = AR. However, under perfect competition, by virtue of the identity between AR and MR, in long run equilibrium MC = MR (= AR) and AC = AR (=MR) necessarily implies that MC = MR = AR = AC. Thus, in long run equilibrium under perfect competition price (AR) equals MC as well as AC. MC equals AC only at the lowest point of the AC curve, therefore, under perfect competition in long-run equilibrium price of a commodity equals its minimum average cost. (You may recall under perfect competition in long run equilibrium the horizontal AR/MR curve becomes tangential to the U shaped AC curve necessarily at its lowest point).

Even though under imperfect competition (as under perfect competition) long-run equilibrium requires MC = MR and AC = AR. By virtue of the MR curve always lying below the AR curve, MC will necessarily be less than AC. MC is less than AC when the latter is falling. This implies that under imperfect competition long-run equilibrium will take place on the falling portion of the AC curve, In other words, in long run equilibrium under imperfect competition price will necessarily be higher than the minimum average cost.

(4) As explained above under perfect competition long-run equilibrium take place necessarily at the lowest point on the AC curve whereas under imperfect competition it takes place to the left of the lowest point on the AC curves. From this it follows that level of output under perfect competition will be optimum while under imperfect competition it will be less than optimum. In other words, under imperfect competition productive capacity is under utilized.

LESSON 10

OLIGOPOLY : COMPETITION AMONG FEW FIRMS

Introduction, Main Features and Causes for the Existence of Oligopoly

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10.1 INTRODUCTION

An oligopoly is a market form in which a market or an industry is dominated by small number of sellers, called oligopolists. The word "O ligopoly" comes from two Greek words: ***oligo***, meaning "few" and polein, meaning "sellers". Unlike monopoly, which has no competitor and perfectly & monopolistically competitive firm, which has many competitors, an oligopoly firm faces only few competitors. An oligopoly has greater market power than monopolistic competition and perfect competition, but not as much market power as monopoly. Since there are few participants in this type of market, each oligopolist is aware of actions of the others. Because of the thorough competition, it is often called as 'cut-throat' competition. Many industries in the developed economies are of oligopolistic form of market. This form of market is an emerging phenomenon not only in domestic but in international market as well.

Few examples of typical oligopoly markets are: (a) Credit Card (Visa, Master Card, American Express & Discover are competing in the global market), (b) Soft Drink (Pepsi & Coca Cola are competing in Indian Market), (c) Automobile industry [specially family car manufacturing] (Maruti-Suzuki, Tata, Hyundai, Honda, Toyota, General Motors & Ford are competing in the Indian market).

Main Features of Oligopoly

1. **Large number of buyers and few Sellers:** This is a unique feature of oligopoly market. Large numbers of buyers but only small numbers of sellers exist in the market. Unlike perfect competition and monopolistic competition only a small number of firms dominate in the market under oligopoly.
2. **Differentiated and Multiple Products:** In an oligopoly market, firms produce differentiated products. Product of one firm is different from the product of others. Each firm claims that its product is superior from competing products in the market. Firms produce multiple products also. For example, Maruti-Suzuki manufactures several models of family cars i.e. Maruti 800, Zen, Swift, Esteem etc. similarly other manufacturers also produce multiple products under the same brand.
3. **Interactivity:** oligopoly markets are characterized by interactivity. The decisions of one firm influence, and are influenced by, the decisions of the other firms. Firms always observe the actions of others before deciding their prices and output.
4. **Absence of Uniformity:** All the firms in an oligopoly market may not be of the same size. Some firms are big in size than others. Some firms may produce more number of products than others. By producing few products a firm can be large than others. Big firms dominate in the market. They produce majority production and always lead in the market.

5. **Advertisement and Selling Cost:** Oligopolistic firms spend a large amount on advertisement and marketing. In a cut-throat competition every firm wants to shift the demand in their favour by showing their products different and superior to other products through advertisement and marketing strategies.
6. **Market Power:** The big firms in an oligopoly market enjoy market power. Through differentiated products and innovative advertisements few firms capture the major share in the market. Firms always compete with each other to become number one. For example, newspaper market. Times of India and Hindustan Times both claim to be number one in Delhi. They sometimes give special discounts to increase their sale. These two only capture major share in the market.
7. **Conditional Price Rigidity:** Price rigidity prevails in an oligopoly market. Unless rival firm change its price, firms do not change prices. A firm will change its price when its rivals change price, A firm will follow its rival only when rival reduces its price. Price rise is normally not followed by rivals. Because of price rigidity firms under oligopoly face a kinked demand curve.
8. **Close Competition:** A close competition exist in an oligopoly market because of less number of sellers. Each firm reacts to its rivals. Each firm try to know about the upcoming products of its competitors. Each firm tries to prove that its products are different and superior to the products of others. Each firm knows that any change in price and quality of products will be followed by the rivals.
9. **Barriers to Entry:** Oligopoly markets are characterized by some barriers to entry. It becomes difficult for a new firm to enter into the market because of natural barriers like, economies of scale and scope, cost advantage of old firms, patent rights, etc. In addition to these, firm created barriers can also prevent the new firms from entering into the market. Predatory pricing and excess capacity are some of the common strategies that the existing firms apply to put barriers for the new firms who desire to enter the market.

Questions for self practice:
1. What do you mean by oligopoly market? What are the main features of oligopoly?
2. How oligopoly market is different from perfectly competitive and monopolistically competitive markets?

Causes for the existence of oligopoly

Several factors contribute for the existence of oligopolistic firm. Factors responsible for the existence of oligopoly can be broadly divided into two categories. Some of these are 'natural', and some are 'firm-created'.

Natural Causes of oligopoly

(a) **Economies of Scale:** The existing big firms in an oligopoly market enjoy the benefit of division of labour due to their large share in the market. When firms produce in large scale, production process can be divided in many stages. Specialization plays an important role in such a situation. Division of labour has contributed significantly in modern economic growth. As Adam Smith observed long time back that it depends on the size of the market. The big firms have cost advantage over the small firms when they produce in large scale through division of labour. The average variable cost declines when a firm produces in large scale.

(b) **Fixed Cost:** The fixed costs are very high to establish a new firm in an oligopoly market. For a new firm, to design, develop and marketing involves a huge sunk cost (costs which are never recovered). High fixed costs push the total average cost upward if a firm produces in small numbers. The existing firms, those produce in large numbers, have a distinct pricing advantage over a new firm that have a very small share in the market. Huge fixed costs restrict the new firms from entering the market.

(c) **Economies of Scope:** Firms which produce various products in large scale enjoy economies of scope. A single firm produces multiple products under a single brand. For example, Hindustan Level Ltd. produces several bath soaps and cosmetic products in different names. Similarly Johnson and Johnson produces almost all items required for the small kids. It is the size of the firm, not the size of the plant or amount of a single product which help them to reduce or distribute the non-production cost among various products they produce. Finance and marketing costs are too high for a new firm in such a market where the existing firms have a cost advantage (through economies of scope).

Firm-created Causes of Oligopoly

Strategic behaviour is necessary for an oligopolitic firm to remain a profit making firm and to restrict others to enter into the market. Average size of the survivors rises when the number of firm decreases. Dominating firms in an oligopoly market may buy the small one's (acquisition) or can merge with them (mergers) to increase their market power and earn supernormal profit. These supernormal profits attract new entrants in the market unless the existing firms can create and sustain barriers entry. Apart from the natural factors, firms can restrict others by convincing the aspirants. The most common forms of entry deterring practices are predatory pricing and excess capacity.

Questions for self practice:

1. What factors are responsible for the existence of oligopoly?
2. Explain the natural causes of oligopoly. How the existing firms restrict the new firms to enter the market?

Price and Output determination under oligopoly

Unlike other market forms price and output under oligopoly is never fixed. Because of the interdependence of firms, uncertainty always exists in the market. It is not possible to determine the equilibrium price and output for an oligopolistic firm in such a situation. An oligopolist cannot assume that its competitors will not change their price and/or output if it changes. Price change by one firm will be followed by other competitors, which will change the demand. Therefore, demand curve for any firm is not fixed like other markets. Demand curve for a firm keeps changing as firms change ' their prices. Therefore, in the absence of a fixed demand (Average Revenue) curve, it is difficult to determine the equilibrium price and output. However, economists have developed some price-output models to explain the behaviour of oligopolistic firms. They are as follows:

I. Some economists ignore the interdependence among the firms when explain the oligopoly market. In such case the demand will be known and equilibrium price and output can be determined.

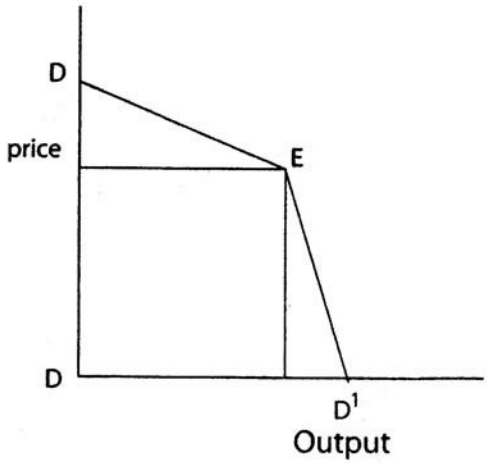


Fig. 10.1 Sweezy's kinked demand curve

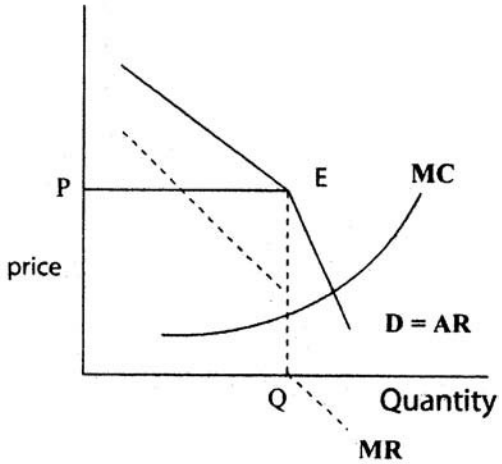


Fig. 10.2 Equilibrium through MR and MC Curves

II. Another approach is based on collusion. Oligopolists can form a group and maximize their joint output and profit. Best example of such collusion is Cartel (it is a situation when oligopolists make agreement to work together in the international market). One firm is chosen as a leader. The prices determined by the leader are followed by others in such a case.

III. Third approach assumes that an oligopolist predicts the reaction of its competitors. Problems regarding prices and output determination are solved by such assumptions. Various models based on different assumptions exist in this category. Few of them are: Chamberlin Model, Cournot's Model, and Sweezy Model etc.

Kinked Demand Curve Analysis

Price rigidity is an important feature of oligopoly market structure. Oligopolists do not change their prices frequently. Price rigidity can be explained with the help of kinked demand curve. Demand curve faced by an oligopolist will be kinked at the prevailing price. According to Sweezy an oligopolist will face a kinked demand curve if its rivals match a price cut but not price rise.

The demand curve $\boldsymbol{DED^1}$ shown in figure 1 above is kinked shaped. The upper portion of the curve, $\boldsymbol{DE}$ is relatively elastic shows that if a firm increases the price its rivals will not follow, then it may loose its sales and revenue. The lower portion of the demand curve $\boldsymbol{ED^1}$ is relatively inelastic which shows that price cut by a firm will be matched by its rivals and demand will not change significantly. Therefore, the best option for an oligopolist is to produce at the kinked point, which can be regarded as the equilibrium point for an oligopolist. The equilibrium shown in the above figure has been carried out in terms of demand or average revenue curve. So long as, oligopolists find the average revenue higher than the average cost of producing equilibrium output, they will make profit. Any reference to the marginal cost of a firm is not necessary in such an analysis. Even if we want to bring in the marginal revenue and marginal cost curves into the discussion, it will not affect the equilibrium of the firm. Equilibrium through marginal revenue and marginal cost curves are shown in the next figure.

Figure 2 above shows equilibrium of an oligopolistic firm through marginal revenue and marginal cost curves. Once kinked demand curve is known and given, oligopoly equilibrium automatically follows. The equilibrium point is E and it will be stable and rigid. Marginal cost curve cuts the marginal revenue curve at the broken portion of the marginal revenue curve. The equality between MR and MC is also fulfilled. Price and output can be determined subsequently. Firm's equilibrium is the same in figure 2 as in figure 1. Firm's equilibrium does not change even if we introduce the marginal revenue and marginal cost curve into it. The price level P and output Q will remain same after introduction of marginal revenue and marginal cost curves into the discussion.

However, the kinked demand curve solution has also come under some criticism. Sweezy's behavioral assumptions are doubted. Once the kinked position is known the rest of the analysis follows. However, how to determine the kink is not mentioned.

Questions for self practice:

1. Explain price rigidity through a kinked demand curve.
2. Explain the equilibrium through marginal cost and marginal revenue in an oligopoly market.

10.2 CO-OPERATIVE VS. NON-COOPERATIVE BEHAVIOUR AND DILEMMA OF OLIGOPOLISTIC FIRMS, GAME THEORETIC MODELS

Co-operative behaviour in oligopoly is a situation when firms jointly decide the prices and output and maximizes their joint profit. This situation is called collusion, in this situation it becomes profitable for one firm if it defects and cuts the prices and rises output, as long as other do not do so, Non-cooperative behaviour is a situation when they do not co-operate and decides their prices and output separately and compete with each other. When firms in oligopoly do not co-operate it is called non-cooperative equilibrium or Nash equilibrium (Named after US mathematician John Nash).

In ologopoly the basic dilemma the firms face is whether to co-operate or to compete. If they co-operate profit will be maximum and if they do not profit for all will decrease. Now we will see the behaviour of an oligopolistc firm through an example of game theory. Game theory is the study of decision making in situations where strategic interaction (moves and countermoves) between rival firms occurs. We will assume a case of only two firms in the market, called Duopoly. The case is as follow:

Figure 3. The Oligopolist's dilemma: to co-;operate or to compete.

Firm B's Output		One-half Monopoly output		Two-third Monopoly output	
Firm A's Output	One-half Monopoly output	20	20	15	22
	Two-third Monopoly output	22	15	17	17

The figure 3 above explains the dilemma faced by oligopolists of whether to co-operate or to compete. It is called Payoff Matrix for a two firm duopoly game. The right side figures on each cell shows the profits of firm A and left side figures on each cell show the profits of firm B (in Rs. Crores). It can be explained that if the two firms co-operate and produce one half of market share each will earn Rs. 20 crores of profit. In case of co-operation they can maximize their profits. If firm A defects and produces two thirds of output and firm B produces half of monopoly output then firm A will earn Rs. 22 crores and firm B Rs. 15 crores. Similarly if firm B defects and produces two-third and firm A produces one-half then firm B will earn Rs. 22 crores and firm A will earn only Rs. 15 crores. If both decide to compete and produce two-third of monopoly output each then profits for both will fall to Rs. 17 crores. This type of game, where they reach a non-cooperative solution when they could co-operate, is called Prisoner's Dilemma. Prisoner's Dilemma is shown below:

Figure 4. The Prisoner's Dilemma

		Mr. Ram			
		Confess		Not confess	
Mr. Shyam	Confess	6	6	0	9
	Not confess	9	0	1	1

Two prisoners Mr. Ram and Mr. Shyam are arrested for committing a crime and interrogated separately. They are told the following:

(a) If both are claimed to be innocent, they will get a light sentence that is 1 year in jail.
(b) If one confesses and the other does not, then who confesses will be released free and the other will be punished for 9 year in jail, and
(c) If both confess, then both of them will get a-punishment of 6 years in jail.

The payoff matrix presented in figure 4 shows the dilemma of the prisoners about whether to confess or not to confess. If none of them confess then both will get 1 year of jail, but if Ram confesses and Shyam does not then Ram will be left free and Shyam will get 9 year of imprisonment and the vise-versa. And if both of them confess then both will get 6 years of imprisonment. Not confessing is the

best solution in this game (Pareto efficient solution) but this leaves one always in uncertainty. This solution is not a stable solution as one gets an imprisonment of 9 years if he/she does not confess and the other does. Therefore, confession dominates in the mind of both the prisoners. If both of them confess then they end up with 6 years jail for both. This kind of equilibrium is called Nash equilibrium. From both the figures above it is clear that it they co-operate then they will earn the maximum profit than if they compete.

Questions for self practice:
1. Explain the prisoner's dilemma.

Types of co-operative behaviour

In order to avoid uncertainty arising out of interdependence and to avoid price war and cutthroat competition, firms under oligopoly often enter into some agreement about determining uniform price and output. The agreement can be of the following two types.

Explicit Collusion: It is situation when firms under oligopoly do formal (explicit) agreement to determine uniform price and output and maximize their joint profit. Such agreements at international level is called Cartel, many such agreements have taken place in the past. The best example of cartel in the past is that of OPEC - Oil Producing and Exporting Countries. Saudi Arabia and other countries after 1973 formed a cartel. An individual firm always has incentive to cheat. Possibility of cheating is larger if number of firms is large. Cheating by a small firm has negligible effect on the market price.

Tacit Co-operation: When firms co-operate without any explicit agreement is cal led tacit co-operation. For example in Figure 3 above, if firm A produces one-half of monopoly output hoping that firm B will do the same and firm B does so then they achieve the co-operative equilibrium without any formal agreement.

Types of competitive behaviour

In the absence of formal or informal agreements about co-operation firms under oligopoly compete with each other. Competitive behaviour under oligopoly can be of following types.

Competition for market share: Firms under oligopoly always compete with each other for market share. They use various forms of non-price competition such as advertising, quality products etc. to increase their market share. For example in Delhi major mobile service providers like Airtel, Hutch, and Idea compete for increase their mobile connections.

Covert Cheating: In oligopoly, because of huge market share, firms sale their products through contract. Large scale production and distribution is done through contracts. When firms provide secret discounts and rebates to their buyers to increase sales is called covert cheating.

Very long-run competition: Under oligopoly, firms often change the characteristics of their products. They keep innovating to improve the quality of their products and try to capture majority of market share. It can be possible only when a firm decides to compete for a long period. Firms sometimes cut their prices in the short-run to capture market share, it helps them to enjoy exclusive market power and profit in the long-run.

Questions for self practice:
1. Explain the various co-operative and competitive behaviours of oligopolistic firms.

10.3 LONG-RUN BEHAVIOUR, THE IMPORTANCE OF ENTRY BARRIERS

In the long run, when oligopolistic firms earn abnormal profits by increasing their prices over and above total average cost, new firms are attracted to this industry. In such a situation, entry barriers become important for the existing firms to sustain the abnormal profits. In the absence of natural oligopolists do create barriers to restrict the new firms.

Some of the firm-created barriers are as follows:

(a) **Brand Proliferation:** It is a situation when the existing firms under oligopoly produce multiple products with differentiated features and capture major share in the market due to their brand image. For example in the automobile industry all existing branded companies produce various models of cars with different features, It becomes difficult for a new firm to compete with the existing multi product branded firms. New firms entering the market with single product can fetch very share in the market. Through advertisement and innovative marketing strategies consumers are made so brand savvy that they do not want to buy non-branded (local) products. Branded products are considered superior than the non-branded products.

(b) **Set-up Costs:** Oligopolistic firms can restrict, entry of new firms by imposing high fixed cost. This becomes possible in an industry where sales are promoted by huge advertisement. Oligopolistic firms spend a huge amount on advertisement to shift the demand in their favour. New firms can not afford to spend such a huge amount in the beginning with a little share in the market. Chances of loss always keep the new firms away in such a situation.

(c) **Predatory Pricing:** It is a situation when the existing firms in oligopolistic market cut their prices below costs when they expect that new firms will enter the market. A new firm will not enter the market if it expects losses after entry. New firms are often discouraged by the existing firms through predatory pricing. This strategy may be costly since the existing firms need to cut the price below the average variable cost in the short run but it creates profit as well as good reputation in the long run for the existing firms.

Oligopoly and the functioning of the economy

Oligopoly is an important market feature in modem economies. Oligopoly has played an important role in modern economic growth. It is an emerging phenomenon in the developing economies in recent time. Many industries are operating through oligopoly market structure. The existence of economies of scale and economies of scope make impossible for perfect competition and monopolistic competition to survive. Too many firms cannot exist in such a situation. In the long-run oligopoly can be evaluated through the following three questions:

1. **The market mechanism under oligopoly**
   Under perfect competition, prices are determined by the forces of demand and supply whereas prices are administered by the firms under oligopoly. Despite this difference, Lipsey observes that, the market system reallocates resources in response to change in demand and costs roughly by the same way under oligopoly as under perfect competition.
2. **Profits under oligopoly**
   Oligopolists either co-operate or compete in the market. They can maximize their joint output and profit through co-operation, but one can always increase its individual profit by defecting. High profit in the long-run can always attract the new firms, unless natural and/ or firm created barriers exist to restrict entry of new firms in the market.
3. **Very long-run competition**
   To survive in the long-run, oligopolists keep on innovating to upgrade the quality of product and minimize their cost of production. Each firm spends significant amount on Research and Development to produce better quality' at minimum costs. Differentiated products with different character are available in oligopoly market. Consumers get more choice in the market. Consumers get quality products at competitive rates. Oligopoly market structure is more conducive to economic growth in the long-run.

Questions for self practice:

1. Explain the long-run behaviour of oligopolistic firms.
2. What is the importance of entry barriers for an oligopolitic firm in the Song-run?

Contestable Markets and Potential Entry

The theory of contestable markets explains that in the long-run, abnormal profits earned by oligopolists can be eliminated without actual entry. Potential entry can also affect the market.as much as an actual entry does. It is possible only when the following two conditions are fulfilled

1. **Entry must be easy to accomplish:** There should not exist any barriers to entry, either natural or firm created.
2. **The existing firms must consider potential entry while making price and output decisions:** The existing firms must react when new firms try to enter into the market. They must cut their prices and sacrifice profits (short run) to restrict the new entrants.

Contestable markets always expect potential entry because of huge profits earn by the existing firms in the market. But entry to such markets is too costly. Fixed costs are very high. To develop, design, and sale a new product in such a market involve huge sunk cost. Sunk costs are those costs which cannot be recovered if a firm leaves the market soon. Firms which produce multiple and differentiated products can easily distribute these costs among those many products. For new firms, producing huge number of differentiated products is not easy. Therefore, these costs are very high for a firm which produces single product in the market.

If a new firm can enter and leave the market without any sunk costs of entry, such markets are called perfectly contestable markets. A market can be perfectly contestable, even if, firms have to pay some costs of entry if these costs are recovered when firms leave the market. If the sunk costs are lower, the market will be more contestable and vise-versa.

Sunk costs of entry constitute entry barriers. Higher the sunk costs, larger will be profits earn by the existing firms. If the firms operate in the market without, large sunk costs of entry, then they will not earn large profits. As part of strategy, existing firms keep their prices as low as that can only cover the total costs. If they charge high prices and earn abnormal profits then the new firms will enter and may capture the profits and leave until it is vanished. Contestability forces the existing firms to keep the prices low. Potential entry works as good as actual entry in a contestable market to limit the profits of existing firms.

TOPIC 5

CONSUMER AND PRODUCER THEORY IN ACTION

LESSON 11

CHANGES IN SUPPLY IN A COMPETITIVE INDUSTRY

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The main aim of this lesson is to use the theory of competitive market behaviour to understand some important real world problems. In particular, we shall see how the economy responds in the short ran as well as in the long ran to shifts in supply that are brought about by changes in the cost structure of an industry.

Cost Changes

Costs for an industry can change for a variety of reasons.

1. A common reason for a change in costs for an industry is a change in the price of some input used by the industry. We can think of several recent examples: Wheat prices in India have gone up sharply since 2006. This has increased the costs for several industries. For instance, restaurants and hotels, manufactures of bread and biscuits etc. have seen their costs escalate in recent times as a result of the increase in wheat price. Another example is provided by the sharp increase in crude oil prices in the last few years. This has lead to an increase in costs for the petroleum products industry and consequently for the transportation industry. Another example that has been discussed a lot in the newspapers recently is the effect of a sharp hike in cement prices witnessed in India since 2006 on the costs for firms engaged in construction and infrastructure creation.
2. Technological changes might also lead to changes in costs. For example, technological advances over the last few decades have drastically reduced the costs of several industries. Computers and mobile phones are some of the examples that immediately come to mind, if one wants to see evidence of a dramatic reduction in costs over a very short span of time due to technological advancement. However, there are times when use of a different technology in order to reduce environmental damage might actually lead to an increase in costs. This might explain why some advanced industrial countries are so vehemently opposed to pollution control measures advocated by environmentalists.
3. Another common reason for a change in costs is a change in taxes paid by the firms in the industry. In India, every year industry watchers eagerly wait for the budget speech of the Finance Minister in the Lok Sabha to analyze the impact of changes in excise and customs duties on a wide variety of industries like iron and steel, cement, cars, petroleum products etc.
4. Acts of nature might also be an important source of costs changes for some industries. Winter fog in Delhi, for instance, increases the costs for aviation industry because it leads to delays in landing and take-off of aircrafts and sometimes might even result in cancellation of flights. Massive rains that lead to widespread flooding in Mumbai a few years ago resulted in an increase

in costs for the insurance industry. On the other hand, adequate rain in the months of July and August in states like Punjab and Haryana might lower the costs of paddy production for farmers since they might not be required to use diesel-run pump sets for irrigation.

Comparative Statics

In this lesson we use the comparative static technique. We start with a market that is in long run equilibrium. We then introduce a cost change that leads the market to a new equilibrium (that is a new state of rest or no change for the system when ail the adjustments to cost changes have taken place). We compare these two equilibrium stales to study the impact of cost changes. Comparative statics is to be contrasted with static analysis that looks at equilibrium in a market that does not receive any external shocks or disturbances (that is. a change in a variable fixed from outside). Both these methods are to be contrasted with dynamic analysis that looks at the path of evolution of the state of a system when it is not in equilibrium.

Long run response might be very different from what happens in the short run

We shall first see now the economy adjusts to changes in costs in the short run. In the long run, however, the response of a competitive industry can be very different. We analyze the long run response next. A large part of the difference in our analysis and conclusions between the short run and long run effects is explained by free entry and exit of firms in a competitive industry in the long run in response to abnormally high or low profits.

Freedom of entry and exit of firms is one of the most important characteristics of competitive markets. Most of the efficiency results of competition stem from this. Freedom of entry and exit of firms lies at the heart of adjustment process in a competitive market and we try to illustrate it in a wide variety of situations. At times our conclusions are quite different from the answers of those who have not received a formal training in economics. A little investment of time and energy on your part will, we hope, change the way you think about major issues of public concern.

Changes in Input Prices

To begin with, we illustrate the general impact of a change in input prices on a competitive industry by considering a specific example. We consider the impact of a reduction in the price of wheat flour on the bread industry. Suppose each loaf of bread requires a constant amount of wheat flour, say 200 gin per loaf of bread. If the price of wheat flour declines, say by 5 Rs. per kg, the marginal and the average cost curves of a typical bread factory decline by the same vertical amount (by one Rupee for all levels of bread output).

This is shown in Figure 11.1. Notice that there is a parallel vertical shift in the average and marginal cost curves in Panel B and the extent of vertical shift is the same. Assume all firms in the industry have the same cost curves. The industry supply curve is obtained by horizontally adding up each firm's MC curve that lies above the AVC.

We start from a position of long run equilibrium. In Panel A of Figure 11.1, initial industry equilibrium is at E_0 where the industry demand curve D and initial industry supply curve S_0 intersect. The initial market price is P_0 and the quantity demanded and supplied in the industry is Q_0.

The corresponding initial equilibrium for a typical firm in the industry is at e_0 in Panel B of Figure 11.1, where price = MC = AC. Each firm supplies q0, a quantity at which AC is minimized and every firm makes zero economic profit (that is, it earns normal profits) and hence there is no incentive for an existing firm to exit or for a new firm to enter the industry. Given our assumption about fixed input use per unit of output, a reduction in price of wheat flour leads to a downward parallel shift of one Rupee in MC and AC curves from MC_0 and $STAC_0$ to MC_1 and $STAG_1$ respectively. In general, shifts in AC and MC are not parallel. As a matter of fact, while a cost reduction will always lead to a downward

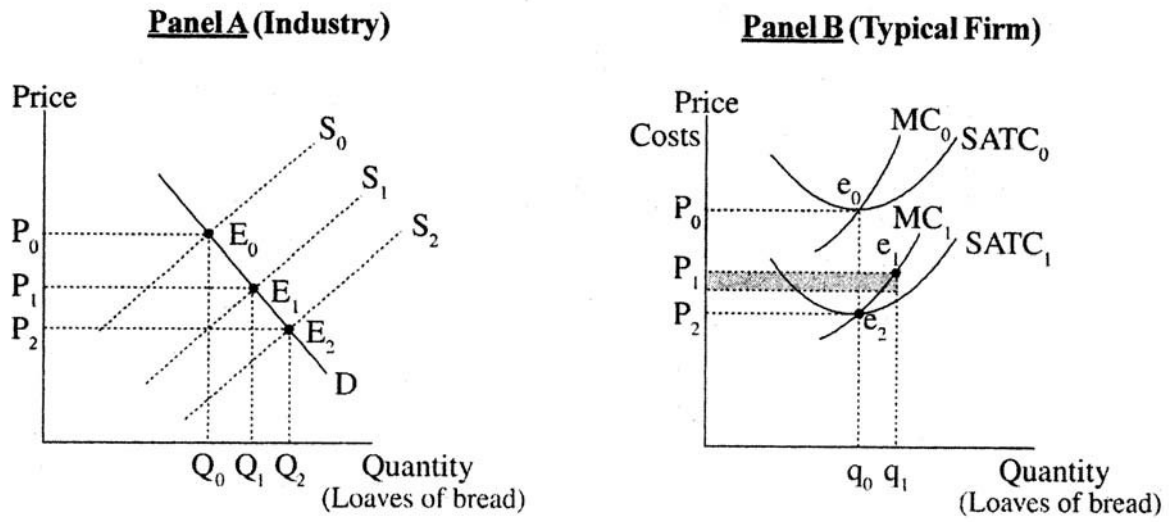


Diagram 11.1

shift in AC curve, though not necessarily a parallel one, the MC might not shift down at all. This might happen, for instance, if only fixed costs decline and variable costs remain the same.

Short run impact of a decline in input prices

Since each firm's MC has shifted down, the industry supply curve also shifts down to S_1, market price falls to P_1 and industry output rises to Q_1 in Panel A of Figure 1. Notice that the fall in market price is less than the one Rupee fall in costs given by P_0P_2, the vertical distance between S_0 and S_1 in Panel A of Figure 11.1.

In Panel B we see that when the market price is P_1 and the costs for each firm have declined (by more than the decline in market price). Each firm in the industry increases its optimal quantity supplied to q1 a level higher then the efficient one at which AC is minimum. Moreover each firm in the industry makes supernormal profits in the short run since price is greater than AC. The area of the shaded rectangle in Panel B of Figure 1 gives the magnitude of this profit.

Long run impact of a decline in input prices

In the long run, however, in a competitive industry these positive economic profits will attract new firms into the industry. As the number of firms in the industry rises, the short run industry supply curve shifts to the right, the market price falls and the industry output rises. This process continues till the short run industry supply curve has shifted to S_2 and the market price falls to P_3, equal to the new minimum AC. The industry output rises to Q_2.

Fall in market price from P_1 to P_2 implies that each firm in the industry is now producing output q0, the efficient level of output at which AC is minimum. Notice that q_0 is less than q_1, the output produced by an existing firm in the industry in the short run after a cost decline. The entry of new firms pushes down the market price and hence leads to disappearance of supernormal profits earned by the existing firms.

Long run Supply Curve of the Industry

An alternative way of analyzing the long run impact is to look at how the long run industry supply curve shifts. With free entry and exit of firms and with identical cost curves for all the firms, the long run industry supply curve is a horizontal straight line whose vertical intercept is equal to the lowest AC for a typical firm. This is shown in Pane! A of Figure 11.2 The long am industry supply curve shifts from S to S*. The market price drops from P to P*, the full extent of drop in costs, and industry output rises from Q to Q*.

In Panel B Figure 11.2, we see that each firm continues to produce output q, the efficient output level, when market price and costs decline. Moreover, each firm continues to make zero economic profits in the long run.

In the long run, under perfect competition, the price declines by the full extent of the decline in the lowest AC. The output is higher and the price is lower. The firms are still making zero economic profits. All the benefits of lower input prices are passed on to consumers.

Questions for Review

1. We discussed above the case of a reduction in input prices. Discuss the opposite case of an increase in input prices. Carefully describe the short run and long run impact on the industry as well as on a typical firm in the industry.

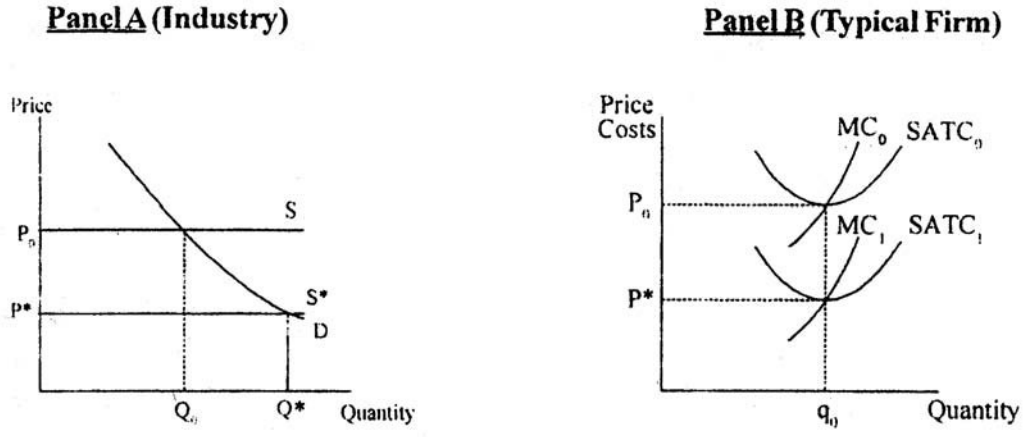


Diagram 11.2

2. We discussed a special case of cost change above where both MC and AC curves shifted down by the same vertical distance. We remarked that this need not always happen. Discuss the short run and long run impact of a decline in fixed costs on the industry as well as on a typical firm in the industry.
   (**Hint:** The MC curve for a firm will not shift at all.)
   (a) What happens to price and quantity in the short run?
   (b) What happens to profits of the firms in the industry in the short run?
   (c) Are there any incentives for entry of new firms in the industry?
   (d) What is the new long run equilibrium?

LESSON 12

CHANGES IN TECHNOLOGY IN A COMPETITIVE INDUSTRY

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In this lesson we try to learn how a change in the technology for the production of a good affects its market. Preferences and technology are the basic building blocks from which demand-and supply curves are derived. In economics we normally take technology and preferences as exogenous (that is, we regard them as given from outside). Changes in technology, however, have important economic implications. In this lesson we study the impact of exogenous changes in technology within the framework of competitive markets.

Changes in Technology

We shall first see how the economy responds in the short run as well as in the long ran to shifts in supply that are brought about by technological changes in an industry.

We noted in the previous lesson that technological changes are frequently major sources of changes in costs in the real world. In this lesson we analyze the short run and long term impact of two kinds of technological changes.

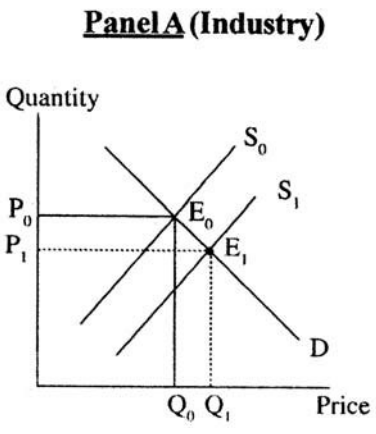
1. A oncc-for-all-change in technology
2. A continuous process of technological change

A once-for-all-change in technology

Assume that the industry starts from a situation where there has been no change in technology for a long time and all firms have the same cost curves. Further, suppose that the industry is initially in a state of long run equilibrium.

This is shown in Figure 12.1. We start from a position of long run equilibrium. In Panel A of Figure 1, initial industry equilibrium is at E_0 where the industry demand curve D and initial industry supply curve S_0 intersect. The initial market price is P_0 and the quantity demanded and supplied in the industry is Q_0.

The initial equilibrium for a typical firm in the industry is at e_0 in Panel B Figure 12.1, where price = MC = ATC. Each firm supplies q_0, a quantity at which ATC is minimized and every firm makes zero economic profit (that is. it earns normal profits) and hence there is no incentive for an existing firm to exit or for a new firm to enter the industry. Notice that P is greater than AVC, hence the firm is



making positive operating profits (the difference between total revenue and total variable costs) that just cover its fixed costs.

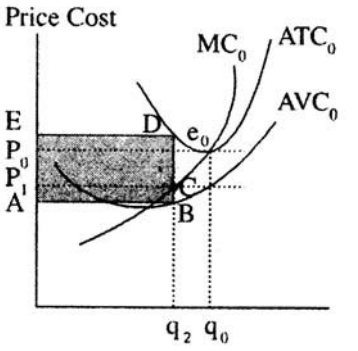
Now suppose that a single advance in the industry's production technology takes place that lowers the costs of production for newly built plants. We assume that existing plants can't take advantage of this technological advance since the new technology has to be embedded in new plant and equipment. In the very short run there will be no change in the industry since it takes time to build new plant and equipment.

In the medium run, since new technology lowers the average total cost curve to ATC_1 and the original price P0 was equal to the average total cost for the existing plants; new plants are profitable and will be built soon. With this capacity expansion, the industry' supply curve shifts to the right to S_1, market price falls to P_1 and industry output rises to Q_1 in Panel A of Figure 12.1. Notice that capacity expansion and fall in market price continues till price has fallen to the lowest AC for the new plants and further entry is not profitable,

At price P_1, the new plants are operating at the most efficient scale where they are producing an output at which AC is minimized. Firms with new plants are making zero economic profits since their operating costs just cover their fixed costs. This is shown in Panel C of Figure 12.1.

Firms with old plants, however, will not be covering their total costs. If the costs for the new plants are sufficiently lower than that of the old plants, the new market price PI will be lower than minimum AVC of old plants. Old plants will be shut down immediately and all surviving firms will use the new technology.

Panel B (Typical Firm) with old Plant



Panel C (Typical Firm) with new Plant

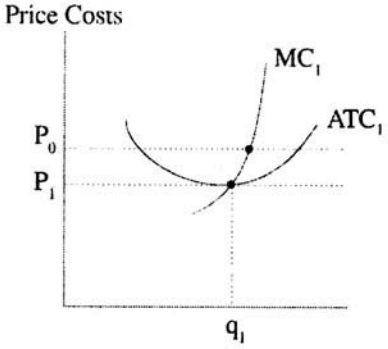


Diagram 12.1

A more interesting case, however, is where the new market price P_1 is higher than minimum AVC of old plants. This is shown in Panel B of Figure 12.1. At price P_1 firms with old plant produce output q_2, a level of output at which price = MC and since price is less than ATC, each Urn; with an old plant makes a loss given by the area of rectangle P_1CDE. It is, however, optimal to produce output q2 since price is higher than AVC and the firm is making an operating profit given by the area of the rectangle ABC P1. Had the firm shut down its loss would have been higher. Its revenue would have been zero, it would still have to incur the fixed cost of production (given by the area of the rectangle ABDE) and losses would have been greater since the firm would not have been able to use its operating profits to at least partially offset its fixed costs.

Old plants will continue to coexist with new ones and firms with old plants will be making losses. A non-economist might think that operating loss-making old plants is inefficient and it would be advantageous to discard them. He could not be more wrong! *As long as old plants recover their variable costs, it is optimal to operate them. Fixed costs are sunk; they can't be avoided by shutting down old plants.* One of the first lessons in economics is to ignore sunk costs. Let us try to understand this by looking at an example from everyday life. If you go to a restaurant and happen to order a lousy meal, don't force it down your throat just because the price you paid is very high. You have to pay the price whether you finish the meal or not. It is a sunk cost. The decision whether to eat all of what you ordered or to leave it in the plate depends not on the size of the bill (you have to pay that in either case), but on whether not eating (or eating something else or somewhere else and paying something additional for it) makes you happier than eating what is in front of you. Let *bygones be bygones.*

With the passage of time, however, old plants will wear out. They will now be replaced by plants

using new technology. At the time of replacement, the cost of plant is not sunk. Profit maximizing firms will choose plants with lower costs. Plants with old (higher-cost) technology will gradually disappear. In the long run a new equilibrium will be attained in which all plants use the new technology. As shown in Panel A of Figure 12.1, output will be Q_1, higher than output Q_0 in the original equilibrium. Price will be P_1 lower than P_0 in the original equilibrium. The new plants will be operating at an efficient scale and will be just covering their costs.

All the benefits of lower costs due to technological advancement will be passed on to the consumers in the long run.

Ongoing technological change

We can generalize the analysis of the previous section to consider the outcome in a competitive industry where there is a continuous technological change. Plants built today have lower costs than plants that were built in the past. However, costs are expected to be even lower for plants that might be built at a future date.

It is clear from the analysis of previous section that ongoing technological progress will lead to a continuous process of entry of newer lower cost firms. The market price will continually decline. However, older plants will not necessarily be shut down as soon as plants with better and lower cost technology make an appearance. Owners of old plants will continue to operate them as long as they cover their variable costs.

This situation is described in Figure 12.2. The Plant shown in Panel A of Figure 12.2 is the oldest plant that is on the margin of shutdown. It is making a loss since market price is lower than its average total cost. The plant is just covering its AVC and is indifferent between shutting down and continuing to produce output q_1. If the price drops any further, the plant will be shut down.

The plant shown in Panel B is using an intermediate technology. It is also making a loss, but it is covering at least some pan of its fixed costs (shown by the shaded area) in addition to covering all its variable costs by producing its optimal level of output q_2.

The plant shown in Panel C is the one that uses the newest technology and has the lowest costs. It not only covers its fixed costs (notice that price is higher than its AVC), but it also makes a profit (price is higher than its ATC) for the time being by producing its profit maximizing output, q_3. Since the potential entrant firms know that technological progress is continuous, they will enter the industry only if they make positive profits at the lime of entry that will compensate them for the losses they expect to make in the future when newer firms with lower cost technology will enter the industry and push down the price.

The point made above about the link between modernization and economic efficiency needs to be emphasized. Older plants have higher costs and firms using them might be making losses. At the same lime there are firms in the industry that operate newer plants and have lower costs. These firms are making profits. Is this compelling evidence of economic inefficiency on the part of firms using the old plants? Is it true that firms using older loss-making plants should discard

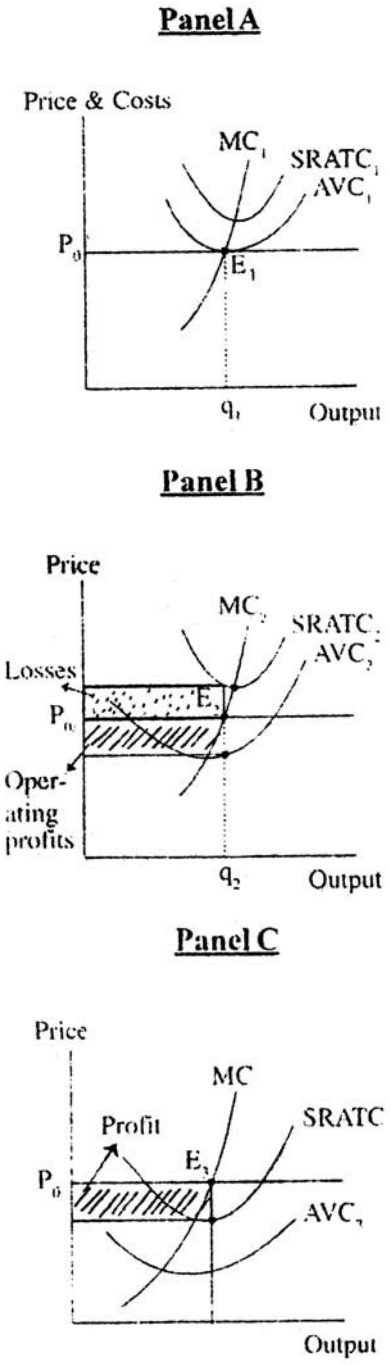


Diagram 12.2

them immediately and modernize their plant and equipment? Is doing so profitable for these firms? Is it welfare enhancing for the society? It should be clear from our analysis above that the answer to all these questions is not necessarily in the affirmative. It is efficient to use older loss making plants as long as they cover their variable costs. They produce goods that are valued more by the consumers than the resources currently used up by operating the old plants (their variable costs). It is in the interest of the firms with old plants and also in the social interest to continue to use these old plants as long as the variable costs are covered.

Another point to be noted is that market price paid by consumers is determined not by the average costs of (he old inefficient plants, but by the costs of the firms with the newest and the most efficient plants. Entry of firms with the most efficient technology into the industry will continue and supply will keep on increasing till the price has dropped to a level where latest entrants can barely cover the opportunity cost of their capital over the expected lifetime of their plants. It implies that new entrants today must earn positive economic profits for some time to offset the losses that they expect to earn later when firm's with even more efficient technology enter the industry and push down the market prices to a level lower than the ATC of these current entrants. *The full benefit of new technology are passed on to the consumers as soon as begins to get used by the new entrants even though a vast majority of firms in the industry might still be using old technology. The price paid by the consumers depends only on the costs of the most efficient firms*. As Paul Samuelson once said, it is the tail that wags the dog in economics. Owners of older firms have to sell their goods at the same lower price that is charged by the new firms. Their operating-profits keep on declining as entry of lower cost firms keeps on driving down the market price. These firms will ultimately quit the industry when they can't even cover their variable costs.

This brings us to the final point that we want to make in this lesson. The concept of economic obsolescence is different from that of physical wear and tear. We emphasized above that old machinery should not necessarily he discarded just because firms using it have higher costs and might even be making losses since market price depends on the costs of the most efficient firms. Just as one should not be overenthusiastic about discarding old machinery, one should not continue to use an old machine because it is still functional. When the price drops below average variable costs the machine is economically obsolete even though it may not be physically worn out. *Old capital equipment is obsolete and should not be operated if by using it the firm can't even cover the variable costs*. This might happen well before the equipment is physically worn out. The concept of economic efficiency should be understood both by those who have a fetish for new technology and want to discard old equipment as soon as they see something more; modern and also by those who would never discard old equipment, as long as it works.

Questions for Review

1. In what sense are the benefits of technological progress passed on to the consumer in a competitive industry? Would your answer change if entry to the industry were restricted?
2. How would your answer to the first question be modified, if the new technology is patented and only one firm can use it?
3. In reality firms have to spend money on research and development to generate technological progress. Use your answer to questions 1 and 2 to present an economic case for patents.

LESSON 13

EFFECTS OF TAXATION ON COMPETITIVE INDUSTRY

There are various kinds of taxes that the government imposes which ultimately affect the costs of firms and industry. We will consider three different types of taxes-per-unit tax, lumpsum tax and profit tax.

(1) Per-unit tax: It is a tax that is levied on each unit produced by the firm. In a way it can be said to be another cost to the firm. As a result of per unit tax (say sales tax) the marginal cost of the firm shifts up by the amount of the tax. At the industry level the supply curve shifts up by the amount of the tax. Accordingly the effects of a per-unit tax on output of a competitive industry can be listed as follows:

(i) In the short run the price of the output will rise but by less than the amount of the tax. So the tax burden will be shared by consumers and producers. The consumers pay higher price than before and producers do not cover their average total costs.

(ii) In the long run, some firms who don't cover their costs may leave the Industry. The industry will contract and losses will disappear. If the cost curves of existing firms remain unaffected due to contraction of the industry then price will rise by full amount of the tax. In such a case the burden of the tax will be totally on the consumers. This also implies that government intervention in the competitive industry may affect its size, volume of sales and price in the short run but it cannot influence its long-run profitability effects of per-unit tax is shown in the diagram below.

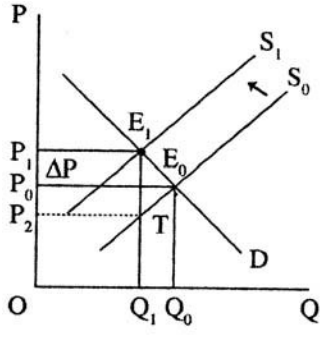


Diagram 13.1

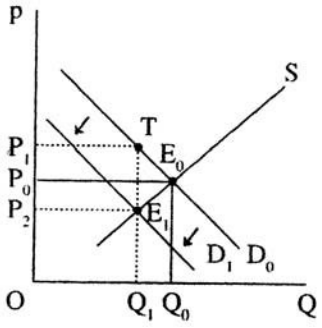


Diagram 13.2

Diagram 13.1 shows effect of per-unit tax on price and quantity by shifting the supply curve upwards. The original equilibrium point is E_0 with price P_0 and quantity Q_0. Due a per-unit tax supply shifts from S_0 to S, so that new equilibrium is now at point E_1. Tax equals S_0S_1 or E_1T or P_1P_2. Price increases to P_1 Since increase in price is P_0P_1 which in less than the tax E_1T, the tax burden is shared by consumers and producers in the short run. After tax quantity has also fallen to Q_0.

In **Diagram 13.2** the effect of per-unit tax is shown by shifting the demand curve down by the amount of tax. It shows that after tax producer gets price P_2 after tax which is less than the market price P_1.

(2) **Lump-sum tax:** Lump sum tax is a kind of fixed cost of the firm and increases the total cost of the firm and industry. The marginal costs and marginal revenues remain unaffected. The average cost curve shift up due to tax at the existing level of output. Lumpsum tax reduces the revenue. As long as the firm is able to recover its variable costs it will remain in business otherwise it will shut down in the short run lumpsum tax does not affect price and output in the short run. However, in the long run some firms, who do not cover their increasing costs leave the industry and the size of the industry will fall. Price will rise and output will fall until the whole of tax burden is passed on to the consumers.

(3) **Tax on profits:** From the economists point of view the firm in perfect competition earns normal profit or zero economic profit in the long run. So on this basis a tax on profits will neither affect price nor output of a competitive industry in equilibrium. So it will also not affect allocation of resources.

However, in reality profits are defined in tax laws according to accountants usage which includes returns to capital, reward for risk-taking and could be taxed.

LESSON 14

OPEC—A CASE STUDY OF A CARTEL

OPEC stands for Organization of Petroleum Exporting Countries.

Cartel means association of many firms in an industry who agree to cooperate with one another and behave as if they were all a single seller or monopoly with an objective to maximize joint profits by setting price and limiting output and eliminating competition among themselves.

We know that firms under perfect competition take the market price as given and equate it with their marginal cost to determine output with free entry and exit in the long-run they earn zero economic profit. But i f they agree to restrict output by forming a cartel then they can earn maximum profits. Further it may still pay for each firm to increase its own profit by cheating while every one else co-operate. Yet cartel objective will fail if all cheat.

In this context OPEC provides an example of the cartilization of petroleum industry consisting jf a large number of competitive firms which are price takers. Since many similar firms are not part of OPEC, it has created an oligopoly rather than a monopoly. So its behaviour combines both the problems of oligopolies industries as v/ell as general functioning of price system in competitive industries.

The OPEC story can be described in the following way—

(a) Success of OPEC – In 1973 the cartel members in OPEC agreed to restrict output by negotiating quotas. They were accounting for 70 percent of world supply of crude oil and 8" percent or oil exports of the world output restriction pushed the oil price is four times than the previous level. The higher price was maintained because combined with OPEC's control in larger part of supply, the other countries producing oil could not increase their output quickly and the world demand for oil was too inelastic in the short-run.

As a result of higher prices, OPEC countries started enjoying vast wealth which they could spend on arms and economic development. Tempted to earn even more @ OPEC engineered another price rise in 1980s. This way price of a barrel increased from $3 to nearly $12 in 1973 to $30 in the 80s Diagram 14 illustrates the success of OPEC.

In the diagram S_1 represents supply of non-OPEC countries P_0 is the world price of oil and S_3 is the world supply of oil. The production of non-OPEC countries at P_0 price is Q_0. Given the world demand curve D the total oil demand is Q_1 at price P_0 Hence the production of OPEC countries is Q_0Q_1. By restricting output OPEC shifted the world supply curve to S_2 from S_3. The price of oil increased to P_1 at which non-OPEC countries supply Q_2 and OPEC countries supply Q_2Q_3 given inelastic demand, increase in price increased OPEC revenue even though quantity fell.

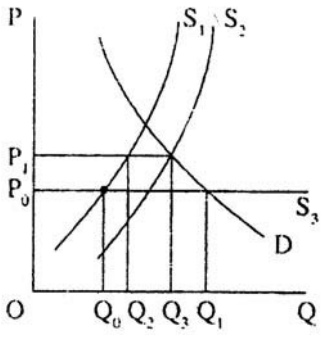


Diagram 14.1

Long Run Effect of OPEC Action:

(i) OPEC action of restricting its output caused increase in supply of oil by non-OPEC countries because of increase in price. This caused shift in supply curve of these countries to the right.

The share of OPEC declined. By 1985 it reduced to 30 percent. The price fell and in order to maintain price OPEC had to further reduce its output.

(ii) Secondly the long run demand curve becomes more elastic as compared to the short-run demand curve in above diagram. This is because people have to spend their money more on insulation of oil heated buildings, economical diesel engines etc. In the very long run more money was diverted for research to develop more petroleum efficient and alternative technologies such as solar technology etc. All these resulted in fall of OPEC exports. Production limitations continued to maintain the price at high level.

(iii) Because of heavy reduction in output to maintain price OPEC started experiencing fall in income. Disturbed by this development members started violating their quotas and had to meet frequently to settle things. Ultimately OPEC had to eliminate quotas by 1985. The price fluctuated before settling clown in the 1990s.

OPEC experience tells that:

(i) It is highly profitable for competitive firms to form a cartel and behave like monopoly in the short run by restricting output given inelastic demand curve.

(ii) In the long-run however, it becomes increasingly difficult to retain the monopoly power and firms have to choose between short run and lone run profits

(iii) Also in the long run it is not possible to continue output restrictions due to loss in revenues and threat of breaking down of cartel.

LESSON 15

ALTERNATIVE TO PROFIT MAXIMIZATION

(1) **Principal-Agent theory:** Neo classical theory of the firm focuses on profit maximization as the single most goal of the firm. It does not distinguish between ownership and management and ignores uncertainty. However modern economic thinking separates ownership from management which is a reality in corporate culture. Ownership of many firms is diversified among thousands of shareholders. The day to day functioning, taking business decisions are taken by well-qualified managers. In such a situation profit maximization hardly becomes the sole objective and rather a new dimension emerges which is called **Principal-Agent problem**.

The Shareholders who are owners of the business firm are termed as Principal and the managers who are hired to run the firm are called agents. It is expected that the agents (managers) must work in the interest of the principal (Shareholders owners). The managers have the expertise and adequate information which the owners do not have. While the shareholders can observe profits, they cannot directly observe or evaluate managers' efforts. To do this owners must monitor the managers which involves high cost.

On the other hand managers also wish to pursue their own goal due to self interest without ignoring profit maximization because they will not like to loose job due to bad performance. To what extent the managers will pursue their goal depends on degree of competitiveness in the industry and possibility of takeover by a manager with other profit making organisation. So managers always try to maximize "something" other than profits. So that actual profits are less than what it could have been in a situation where principal (owner) and agents (managers) are same.

This "something" other than profit could be **"Sales"**. Managers need to make some minimum level of profits to keep the owners satisfied and beyond that they pursue the goal of sales maximization because their salary, power and prestige all rise with both profits and sales revenue. According to sales maximization hypothesis the managers (agents) maximize the sales revenue given a level of profit. To achieve this managers sacrifice some profits by setting a price below and output above the profit maximizing level. See diagram 15 below.

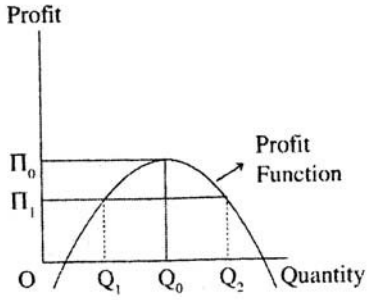


Diagram 15.1

Given the profit function in the diagram above Π_0 is the maximum profit and Q_0 is the profit maximizing output. When manages try to maximize sales then profit level is reduced to accept level Π_1 and sales increased to Q_2.

(2) **Non-maximizing Theories:** Another class of theories who also criticise profit maximization principle believe that firms do not maximize anything. Because of lack of knowledge or simply because of lack of interest in acquiring more knowledge, firms will not respond always quickly and accurately to minor changes in market signals from both private sector and government policy. They may prefer not to change their behavior inspite of profit incentives. We will consider three different theories which explain the non-maximizing behavior of the firm. They are (i) full cost pricing theory (ii) satisfying theory and (iii) evolutionary theories.

(i) **Full cost pricing:** Based on empirical findings in 1930s, full cost pricing theory says that firms set price equal to average cost at normal capacity output plus a conventional mark-up instead of equating its marginal cost with marginal revenue. Price will change if average cost change. In the short run it was observed that firms change their output, not price, in response to fluctuations in demand which is not profit maximizing behavior. However, critiques of this theory say that because of presence of mark-up factor full-cost-pricing is consistent with profit maximizing principle.

(ii) **Satisfying theory:** The propounders of satisfying theory hold that firms operate in under uncertainty. In the long-run their success or failure depends on their ability to adopt innovation and change. Because of existence of risk firms normally tend to be risk averse and do not change their behavior until and unless profits are down alarmingly. In general firm is said to be satisfying provided that a satisfactory, rather than optimal, level of performance is currently achieved. Herbert Simon who first forwarded this view about firm behavior was awarded 1978 Nobel prize in economics. According to the satisfying hypothesis firm produce arrange of possible outputs that also includes the profit maximizing output. In the above diagram this range of output is Q_1Q_2 for profit P_1.

(iii) **Evolutionary Theories:** American economists Nelson and Winter are the main propounders of evolutionary theories which make some key analogies with the theory of biological evolution. Take the example of gene in biology. The way behavioral patterns are transmitted overtime by genes, rules of behavior fulfill the same function in the evolutionary theory of the firm. Finns normally follow routine pattern in decision making and remember the past action in repeating them in present and future on mostly established areas of operation.

Secondly, as in biological involution mutations are vehicles of change, in evolutionary theory' innovations' perform the same function. Besides product innovation and innovation in production technique, evolutionary theory talks about introduction of new rules of behavior as an important class of innovations. A firm is more of a satisfier and innovates when they face some kind of trouble rather than motivated by profits above satisfactory level.

Notes

Notes

B.Com./B.A. (Programme) I Year Economics

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TOPIC 6

INCOME DISTRIBUTION AND FACTOR PRICING

LESSON 16

DEMAND AND SUPPLY OF FACTORS

Introduction

The total output of an economy is the result of the joint productive efforts of the various factors of production; land, labour, capital and enterprise. This total output ultimately gets distributed among the factors that contributed to its production in the form of wages, rent, interest and profit. The purpose of the theory of distribution is to explain the principles that govern this distribution. The distribution of total product depends on how the various factors are priced in the market. *Thus, pricing of the various factors of production is the subject matter of the theory of distribution.*

There are two aspects of the factorial distribution of national income; (i) determination of the per unit prices of the different factors and (ii) the division of the national income as between the different factors, i.e., absolute and relative shares of different factors in national income. The first question is essentially a micro-economic problem concerning the determination of equilibrium at the level of an individual firm or an industry. The second question concerns the factorial distribution of income at the level of the economy and, therefore, forms part of macro analysis. Thus, we have micro and macro theories of distribution. In the present set of lessons we are concerned only with the micro theories of distribution i.e., the question of factor-price determination.

Just as the price of any commodity is determined by the interaction of the forces of supply and demand, similarly the price of a factor is determined by the interaction of the forces of supply and demand for it. The theory of distribution is, thus, a special case of the theory of price determination discussed in the earlier set of lessons. However, the supply and demand for factors exhibit some peculiarities which have to be taken into account while considering the pricing of particular factors. Herein lies the justification for a separate theory of factor price determination. Let us first examine the demand for and supply of factors in some detail.

16.1 THE DEMAND FOR FACTORS

1. The Nature of the Demand for a Factor

Why does a producer demand a factor? The demand for a factor is derived (or indirect) and not direct demand. The demand for a commodity is direct in the sense that it directly satisfies some human want, The demand for a factor, on the other hand, is not direct in this sense. A factor is demanded not for its own sake, but simply because it can contribute to the production of some commodity demanded by the consumers. For example, a farmer pays rent for the use of land simply because it helps to produce, let us say, wheat which is demanded by the consumers. Similarly, he pays for seeds and fertilizers because they help to produce commodities, which are demanded by the consumers..

When a producer employs an additional unit of a factor it yields him some extra output. While demanding a factor, the producer is not so much interested in the extra output that it yields him as

in the amount of the extra revenue he will get from the sale of that output. In other words, he demands a factor simply because it ultimately contributes to his revenue. Hence the price a producer will be willing to pay for a factor unit will depend upon the addition to his total revenue which results from the employment of an additional unit of that factor. The additional revenue yielded due to the employment of an additional unit of a factor is called the marginal revenue product (MRP). For example, suppose that by employing 10 labourers on a given plot of land a farmer gets 100 quintals of wheat which sell for Rs. 20,000 in the market and by employing 11 labourers instead of 10 he is able to raise 110 quintals of wheat which sell for Rs. 22,000. It is evident that due to the employment of an additional labourer total revenue of the producer rises from Rs. 20,000 to Rs. 22,000. Rs. 2000 is, thus, the MRP of the 11th unit of labour. *While demanding a factor the producer has his eyes set on this quantity. It is in this sense that the demand for factors is derived out of the demand for the commodities that they help to produce.*

2. Different Concepts of Marginal Product

There are three different senses in which the concept of marginal product (MP) is used. Firstly, it may be used to express the addition made to the total physical product of a producer due to the employment of an additional unit of a factor, the amounts of all other factors remaining constant We call this additional physical product as the marginal physical product (MPP). For example, if by employing 11 labourers on a given piece of land instead of 10, the total wheat output of a farmer increases from 200 quintals of rice to 220 quintals, then the MPP of the 11th unit of labour will be said to be 20 quintals. *Thus, the MPP of a factor is the addition made to the total physical output of a producer due to the employment of an additional unit of a factor while keeping the amounts of all other factors constant.*

Secondly, the concept of MP may be used in value productivity sense. *The addition to the total revenue of a producer made by the employment of an additional unit of a factor, with amounts of all other factors remaining constant, is called the marginal revenue product (MRP) of the variable factor in question.* According to this above example, the total physical product of the producer increases from 200 quintals to 220 quintals when he employs 11 labourers instead of 10 on the same plot of land. Now if the total revenue of the producer increases from Rs. 40,000 to Rs. 42,000 when he sells 220 quintals instead of 200, the MRP of the 11th labourer will be said to be Rs. 2,000.

It is evident that the MRP of a factor depends upon two things: (a) the additional units of output produced and (b) the contribution of each unit of output to the total revenue of the producer. The additional output produced by the employment of an additional unit of a factor is called the MPP and the contribution of an additional unit of output to the total revenue of a producer is called the marginal revenue (MR). Thus:

$$\text{MRP} = \text{MPP} \times \text{MR}$$

Thirdly, the concept of marginal product may also be used to denote the market value of the MPP of a factor. For instance, the MPP of the 11^{th} labourer according to the above example is 20 quintals of wheat. Now if the ruling market price of wheat, when the larger output is sold (220 quintals instead of 200 quintals) is Rs. 200 per quintal, the market value of the additional output will equal Rs. 4,000, Rs. 4000 then will be said to be the value of marginal product (VMP) of the 11th labourer. *VMP is simply the MPP multiplied by the market price of the commodity*. As already explained in the context of the theory of firm, market price and average revenue (AR) are one and the same thing. Thus:

$$\text{VMP} = \text{MPP} \times \text{AR}$$

3. Relation between MRP and VMP

MRP equals MPP × MR while VMP equals MPP × AR MPP is common to both concepts. MPP, as discussed in detail in Set VI of this paper, depends solely on the technical conditions of production

while MR and AR depend upon the structure of commodity market where the firm sells its output. If the firm sells its output on a perfectly competitive commodity market, it will be faced with a perfectly elastic demand curve and its AR and MR will then be identical. *Thus in the event of perfect competition in the commodity market the MRP (=MPP × MR) and VMP (=MPP × AR) of a factor to a firm will be the same because AR and MR are identical*. But if the firm is faced with an imperfectly competitive commodity market, then MRP and VMP will not be the same. In the event of imperfect competition in the commodity market, as we have already studied, MR will necessarily be less than AR. *From this it follows that in the event of imperfect competition in the commodity market, MRP (which equals MPP × MR) will necessarily be less than VMP (which equals MPP × AR) because MR is less than AR*. Thus, in conclusion we note that in case of perfect competition in the commodity market MRP equals VMP and in case of imperfect competition MRP will necessarily be less than VMP. Thus:

MRP (=MPP × MR) VMP (=MPP × AR) in case of perfect competition in commodity market.

MRP (=MPP × MR) < VMP (=MPP × AR) in case of imperfect competition in the commodity market.

We clarify the point further with a simple example. Suppose the total physical product of a fanner per year increases from 200 quintals to 220 quintals of rice when he employs 21 labourers instead of 20, on a given piece of land. The MPP of the 21st labourer, according to this example, would be 20 quintals. Further suppose that the farmer sells his output on a perfectly competitive commodity market so that the price of rice remains constant at Rs. 100 per quintal even when he sells the larger output. MRP of the 21st labourer in this case would equal the change in the total revenue of the producer due to the sale of the larger output i.e., 220 × 100-200 × 100 = 22000–20000 = Rs. 2000. VMP (MPP × AR) in this case would also equal Rs. 2000 (=20 × 100 = 2000). Now suppose the fanner is faced with an imperfect commodity market so that he is able to sell the larger output at Rs. 98 per quintal and not at Rs. 100 per quintal. In this case MRP of the 21st labourer would equal 220 × 98 – 200 × 100 = 21560 – 20000 = Rs. 1560. And VMP would equal MPP (=20) × AR (=Rs. 98) = Rs. 1960. Why is MRP in this case smaller than VMP? The reason is very simple. When the price falls from Rs. 100 to Rs. 98, this reduction in price applies not only to the extra output but also to the earlier output (i.e., 200 quintals) which was earlier sold at Rs. 100 instead of Rs. 98. Thus, while the producer gets additional revenue from the sale of the extra output (=20 quintals) at the current market price equal to Rs. 1960, at the same time he suffers a loss in his earlier total revenue equal to the fall in price (i.e., Rs. 2) multiplied by the earlier total output (i.e., 200 quintals) i.e., output but also to the earlier output (i.e., 200 quintals) i.e., Rs. 400. The MRP (or the net addition to the earlier total revenue of the producer) would thus equal Rs. 1960 – Rs 400 = Rs. 1560. *Thus as a general rule we note that in the event of imperfect competition in the commodity market MRP will be less than VMP by the amount of loss of revenue suffered by the producer on his earlier output due to the fall in price*. In the present case when, in order to sell the larger output (220 quintals instead of 200. quintals), price falls from Rs. 100 to Rs. 98, he is compelled to sell the earlier output (200 quintals) also at Rs. 98 per quintal and thus suffers a loss of revenue of Rs. 400/-. Therefore, MRP of 21st unit will be less than its VMP by Rs. 400.

The Shape of the MRP Curve

The demand for a factor is derived from its MRP. MRP, as we have seen above depends upon MPP and MR. The behaviour of MRP will thus depend upon the behaviours of its components with changes in the quantity of the variable factor employed. Under a given set of conditions the behaviour of MPP is determined by the operation of the law of diminishing returns (or the law of variable proportions). The law states that as more units of a variable factor are used with a given amount of other factors, after a point its MPP starts diminishing, provided there is no change in the state of technology. We can explain this law with a simple numerical example. Imagine a farmer employing more and more

labourers on a given plot of land. The table below records total, average and marginal products as the farmer employs more and more labourers on the given plot of land and other equipment etc.

TABLE 16.1

No. of workers	*Total Product*	*Average Product*	*Marginal Product (In physical units)*
1	15	15	15
2	36	18	21
3	60	20	24
4	92	23	32
5	120	24	28
6	144	24	24
7	161	23	17
8	176	22	15
9	189	21	13
10	189	19	0
11	176	16	–13

The figures in the above Table show that both the average and marginal products increase at first and the decline. The marginal product falls faster than the average. The important point to note is that with the employment of the fifth unit the marginal product starts diminishing. The same phenomenon is depicted in the diagram below.

In the diagram 16.1 below the MPP curve rises till the employment of OA units of labour and thereafter it falls continuously. The APP curve rises till the employment of OB units and thereafter starts declining. The relationship between APP and MPP is the same as that between AC and MC explained in the earlier set of lessons.

In order to convert the MPP curve into the MRP curve we need to know the contribution to revenue made by the MPP at each level of employment of the factor. It bears repetition to point out at this stage that while MPP depends entirely on the technical conditions of production, its value productivity

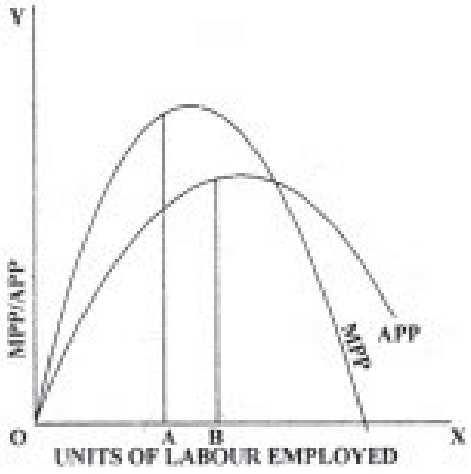


Diagram 16.1

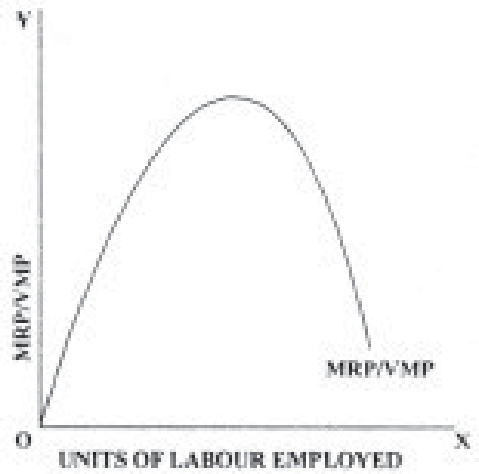


Diagram 16.2

depends upon the commodity market where the firm sells its output. *If the firm sells its output on a perfectly competitive market, its MR will equal its AR and thus the MRP curve can be derived from the MPP curve simply by multiplying the MPP corresponding to each level of employment of the factor by the given market price of the product (AR)*. Diagram 16.2 depicts the MRP curve corresponding to the MPP curve of the diagram 16.1.

Carefully note the fact that just like the MPP curve the MRP curve is also downward sloping. The reason for this is the diminishing marginal productivity of the factor. Also note the fact that in this particular case MRP curve is also the VMP curve.

However, as already explained, if the firm is confronted with an imperfectly competitive commodity market, it will be able to sell larger outputs only by reducing the market price so that MR will be less than AR. As a result two things happen. Firstly, as the firm is able to sell its extra output at a lower price, the VMP curve (which is derived from the technically given MPP curve by multiplying MPP corresponding to each level of employment of the factor by the market price of the product) will fall more sharply than the MPP curve. Secondly, since MR will be less than AR, the MRP curve will lie below the VMP curve and slope more sharply than the latter. Diagram 16.3 depicts the VMP and MRP curves of a firm selling its product in an imperfectly competitive commodity market.

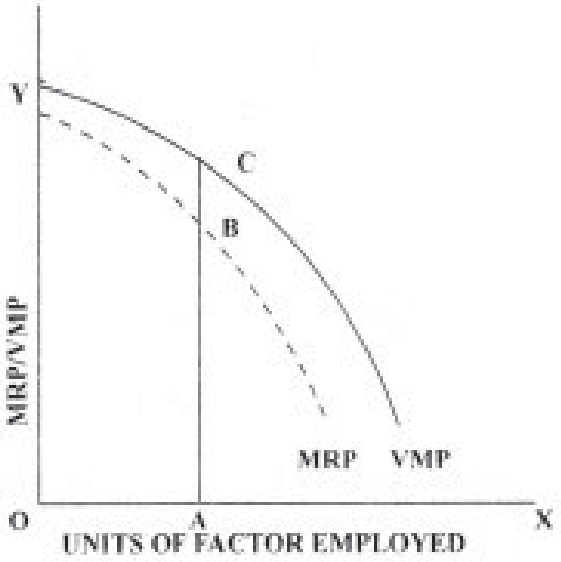


Diagram 16.3

The difference between MRP and VMP is further explained with hypothetical figures given m Table 16.2 below.

TABLE 16.2

Difference between MRP and VMP under Perfect and Imperfect Competition in the Commodity Market

Units of the Factor	*Total Product*	*MPP.*	*Perfect Competition in the Commodity Market*				*Imperfect Competition in the Commodity Market*			
			Pirce	*T.R.*	*M.R.P.*	*V.M.P.*	*Pirce*	*T.R.*	*M.R.P.*	*V.M.P.*
1	15	15	100	1500	1500	1500	100	1500	1500	1500
2	36	21	100	3600	2100	2100	99	3564	2064	2079
3	60	24	100	6000	2400	2400	98	5880	2316	2352
4	92	32	100	9200	3200	3200	97	8924	3044	3104
5	120	28	100	12000	2800	2800	96	11520	2596	2688
6	144	24	100	14400	2400	2400	95	13680	2160	2280
7	161	17	100	16100	1700	1700	94	15134	1454	1598
8	176	15	100	17600	1500	1500	93	16368	1234	1395
9	189	13	100	18900	1300	1300	92	17388	1020	1196
10	197	8	100	19700	800	800	91	17927	539	728

Explanatory Notes:

1. MPP = Difference between two successive total products.
2. T.R, = Total revenue = Total product × price at which it is sold:
3. MRP = Marginal revenue product = Difference between two successive total revenues.
4. VMP = Value of MPP = MPP × the price at which total product sells.

Carefully note the following:

1. Tolal product and MPP figures are the same because they are determined purely by-technical factors.
2. In case of perfect competition in the commodity market, MRP and 'VMP figures are identical,
3. In case of imperfect competition in the commodity market MRP is always less than VMP.

5. Firm's Demand Curve for a Factor

Just as it is true that a profit maximizing firm, whether it is selling its product under conditions of perfect competition, imperfect competition or monopoly, will produce to the point at which its MC equals its MR, so it is true that a profit-maximizing firm will purchase units of a variable factor up to the point at which the addition to its total cost resulting from the employment of an additional unit (i.e. marginal factor cost, MFC) equals the M.RP of the factor in question. Thus, in the purchase of a single variable factor a firm will be in equilibrium when MFC equals MRP of the factor.

Thus, in equilibrium:

$$MFC = MRP \qquad (1)$$

The above is a perfectly general equilibrium condition applicable to all market situations. If we further assume that the firm is able to purchase any amount of the factor without influencing market price (i.e, purchases in a competitive factor market), the MFC of the factor to the firm is simply the market price (AFC). Therefore, for firms that purchase their factor supplies in a perfectly competitive market the above equilibrium condition (1) can be alternatively stated as follows:

$$AFC = MRP \qquad (2)$$

This condition allows us to derive a firm's demand curve for a factor from the MRP curve. The factor's MRP curve shows different MRPs corresponding to the different amounts of the factor employed with given amounts of all other factors, Firm's demand curve for a factor would show the different amounts of the factor that the firm would be willing to purchase at different prices of the factor. Therefore, when a firm purchases its factor supplies in a competitive factor market (so that MFC = AFC) the MRP curve of the factor becomes the firm's demand curve for the factor as shown in the diagram below.

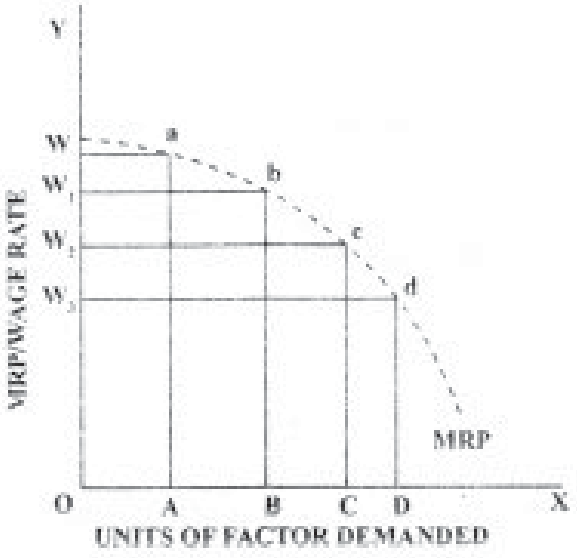


Diagram 16.4

In the diagram 16.4 amount OA of the factor equates its MRP at point a with the price OW. Therefore, at OW price the firm would be willing to purchase OA amount of the factor. Amount OB of the factor equates its MRP at point b with price OWS. Therefore, with OW, as the price the firm would be willing to purchase OB amount of the factor. Similarly, at OW_2 price the firm would be willing to purchase

OC amount of the factor. However, at this stage let us carefully note that the MRP curve is the firm's demand curve for the variable factor in question on the assumption that the price of the product and the price of the factor are both given for the firm.

6. Market Demand Curve for a Factor

In the preceding diagram the MRP curve is the firm's demand curve for the factor in question on the assumption that changes in the price of the factor do not, directly or indirectly, affect the price of the commodity produced and hence the given MRP curve. This assumption would be valid only if all other firms in the industry keep their outputs fixed. However, this is not a realistic assumption. In the event of a fall in the price of a variable factor we would expect all firms in the industry to employ more of this relatively cheaper factor. This would increase the total output of the industry and cause the price of the commodity to fall. A fall in the price of the commodity would cause the MRP curves of all the firms (based on the higher price of the commodity) to shift leftward. Firms will adjust their purchases of the factor with reference to the new MRP curve (corresponding to the lower commodity price). Thus, each fall in the price of a variable factor (via its effects on the factor's total employment, total output and hence the price of the commodity produced) will give rise to a new lower MRP curve with one equilibrium point corresponding to the new factor price. The line joining such equilibrium points on the different MRP curves will be the firm's demand curve for the variable factor in question when the reactions of other firms in the industry to changes in the price of the factor are allowed for. This is shown in the diagram 16.5.

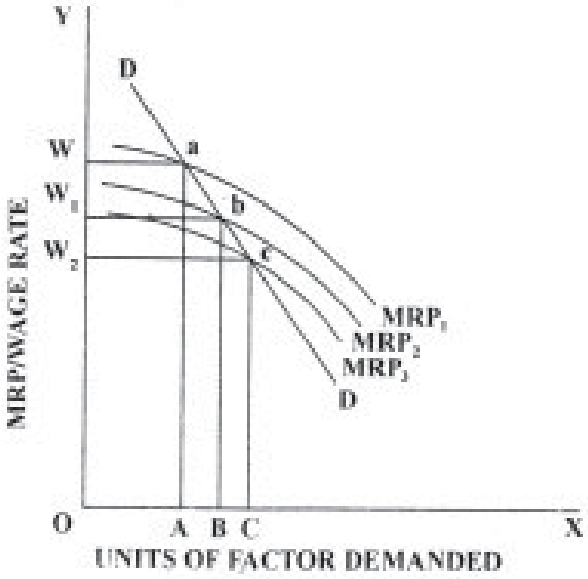


Diagram 16.5

In diagram 16.5 let us start from an equilibrium position such as point a on the curve MRP, with OW as the factor price and OA as the amount demanded of it by the firm. Now suppose the price of the variable factor falls from OW to OW_1. All firms in the industry employ more of this factor, as a result total output of the commodity increases and consequently price of the commodity falls. Fall in the price of the commodity (say, from Rs. 100/- to Rs. 98/-) causes the MRP curves of all firms to shift leftward. Suppose as a result of these indirect effects the MRP, in the diagram above shifts position MRP_2 with MRP_2 and OW_1 as the factor price equilibrium is established at point b with OB as the amount demanded of the factor 0. Similarly, when the price of the factor rails further to OW_2, MRP_2 shifts leftward to the position of MRP_3 on which equilibrium with the lower factor price (OW_2)

is established at point c; with OC as the amount demanded of the factor. *The line DD joining equilibrium points such as a, b, c, etc., is the firm's demand curve for the factor when reactions of other firms in the industry' to variations in the price of the factor are allowed for*.

The lateral summation of the demand curves of all firms for a factor, as. derived above, gives us the market demand curve for the factor in question. Just like the firm's demand curve, the market demand curve for a factor will also be downward sloping.

7. Firm's Demand Curve for a Factor when factor Market Imperfect

As explained earlier, equality of MRP with MFC of a variable factor determines a firm's equilibrium in the purchase of a single variable factor under all market situations. However, a firm's demand curve for a factor, defined as indicating the different amounts of the factor demanded by the firm at different prices of the factor, is based on the assumption that MFC of the factor to the firm equals its price (AFC) so that equality of MFC with MRP also means the equality of price of the factor (AFC) with MRP. This implies that the firm purchases its factor supplies in a perfectly competitive factor market so that it is able to purchase any amount of the factor without influencing the given market price and as a result MFC of the factor equals its AFC. We derived the individual and the market demand curves in the preceding sub-section on the basis of this assumption. However, if a firm does not purchase its factor supplies in a perfectly competitive factor market, it will be able to purchase larger amounts of the factor only at higher prices. When a firm purchases larger amounts of a factor at higher prices, MFC of the factor will necessarily be higher than its AFC. For example, if in order to purchase 51 instead of 50 units of a factor a firm has to raise the factor price from Rs. 100 to Rs. 102, the MFC of the additional unit to the firm will equal Rs. 202 ($102 \times 51 - 100 \times 50 = 202$) which is greater than AFC.

When the MFC of a factor to a firm is greater than its AFC, it cannot afford to equate MRP with the AFC because in doing so it will incur a net loss equal to the excess of MFC over AFC and thus reduce its profits. In such a case the MRP curve cannot be described as the firm's demand curve for the factor in the sense of indicating the different amounts of the factor demanded by the firm at different prices of the factor. Even in such cases MRP curve will be described as the firm's demand curve for a factor but in a different sense which we will explain in a later section.

2. SUPPLY OF FACTORS

I. Supply of Factors to the Whole Economy

At first glance it may appear that quantities of most factors are fixed in an economy. For example, there is an upper limit to the number of workers. Similarly, there are upper limits to quantities of coal, oil, copper, iron ore, etc., available in the economy. However, in practice we are never near these limits. Often a large undiscovered or unexploited quantity exists, and a shortage of the resource that raises its price encourages exploration and the development of previously unprofitable sources. Thus, the supply of a resource to the economy usually varies considerably with changes in the price of the resource. With this brief introduction we now come to a discussion of the characteristic features of the supplies of individual factors.

2. Supply of Land

Land in economics includes all natural resources provided free by nature. The quantity of a particular natural resource existing in the world is, of course, limited. But we are never near these upper limits. Generally large undiscovered (or unexploited) sources exist and a shortage that raises their prices encourages exploration, research and development of previously unprofitable sources. Therefore, the supply of any natural resource usually varies considerably with changes in its price, A high return to land provides

incentives for the development of its productive powers through irrigation, drainage, fertilization, etc., which greatly increase the supply of arable land. On the other hand, if the return to land is low, its fertility may be allowed to be exhausted within a short period of time. Traditionally, however, the supply of land (which includes all natural resources besides mere space) to the whole economy has been assumed to be absolutely inelastic.

3. Supply of Labour

By the supply of labour (or the supply of effort) we mean the total number of hours of work that the population is willing to supply. The supply of effort depends upon the following factors,

(1) The size of the population: The size of the population sets the upper limit to the total of labour, While there is some evidence that the birth and immigration rates are higher in good times than in bad times, it is doubtful, especially in advanced economies, whether economic factors are of paramount importance in determining the growth of population. It is difficult to establish any definite relationship between the reward of labour and growth of population. The reasons for which population varies are at the moment largely unexplained. Therefore, for our purpose we may take the size of population as fixed.

(2) The proportion of the population willing to work: The proportion of the population entering the labour market varies considerably in response to variations in the wage rate. Generally, arise in the wage rate results in an increase in the proportion of the population willing to work. Women, old people and even young boys are induced to join the labour force when the wage rate is high. For example, the proportion of married women and old persons in the labour force increased dramatically during the Second World War. In addition to the rate, the proportion of the population entering the labour market also depends on the age composition of population, social institutions, customs and distribution of wealth in the economy. For example, the extent to which women, especially married women, enter the labour market partly depends on customs and opportunity. Customs and opportunity can vary from one time to another and from one place to another even within the same country. Greater equality in the distribution of property in a society, by reducing the number of those who live on unearned incomes and consequently do not need to work, will increase the supply of labour in an economy,

(3) The number of hours of work offered by each individual worker: By hiring out his services a labourer gets some money as his wage, With this money he purchases goods and services for his consumption. Thus, the labourer trades his leisure for goods, by giving up leisure (i.e., by working) he gets money, and hence, goods. A rise in the wage rate means that there is a change in the relative price of goods and leisure. Leisure becomes dearer- relative-to goods (since each hour of leisure consumed now is at the cost of more goods forgone), or alternatively, goods become cheaper relative to leisure since each hour worked (i.e., leisure traded for goods) now results in more goods than before. In the context of the theory of consumer's demand we noted that a consumer tends to substitute a cheaper good at the cost of a dearer good when their relative prices change. The same logic applies to change in the wage rate also. *Due to rise in the wage rate goods be come cheaper relatively to leisure and as a result a labourer tends to substitute goods at the cost of his leisure; he tends to have more goods by reducing his leisure. This is known as the, 'substitution effect' of wage increase.*

The substitution effect of a wage increase will tend to expand the supply of effort in two ways. Firstly, some of those who were not willing to work at the lower wage rate would now like to work because leisure has now become costlier in terms of goods forgone. Secondly, for the same reason those who were already working would now like to put in more hours of work per day or per week by reducing their leisure. Thus, the total supply of effort will tend to expand due to these two factors.

Quite apart from the substitution effect discussed above, a wage increase also generates an income effect. With an increase in the wage rate a labourer grows richer than before even if he continues to

work the same number of hours per day or per week as he did when the wage rate was lower. Being richer the worker would demand more of all normal goods including leisure. He will spend a part of the increase in his real income in the purchase of leisure. He can do so by reducing the number of hours worked. So, the income effect of a higher wage rate induces the worker to reduce the number of hours worked per day or per, week. Thus the substitution and income effects of a wage increase tend to pull in opposite directions; the substitution effect tending to increase the number of hours worked while the income effect tending to reduce the number of hours worked. The net effect of a wage increase on the supply of effort will, therefore, depend on the relative strengths of the two opposing tendencies. If the substitution effect is stronger than the income effect, labourers will put in longer hours of work in response to a rise in the wage rate. Bat if at any stage income effect becomes stronger than the substitution effect, labourers will put in shorter hours of work consequent upon arise in the wage rate. The supply curve of effort in this case will be backward rising as the one shown in figure below.

In figure A of diagram 16.6 below as the wage rate rises from W_1 to W_2 and then to W_3. The supply of effort expands from OA to OC and then to OD. In other words, upto the wage level W_3 substitution effect is stronger than the income effect and as a consequence supply of effort expands in response to increases in the wage rate. But when the wage rate rises beyond W_3 the income effect becomes stronger than the substitution effect and consequently the supply curve of labour starts sloping backwards to the left. In the figure B of diagram 16.6 when the wage rate increases from W_3 to W_4 instead of expanding, the supply of effort actually contracts from OD to OB.

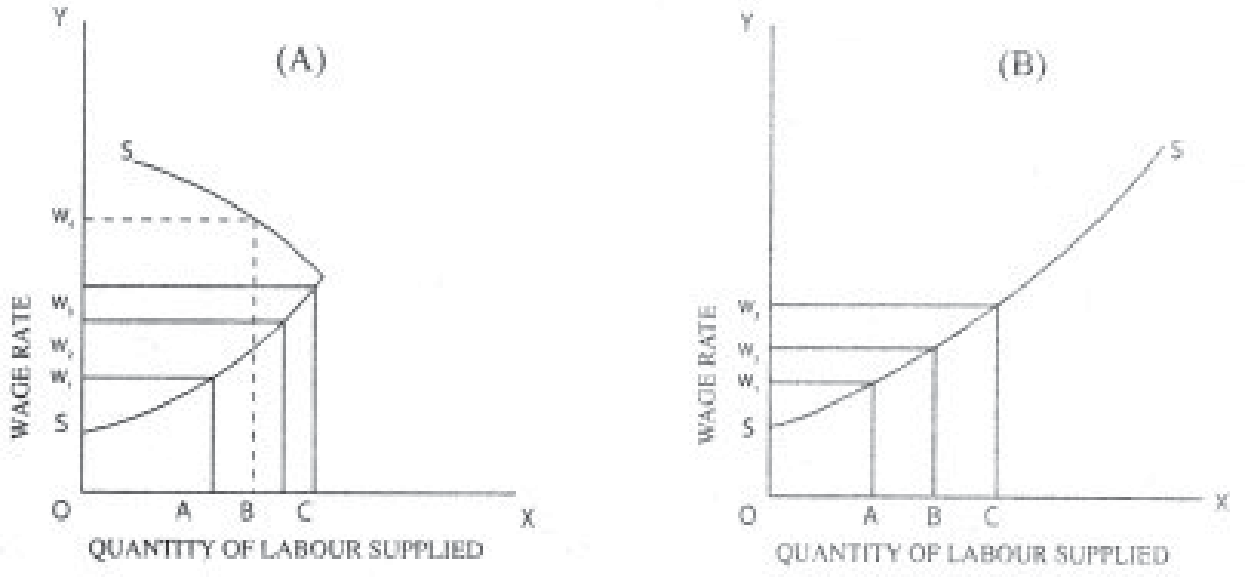


Diagram 16.6

Concluding our discussion of the supply of effort we can say that the backward rising supply of effort curve presents a strong possibility but cannot be taken as the typical case. There is no conclusive evidence available in support of a backward labour supply curve. Therefore, we assume that normally labour supply curve will be upward rising bending.

4. Supply of Capital

Capital is a man-made factor of production and interest is its cost. The supply of capital in a country consists or the existing machines plants, equipment, buildings, etc., and is called the Capital Stock. In the course of production during the year a part of the existing capital stock is used up and to that extent the supply diminishes. On the other hand, new machines, buildings, plant and equipment are produced

every year which go partly to replace the worn-out part of the capital stock and partly to add to the stock. Ignoring cyclical fluctuations, the supply of capital has been increasing over time in all modern economies.

5. Supply of factors to particular uses

Different factors of production can normally be put to alternative, uses. Only few resources may be specific to a particular use and that too only in the short run. A given piece of land can be used to grow a variety of crops. Similarly, a labourer can be employed either to weave cloth in a factory or to build a road or to dig a canal or to grow various cropson a farm. Therefore, factors have to be allocated among various competing industries and among different firms in the same industry in a rational manner.

Factor owners choose the use for their resources in which they earn the most. They, of course, take many other things into account besides monetary benefits. Factors move among different uses until there is no net advantage in further movement. A change in the relative price paid to a factor in two uses leads factor owners to increase the quantity supplied to the use in which the relative price has increased and to decrease the quantity supplied to the use where it has decreased. This means that higher the (relative) price offered to a factor in a particular use, the larger will be the amount of the factor supplied to it. This gives rise to an upward rising supply curve to an industry as shown in the diagram below.

SS curve in the diagram 16.7 is the supply curve of a factor to an industry. It is upward rising indicating that higher the price offered to the factor, larger is the quantity supplied to the industry in question. For example, when the price offered is OW_1 only OA amount of the factor is supplied.

But when the price offered rises to OW_2, amount supplied increases to OB. And when the price offered rises to OW_3 amount supplied increases further to OC.

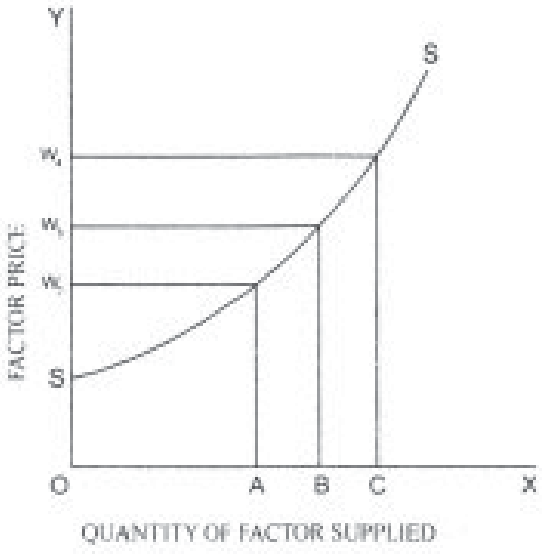


Diagram 16.7

As explained previously, the supply curve of any factor to the economy as a whole will be normally more than perfectly inelastic. However, even in a case where the supply curve of a factor to the economy as a whole is perfectly inelastic (as for example, classical economists assumed the supply of land to be), its supply to a particular industry will not be perfectly inelastic, it will be more classic because the industry will always be able to attract more units of the factor from other industries by offering a slightly higher price. Therefore, the supply curve of a factor to an industry will normally be more elastic compared to its elasticity of supply for the whole economy.

6. Supply of a factor to an individual firm

In a factor market a firm may be either one of a large number of purchasers or one of the few purchasers of a particular factor. If the firm is one of a large number of purchasers of the same factor, its purchases will constitute a negligibly small fraction of the total market supply of the Factor. As a result, the firm would be able to purchase any amount of the factor at the going market price. In other words, the supply of the factor to such a firm will be perfectly elastic at the price determined by the forces of market supply and demand for the factor. As already explained, when the supply of a factor is perfectly elastic, price (AFC) and marginal factor cost (MFC) to the firm are identical. On the other hand, if the firm in question is one of the few big purchasers of a factor, its purchases will constitute a sizeable fraction

of the market supply of the factor and as a result when the firm buys a large amount of the factor, its price is raised. Thus, in such a case the firm is able to buy more units of the factor only at higher and higher prices. The supply curve of the factor to the firm in such a case will rise upward. When the supply curve is upward rising, as already explained, MFC is higher than AFC and therefore, the MFC curve lies above AFC curve.

We may conclude our discussion by observing that normally the supply of all factors to an economy is responsive to factor prices in the long run. In the short run the same factor can have supply curves ranging from the vertical (i.e., perfectly inelastic supply curve) to the horizontal, depending on which demand curve is coupled with supply-the demand curve of a small firm, of an industry (or a big firm) of a group of industries (i.e., the whole economy). This is shown in the diagram 16.8.

It is thus evident that even when the supply of a factor to the economy as a whole is rigidly fixed (as in fig. A below), it will be more elastic to a particular use (as shown in fig. B), and will be perfectly elastic to a small user of the factor (as shown in fig. C).

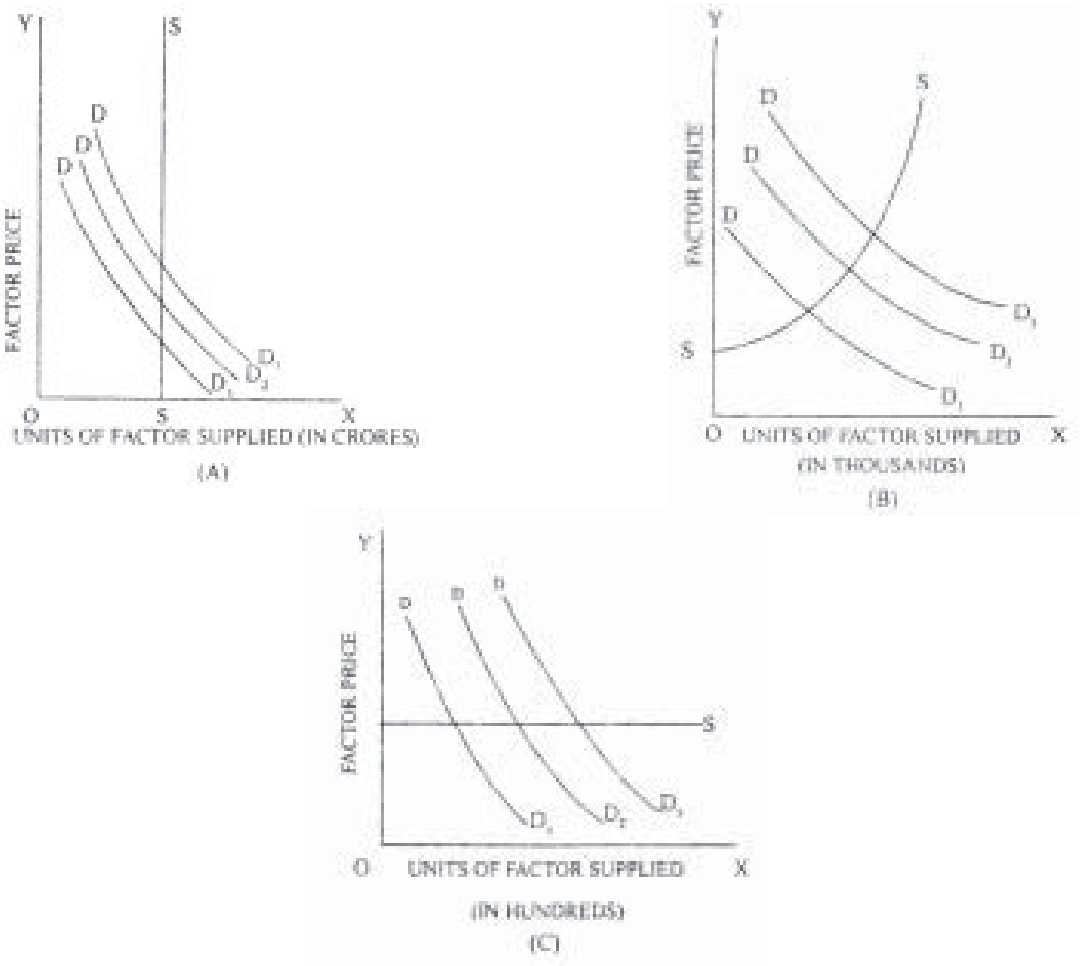


Diagram 16.8

Conclusions

1. In the economic sense factor supplies for the economy as a whole are never perfectly inelastic except, possibly, in the very short run.
2. Supply of a factor to an industry is generally more elastic than its supply to the whole economy,
3. Supply of a factor to a small user of the factor can be assumed to be perfectly elastic.

LESSON 17

FACTOR PRICE DETERMINATION UNDER DIFFERENT MARKET CONDITIONS

INTRODUCTION

Having developed the necessary tools of analysis the demand and supply curves of factors under different market situations-we are now in a position to demonstrate factor price determination under different market situations. The theory of factor pricing is quite general applicable to all factors of production. In the following we discuss wage determination as a special case. However, the analysis is equally applicable to other factor prices as well. If one is interested in capital, he should interpret factor price as interest; if one is interested in land, then factor price should be interpreted to mean rent, and so on.

1. Under Competitive Conditions

When there is perfect competition in both the factor market and the commodity market, market wage rate is determined by the interaction of the forces of market demand for and supply of labour as shown in the diagram below.

In figure A diagram 17.1, the market demand and supply curves of labour intersect at P, determining AP(=OW) as the equilibrium wage rate. At this wage rate amounts of labour supplied and demanded are both equal to OA. At any higher wage rate supply of labour exceed the demand for it. For example, in the above diagram, at the wage rate OW_1 supply of labour exceeds the demand for it by BC. This

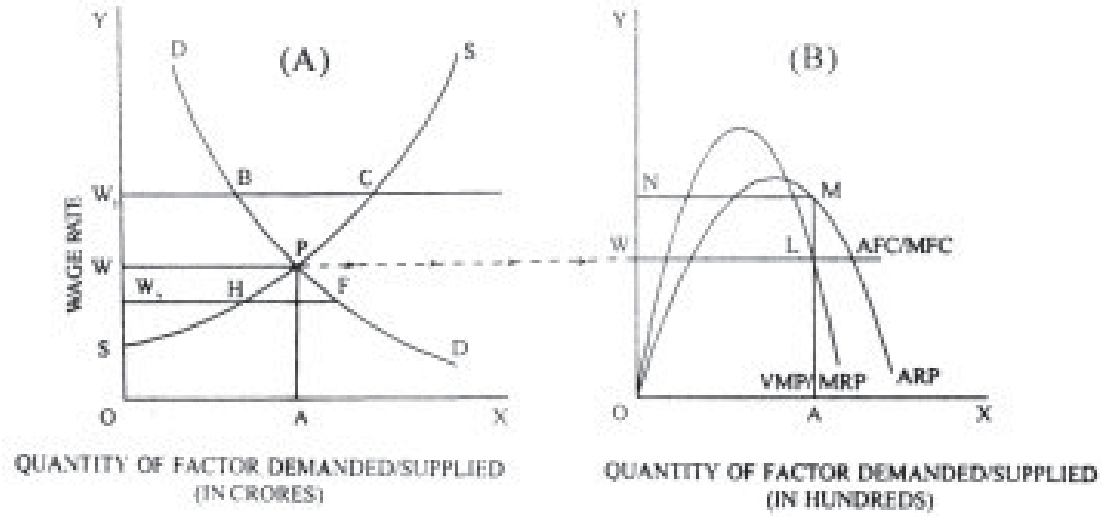


Diagram 17.1

excess supply exerts a downward pressure on the wage rate. On the other hand, if the wage rate is lower than the equilibrium rate the demand for labour will exceed its supply. For example, at the wage rate W_2, demand for labour exceeds its supply by HP. This excess demand will tend to push up the wage rate towards its equilibrium level. Thus, in either case the wage rate will gravitate towards its equilibrium level where supply and demand are equated.

Figure B diagram 17.1 depicts the equilibrium or a competitive firm for which the wage rate and the price of the product (and therefore the ARP and MRP curves) both are given. At the given wage rate determined by the market forces of supply and demand for labour (as shown in Figure A above) the firm only decides to employ so much of labour which equates MRP with the given wage rate. In this particular case MRP being equal to VMP, wage rate equals MRP as well as VMP. Thus, with perfect competition in both the factor market and product market, wage rate is determined by the forces of market demand and supply of labour and at the given wage rate thus determined an individual firm only decides to employ that amount of labour which equates MRP (and also VMP) with the given wage rate.

The equilibrium condition of the equality of MRP and the given wage rate (or any other factor price) is the short run condition for profit maximization. For example, in fig. B above, at the given wage rate the firm employs OA of labour which equates MRP with the given wage rate at L. But in this equilibrium position, ARP being greater than the wage rate by LM the firm is earning abnormal profits equal to the area of the rectangle WLMN. In an industry where there is no restriction on the entry and exit of firms, the possibility of earning abnormal profits is bound to attract new firms into the industry. Entry of new firms into the industry, will mean (1) increased demand for the factor in question and (2) the increased output of the commodity. Increased demand for the factor will tend to push up its market price and increased output of the commodity will lower MRP curve, i.e., the demand curve for the factor. Thus, as a result of the entry of new firms into the industry, the price of factor will tend to rise and demand curves of the firms for the factor (and therefore, its market demand curve) will fall. This process of the entry of new firms into the industry and the consequent increase in the price of the factor and the fall in the MRP curves of firms will continue so long as firms in the industry earn abnormal profits (ARP>factor price). This process will come to an end when factor price equals ARP (in addition to its equality with MRP) so that there are no abnormal profits to be earned in the industry. Therefore, in long-run equilibrium under perfect competition factor price will equal not only MRP but also ARP. Given the shapes of the ARP and MRP curves, it is evident that there is only one point where the two are equal. It is the highest point on the ARP curve where MRP equals it. Therefore, in long run equilibrium the factor price curve (i.e., AFC curve) will be tangential to the ARP curve at its highest point as shown in the diagram 17.2.

The diagram 17.2 depicts the long-run equilibrium of the firm and the industry. The firm is in its long-run equilibrium because in the present situation it is earning only normal profits (i.e., the normal earnings of management) neither more nor less. The industry is also in its long-run equilibrium because there is no tendency either on the part of old firms, to leave the industry or on the part of new firms to enter the industry since there are no abnormal profits to be earned in the industry. How long the competitive process will take to wipe out abnormal profits will depend on the extent of the various frictions in the economy and the difficulties of entry into the industry.

The important conclusion of our discussion above is that in long-run competitive equilibrium factor prices equal ARPs as well as MRPs whereas in short-run equilibrium, they may be greater or less than ARPs (but still equal to MRPs). When factor prices equal their ARPs, prices or goods equal their average costs and total costs equal total revenue, thus leaving no residue over and above what are called ‘normal profits’ (or earnings of management). Managerial functions are different from entrepreneurial functions. Pure profit, which is a residue left after all contractual payments (including normal earnings of management) have been made, is the reward for the entrepreneurial functions. Thus, in long-run competitive equilibrium

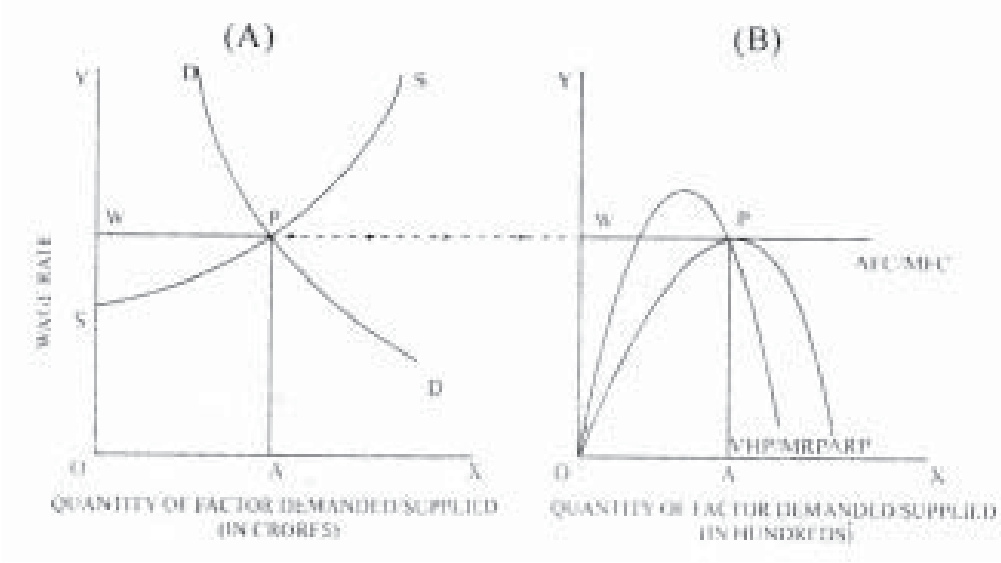


Diagram 17.2

pure profits are zero, or stated differently, entrepreneurial functions become redundant in perfectly competitive equilibrium system. We will have to examine this point more critically when we analyse the nature and causes of pure profits in the last section of this set.

2. One Seller (Monopolist) and Many Buyers

Suppose there is a labour union which controls the whole supply of a particular kind of labour but where buyers are many. The supply curve of labour (which is assumed to be upward firing) represents to the union the marginal costs of supplying different quantities of labour. The market demand curve for labour is downward sloping for the reasons explained earlier. The demand curve shows the different quantities of labour that can be sold in the market at different prices. The union is in the position of a monopolist. The market demand curve is the AR curve for the monopolist union. The union knows that it can sell larger quantities of labour only by lowering the wage rate against it and as a consequence the contribution of each additional unit of labour sold to its total receipts (i.e., marginal revenue) will be less than the wage rate. For example, suppose that the wage rate falls to Rs. 99 from Rs. 100 when the union supplies 51 units of labour instead of 50. In this case MR from the ^sale of an additional unit of labour will equal Rs. 49 only (i.e., 99 × 5l – 100 × 50 = Rs. 49), which is less than the wage rate (Rs. 99). This is so because the union receives a lower wage rate not only for the additional unit sold but also suffers a loss of Rupee 1 each on the 50 units which were earlier sold at 'Rs.100 instead of Rs. 99 each. Knowing that the MR from the additional units sold is less than the wage rate, it will regulate labour supply in such a manner that MR from the last unit supplied equals the MC of supplying it. The supply curve of labour represents to the union the MC of supplying labour. Therefore, as a rational calculator the union will equate the MC of supplying labour not with -the wage rate offered (as indicated by the demand curve) but with the MR (as indicated by a curve marginal to the demand curve). In the diagram 17.3, equilibrium is established at point H where the supply curve intersects the MR curve and not at point F where the supply curve intersects the demand curve. Wage rate in this case is AB which is higher than the competitive wage rate DF. Level of employment OA is lower than the competitive employment level (OD).

Thus, monopoly in the labour market results in higher than the competitive wage rate (AB>DF) and lower than the competitive employment level (OA <OD).

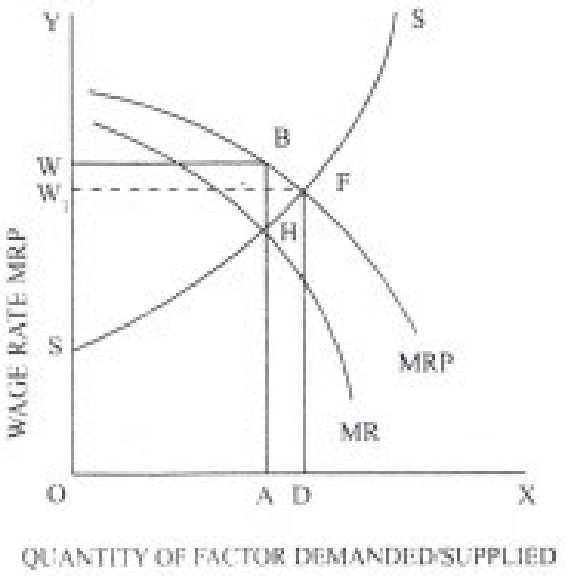


Diagram 17.3

3. One Buyer (Monopsonist) and Many Sellers

Such a situation can obtain when there is a single employer in a particular town or area when labourers are not organized. To the employer the supply curve of labour represents the average cost (AFC) of employing different quantities of labour. The supply curve is upward rising indicating that larger quantities of labour can be bought only by offering higher and higher wage rate. Being the only buyer of labour in the market, the employer knows that if he employs an extra unit of labour he drives the wage rate up against him and as a consequence the addition to his wage bill (MFC of labour) will be greater than the wage rate (AFC). For example, suppose that when the monopolist employs 51 units of labour instead of 50, the wage rate is pushed up to Rs. 101 from Rs. 100. In this case the MFC of employing an additional unit is Rs. 151) (101 × 51-100 × 50 = 151) and not Rs. 101. Therefore, the monopsonist equates the MFC of employing labour (and not AFC) with the MRP of labour. In other words, the monopsonist's equilibrium is determined at the point of intersection, of the MFC curve and the demand curve and not at the point of intersection of the AFC and demand curve. This is shown in the diagram 17.4.

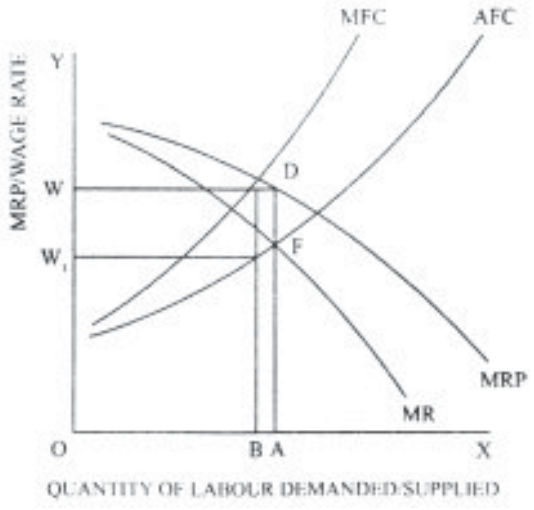


Diagram 17.4

In the diagram 17.4 the intersection of the MFC curve which is marginal to the AFC curve) and the demand curve (i.e., the MRP curve) at E determines the monopsonist's equilibrium. At E, MFC equals MRP. In equilibrium the monopsonist purchases OA quantity of labour at OW wage rate. The intersection of the demand curve and the AFC curve at point F determines competitive wage rate (-OW,) and competitive employment (OB). Thus, the effect of monopsonistic conditions in the factor market is to lower the wage rate as well as the level of employment below what would have obtained under competitive conditions. Compare this case with that of monopoly in the factor market. *Both, types of imperfection tend to reduce the level of employment below the competitive level. But while monopsony tends to reduce the wage rate below its competitive level, monopoly tends to push up the wage rate above its competitive level.*

4. One Buyer and One Seller-Bilateral Monopoly

In this case a monopolist (say, a trade union which may be controlling the whole supply of a particular kind of labour) sells labour to a monopsonist who may be the sole employer of a particular type of labour in a certain region. The monopolist knows that the demand curve for the factor is downward sloping and as a consequence the marginal revenue from selling extra labour is always less than the wage rate. Therefore, he regulates labour supply in such a manner that the marginal cost of supplying an extra unit of labour (which is represented by the AFC curve) is equated with the marginal revenue obtained from selling that unit (which for him is represented by a curve marginal to the demand curve of labour). Thus, the intersection of the AFC curve and the marginal revenue curves determines his equilibrium. The monopsonist, on the other hand, knows that the AFC curve of labour being upward rising, MFC of buying labour to him is higher than the AFC. In his case equilibrium is determined by the equality of MFC (which is represented by a curve which is marginal to the AFC, curve) with the-marginal revenue product of labour (which is represented by the demand curve of labour). This is illustrated in the diagram 17.5.

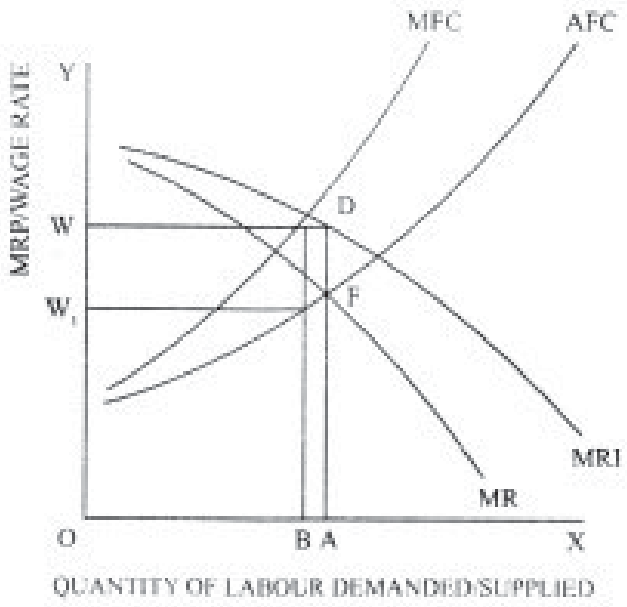


Diagram 17.5

In the diagram 17.5, the AFC curve represents the marginal cost of supplying different quantities of labour for the monopolist and the demand curve represents the average price or average revenue at which he can sell different quantities. The marginal revenue curve (the curve marginal to the MRP curve) represents the marginal revenue obtained from selling different quantities. Therefore, the intersection of the AFC curve and the marginal revenue curve at E determines his equilibrium. The monopolist would, decide to sell OA amount of labour at OW wage rate. The monopsonist, in his turn, equates the MFC of buying labour with the marginal revenue product of labour. The MFC curve of labour for the monopsonist lies above the AFC curve which shows the average cost of labour to him. Therefore, his equilibrium is determined by the intersection of MFC curve and the demand curve (i.e., the marginal revenue product curve) at D. In equilibrium he would like to purchase OB amount of labour at OW_1 wage rate. *Thus, while the monopolist wants to sell OA amount of labour at OW wage rate, the monopsonist wants to buy OB amount of labour at OW, wage rate. The wage rate is thus indeterminate*. If both parties are stubborn to the point where neither will yield a penny, no labour will be bought or sold. But this is not a likely situation. Instead, depending upon their relative bargaining positions, we should expect the two parties to bargain and settle the wage rate somewhere between the two limits.

LESSON 18

MARGINAL PRODUCTIVITY THEORY OF DISTRIBUTION

1. Statement of the Theory

Having examined the general process of factor price determination under different market situations, we are now in a position to undertake critical examination of the Marginal Productivity Theory of Distribution, This theory was first formulated by J.B. Clark, a distinguished Columbia University economist and put forward as a general theory of distribution designed to explain the pricing of all factors of production. However, this theory is mainly concerned with what determines the demand for factors of production. It completely ignores the supply side. It is essentially a micro-economic theory concerning the determination of equilibrium at the level of an individual firm. *The main proposition of the theory is that factors get rewards equal to the values of their respective marginal products.*

What a factor gets as price represents to the employer the average cost (AFC) of employing that factor. Value of marginal product of a factor (VMP) is simply the MPP of the factor multiplied by the market price (AR) of the product. Therefore, the main proposition of the marginal productivity theory that factors get rewards equal to the values of their respective marginal products can be expressed by the following equation :

$$AFC = VMP\ (MPP \times AR)$$

The demand for a factor is derived out of the demand for the product it helps to produce. When a firm employs an additional unit of a factor with a fixed amount of other factors, it yields some extra output. The producer is not so much interested in the extra output produced as in the extra revenue he will get from the sale of that extra output. The contribution made to the total revenue of a firm due to the employment of an additional unit of a factor (i.e., MRP) depends on (1) the addition to total (physical) output (i.e., MPP) and (2) the contribution of each unit of output to total revenue (i.e., MR). Thus, MRP equals MPP x MR. The demand for a factor depends on the MRP that it yields to the firm. While employing an additional unit of a factor the employer has his eyes set on this quantity.

As already explained in detail, when a firm employs more and more units of a certain factor with a fixed amount of all other factors, after a point the law of diminishing returns comes into operation and as a result the MPP of the factor starts diminishing. In other words, the MPP curve of the factor slopes downward to the right. We have explained in detail why the MRP curve will also be downward sloping even when the firm sells its product in a competitive market. And in case of imperfect competition in the commodity market, the MRP curve of the factor will slope downward even more sharply. The downward sloping MRP curve is the firm's demand curve for the factor in question.

While employment of an additional unit of a factor yields some additional revenue (i.e., MRP) to the firm, it also adds something to its total cost. The addition to the total costs of a firm made due to the employment of an additional unit of a factor is called marginal factor cost (MFC). Suppose when a firm employs 51 units of a factor instead of 50 its total cost increases from Rs.2000 to Rs.2100. The

increase in the total cost of the firm due to the employment of the additional unit of the factor (= Rs.100) will be said to be the MFC of the factor. A profit-maximizing firm will always compare MFC with MRP while employing an additional unit of a factor. So long as MRP exceeds MFC, the firm will employ an additional unit of the factor because by doing so it will increase its total profits. On the other hand, if in case of any additional unit MFC exceeds MRP, the firm will never employ such a unit because by employing it the firm will incur a net loss equal to the excess or MFC -over MRP and thus reduce profits by that amount. Therefore, the firm will stop employing more units of a factor when MFC equals MRP. Profits will be maximum when MFC equals MRP. Thus, in the employment of a variable factor, the point of equilibrium is determined by the equality of MFC with MRP. This is a perfectly general equilibrium condition which must hold under all market situations.

A firm has to employ several variable factors and not one. What will be the equilibrium condition in the employment of several variable factors? The equilibrium condition remains the same whether a firm employs one variable factor or several. The equality of the MFCs of the different factors with their respective MRPs will still determine the firm's equilibrium. For example, if a firm is confronted with the problem of employment of three variable factors, X, Y, and Z, equilibrium of the firm will require:

$$MFC_x = MRP_x$$
$$MFC_y = MRP_y$$
$$MFC_z = MRP_z$$

The above equilibrium condition states the simple fact that in the employment or more than one factor the firm will be in equilibrium when MFCs or the different factors are in the ratios or their respective MRPs. By dividing MRPs by the respective MFCs we get:

$$\frac{MRP_x}{MFC_x} = \frac{MRP_y}{MFC_y} = \frac{MRP_z}{MFC_z}$$

What does a ratio such as MRPx / MFCx stand for? This ratio only indicates the MRP from the last unit of expenditure in the purchase of factor X. The equality or the ratios

$$MRP_x / MFC_x = MRP_y / MFC_y = MRP_z / MFC_z \text{ etc.,}$$

simply implies the equality of MRP from the last unit of expenditure in the purchase of all the factors. Therefore, the above equilibrium condition (i.e., MRPs in the ratio of MFCs) can be alternatively expressed by saying that the firm will be in equilibrium when it obtains the same MRP whether it spends an additional unit of money on the purchase of factor X, or factor Y or factor Z. Thus, in the purchase of more than one variable factor firm's equilibrium requires:

$$MFC_x : MFC_y : MFC_z = MRP_x : MRP_y : MRP_z$$

Or alternatively stated:

$$\frac{MRP_x}{MFC_x} = \frac{MRP_y}{MFC_y} = \frac{MRP_z}{MFC_z}$$

The above is a perfectly general equilibrium condition which must hold under all market situations.

2. Examination of the Marginal Productivity Theory

Under a certain framework the traditional marginal productivity theory states that factors get prices equal to the values of their respective marginal products (VMPs). In the form of an equation we have already expressed this proposition as follows:

$$AFC = VMP\ (MPP \times AR)$$

(AFC stands for average factor cost).

In the preceding sub-section we noted that whatever be the market situation the equality or MFC with MRP is the necessary condition for the determination of a firm's equilibrium. From this it follows that the proposition of the marginal productivity theory (i.e., AFC = VMP) will hold only when the necessary equilibrium condition (i.e., MFC = MRP) is also simultaneously satisfied. Thus, the conclusion of the marginal productivity theory will hold when;

1. MFC = MRP (= MPP × MR)
2. AFC = VMP (= MPP × AR)

or, stated alternatively, the theory will hold when (I) MFC = AFC and (2) MRP = VMP. In subsection I above we noted that MRP will equal VMP only when the firm sells its output in a perfectly competitive commodity market. In the event of imperfect competition in the commodity market MRP will be less than VMP. Therefore, for the marginal productivity theory to hold, the first necessary condition is the assumption of perfect competition in the commodity market. Under what conditions will MFC equal AFC? Equality of MFC with AFC implies that the employment of an additional unit of a factor adds an amount to total cost equal to the price of the factor (AFC). For instance suppose the market price of a factor is Rs.1001/- and the firm can purchase any amount of the factor without affecting the market price. Suppose the firm decides to purchase 51 units of the factor instead of 51. What will be the MFC of the 51st unit to the firm? Obviously, the MFC of the 51st unit will equal Rs.1001/- (100 × 51– 100 × 50), which is equal to the market price (AFC). Under what market situation will this condition obtain? As explained above, this will be the case when the firm can purchase any amount of the factor without affecting the market price. This happens when there is such a large number of purchasers of the factor in the market that purchases of a single firm are a negligibly small fraction of the total market supply of the factor. This will be the case when there is perfect competition in the factor market. *Thus, it turns out that the conclusion of the marginal productivity theory that factors get prices equal to the values of their respective marginal products will hold only when there is perfect competition both in the factor market as well as the commodity market.*

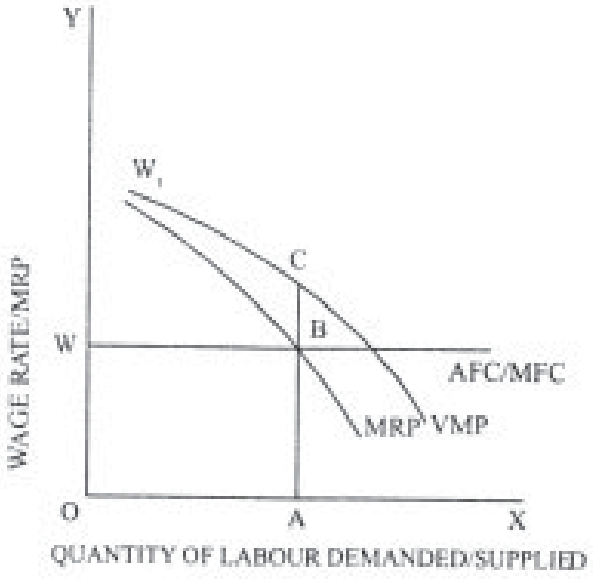


Diagram 18.1

What will happen in the event of imperfect competition either in the factor market or in the commodity market or both? Let us examine the implications one by one.

Imperfect competition in the commodity market will imply that the MRP will be less than VMP. Even if there is perfect competition in the factor market (AFC = MFC), the factor will get a price which will equal its MRP but will be less than its VMP as shown in the diagram above.

In the diagram 18.1 the AFC/MFC curve intersects the MRP curve at point B. This determines the firm's equilibrium. The factor gets a price equal to AB which is less than its VMP by the amount BC.

What will be the result if there is, perfect competition in the commodity market but imperfect competition in the factor market? Perfect competition in the commodity market implies equality of VMP with MRP. Imperfect competition in the factor market implies that the firm is not able to purchase additional amounts of a factor without influencing its market price. In other words, the purchases of the firm are not a negligibly small fraction of the market supply and consequently the firm can purchase additional amounts of the factor only by raising its market price. What happens to MFC of the factor to the firm in the event of imperfect competition in the factor market? Suppose a firm can purchase 51 instead of 50 units of a factor by raising the market price from Rs. 100 to Rs. 101 per unit. In this case the MFC of the 51st unit of the factor will be Rs. 151 (= 101 × 51 – 100 × 50) which is more than the market price of Rs 103. Thus, imperfect competition in the factor market implies that MFC of the factor will be more than its AFC (ie., its price). Therefore, in the event of imperfect competition in the factor market (and perfect competition in the commodity market) the price of the factor cannot equal its VMP as shown in the diagram above.

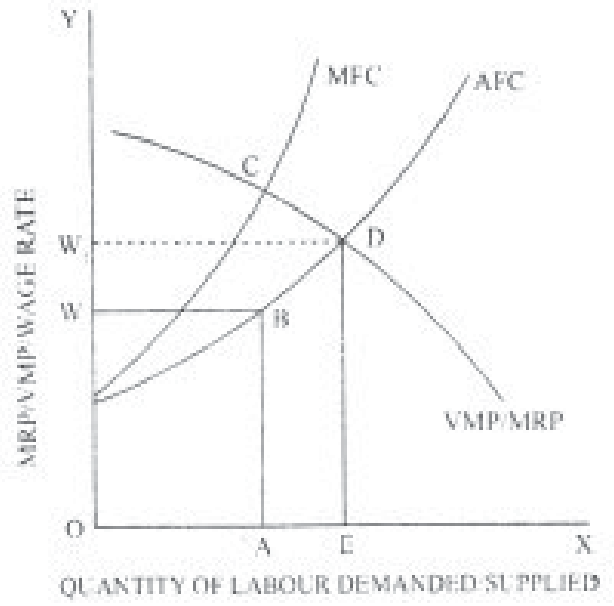


Diagram 18.2

In the diagram 18.2 equality of MFC with MRP at point C determines the firm's equilibrium in the purchase of the factor in question. But the factor gets a price equal to AB (price of the factor is represented by the AFC curve) which is less than both the VMP and MRP. Therefore, in the event of imperfect competition in the factor market a factor gets a price less than its VMP even if there is perfect competition in the commodity market.

3. Conclusion

Thus, in conclusion we note that factors get' prices equal to their respective VMPs only when there is perfect competition in both the factor market as well as the commodity market. Therefore, for the

conclusion of the Marginal Productivity Theory-that factors get rewards equal to the value of their respective marginal products-to hold the necessary condition is the assumption of perfect competition in both markets. In the event of imperfect competition in either market the marginal productivity theory does not hold.

4. Critical Examination of the Marginal Productivity Theory

Before getting down to a critical examination of the theory we first examine the assumptions on which it is based.

1. It assumes perfect competition in both the factor market as well as the commodity market.
2. It assumes that factor proportions are variable.
3. The producer is assumed to know the MRPs and VMPs of the variable factors.
4. The theory assumes full employment.

In the first place it is pointed out that the theory assumes perfect competition in both markets. In the real world, it is argued, imperfect competition is the rule rather than an exception; perfect competition is merely a theoretical construct, and therefore, the theory is unrealistic. It has been discussed above in detail that only in the event of perfect competition in both markets the conclusion of the marginal productivity theory would hold otherwise it would not. However, the strength of this criticism would depend upon how we choose to interpret the theory. If the theory is meant to imply that factor prices are equated to their VMPs, then, of course, it has to assume perfect competition in both markets. For, that alone ensures that MRPs of factors equal their VMPs and their prices (=AFCs) equal their MFCs. However, as noted above, the equality of MFC with MRP is a perfectly general equilibrium condition applicable to all market situations. Therefore, if we interpret the marginal productivity theory to mean that equality of MFC with MRP determines the firm's equilibrium in the employment of a factor then the assumption of perfect competition is not necessary.

In the second place, the theory is criticised for its assumption of the variability of factor proportions. It is pointed out that very often different factors have to be combined in fixed proportions and in such cases it is not possible even to calculate the MMP of a factor. In such cases output can be increased only by increasing die quantities of all the factors in fixed proportions. However, this is not a very valid point of criticism against the theory. Even if in some cases factor proportions are rigidly fixed, (e.g., a driver and a tractor, a carpenter and a saw, etc.) it is generally possible to use the given equipment more intensively by making labour work longer hours per day or per week. Thus, even in short run factor proportions are usually variable. In the long run, of course, alternative techniques of producing a commodity are generally developed and factor proportions remain no longer fixed. What needs attention is, however, the fact that even if it is not possible to continuously substitute one factor for the other, the theory may still be applicable. The only difference it would make is that small changes in factor prices may not induce corresponding changes in factor proportions. This is because in such a case there are less possibilities of factor substitution. Only when factor prices change substantially, will it pay the employer to rearrange factor proportions.

Thirdly, according to the marginal productivity theory the equality between MRP (or VMP) with factor price determines firm's equilibrium. Therefore, it is pointed out, the employer is assumed to know in advance the MRP/VMP that an additional unit of a factor is going to yield in future. This is not always true because no one can forecast what the future holds for him. The actual physical yield may fall short of the expected yield and prices in the future may turn out to be different from what one may have expected them to be. The criticism is not very relevant in the present context. The theory merely asserts that firm's profits would be maximised only when VMP is equated with the price of the factor. The theory says nothing about how the firm guesses the MRP or the VMP of an additional unit; whether the firm does it through a process of trial and error or through some careful calculations

or merely guess work. The theory only asserts that the equality of VMP/MRP with price (or MFC) is a necessary condition for profit maximization. How the firm guesses the VMP or MRP of the factor is an independent question which we will discuss in the last section of this set.

Fourthly, it is pointed out that production of goods generally takes time. In some cases it may take months or even years before the output actually materializes and is sold in the market to realize the revenue. Therefore, it is argued that the firm cannot afford to pay the full value of the MRP or VMP yielded by a factor but will pay only its discounted value. This criticism is valid and the theory needs to be modified to take care of this point.

Fifthly, we define marginal product as the addition to the output of a firm by an additional unit of a factor, the amounts of all other factors remaining constant. This definition of marginal product gives the impression as if the additional output (MPP) is due solely to the additional unit of the factor in question and the other factors have made no contribution. Thus, the concept of marginal productivity tends to emphasise the contribution of one factor taken in isolation. This is considered to be unrealistic. Output is generally produced jointly and it is unrealistic to attribute the additional output to one factor alone ignoring, the contributions of other factors. Different factors generally increase each other's effectiveness and are thus complementary. Labour productivity may increase as much due to its own efforts as due to, say, the amount of other factors it works with, the kind of capital goods it uses, the level of technology, etc. Thus, the concept of marginal product fails to isolate the real contribution of a factor of production.

Finally, the theory is primarily concerned with what determines demand for factors of production. It does give precision to what determines the demand for a factor but tends of ignore the supply side completely. This is one of the most serious weaknesses of the theory.

LESSON 19

THE CONCEPT OF ECONOMIC RENT

1. THE CONCETP

In common usage the term 'rent' refers to any periodic payment made regularly for the hire of land, buildings and other goods. For example, rentals paid for the hire of automobiles or television sets and rents paid for houses, flats, shops etc., where they are not bought outright, are all called rent in common usage. However, in economics the concept of rent is used in an entirely different sense. *In economic theory it refers to that part (or the whole) of the income earned by a factor of production in its present use which is over and above the minimum earnings necessary to retain it in its present use.* The minimum earnings necessary to retain a factor unit in its present use is the income it can earn in its next best alternative use. *The income that a factor unit can earn in its next best alternative use is called 'transfer earnings' in economic terminology. Thus, economic rent is that part of the actual/ income of a factor unit which is over and above its transfer earnings. If the transfer earnings of any factor unit are zero (i.e., it has no alternative use), it follows that the whole or its present income is economic rent*. For example, suppose the next best alternative employment available to a teacher is to work as a clerk and as a teacher he earns Rs. 1000 per month, whereas as clerk he can earn only Rs.500 per month. From the standpoint of his present employment (teaching) Rs.500 represents the teacher's transfer earnings and the rest (Rs.500) is economic rent should his present earnings as a teacher sink below Rs.500 he will start working as a clerk. Thus, a part of the teacher's present income represents his transfer earnings and a part represents economic rent. We take another example, to show that, depending upon circumstances, the whole of the earnings of a factor unit can be economic rent. Suppose there is a plot of land adjacent to sea shore which because of its location, can be used only to build a hotel, and cannot be put to any other use. Suppose, when put to this use the plot earns Rs.1000 per month over and above other running costs. Since the plot cannot be put to any other use, its transfer earnings are zero and therefore, the whole of its present income is economic rent. *Therefore, the essence of the modern concept of rent is the concept of a surplus earned by a factor unit in its present use over and above its transfer earnings. When the transfer earnings of a factor unit are zero, the whole of its present income is economic rent*.

2. HISTORICA BACKGROUND OF THE CONCEPT

The concept of rent has a historical background to it. It arose out of the famous corn price controversy. In the early part of the 19th century there arose a controversy regarding the causes of the high prices of corn (the generic term used for all grains). Some people held the view that corn prices were high because landlords were charging high rents from farmers. High rents meant high costs of production to the farmers. In order to meet these high costs the prices that farmers charged for their grains had to be raised to a high level. *Therefore, it was argued, corn prices were high because their costs of production were high and costs of production were high because rents of land were high. Thus, according to this view, rent being a cost of production was considered to be the cause of high corn prices.* Those

who held this view advocated for restricting the powers of the landlords and somehow forcing them to behave reasonably.

Contrary to the above view, Ricardo (the great classical economist) held that rents of land were high because corn prices were high. He argued that prices of corn had risen high because of the shortage of corn caused by the Napoleonic wars and increased population. Because of the high corn prices corn-growing had become more profitable and as a result there was keen competition among farmers to obtain land. This competition among farmers bid up the rents of land. If the price of corn were to fall so that corn-growing became less profitable, the demand for land would fall and the price paid for the use of land (i.e., rent) would fall accordingly. Therefore, Ricardo advocated for the removal of tariffs so that cheap corn could be imported into the country. *Thus, according to Ricardo, price of corn was high not because rents of land were high, on the contrary, rents of land were high because prices of corn were high.*

In terms of the demand and supply framework of factor price determination developed above, Ricardo's arguments amount to this: The landlords cannot just charge any rent they like. It is determined by the forces of demand for and supply of land. The demand for land is derived out of the demand for corn it helps to produce. Higher the price of corn higher will be the demand for land. Because of the operation of the jaw of diminishing returns the demand curve for land is downward sloping.

Regarding the supply of land Ricardo assumed that for the economy as a whole land was in perfectly inelastic supply and it had only one use, the growing of corn. In other words, land has no transfer earnings and therefore, whatever land earned was a surplus over and above the minimum necessary to retain it in its present use. Given the perfectly inelastic supply of land, its price-rent-depends on the demand for land, which itself is a function of the price of corn. Ricardo's argument can be explained with the help of a simple diagram 19.1.

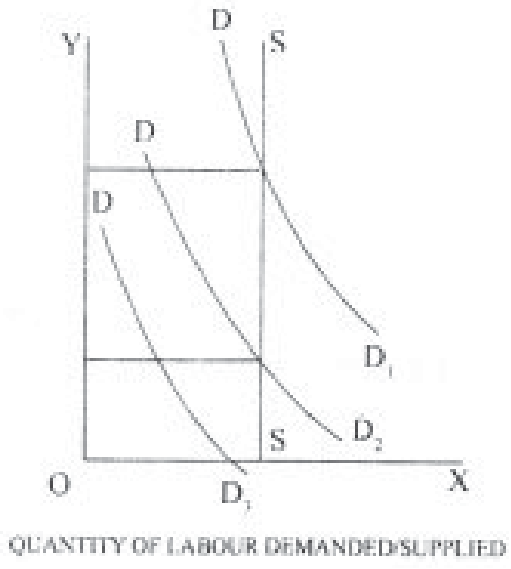


Diagram 19.1

As usual, on the horizontal axis we measure the quantity of land demanded and supplied and on the vertical axis we measure MRP and rent of land. The supply of land is assumed to be perfectly inelastic implying that whatever the level of rent, the quantity supplied remains fixed at OS. D_1, D_2 and, D_3 are three demand curves for land based on three different, prices of corn. They are downward sloping because of the operation of the law of diminishing returns. With D_1 as the demand curve for land,

equilibrium level of rent will be OR_1, with D_1 it will be OR_2 and with D_3 it will be zero. What needs careful attention is the fact that *given the perfectly inelastic, supply of land (i.e., transfer earnings zero), what land earned as rent depends entirely on the demand for land, which itself is as function of the price of corn. Higher is the price of corn, higher the demand curve for land ($D_1 > D_2 > D_3$), higher, correspondingly, is the level of rent. Because transfer earnings of land are zero, therefore, whatever land earns as rent is a pure circles and hence, rent in the economic sense.*

Historically the concept of rent has been closely associated with the concept of the 'free gifts of nature'. The chief of these 'free gifts of nature' is space and for this reason they have usually been referred to simply as land. The essential characteristic of the free gifts of nature is that, in contrast to other factors of production, they do not owe their origin to human effort. A free gift of nature, by its very definition; exists by the grace of nature and no human effort is required to bring it into existence. No amount of human effort can influence its supply in the slightest degree even in the long run. Its supply price to the society is zero and therefore, whatever is paid for its use is economic rent. *Subsequently it was realised that factors of production other than land often earn a surplus over and above what is necessary to keep them in their present use*. A musician, for instance, may earn a very high income because of the high demand for his services. But if the demand for his services falls and he has to work as an unskilled labourer, he *will* earn a very low income. Therefore, as a musician he is receiving much in excess of what is needed to retain him in his present use. *Secondly, it was also realized that even when the total supply of a factor is assumed to be absolutely fixed (i.e., in perfectly inelastic supply), from the standpoint of any one use, its supply will be more elastic (and may be even perfectly elastic)*. Consequently, a part or whole of the price paid for the use of land would be a necessary inducement to retain it in its present use. (*i.e., its* transfer earnings) and only the rest would be a pure surplus. *Thus, it was realized that factors other than land were very much the same in these respects; a part of the price paid represents transfer earnings and the rest is a surplus over transfer earnings. Therefore, the term rent which was originally confined to the earnings of land (the free gifts of nature) was latter borrowed by economists as the title of the sort of surplus income earned by any factor over and above what was necessary for keeping it in, the present use (transfer-earnings). This surplus (over and above transfer earnings) is now described as 'economic rent' irrespective of to which factor it accrues.*

3. ELASTICITY OF SUPPLY AND ECONOMIC RENT

Historically, the concept of land emerged in the context of the free gifts of nature (i.e., land) which do not owe their origin to human effort. Ricardo analyzed the problem from the stand-point of the whole economy. From the economy's point of view the supply of land is perfectly inelastic and it has no alternative use (i.e., has no transfer price). Therefore whatever land earns is a surplus over its transfer earnings and hence economic rent. However, when we look at the matter from the stand-point of a single use (an industry) or a single user (an individual firm), the supply of land, which is completely inelastic for the economy as a whole, becomes more elastic or ever perfectly elastic. For example, for a single industry the supply of land will be more than perfectly inelastic because by paying a slightly higher price for its use it can always compete away some land from other industries. And from the point of view of a single firm, which uses a very small fraction of the total supply of land, which is assumed to be perfectly inelastic from the economy's point of view, supply, land is more elastic or even perfectly elastic. The same argument applies to the supplies of factors other than land. What happens to rent when elasticity of supply varies for different uses? In order to answer this question let us analyse the effect of elasticity of a factor on rent.

1. When Supply of Factor is Perfectly Inelastic

The demend for a factor depends on its MRP which itself depends on the price of the commodity which the factor'helps to produce. Higher the price or the commodity, higher will be the demand for the factor

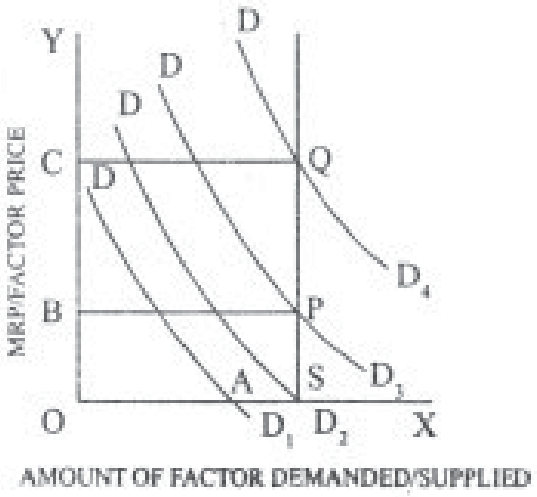


Diagram 19.2

and vice versa. When the supply of a factor is completely inelastic, the supply curve would be vertical (parallel to the Y axis) implying that it is totally insensitive to changes in the price of the factor. The given amount of the factor is available for use in production whether or not a price is paid for its use. For example, in the diagram 19.2 the supply of a factor remains fixed at OS whether price paid is zero, OB or OC. The demand curve OD_1 intersects the X axis at A implying that only OA amount of the factor is used, AS remains unused and factor commands no price.DD_2 intersects the supply curve at simplifying that the whole supply of the factor is used but still no price is paid. However, when the demand curve rises to DD_3, the factor starts commanding a price equal to OB. And when the demand curve rises further to DD_4 factor price rises from OB to OC. The conclusion is evident. *When the supply of a factor is completely inelastic (i.e., its supply price is zero), the whole of its earnings will be surplus over its transfer earnings and hence economic rent. Secondly, the level of price will depend upon the height of the factor's demand curve which, in turn, depends on the price of the commodity the factor helps to produce. Higher the price of the commodity, higher will be the demand curve and higher, consequently, will be the factor price*. This is how Ricardo viewed the problem of rent of land.

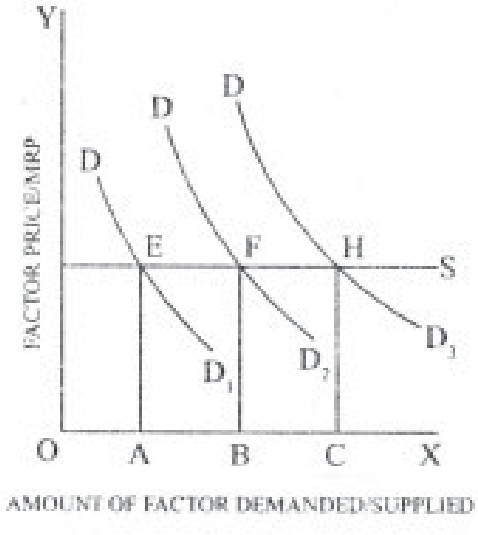


Diagram 19.3

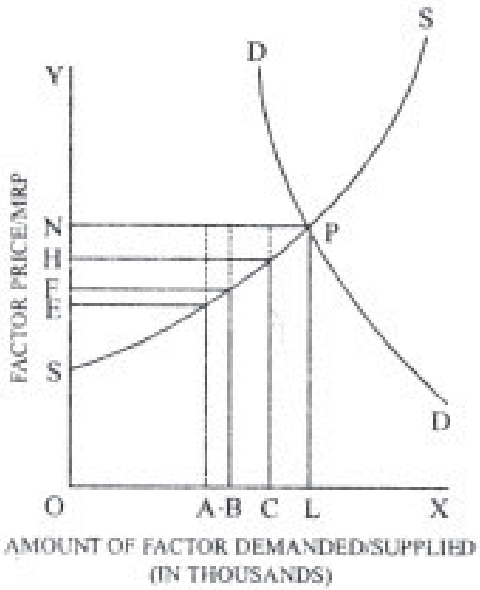


Diagram 19.4

2. The Perfectly Elastic Supply Case

When the supply of a factor is perfectly elastic, its supply curve will be horizontal and parallel to the X-axis as shown in the diagram below. A perfectly elastic supply curve implies that any amount of the factor can be purchased at the prevailing price of the factor, For example, in diagram 19.3 above, price of the factor remains fixed equal to OS whether the demand curve for the factor is DD_1, DD_2, or DD_3. Thus, in this case the factor gets a price exactly equal to its transfer earnings (= OS) and nothing more. *Thus, in this case the factor earns no rent. Therefore, we conclude that when the supply of a factor is perfectly elastic it earns no rent.*

3. Less than Perfectly Elastic Supply Case

A less than perfectly elastic factor supply curve implies that larger amounts of the factor can be bought by offering higher and higher prices. Such a supply curve would be upward rising as shown in the diagram 19.4. Supply curve SS in the above diagram shows that OA amount of the factor can be bought at OE price, OB amount can be bought at OF price, OC amount can be bought at OH price, and so on. Given the demand curve DD (i.e., the MRP curve of the factor) and the supply curve SS, the point of intersection at P determines the equilibrium with ON as the price and OL as the quantity demanded and supplied. Each unit of the factor gets a price equal to ON and the total payment received by the factor equals the area OLPN.

The important point to note in the present case is the feet that only the marginal unit (*i.e.*, the last unit purchased) the OLth unit-has a supply price equal-to ON and all the intra-marginal units (*i.e.*, all the units except the marginal unit) get a price which is more than their respective supply prices. For example, the supply price of OA amount of the factor is only OE whereas its actual price is ON, the supply price of OB amount is only OF whereas its actual price is ON, the supply price of OC amount is OH but its actual price is again ON, and so on. Thus, all the intra-marginal units earn more than their respective supply prices. The vertical distance (shown by broken lines in the diagram) between the supply curve and the price line NP represent the surplus earned by each unit, over and above its supply price. The surplus earned by each unit over and above its supply price is economic rent. The marginal unit earns no rent because it earns a reward just equal to its supply price. According to the above diagram the area OLPN represents the total amount actually earned by the factor and the area OLPS represent its transfer earnings. Thus, the area SPN represents the economic rent under the present situation. SPN represents the difference between OLPN and OLPS, i.e., the difference between total amount actually earned and the total transfer earnings (the amount necessary to call forth the requisite amount of the factor). *Thus, in the present case a part of the actual price paid to each, except the marginal unit, is its transfer earning and the other part is economic rent.*

The above discussion leads us to the following important conclusions.

1. Economic rent arises due to inelasticity of supply. If the supply of a factor is perfectly elastic, it will earn no rent; it will only earn a price equal to its transfer earnings.
2. When the supply of a factor is perfectly inelastic (i.e., its transfer earnings are zero), the whole of its actual price is economic rent
3. When the supply of a factor is neither perfectly elastic nor perfectly inelastic, a part of the factor price will be rent and the other part its transfer earnings.

All the above conclusions can be summed up in a single conclusion: *The higher the elasticity of supply of a factor, lower is the share of economic rent in its price and vice versa.*

LESSON 20

QUASI RENT

Our discussion in the preceding sub-section has shown that the inelasticity of supply of a factor is the basic reason for the emergence of economic rent. Higher the elasticity of supply of a factor, lower will be the rent element in its earnings and vice versa. If the supply of any factor is perfectly elastic for all amounts, it earns a reward just equal to its transfer price and no rent. On the other hand, if the supply of a factor is perfectly inelastic, by definition, its transfer price is zero and as a result the whole of its income is economic rent. *However, inelasticity of supply of factors may be a short-run or a long-run phenomenon. This adds another dimension to the theory of rent discussed thus far.*

Inelasticity of supply may be a permanent feature of some factors in the sense that no amount of human effort can increase or decrease their supplies even in the long run. Land (i.e., the free gifts of nature) can be cited as the example of a factor whose supply is perfectly inelastic even in the long run. Similarly, nature has endowed some persons with certain rare gifts whose supply cannot be influenced by human effort even in the long-run. For example, some singers, actors, poets, writers, etc., are endowed with some unique innate qualities which can never be duplicated, whatever the amount of education and training. When the demand for the services of such factors increases, rents earned by them increase without limit, there is no force on the supply side to wipe out these rents even in the long-run. These rents cannot be competed away because supply of such factors cannot be increased or decreased by human action even in the long run. These rents increase or decrease depending entirely on the intensity of demand for such factors.

In contrast, there are also factors whose supplies tend to be inelastic in the short run but not so in the long run. This is true of all man-made instruments of production and investment in human skills. An increase in the demand for residential houses, for example, leads in the long ran to the construction of more residential buildings. Or, to take an example of human capital, an increase in the demand for engineers will lead to an increase in their supply, given sufficient time for training and education and given favourable long-ran expectations of earning good incomes. However, in the short run their supply is perfectly inelastic (or nearly so) because (1) it takes time to build such durable capital assets and (2) returns from such durable assets being spread over a number of years in the future, investment in them will be undertaken only when they are expected to yield normal returns over their productive lives and not merely on the basis of short-ran fluctuations in demand which are expected to be temporary. Because of these constraints the supply of such factors is almost perfectly inelastic in the short rah but given sufficient time and favourable long-run expectations regarding their returns, their supplies can always be adjusted to the demand for them. For the same reason their supplies cannot be reduced in the short-run. In other words, their supplies are perfectly inelastic in the short run. Therefore, in the short run they will continue to be used so long as they earn anything over and above their operating costs because from the short-ran point of view their transfer earnings are zero Whatever income, therefore, they earn in the short ran over and above their operating costs (i.e., variable costs) *is* in the nature of economic rent. However, from the long-run point of view capital assets are expected to earn some

normal return over all costs to make investment in them worthwhile. Thus, a part of what appears to be economic rent in the short period will, from the long-run point of view represent only the transfer price of such capital assets necessary to keep them in their present use. *Therefore, factor incomes whose short-run behaviour resembles the behaviour of land rent in the long run are called quasi rents. In short, quasi rent is at the mercy of short-run demand just as rent of land in the long run depends on long-run demand.*

Marshall was the first economist to introduce the concept of quasi rent in economic literature. *However, he restricted the use of this concept only to the earnings of capital goods in the short period.* But there seems to be no reason why the use of his concept cannot be generalised to apply to the short-run earnings of all those factors whose supplies can" be influenced by human effort in the long run. How are, for example, skilled personnel specialized for particular jobs such, as doctor, engineers, nurses, technicians, etc., different from capital goods ? Given sufficient time for education, training and apprenticeship, the supplies of such specialists can always be adjusted to the demand for them in the long-run. Therefore, their short run incomes are strictly comparable to the short-run earnings of capital goods. Supplies of such specialists are perfectly inelastic only in the short run (because engineers and doctors cannot be trained over night) but not so in long-run. *Therefore, the concept of quasi rent can be generalized to cover the short-run earnings of all those factors whose supplies are inelastic in the short-run but can be increased or decreased by human effort in the long run.*

Using short run equilibrium situation of a competitive firm we can show quasi-rent as given in diagram 20.1.

Quasi Rent is the surplus of Total revenue over total variable cost in the short run. In the diag. 20.1 equilibrium point of firm given AR = MR is F with price OP and quantity OQ. So total revenue is the area OPFQ. With the average variable cost (AVC) being GQ per unit of output the total variable cost is the area OAGQ. So Quasirent is the area (OPFQ-OAGQ) i.e. area APFG. (Shaded area). It has two parts, (i) Area APFG = Area ABDG + Area BPFD. Area ABDG is the difference between area OBDQ and area OAGQ. Area OBDQ being total cost and area OAGQ being total variable cost hence area ABDQ is total fixed cost (TFC). Area (ii) The second part is area BPFD which is abnormal Profit (OA) of the firm.

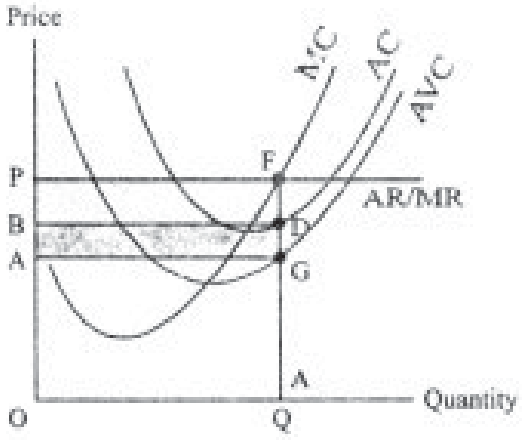


Diagram 20.1

Hence Quasirent = area (ABDG + BPFD)

or Quasirent = Abnormal Profit + Total fixed cost

= TA + TFC.

Note that dA and TFC vanishes in the longrun. So Quasirent is a short run phenomena.

RENT ELEMENT IN THE EARNINGS OF DIFFERENT FACTORS

Modern economists define rent as the surplus earned by a factor unit over and above its transfer price. Transfer price is the income that a factor unit can earn in its next most profitable employment. Factors of production do not consist of homogenous units in respect or their efficiency either in a single industry or in different industries and occupations. Each factor unit has a hierarchy of possible alternative uses out of, which it tends to be allocated to the most profitable use. *How much of the 'present income of a factor unit is economic rent and how much is its transfer price depends on which of its alternative uses we choose to consider; in firms within the same industry, in a different industry, in a different occupation or region.*

Within a single competitive industry each firm will have to pay the same price to a factor. Therefore, within the same industry no unit of a factor is likely to earn economic rent. For example, a textile worker will receive the same wage whether he works in one textile factory or the other. However, this will not be the case when we consider a person's transfer price in another industry. For example, the next best alternative employment available to a doctor, let us suppose, is to work as a teacher. As a teacher he is likely to earn much less than what he can earn as a doctor. Therefore excess of his income as a doctor over his income as a teacher will be economic rent. Next consider a doctor's transfer price as an unskilled labourer. As an unskilled labourer his earning are bound to be very low compared-to his earnings as a doctor. With reference to his transfer price as an unskilled labourer, the greater part of his income as a doctor will be *economic rent. Therefore, we cannot assert that so much of the income of a factor unit is economic rent per se. A factor unit may have several alternative uses and hence a number of transfer prices. How much of the present income of a factor unit is economic rent depends on which of the alternative uses of the factor we choose to consider.* If a certain factor unit has no alternative use (i.e., it is completely specific to its present use), by definition its transfer price is zero and the whole of its earnings in the present Use is economic rent.

Arguments applicable to the earnings of labour are also equally applicable to the payments made for the use of land, earnings of capital assets and entrepreneurs. Let us first analyse the payment made for the use of land. In the Ricardian framework of analysis, the supply of land for the society as a whole is perfectly inelastic and it has no alternative use except corn-growing. In other words, its transfer price for the society as a v/hole is zero. Therefore whatever is paid for the use of island is pure economic rent. This is how Ricardo analysed the problem of rent. However, the supply of land, which is perfectly inelastic for the society as a whole, is more elastic from the standpoint of a single industry using land. Let us consider the supply of land to two competing crops such as wheat and cotton. Wheat growers can always divert some land from cotton by paying a price slightly higher than what land can earn under cotton. Even though the supply of land for the society as a whole is perfectly inelastic, its supply to an industry is more elastic. *What land can earn when put to cotton growing is its transfer price from the standpoint of wheat growing. The excess of the price paid by wheat growers over what land can earn under cotton is economic rent.* We can also look at the problem from the standpoint of a small farmer who is one of a large number of competitors for the available supply of land, At the going market price an individual can obtain as much of land as he may need and he will not be able to command any land at ail if he offers a lower price. Thus, at the going market price supply of land is perfectly elastic for him. The going market price represents the transfer price of land to him. Therefore, in this case land earns no rent. *Thus, what is pure economic rent from the standpoint of the society as whole, becomes partly economic rent and partly transfer price when looked at from the standpoint of an industry and no part of it remains economic rent when looked at from the point of view of a small producer. Thus, we reach the important conclusion that magnitude of economic rent earned by a factor unit depends on which transfer price we take as our point of reference.*

Similar arguments apply to the earnings of capital assets and entrepreneurs. Returns on durable capital assets may represent partly their transfer prices and partly economic rent earned by them. For two reasons the supply of durable capital assets is perfectly inelastic (or nearly so) in the short ran. First, it takes a long time to build them. Their supply cannot be increased over-night. Second, returns from durable capital assets are spread over the whole of their productive lives. Therefore, investment in them will be undertaken only if they are expected to yield a certain minimum return (at least equal to the rate of interest) over the whole of their productive lives and not merely on the basis of short-run fluctuations in demand which may be expected to be temporary. *Because of these constraints the supply of durable capita/ assets Is perfect/y inelastic In the short run*. Therefore, in the short run it will be worthwhile to continue using them so long as they earn any income over their operating costs. From the short-run point of view their transfer prices are zero. *Therefore, whatever income they earn*

over their operating Cost in the short run 18 economic rent which has been termed as 'Quasi Rent'. However, from the long ran point of view a part of what appears to be economic rent becomes the transfer price of the capital assets because, unless they are expected to yield a certain minimum return (at least equal to the rate of interest) net of all costs, they will not continue to be allocated to their present uses. *It is thus evident that economic rent can accrue even to capita/ assets.*

Arguments applicable to the earnings of capital assets are equally applicable to the earnings of entrepreneurs as well. In the long run the necessary minimum for art entrepreneur is the level of earnings which is sufficient-to prevent him from relapsing into the ranks of employed labour. *Most entrepreneurs earn Incomes much greater than the necessary minimum. The excess of an entrepreneur's actual income over the necessary minimum is in the nature of economic rent*. However, from the purely short-run point of view, when an entrepreneur has committed his resources to a particular field, whatever he earns in the present use is quasi rent because in the short run he cannot move out of the industry. *In other words, his transfer price is zero in the short run and the while of his short-run earnings are 'in the nature of economic* rent. From the long-run point of view a part of these short-run earnings represents transfer price.

TOPIC 7

MARKET SUCCESS AND MARKET FAILURE

LESSON 21

MARKET SUCCESS AND MARKET FAILURE

1. Basic functions of government: According to Classical economist Adam Smith government must-perform two basic duties:
   (a) government must protect the society from the violence and invasion of other independent societies
   (b) government must protect, as far possible, every member of the society from injustice or oppression of every other member of it. In the sphere of economy this implies that government must provide security of property and define and enforce property rights that give people a secure claim to the fruits of their own labour and allow markets to function efficiently. These property rights include effective legislation on consumption and production rights, working of institution such as insurance companies, banking, stock exchanges and joint stock companies etc.
2. Market efficiency:-See allocative and productive efficiency of perfectly competitive market.
3. Market Failure:- Market failure refers to failure of market mechanism to achieve efficient allocation of resources in the economy allowing a smooth circular flow of income. There are several factors responsible for market failure. They are-
   (i) lack of competition among firms and presence of market power in the form of oligopoly or monopoly which is also called imperfect competition. There is presence of excess capacity in these markets and price exceeds marginal cost causing allocative inefficiency by reducing consumers and producers combined surplus.
   (ii) Provision of public goods whose consumption cannot be only restricted to those who can pay for them and common property resources whose owners are none but users are everybody.
   (iii) Problems of externalities in both consumption and production wherein action of one agent affects another in the society.
   (iv) Asymmetric information which creates a situation where one party to a market transaction has fuller knowledge of it consequences than is available to the other party. For example in the market for secondhand car only the seller knows the actual condition of the car and buyer has no information on the quality of the product.
   (v) If there are missing markets i.e. needed markets do not exist at all.

PUBLIC POLICY TOWARDS MONOPOLY AND COMPETITION

We have already seen that monopoly is allocatively inefficient because of lower output and price being higher than marginal cost which cause dead weight loss to the society. This calls for government intervention. Government intervention can take several forms as given below.

(i) Government may ask monopoly firm to produce at a price equal to marginal cost. This is not a problem if the monopolist continues to earn profit at marginal cost pricing. But in case of natural monopoly marginal cost pricing will create losses to the firm. (See diagram below)

In panel-1 of diagram 21.1 if government controls the price at p0 which is equal to marginal cost at point-E there is still profits for the monopolist since at this price average cost is C_1 which is less. So profit is P_0C_1, per unit of output. Here the government successfully controls the monopolist who also survives in the market by getting some profit.

But in case of a natural monopoly (panel-2 of diagram 21.1 marginal cost pricing lead to loss because at price P_0 = MC average cost C_1 is more so that loss in C_1P_0 per unit of output. Natural monopolies emerge in the provision of public utilites where of a single firm can supply the market output.

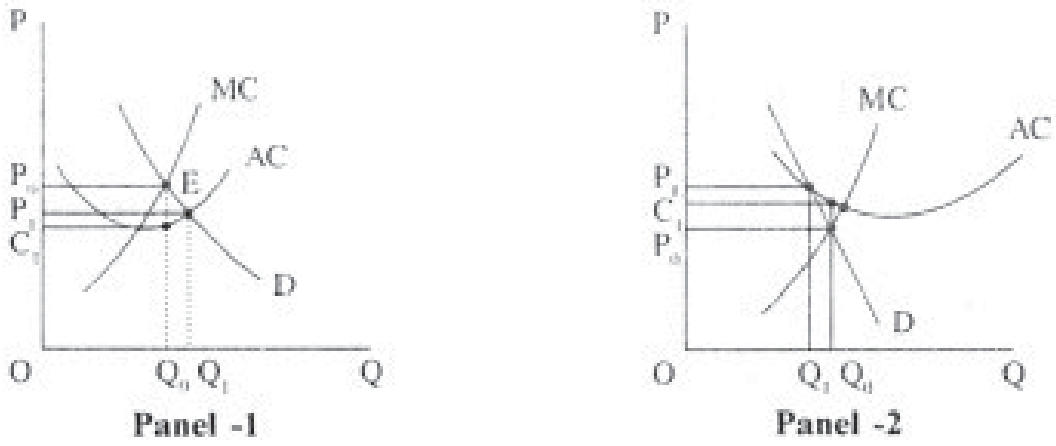


Diagram 21.1

(ii) Even controlling price at average cost level may be inefficient again for natural monopoly. As in panel-2 of diagram 21.1 P_1 is average cost price which is higher and the corresponding output, is below competitive level of Q_0.

(iii) Since both marginal cost and average cost pricing do not yield desired result for natural monopolies, they are directly taken over by government itself in many countries.

(iv) Technological changes have made many natural monopolies behave like competitive industry. So government policies must adjust itself to continuous technological change.

(v) Due to failure of government as business organization there have been a wave of privatization recently in many countries including India. Many nationalized industries have been privatized in UK. Disinvestment of public sector units in India is another example. While allowing privatization to be implemented rapidly governments are also creating public regulatory authorities to look into the functioning of these natural monopolies. In UK example of such bodies are OFTEL (Telephones), OFGAS (gas) etc. Security Exchange Board of India SEBI in a regulatory body in India. Privatization reduces governments' role in business and allows innovations to take place faster. It is expected that government's intervention as controller and regulator must allow competition to grow among firms.

TOPIC 8

INTERNATIONAL TRADE

LESSON 22

INTRODUCTION TO INTERNATIONAL TRADE

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The term trade refers to exchange of goods and services and when it takes place across the countries, it is called international trade. All countries are not sufficient in themselves. Different countries different endowed with resources, Generally, while a country has the abundances or surplus of some resources it suffers the scarcity of certain others.

Gulf countries for example are endowed with expensive oil beyond what they themselves would need. But there fare suffering the scarcity of industrial goods and food grains. In such; situations, trade across the boundaries helps to exchange your surplus goods with those who do not have. International trade implies international specialization.

An economy that engages in international trade is an open economy. A country that does not involve in trade is called closed economy and situation in which a country conducts no foreign trade is called autarky. The advantages which are gained from trade with other country fare called the gains from trade.

22.1 DISTINGUISH BETWEEN INTERPERSONAL, INTERREGIONAL AND INTERNATIONAL TRADE

Each person would have to be self-sufficient without trade. If the person would produce all the food, clothing, shelter, medical services, entertainment and luxuries etc. But it is impossible for the particular person, Therefore trade between individual allows people to specialize in those activities of which they can do relatively well and to buy from others the goods and services at which cannot be produced by them easily. It is called interpersonal trade.

International trade is also based on interpersonal trade. Each region would be forced to be self-sufficient. If trade does not exist between these regions. But trade exist in the region where each region can specials in producing those goods or services for which it has some natural resources plain regions can produce that specialized goods which their abundance in that natural resources. For example, plain areas can produce different food grains while mountains regions can specialize in mining and forest products.

Therefore each region showed produce that goods in which it has some natural resources or acquired advantage and obtains other products of trade when all region scale to self-sufficient.

The interpersonal and interregional principles which have been mentioned in the case the nations, the international trade arises. Almost all countries produce more of some goods than their residents wish to consume. At the same time, they consume more than of that particular commodities whatever are producing.

International trade is necessary to achieve the gains that international specialization makes possible. Trade allows each individual region or nation to concentrate on producing those goods and services that it produces relatively efficient while trading to obtain goods and services that it would produce less efficiently than others.

Question 1 What do you mean by International trade or specialization?

Question 2 What is the basic of trade? Why do nations trade?

Question 3 What are the main difference between international and international trade?

Question 4 What is the scope of study of international trade?

22.2 INTERNATIONAL TRADE IMPLIES INTERNATIONAL SPECIALIZATION

From the individual's point of view, specialization refers to the acquisition of a specialized skill in the performance of particular activity or in the production of a particular commodity. From the country's point of view, it refers to utilization of the country's resources, in specialized areas of production in which the country has absolute or comparative cost advantage compared to the rest of the world. When the country's resources are utilized in certain specialized areas, production of specialized commodity tends to be more than their domestic need. The surplus products are exposed.

On the other hand, when resources are withdrawn from the non-specialized areas production of certain commodities falls short of the country's domestic requirements. This refers import situation. International trade-exports and imports are the obvious outcome of international specialization. Since international specialization is based on the principle of some theory which were given by different economists, the significance of international specialization lies in gains from trade.

Determinants of Internationa Trade

There are different factors which affect the international trade or international specialization which follows:

1. **Natural Endowment:** Natural endowment is the basic of international specialization. It refers to the resource base of a country available to it as a free gift of nature. Natural endowment also include nature and fertility at the soil as well as climate conditions. Thus India and Srilanka specialize in the production of tea simply because of the conducive climatic conditions.
2. **Technical condition:** International specialization also depends upon technical conditions of the country with their technical advancement developed of the world have solved all ^confronts of natural endowment. Japan, for example, is just a small coastal country which has a few natural resources but its technical superiority had made the distinction of most advanced nation in their field of Automobile production.
3. **Lost differences:** The fundamental basis of international specialization is the difference between the cost of production of the different commodities. Different countries specialize, in the production of those goods in which they have absolute or comparative cost advantage. The important parameter of competitiveness in the international market is the cost different of the produced goods.
4. **New Economic order:** Globalization of the World market through multi national corporative and the emergence of new economic order has forced various nations to integrate their economies with the rest of the world, leading to greater degree of specialization and international trade.

22.3 ADVANTATE OF INTERNATIONAL SPECIALIZATION OR INTERNATIONAL TRADE

There are different advantages from international trade or specialization which follows:

1. **Fuller utilization of Natural Resources:** International trade enables the natural resources to be exploited fully. Under developed countries are not in a position to utilize natural resource fully. Such countries export their raw materials to developed industrial countries.
2. **Cheaper goods:** International trade provides cheaper goods to those countries which cannot produce the particular goods. It is so because every country produces those goods in the production of which it has to incur less comparative cost. Accordingly, international specialization or trade facilitates higher level of consumption and therefore better quality of life.
3. **Surplus production:** International specialization enables every country to dispose off its surplus production. Some countries produce more goods than their own requirement. They sell this surplus production in other countries and they avoid the occurrences of deflationary pressures in the domestic economy.
4. **Bulk production and economies of scale:** On account of international specialization, 'different countries specialize in the production of those goods alone in which they enjoy favorable production conditions. As a result goods are produced in large quantity at low price in consonance with the economics of scale in the words of Mconnell, "International trade is a means by which nations can specialize increase the productivity of their resources and thereby realize a larger output than otherwise.
5. **Possibility of Economic Development:** Economic development of any countries depends upon the international trade. Underdeveloped countries can make the optimum use of their available natural resources and raw materials by imparting machinery and technical equipment from, the developed countries. They are thus enabled to increase their output and exports and thereby promote economic development. In the words of Robertson, "International trade is an engine of growth".
6. **International co-operation:** Mutual co-operation can be developed on the basis of international specialization with the different countries. It creates an atmosphere of good will, cordiality and friendship among the trading countries. According to Henry Cornez, "International specialization is the greatest civilizing agency.

LESSON 23

GAINS FROM TRADE

23.1 THE GAINS FROM TRADE OR SPECIALIZATION WITH GIVEN COSTS

The gains from trade depend on different theory is which some are discussed below: According to this theory difference is cost of production of different goods across different nation constitutes the fundamental basis of international trade. Difference in costs may be of three kinds.

1. Absolute Difference in costs

Adam Smith gave absolute differences cost theory. According to this theory, absolute difference in the cost of production of different goods across different counties is the basic reason behind the international specialization trade. The absolute cost difference arises when one country is in a position to produce a commodity at a very low cost compared to another country and the other country can produce some other commodity of a very low cost compared to the first country. All there becomes possible when a c.oun try is endowed with a special kind of soil, climate conditions and facilities. Consequently, a country specializes in the production of a particular commodity and exports it to other countries and imports another commodity from another country in which the letter specializes. It is further elaborated with the help of table.

TABLE 1
Absolute Difference in costs production of two countries

Countries	*Rice*	*Wheat*
India	2	4
Nepal	4	2
Total	6	6

It is clear from above table that one unit of labour produces 2 units of rice or 4 units of wheat in India, on the other hand one unit of labour in Nepal produces 4 units of rice and 2 units of wheat. It is clear that

In India 1 unit of rice = 2 units of wheat

In Nepal I unit of rice = 0.5 units of wheat

It is quite clear from the above example that India has an absolute advantage in the production of wheat and Nepal in production of rice. It is an essential condition of interference Trade that the production cost in two trading countries should be different.

The cost of the rice for wheat in India is 1 : 2 and in Nepal it is 1 : 5 there is no trade between those two countries and both produce both the commodity then two days of labour will produce in the two countries total of 6 unites of wheat and 6 units of rice. Suppose India specializes in wheat and Nepal in rice and they trade with each other. This can be shown by diagrammatically:

In the above figure, AB curve is the production possibility curve of Nepal and AC curve is the production possibility curve of India. Production possibility curve states that with the help of a given quantity of factors of production in order to produce more unit of a commodity how many units of another commodity will have to be sacrificed. Slope of these curves indicates the opportunity cost to two commodities opportunity cost also means that in order to produce one more unit of a given commodity how many units of another commodity are to be sacrificed. This figure is based on the assumption of the law of constant costs. That is why production possibility curves are straight lines/ AB curves states that if Nepal is to produce one unit of rice, it will have to sacrifice 0.5 unit of wheat. Hence if by giving one unit of rice it gets more than 0.5 unit of wheat, it will be a gainer. Similarly, AC curve indicates that if India chooses to produce one unit of rice it will have to sacrifice two units of wheat if, however, India gets one unit of rice by parking with less than two units of wheat then India will stand to gain by producing what shaded area ABC in the above figure refers to the gain from international trade. Distribution of this gain between the two countries will depend upon the terms of trade. Terms of trade are governed by the reciprocal demand of the countries concerned for each other's product.

Question: Examine the Absolute advantage theory of 'International trade.

Question: Explain the Adam Smith absolute advantage theory of international trade,

Theory of Comparative Costs

Theory of comparative costs was discussed by the famous economist David Ricardo in his book principles of political economy and taxation. The theory is also called theory of comparative advantage. Ricardo theory of comparative costs claims that trade enables countries to specialize in producing the products that they produce best. According the theory, specialization and free trade will benefit all trading partners even those that may be absolutely loss efficient producers.

Ricardo's comparative cost theory is based on the following assumptions:

1. There are only two countries and they produce two goods
2. Labour is the only factor of production and cost of production is measured in terms of labour units
3. All units of labour are homogenous
4. Production is subject to law of constant returns
5. Factors of production are perfectly mobile within the country but are perfectly immobile between two countries
6. There is no cost of transportation
7. International trade is free from all government comforts
8. There is full employment in countries engaged in international trade
9. There is perfect competition both in the goods market and factor market.

Comparative Difference in Costs

The comparative difference in the costs was given by David Ricardo. According to him, comparative difference in cost is the safe cause of international trade. Comparative difference in costs means that a country is in a position to produce both the goods at absolutely less cost than the other country. Yet it has greater comparative advantage in the production of one of the two goods, while it has less

comparative advantage in the production of the other good. The other country produces both the goods at a higher cost, but it has less comparative disadvantage in the production of one goods, while it has greater comparative disadvantage in the production of the other good.

Comparative advantage refers to the advantage in the production of a product by one country over another when that product can be produced at lower cost than in the other country in terms of other goods.

For example, there is a leading practicing lawyer in Delhi who is also a proficient typist. His clerk also knows typing but nothing about legal practice. Although the said lawyer is competent in both the jobs, yet he will gain comparatively more if he denotes all his time to legal practice. On the other hand, the clerk is less capable than the lawyer, still in typing job his comparative disadvantage is least. If the lawyer confines himself to legal practice and entrusts the typing job to his clerk he will enjoy greater comparative advantage.

In short, a country may have absolute cost advantage in the production of both goods A and B. Yet it may opt to specialize in A rather than B, because A offers comparatively greater cost advantage than B.

This can be shown by Table 1

TABLE 1

	Wheat	*Clothes (Metre)*
India	0.60m cloth	1.67 kg wheat
Nepal	2.00m cloth	0.50 kg wheat

We assume that the opportunity cost of producing 1 kilogram of wheat is 0.60 metre of cloth in India, while in Nepal it is 2 metres of cloth. The second column of this table gives the same information again but expressed as the opportunity cost of 1 metre of cloth. India has a comparative advantage in wheat production and Nepal is in the cloth.

It can be seen diagrammatically

AB is in the production possibility curve of India and AC of Nepal. It means that to get one metre of cloth, India has to sacrifice one unit of wheat. Nepal can get two units of wheat, by sacrificing one metre of cloth. It is clear that India has greater comparative advantage in the production of cloth and Nepal has least comparative disadvantage in the production of wheat.

By giving one unit of cloth to Nepal, India can get in exchange more than one unit of wheat. On the other hand, by with less than 2 units of wheat. Nepal can get one metre of cloth from India. Advantage arising out of international trade to both the countries is shown by the shaded area A advantage will be distributed between the two countries on the basis of settled terms of trade. Terms of trade are settled on the basis of reciprocal demand for each other's product.

Criticism of the Theory

Ricardo's theory of comparative costs is an important theory of international trade. In the words of Samuelson, "The theory of comparative advantage has in it a most important glimpse of truth". Despite being reciprocal from the logical point of view, it has many shortcomings.

1. **Only a Normative Theory:** Ricardo's theory of comparative costs is only a normative theory. It does explain as to how the resources of the country can be put to optimum use but it fails to explain the composition of international trade or the nature of exports and imports and what are their problems. It is not a positive explanation of international trade.

2. **Based on labour Theory of value:** Theory of comparative costs is based on the theory of labour cost. According to this theory, cost of a good depends upon the amount of labour necessary to produce it. But in reality cost of a good is also influenced by the price of other factors like land, capital etc in addition to that of labour. Critics of this theory therefore like to examine it in terms of money cost in place of labour cost.
3. **Transport costs ignored:** One of the main defects of the theory of comparative costs is that it does not take into account transport cost. In case of some commodities transport costs are higher than their production costs. It is therefore essential that while exporting and importing of goods total costs should be calculated by taking into account both production and transport costs. International trade is very much influenced by transport costs. It cannot be ignored.
4. **Based on the low of constant costs:** The theory assumes that cost of production per unit remains constant even if production is increased or decreased. The assumption is not only unrealistic but unscientific also. Ordinarily one finds that production is subject to the law of increasing costs or law of diminishing costs. The possibility of the opinion of law of constant costs is rare.
5. **Impossibility of complete specialization:** It is not possible for the countries participating in international trade to specialize fully in the production of some goods supposing India and Nepal enter into international trade India specialists in the production of cotton cloth and Nepal in the production of woollen cloth. Nepal being a small country cannot meet fully the demand of India for woollen cloth nor can it absorb all the cotton cloth produced in and exported from India. Hence we will have to produce both cotton and woollen cloth, It can therefore be asserted that full-scale international trade is possible only when it is between two equi-sized countries producing goods at equal value.
6. **Based on the free trade:** Classical economists assume that international trade is free from all restrictions, but the situation in the modern times is entirely different. No country wishes to expand upon any other country to the extent that it is pushed into the realm of uncertainties. Besides, several other situations like imperfect competition, trade restrictions, state trading, export-import duties and economic planning do not allow complete freedom of international trade.
7. **Static Conditions:** Another assumption implied in this theory is that tastes of the people and production conditions in two countries remain unchanged. Besides the supply of land capital and labour remain static. But in real world all these things go on changing from time to time. This assumption therefore is baseless.
8. **One-sided:** Ricardo's theory of international trade is one-sided. It takes into account the supply side of the trade but ignores the demand side. It tells us what goods a country imports or exports but does not explain as to how terms of trade and rate of exchange are determined.

Question: Explain the theory of comparative cost advantage in the context of International Trade.

Question: Distinguish between absolute and comparative advantage and show how all trading nations could gain from trade.

Opportunity Cost Theory

Opportunity cost theory was given by Prof. Habarler. He has attempted to elucidate the trade with the help of opportunity cost. In the words of Lipsey, "The opportunity cost of X in terms of Y is the number of units of y that must be sacrificed in order to produce one more unit of X.- For example, if to produced one ton of what two tons of grams are sacrificed then the opportunity cost of one tone of wheat is two tons of from that have been sacrificed.

According to Habarler, the factors of production have alternative uses. As such, the rate of exchange of goods is equal to their opportunity costs. It can be shown with the help of the following example.

Opportunity cost of the one unit of wheat and one unit of rice

Countries	*Opportunity cost of one unit of wheat*	*Opportunity cost of one unit of rice*
India	0.6 units of rice	1.67 units of wheat
Nepal	2.0 units of rice	0.5 unit of wheat

From the above table, in India one unit of factor can produce 6 quintals of rice or 10 quintals of wheat. Thus in India, opportunity cost of 1 unit of wheat is 0.6 unit of rice and the opportunity cost of 1 unit of rice is 1.67 units of wheat. On the other hand, in Nepal one unit of a factor can produce 8 quintals of rice or 4 quintals of wheat. Thus in Nepal, opportunity cost of 1 unit of wheat is 2 units of rice and the opportunity cost of one unit of rice is 0.5 unit of wheat.

It is clear from the above table that in India in order to produce 1 unit of rice more than one unit of wheat is to be sacrificed and in Nepal in order to produce 1 unit of wheat more than 1 unit of rice is to be sacrificed. Both the countries should gain if India specializes in wheat and Nepal in rice.

23.2 THE GAINS FROM TRADE WITH VARYING OPPORTUNITY COSTS

International trade provide facilities to an expansion of the set of goods that can be consumed in the economy in two ways 1) by allowing the bundle of goods consumed to different from the bundle produced and 2) by permitting profitable change in the pattern of production. In the absence of international trade, the bundle of the particular commodities will be consumed which are available in that country. International trade, however, increase the productivity and standard of living of the country. It can be seen by diagrammatically.

Fixed Production

In the above diagrams, the DE is the production possibility boundary curve and TT is the consumption possibilities curve. If there is no international trade, the economy must consume the same bundle of goods that it produces. Thus, the production possibility boundary is also the consumption possibility boundary. Suppose the economy produces and consumes at point A with X1 of good X and Y_1 of good y. The slope of TT indicates the quantity of Y that exchanges for 9 units of X on the international market. Let us assume that at the point A good Y can be exchanged for good X internationally.

Although production is fixed at 9, consumption can now be anywhere on the line TT. For example, the consumption point could be at B. This could be achieved by exporting y1-y2 units at Y and importing x2-x1 units of x. Since point B lies outside the production possibility boundary are potential gains from trade. There is no restriction for the consumer to stay at their country's production possibilities. Let us suppose consumer prefers point A to point B. They have achieved a gain from trade by being allowed to exchange some of their production of good for some quantity of good x and to consume more of good x than is produced at home.

Variable Production

The country may produce the bundle of goods that is most valuable in world market. There is a further opportunity for the expansion of the country's consumption possibilities. The production bundle may be changed in response to international prices in case of trade with other countries. This can be shown by diagrammatically.

The consumption possibility set is shifted to the line LL by changing production from A to D and thereby increasing the country's degree of specialization in goods Y. The change line TT allows more consumption of both goods such as point D and F. The new consumption possibility set lies everywhere above the production possibility curve except the point D with zero trade. The gains from the trade can be achieved by moving from no trade position such as A to a trading position such as B or F. When the production of good Y is increased and the production of good X demanded, the country is able to move to 9 point such as F by producing more of good Y in which the country has a comparative advantage and trading the additional production for good X.

Question: Discuss the opportunity cost theory of international trade

Question: Discuss international trade equilibrium under constant and increasing in the production of the two goods.

LESSON 24

TERMS OF TRADE, FREE TRADE AND PROTECTION

24.1 TERMS OF TRADE

The terms of trade refer to the rate of which the goods of one country are exchanged for the goods of another county. It is a measure of the purchasing power of exports of a country in terms of in its imports and is expressed as the relation between exports prices and imports prices of its goods when the export prices of a country rise relatively to its import prices, its terms of trade are said to have improved. On the other hand, when its import prices rise relatively to its export prices, its terms of trade are said to have deteriorated. In case terms of trade deteriorate for a country its gain from trade is reduced because now it can have a smaller quantity of imports in exchange for a given quantity of exports than before.

Terms of trade refer to the physical exchange ratio at which goods are exchanged for one another between the countries when trade takes place between two open economies certain goods are affected for sale by both the countries. Since many commodities are exported and imported simultaneously from both the sides we can no longer use the physical quantities like in terms of kilogram of wheat or metres of cloth. We find the index of export prices and index of import prices to determine the terms of trade.

We use the following equation to estimate terms of trade:

$$\text{Terms of trade} = \frac{\text{Index of export prices}}{\text{Index of import prices}} \times 100$$

This is also called the index of terms of trade. Terms of trade become favourable for a country if this index increases. Suppose export prices increase by 15% (i.e., price index of export increases from 100 to 115) and import prices increase by 5% (i.e., price index of import increases from 100 to 105), then the index of terms of trade increases from 100 to 109 (115/105 × 100 = 109). That is at new terms of trade one unit of exports will buy 5% more imports than at the old terms.

Similarly term of trade becomes unfavourable when percentage change in export prices is less than the percentage change in import prices. In such situations terms of trade index is below 100. Suppose export price index increases by 5% and import price index increases by 10% then the terms of trade index should be

Terms of trade (TOT) = 105/110 × 100

In this case one unit of export will buy approx 5% less imports.

Terms of trade are closely related to competitiveness. If the is 9, substantial increase in export prices implying a significant increase in index of term of trade, it may in fact be a situation of loss of competitiveness.

Question: What do you understand by terms of trade?

24.2 THE THEORY OF COMMERCIAL POLICY

Govt. policy towards international trade is known as commercial policy. A country either uses free trade policy or professionals' policy. The policy of non-intervention in international trade is known as free trade policy. Exporters and importers are allowed to trade policy freely without any export duty or import tariff.

Protectionism or protectionist policy on the other hand, refers to the policy of protecting the local producers (from foreign competition) through the imposition of tariffs or non-tax barriers. Non tax barriers include fixation of groups or making customs procedures deliberately complicated with a view to keeping imports under check.

Meaning of Free Trade

A trade policy which does not impose any barrier on the exchange of goods and services between different countries, is know as the free trade policy. Free trade allows all countries to specialize in producing products in which they have a comparative advantage, According to Smith, the concept of free trade policy refers to a system of commercial policy which draws no distinction between domestic and foreign commodities and thus which neither imposes additional burden on the letter nor grants by special favour to the farmer. Thus free trade policy permits international flow of goods and services without any artificial impediments. Hence a world of free trade would be one with no tariffs and no restrictions of any kind on importing or exporting. In such a world a country would import all those commodities that it would buy from abroad at a delivered price lower than the cost of producing then at home.

Advantages of Free Trade

There are different advantages of free trade policy which are follows:

1. Maximization of output: According to the principle of comparative cost advantage every country would specialize in the production of that commodity for which it is best suited or in the production of which it had comparatively greater advantage. This would create the maximization of wised output of diverse goods and services.
2. Optimum utilization of resources: Since production is conducted on the principle of Comparative cost advantage then the resources are optimally utilizes. Each country produces goods with least cost combination of inputs.

Disadvantages of Free Trade

The policy of free trade came to be practically abandoned after the great depression both on theoretical and practical grounds of which the following are the important ones:

1. Free trade pre-supposed the existence of laissez faire and the working of price mechanism under perfect competition. But these conditions do not exist in the present day world. Monopoly, monophony, carrels imperfect labour markets and tariffs led to the abandonment of the free trade.
2. Under the policy of free trade, some industries possess comparative advantage but other industries are not developed so this naturally leads to the one-sided development of the economy.
3. As under the regime of free trade there was laissez faire policy and the state did not impose any restrictions on the international movements of goods among nations. Many harmful commodities 'came to be imposed by unscrupulous merchants in a number of countries. This had extremely harmful effects on the health and welfare of the country.
4. Free trade policy may lead to the emergence of international monopolies and local monopolies. According to Harbarlor such monopolies developed under free trade which proved harmful to

the other countries and the domestic interests. This factor also led to the adoption of the policy of production.

5. Prof Harbarlor view that policy of free trade would help rapid economic development of backward countries cannot be accepted It is now well recognized that underdeveloped countries can develop better under a policy of protection rather tax free trade.

Question: What is commercial policy and explain the advantages and disadvantages of free trade.

24.3 THE CASE FOR PROTECTION

The term protection refers to a policy whereby domestic industries are to be protected from foreign competitions. The aim is to impose restrictions on the imports of low-priced production in order to encourage domestic industries productions high price products. The domestic industries may be protected by imposing import duties which raise the price of foreign goods by more than the price of domestic goods or they may be protected by groups of other non-tariff restriction which make imports of cheap foreign goods difficult or impossible or the domestic industries may be paid subsidies or aunties to enable them to compete with cheap foreign goods. There are two kinds of argument for protection which are commonly offered 1. Economic Arguments and 2. Non-Economic Arguments

Economic Arguments

The economic arguments usually offered in favour of protection. There are important arguments for the use of tariffs when the objective to make national income as large as possible.

1. To protect infant industries

To protect infant industry was first of all formulated of Alexander Hamilton but was popularized by F List. The aim of protection is to raise the standard of living in the country. It comes in a state and dynamic form. The static form assumes that world technology is given and constant. If an industry has large economies of scale costs will be high when industry is small but will fall as the industry grows. It is argued that if industries in their infancy are not protected from established foreign producers they cannot develop to enjoy the comparative advantages. So they are protected by providing all types of facilities such as subsidies heavy import duties on foreign goods etc. They may expand and enjoy internal economies of scale.

A newly developing country may find that in the early stages development its industries are unable to compete with established foreign rivals. A trade restriction may protect these industries from foreign competition while they grow up If these industries would be in the developed condition then they will be able to produce as cheaply as foreign rivals and therefore will be able to compete without protection.

The dynamic form of the argument emphasizes that technology is constantly increasing endogenously. Those industries which were stagnant in the early stage of development will gain technological experience and advancement. A country needs to protect its domestic industries during the early stages of development when industries are using the technology. The objective is not to move along a given falling long run cost curve but rather to develop industries that will have cost curves that fall over time as fast as the similar cost curves are falling in the advanced countries because of invention and innovation. To prevent the new industries from becoming stagnant under the protection that shields them from foreign competition the protection must be consistent on achieving success in foreign markets within a stated period of time. Once they have developed the skills needed to hold their own in the intense international competition associated with new technologies then protection can be removed. The advocates of their arguments for early protection point out that all the economically advanced countries developed their early industries under tariff protection:

2. To encourage learning by doing:

The dynamic version of the infant industry argument is supposes by the argument based on learning by doing learning by doing suggests that the pattern of comparative advantage can be changed. If a country learner enough through producing product in which it currently is at 9 comparative disadvantages, it may gain in the long run by specializing in those products and could develop a comparative advantage as the learning process lowers their cots.

Protecting a domestic industry from foreign competition may give its management time to learn to be efficient and its labour force time to acquire the needed skills.

Some countries have, succeeded in developing strong comparative advantages in targeted industries but other may failed. One reason such policies sometimes fail is that the industries and complacent. Another reason is the different of identifying the industries that will be able to succeed in the long run.

3. To create or to exploit a strategic trade advantage

An important recent argument for tariffs or other trade restriction is the need to create a strategic advantage in producing or marketing. New product will be expected to increase the normal profits. Some goods are produced in industries containing barrier to further entry. Firms in those industries can earn extra high profits ever long periods of time. Where such industries are already well established then is little chance that a new firm will replace one of the existing grants.

The first firm to develop and market a new product successfully may earn substantial pure profits over all of its opportunity costs and become one of the few established firms in the industry. If protection of the domestic market can increase the chance that one of the protected domestic firms will become one of the established firms in the international market the protection may pay off.

There are lots of high tech industries which are facing declining average total cost because of their large fixed cost of product development. For example, a new generation of civilian aircraft, computers software and pharmaceuticals. They are fixed costs of entering the market. They must be increased before a single unit of output can be sold in such industries a few firms can find place.

The characteristics just described are sometimes used to provide arguments for subsidizing the development of such industries or protecting their home market with a tariff. Suppose for example that there is room in the aircraft industry for only three major producers of the next round of passenger jets. If a government assists a domestic firm, this firm may become one of the three that succeed and the profits that are subsequently earned many more than repay the cost at the subsidy.

On the basis of above discussion the economists advises that their governments should adopt strategic trade policies more broadly than they now do. This means for high-tech industries, government protection of the home market and government subsidization of the product development stage.

Criticism: Critics argue that one all countries try to be strategic. They will all waste vest sums trying to break into industries in which there is no room for most of them. Supposes of strategic trade policy reply that a country cannot afford to stand by white others play the strategic game. According to advocates who support the strategic trade policy that there are key industries that have major spillovers into the rest of the economy. If a country wants to have a high standard of living it must compete with the best if a country lets all of its key industries migrate to others countries many of the others will follow. The country then risks being reduced to the status of a less developed nation.

Opponents argue that strategic trade policy is just the modern version of modernization, a policy of trying to enrich oneself at the expense of neighbors rather than working for mutually beneficial gains from trade. There are real doubts that such prosperity could be maintained if the volume of trade were to shrink steadily because of growing trade barriers.

To Protect Against Unfair Actions by Foreign firms and Governments

Tariffs may be used to prevent foreign industries from gaining an advantage over domestic industries by using practices that will harm domestic industries and hence lower national income. Subsidies and dumping are used to protect against unfair actions by foreign firms and government.

To Alter the Terms of Trade

Trade restrictions can be used to turn the terms of trade in favour of countries that produce and export a large of the world's supply of some product. They can also be used to turn the terms of trade in favour of countries that constitute a large fraction of the world demand for some product that they import.

Suppose a country that provides a large fraction of the total demand for some product that it imports.

But restrictions are imposed on the demand for the commodities through tariffs, it can force the price of that product. This turns the term of trade in its favour because it can now get more units of imports per unit of exports.

Non-Economic Argument

There are important non-economic arguments favouring protection. These factors are not maximizing rational income.

1. **Defence Argument:** A country should adopt the policy of protecting its industries from the standpoint of national defence. If a country is dependent on the other countries for its requirements of agricultural and industrial products, it will be very harmful for its national interest in terms of war.
2. **Non-economic advantages of diversification:** Comparative advantage might dictate that a country should specialize in producing a narrow range of products. The government might decide that there are distinct social advantages in encouraging a more diverse economy. Citizens should be given a wider range of occupations. The social and physiological advantages of diversification would more than compensate for a reduction in living standard.
3. **Risk of Specialization:** The specialization in the production of only a few products many involve risks that country does not wish to take. One such risk is that technological advances may render its major product obsolete. The pro-tariff argument is that the government can encourage a more diversified economy by protecting industries that otherwise could not compete.
4. **Protection of specific groups:** Although free trade will maximize per capita GDP over the whole economy, specific groups may have higher incomes under protection than under free trade. If a firm or industry in a monopoly condition then tariffs are used to restrict foreign competition. Tariffs tend to raise the relative income of a group of people who are in short supply domestically and to lower the relative income of a group of people who are in plentiful supply domestically tree trade does not the opposite.

Question: What do you understand by protection? Explain the economic and non-economic arguments for protectionism.

24.4 METHODS OF PROTECTION

We have now studied some of the many reason why government may wish to provide some protection for some of their domestic industries. Policy instruments of protection are broadly classified as:

1. Tariff barrier 2. Non-tariff barriers

1. **Tariff Barriers:** Tariff which is imposed by different countries in the world has been the most important type of trade restriction. A tariff is a ban or duty levied on the traded commodity as it crosses a national boundary. An import tariff is a duty on the imported commodity while

an export tariff is a duty on the exported commodity. In the context of the policy of protection import tariffs are more important than export tariffs. Infact tariff barriers are basically concerned with import duty. There are main two type of protection policy, first policies that directly raise prices and second policies that directly lower quantities.

The first type of protectionist policy directly increases the price at imposed commodities thereby offering protection to the domestic producers from international competition. A tariff which is often called an import duty is the most common policy of this type. This can be shown by diagrammatically in case of free trade and restricted trade.

In the above figure, the D and S are the demand and supply curve in domestic market and P_w is the world price. In case of free trade, domestic consumption is q_1 domestic production is q_0 and imports are q_0-q_1.

In case of restricted trade

It illustrates how gains/loss occurs to the consumer the government the domestic producer and the foreign producer when the tariff is imposed.

In above figure, D and S are the demand and supply curves of a commodity respectively. In free trade regime Q_0Q_1 units are imported at price P_w (Q_0Q_1 is the excess demand in case of domestic consumer)

Now, tariff given by it is imposed for each nit imported. Consequently the price increases by the amount oft and each domestic producer receives Pd price for all units sold.

At their price, the quantity consumer reduces by Q_2Q_1 units now the consumers are to pay a higher price Pd as compared to Pw for each unit of consumption. The total loss to consumer due to tariffs is given by area of region A, B and T As the price increases by t1, the consumer pays extra amount t for each of OQ_2 units.

The domestic producers now can sell more and their supply increase by Q_0Q_3 units. Consequently imports are restricted to only Q_3Q_2 units. The domestic t producers receive Pd price for each unit sold. Before their total revenue increase by area of region A B and C. C is the revenue which would have been earned by foreign producer in case of a free trade regime. The foreign producers can sell only Q_3Q_2 units at a price. Pw therefore their total revenue tends to decrease. The area T lost by consumer is received by government. It shows the total revenue collected by government tariffs when T per unit import duty is imposed (Total cost revenue = $T \times Q_3Q_2$)

After imposing tariff barriers the domestic price is increased by amount of tariff hence there is loss to domestic consumers and foreign producers and again to the domestic producers of course the government gains in terms of tax revenue.

Policies that directly lower quantities

The second type of protectionist policy directly restricts the quantity of an imported product. All the barriers that do not directly increase the price of an imported commodity are called non-tariff barriers. In other worlds, any direct or indirect trade restriction which does not involve tariff is called non-tariff barrier,. Import quota is one of the important types of non-tariff barriers. Under import quotas, the importing country sets a particular limit for a commodity beyond which no import is allowed during the stipulated time period.

Apart from import quota, for may years there has been in operation the voluntary export restriction (VER) through an agreement between the trading countries exporting country to agrees to limit the amount of a good that it sells to the importing country.

Question: What are the methods of protection?

Question: Distinguish between tariff and non-tariff barriers.

Fallacious trade policy arguments

There are many fallacies that exist for free trade as well as for protectionism. We have also seen that there are some valid arguments for a moderate degree of protectionism for one specific country. Fallacious arguments are heard on both sides and they colour much of the popular discussion. Such arguments have persisted for ages but their survival does not necessarily make them true. We examine them now to see where their fallacies lie.

(A) Fallacies related to free trade argument

1. **Free trade always benefits fall countries:** It is a standard knowledge that most developed economies do not believe in free trade. Infact a small group of developed countries tend to collude to make and after the terms of trade in their favour by following restrictive trade policies. If they resort to free trade unilaterally they would lose the advantages earlier enjoyed under the tariff protection regime. Thus free trade does not necessarily maximizes income or benefit of every trading partner.
2. **Infant industries never abandon their tariff protection:** It is argued that granting protection to infant industries is a mistake because these industries selfdom admit to growing up, and will cling to their protection even when fully grown. But infant industry tariff are a permanent tariff protection would be required to protect a weak industry never able to compete on an equal looking in the international market. But if the industries do grow up and achieve the expected scale and learning economies, the real costs of production are reduced and resources are freed for other uses
3. **Free trade maximizes world income under real world conditions:** Free trade can be shown to maximize world income when technology and comparative cots are given. But if technology is changing endogenously as a result of conscious decisions taken by firms and other agents of charge it cannot be proved that completely free markets will maximize income over time it is possible that some types of government interventions or market imperfections will produce more technological change than completely free and fully competitive markets,

Fallacious arguments for protectionism

1. **Avoid exploitation:** According to this argument the free trade policies benefit a nation at the cost of the other. In other words, free trade would never be mutually advantage as one party always gains at the expense of the other. In such a situation, it becomes necessary for weaker nations to protect themselves through various protectionist policies like tariffs port quota etc. But, the principle of comparative advantage refuses this argument by showing that both the trading partners tend to gain from international trade provided opportunity cost refers differ across the nations. Specialization and trader are expected to enhance production and consumption.
2. **Protects against low-wage foreign labour:** It is often argued that in industrials countries the cheap imports from low-wage nations will drive out domestic products from the market. This would lower the standard of living in industrialized nations down to the level prevailing in the low wage nations.

   However, this argument is not completely true as the developed nations tend to gain by obtaining imports at a low cost in exchange for the goods which must be exported owning to their surplus domestic production mutually beneficial trade is based on comparative advantage rather than the absolute advantage low-wage nation specializing in the production and export of capital intense commodities. Even if this does not happen high domestic labour costs can be effectively lowered if productivity of labour is higher than in low wage countries of abroad.

   Another side of the argument is that in the long run a richer nation can hurt itself by importing cheaply and not exporting at all. But imports can only be obtained by spending currency of

that nation. And foreign currency can be obtained either by exporting or by borrowing since one cannot borrow for long exports become essential. Hence trade always moves in tow directions i.e., imports must watch the exports.

3. **Greater the export better the living standard:** Yet another arguments is that exports of goods and services must enhance domestic income and employment. Thus it is beneficial to encourage exports through subsidies and reduce imports by imposition of trade

   Though it is very convincing this argument favouring protectionism is equally erroneous. Export value to domestic output of course but standard of living in a country depends on the availability of goods and services for consumption. The importance of exports is that they facilitate imports. In international trade goods pay for goods and more of moves from one country to another only to adjust the balance of payments disequibrilium. The currency of one country is for the other unless the country spends it on the purchase of goods in that country.

4. **Creation of employment:** Protection policies are sometimes favoured in country with large-scale unemployment. It is argued that these countries must impose tariff and import quotas to create employment in local industries producing similar products. However this would crate employment only in the short run. On the other hand when imports of a country decline exports of other countries suffer. It leads to unemployment and loss of income in the rest of the world sector. Consequently demand for goods would reduce from the country following protectionism. This implies loss of jobs in the export industry of the country. Hence while jobs are gained in less competitive protected industries, these are list in the unprotected export industry. This in the long urn employment will not rise but will only be redistributed among industries.

   Infact, redistribution of employment in favour of less efficient (protected) industry would only lower the overall level of output and therefore overall standard of living in the country.

Question: What are the various fallacious arguments favouring free trade and protection policy.

LESSON 25

GLOBAL COMMERCIAL POLICY

Practically all nations impose some restrictions on the free flow at international trade, f since these restrictions and regulations deal with the nation's trade or commerce, they are generally known as trade or commercial policies. When we take into account the effect of various supranational influences and international agreements on commercial policies, the global commercial policy comes into view.

During the great depression in early 1930's the world trade fell particularly due to free imposition of tariffs on imports by many countries. This resulted in reduced economic activity lower ' efficiency and less trade without an increase in employment. Since then several multilateral and regional agreements have taken place to avoid such situations in future.

GATT AND THE WTO

One of the most notable achievements of the postwar era was the creation of the General Agreement on Tariffs and Trade (GATT). It is an international organization which was created in 1947 with headquarter in Geneva (Switzerland) was devoted to promotion of free trade through multilateral trade negotiations. The principle of the GATT is that each member country agrees not to made unilateral tariff increases. This prevents the outbreak of tariff wars in which countries raise tariffs to protect particular domestic industries and to retaliate against tariff of other countries increases.

There are three basic principles on which GATT words.

1. **Non-Discrimination:** This principle refers to absolute acceptance of any reciprocal tariff reduction negotiated by one country with any of its trading partners. The principle diverts slightly only in cases of economic integration such as customs unions and in the trade between a nation and its former colourless and dominions.
2. **Elimination on non-tariff trade barriers:** GATT also on each member agrees not to resort to unilateral tariff hikes to prevent outbreak of tariff that only shirkers mutual gain from trade.
3. Consultation among nations in solving trade disputes within the GATT framework. Under the auspices of GATT eight rounds of global trade talks since 1945 have been completed. The three recently concluded GATT agreements are: The Kennedy round (completed in 1967) The Tokyo round (competed in 1979) and the Uruguay round (completed in 1993). Each of these rounds has resulted in reducing world tariffs substantially, the first two by one-third each and the last by about 40 percent.

The Uruguay round replaced the general agreement on tariffs and trade (GATT) with the World Trade Organization (WTO) in 1995 in Geneva with authority not only in trade in industrial products but also in agricultural products and services.

Types of Regional Agreement

Besides WTO, today there are various forms of regional economic associations to liberalize trade in small groups of nations. This is done to promote economic integration which refers to the commercial policy of discriminately reducing or eliminating trade barriers only among the nations joining together. The degree of economic integration depends on regional trade liberalizing agreements such as free-trade areas, customs unions, and common markets.

Free Trade Area: A free trade area allows for tariff free trade wherein all barriers are removed on trade among members but each nation regains its own barriers to trade with non-members. Therefore custom points have been set up at the common borders of members so that al imports into free trade areas should not tariff. Besides this various rules and regulations pertaining to custom duties, duty free passage of goods produced and imported among members, others tariffs etc are formulated with a view to promoting trade. The best examples are the European Free Trade Association EFT A), North America Free Trade Association (NAFTA), Southern Common Market (Marlousr) etc.

Custom Union: A custom union allows no tariff or their barriers on trade among members and in addition it harmonizes trade policies towards the rest of the world. Since they have a common tariff will against the outside world, there are no customs controls on movement of goods among members or the rules of origin. Examples are: European Union (EU) or European Common Markets, and Zollverin or Custom Union of a large number of Sovereign German States.

Common Markets: A common market goes a step further than the customs union by also allowing the free movement of labour and capital among member nations beside removing barriers on trade and harmonizing trade policies. The EU achieved the status of a common market at the beginning of 1993.

TRADE CREATION AND TRADE DIVERSION

Regional trade liberalization affects resource reallocation which is often studied under two heads: trade creation and trade diversion.

1. **Trade Creation:** Trade creation occurs when some domestic production in a nation that is a member of a customs union is replaced by lower cost imports from another member nation. This leads to increase in welfare of member nations as it promotes greater specialization in production based on comparative advantage. A trade members because some of the increase in real income spills over into increased imports from the rest of the world.
2. **Trade Diversion:** Trade diversion takes place when cheaper imports from outside the customs union are replaced by more expensive imports from a member nation due to preferential trade treatment given to members. This leads to lesser welfare because of shifts in production from efficient non-members to inefficient members. Thus international allocation of resources is worsened and production diverts from the principle of comparative advantage.

Trade Diverting: The trade diverting customs union brings mutual benefit to member nations as they result in trade diversion as well as trade creation. The welfare of non-member tends to decline as their economic resources are utilized less efficiently after trade is diverted away from them. Thus, while trade-creating customs union lead only to trade creation and increases welfare of members as well as non-member a trade diverting customs union leads to trade creation and trade diversion and while it tends to increase welfare-of members is surely reduces welfare of the rest of the world.

EFTA, NAFTA and other FATs

In 1960, the free trades are called the European Free trade Association was established among several nations. The United Kingdom, Austria, Denmark, Norway, Portugal, Sweden and Switzerland wish Finland becoming as associate member in 1961. The EFTA achieved free trade in industrial goods in 1967 but

only a few special provisions were made to reduce barriers on trade in agricultural products. On January 1994 the EFTA joined EC to form European Economic Area (EEA) a customs union that will eventually allow the free movement of most goods services capital and people among 17 member nations. In 1995, Austria, Finland and Sweden left EFTA and joined EU.

In September 1993, the United States, Canada and Mexico signed the North America Free Trade Agreement (NAFTA), which came into effect from January 1994. The main impact o NAFTA was on trade between United States and Mexico. Several similar associations have come up which remove restrictions on trade among member nations to accelerate mutual economic growth. Most of these attempts however have met with only limited success or even failure. Some common examples are:

1. The Central American Common Market (CAM) formed by Costa Rica, El Salvador, Guatemala and Nicaragua in 1960 was dissolved in 1969 and revised in 1990.
2. The Latin American Free Trade Association (LAFTA), established in 1960 by Mexico and most of South America hoped to increase the safe of economic development and establish a common market. In 1980 it was superseded by Latin American Integration Association (LAIA).
3. The Southern Common Market (Marcos) formed by Argentina, Brazil Paraguay and Uruguay in 1991 became a customs union in 1995 and was joined as associated members by Bolivia and Chile in 1996.
4. The Association of South-East Asian Nations (ASEAN) like Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand although a political association decided to become a common market in 1977.

COMMON MARKET: THE EUROPEAN UNION

The European Union (EU) was founded by the Treaty of Rome signed in 1957 by West Germany, France, Italy Belgium, Netherlands and Luxemburg European Economic Community (EEC), and after 1993 as the European Union (EU).

This association was joined by United Kingdom, Denmark and Ireland in 1973 Greece in 1989 Spain and Portugal in 1986. Austria, Finland and Sweden in 1995. The EU is now in negotiations to admit 13 new members such as Poland, Hungry the Crèche Republic, Cyprus etc.

Free trade in industrial goods among the members and common agricultural prices were agreed upon in 1968. The establishment of common Agricultural Policy (CAP), which guaranteed farm prices by means of intervention and an import levy, proved to be of limited benefit only. There remained various tasks undone till mid-1980 such as removal of non-tariff barriers, mobility of labour achievement of quality standards, meeting licensing requirements and removal of the regulatory restrictions. Therefore several measures were initiated towards achievement of common market in 1985.

(a) **The Single Market Programme:** In 1986, the DU amended the Treaty of Rome with the single market Act, which provided removal of all remaining barriers to the free flow of goods services and resources among members and bearer a style unified market at the ends of 1992. Elimination of non-tariff barriers is considered on a product-by-product basis to maintain minimum quality standards. The act also simplified the administrative procedure whereby single market legislation needed only weighted majority support instead of unanimity. Some border checks have also been removed among member nations as yet another step towards achievement of a common market. However, these are only a few measures that have been implemented while several are being still pursued. The process is still in operation.

(b) **The Single Market in Financial Services:** Financial services have gained significantly from single market programme. With the implement of Capital Liberalization Directive exchange controls prohibiting investments by residents of one country into another were removed. This

led to immediate integration of wholesale financial markets with the global financial system because sophisticated borrowers and lenders had an incentive to shop around for the best terms. The United Kingdom abolished its exchange controls in 1979 Japan in 1980, France and Italy in 1989, Spain in 1991, Portugal and Ireland in 1992, and Greece in 1994. Tne introduction of Euro in 1999 also added further impetus go globalization.

A dual set of principles govern the single market in financial services. They are based on home country authorization and host country conduct of business rulers. This allows a firm to a trade throughout the union by the authorization of home regulator but local lowers in the concerned nation must be complied with while trading. This helped foreign firms to get the same treatment as indigenous ones. Thus while home countries regulated entry of firms the hosts regulated performance.

The Cecchini Report of 1989 estimated that full implementation of single market programme would increase GDP of European Union by 6%. Also the European Challenge (Ceechini) 1992 estimated fall in rate of inflation of 0.1% and creation of 1.8% million additional jobs which would reduce average rate of unemployment in EU by 1.5 % points. Thus though the reduction in trade barriers and economic integration faces political obstructions it eventually results in far greater benefits and economic efficiency.

(c) **The Maastricht Treaty:** This historic treaty signed in the Dutch city of Maastricht in 1992 aimed to further centralize macro-economic policies bring about transparency in the price system and reduce exchange rate margins of all member nations. For the achievement of such objections a single currency and a European Central Bank that would engage in foreign exchange market intervention and open market operations were established in 1999. The treaty also included a social chapter to soften various policies regarding labour and other social areas.

THE FUTURE OF THE MULTILATERAL TRADING SYSTEM

International trade contributes significantly to the process of economic development. Globalization has also led to greater economic efficiency and the growth of nations. This can largely be attributed to multilateral trade agreements such as GATT, WTO, EFTA, and NAFTA etc, which have brought about successive reductions in tariff barriers leading to phenomenon growth of trade among nations.

However such agreement face serious challenges in the form of regional trading blocks that promote trade only with members and the growth of state managed trade. Also despite great benefits arising from such agreement problems such, as high subsidies and tariff in agricultural product high protectionism in agriculture and textile absence of proper labour and environmental standard abuse of antidumping and other safeguards etc still persists. In addition the countries have not been adequately addressed. In the long run this would result in rising tariffs lower employment creation lower efficiency and incomes.

It would also regard technological dynamism hence overall growth world over with developing and under developed economies being worst hit.

Thus, the challenge for the twenty first century is now to enlist these multilateral agreements in helping all nations reducing international inequalities and protecting the environment for future generations.

Notes