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LESSON NO. :

2.1 : Production function and the Law of Variable Propostions

2.2 : Concept of Revenue and Break Even Analysis

2.3 : ISO-Quant Curves and Producer's Equilibrium

2.4 : Price Determination under Perfect Competition

2.5 : Price Determination under Monopoly and Monopolistic Competition

2.6 : Pricing and Output under Oligopoly

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B.COM. SEMESTER-I B.C. 106
PRINCIPLES OF ECONOMICS

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PRODUCTION FUNCTION AND THE LAW OF VARIABLE PROPORTIONS

2.1.1 Objective: The major objectives of the lesson are as follows

- To study the concept of the production function
- Develop familiarity with the concept of the law of variable proportion
- To understand the various types of economies of scale

2.1.2 Introduction: human being possess in itself nothing but the power of labour. Man take the material i.e. raw material(gifted by nature) and by means of labour converts them into other forms which then satisfy human needs. Production therefore, is the process of adapting things to human wants, of making them useful.

2.1.3Production Function

A product is the outcome of the co-operation of all the factors of production- Land, Labour, Capital and Organisation, all factors contribute in their own way to the final product produced by a firm. In mathematical terms, this fact can be stated like this :

P = f (L, Lr, C, O), where L stands for land, Lr stands for labour, C for capital and O for organization. P stands for product, f stands for the function i.e., the way product is related to the various factors of production. An increment in the various factors of production will cause a change in quantity of the product produced which may be either proportionate or more/less than proportionate in comparison to the change mentioned above. In fact, the function stresses the most evident, relationship, existing between the factors of production and the output. Whether or not the output changes proportionately in response to the increased/decreased quantities of factors of production depends upon many other factors such as technology, the scale of production, the internal economies etc.

Every producer is interested in maximizing the output from a given combination of inputs. Or if he has decided to produce a given output, he is anxious to find out the minimum combined cost of various inputs that will produce this output. The production function is, therefore, a statement of technical facts which the producer uses to obtain the least cost combination of inputs required to produce an output.

Let us examine these important economic conditions which would influence the production function and give us varying rates of output in response to various proportions of inputs. We, first of all, explain below economies of scale of production.

2.1.3.1 Economies of Scale of Production : Internal & External Economies

As already mentioned above, whenever the quantities of inputs (factors of production) are increased, production is increased. In the initial stages of this enlarged scale of production the firm reaps many economies in the cost of the production of the product. Increased output is obtained at falling cost of production. It is not only a firm alone, even the entire industry comes to enjoy certain economies

because of its large scale of production. These economies are named as Internal and External economies, respectively.

2.1.3.1.1 Internal Economies : These economies are enjoyed by a particular firm in the market. These arise on account of the internal organization, scale of production and the quality of inputs used by firm. Other firms in the industry may not be having the advantage in the process of production. These economies become available due to specialization and indivisibilities of factors of production. These economies are explained below :

(i) Managerial Economies : A firm may have a manager or a supervisor of great experience, acumen, calibre and drive. A large scale of production has enabled this firm to engage such a manager. Certainly his experience, organization, skill and drive would materially bring down the cost of production. A similar experience may not be the fate of another firm in the market.

(ii) Labour Economies : A firm, because of its large scale of production, may have certain labour economies such as specialization and division of labour. We know what economies accrue from the introduction of division of labour and specialization. Reduction in the cost of production is the most important economy. Other firms having a smaller scale of production may enjoy such economies.

(iii) Technical Economies : These economies may be due to the size of the plant and the nature of the plant. We know the use of ultra modern methods of production by big plants has drastically brought down the cost. Only a firm with a large scale of production could take advantage of the economies resulting from these methods.

(iv) Marketing Economies : A particular firm having large scale of production and affording a fleet transport vehicle may reap certain types of economies from large buying and large scale selling. They can buy cheap and sell dear by rigging the market. A smaller firm may be ineffective from this point of view.

(v) Financial Economies : Similarly the large production unit finds it easy to borrow funds and that too at cheap rates of interest. The unit has sufficient financial reserves and backing of the investment houses to undertake huge ventures in research and other innovational experiments. No small firm could think of affording such a venture.

(vi) Transport and Storage Economies : A big firm has its own feet of trucks to carry raw material and finished products. The firm also has its own storage and godown facilities. It can, therefore, store its products when prices in the market are not favourable. The transport and storage facilities help the firm to sell its product at the opportune time and at favourable price.

Some times these economies are seen from another angle, particularly by the British economists. They call them the “indivisibilities” of various factors of

production. According to them these economies result from the increasing use of bit-sized inputs. For example, a bit sized plant, underutilized before, may now be used according to its capacity. This enlarged scale of utilization would definitely give rise to economies (fixed costs per unit would be reduced). This explains the down sloping part of the firm – run AC curve.

But in time of the expansion of a firm it may give rise to diseconomies and therefore higher per unit costs. The main factor causing diseconomies of scale has to do with certain managerial problems which typically arise as a firm becomes a large scale producer. The expansion in the depth and width of management becomes unwieldy and this impairs the efficiency of a firm and leads to higher costs.

2.1.3.1.2 External Economies

These economies benefit all firms within the industry as the size of the industry expands. These economies arise not because a firm expands, but the industry expands and firms in turn benefit from industry's expansion. Such economies accrue to firms when the industry is localized in a particulars area, makes inventions and evolves specialization of production processes.

These economies are explained below:-

(i) Economies of Concentration : When several firms of an industry establish themselves at one place then they enjoy many benefits together like availability of developed means of transport and communication etc. Besides, some subsidiary industries may come into being and commercial and financial institutions may be set up. All these facilities help the firms to develop and progress.

(ii) Economies of Information : When the number of firms in an industry increases it becomes convenient for them to collect necessary information through scientific and trade journals. These journals provide sundry information like new markets pertaining to the goods produced by the firms and development of new production techniques abroad etc.

(iii) Economies of Disintegration : When an industry develops the firms engaged in mutually agree to divide the production process among themselves. Every firm specializes in the production of a particular item pertaining to that industry. For example, in case of cycle industry localized at a particular place, some firms specialize in the manufacture of free wheels, offer specialize in cycle chains, still others in pedals, rims and hubs etc. It is called disintegration.

2.1.3.1.3 Diseconomies of Scale

A firm or an industry enjoys economics only upto a certain limit. Having reacted this limit, these very economies turn into diseconomies. In other words, a given

percentage increase in all the factors causes less than proportionate increase in output, after a point. Consequently, diminishing returns to scale operate. These diseconomies are explained below:-

(i) Internal Diseconomies: These diseconomies arise when a given firm increases its scale of production beyond a point. Further, these are of two types.

(a) Unwidely Management : When a firm expands, difficulties of management go on multiplying. In a big firm, it becomes pretty difficult to co-ordinate the work of different sections. It becomes a tough problem to supervise the work spread all over. It adversely affects operational efficiency of the firm.

(b) Technical Difficulties : Another cause of internal diseconomies is the emergence of technical difficulties. There is an optimum point upto which technical improvement can be carried out. Beyond this optimum point, technology becomes uneconomical causing diseconomies of scale.

(ii) External Diseconomies : When an industry in a given area expands beyond certain limit then firms operating in that industry suffer external diseconomies. Because of large demand for raw material, it becomes scarce and expansive. Besides, availability of skilled labour, power, transport and finance becomes difficult and expensive. The cost of land for the new firms becomes prohibitive. All this leads to closure of several firms in the industry.

The production is subject to laws of production. The output may increase at increasing rate, constant rate or diminishing rate. In conventional terms, the various laws of production i.e. law of increasing returns, constant returns or diminishing returns may operate, or in yet another known terminology, the law of a variable proportion may apply. Since there has been confusion in the use of various terms so it is desirable to explain the laws rather more clearly. In modern treatment the principles of production are dealt with on two lines :

2.1.3.2 The Law of Variable Proportions

In the short-period, when the output of a good is sought to be increased by way of additional application of the variable factor, the Law of Variable Proportions comes into operation. The short-run is a period of time when the value of only variable factors of production can be changed, while the value of fixed factors of production is held as constant. According to Leftwitch, "The Law of Variable Proportion States that if input of one resource is increased by equal increments per unit of time while the input of offer resources are held constant, total output will increase, but beyond some point the resulting output increases will becomes smaller and smaller".

Assumption : (i) One of the factors is variable, while all other factors are fixed.

(ii) All units of the variable factors are homogeneous.

(iii) There is no change in the technique of production.

(iv) The factors of production can be used in different proportions.

Table No. 1

Units of Land	Units of Labour	Total Product	Marginal Product	Average Product
1	1	2	2	2
1	2	5	3	2.5
1	3	9	4	3
1	4	12	3	3
1	5	14	2	2.8
1	6	15	1	2.5
1	7	15	0	2.1
1	8	14	–1	1.7

Supposing you have a land measuring 1 hectare and you grow tomatoes on it. In column I of the above table units of the fixed factor i.e., land has shown. The column II shows the changes in variable factor i.e., labour. The column III shows total product and column IV marginal product. By using one more unit o labour, whatever addition is made to the total product is called marginal product. The column V shows the average product. It is calculated by dividing the total product of the labour by the number of labourers.

Figure

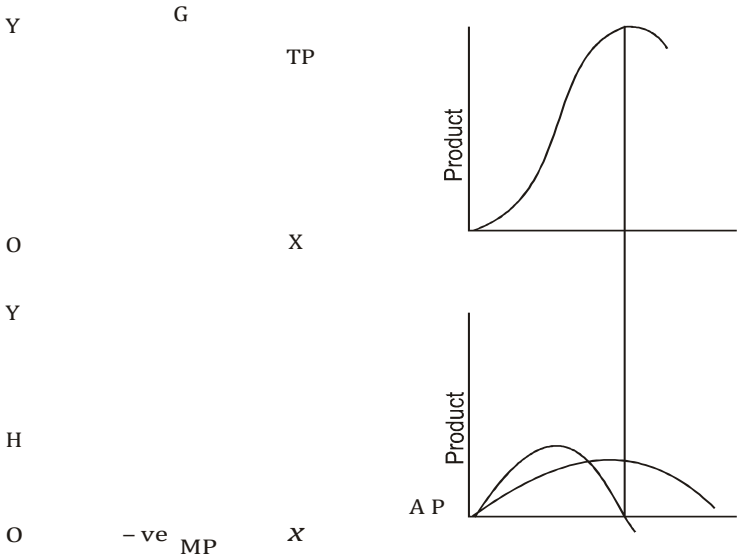


Fig. 1

In the above figure, quantity of the product is shown on oy-axis and number of labourers on ox-axis. The TP is the total product curve. At point G the total product is maxium when marginal product is zero. Thereafter, it begins to diminish corresponding to negative marginal product. MP is the marginal product curve. Upto point H marginal product increases. At point H it is maximum. Thereafter, the marginal product begins to diminish. Before point I marginal product is more than average product. At point I marginal product and average product are equal. After point I the marginal product diminishes. The marginal product is zero at point c and thereafter it turns negative. AP curve represents average product. Before point I average product is less than marginal product. At point I average product is maximum. Upto point I average product increases, but after that it begins to diminish.

1. Return of Scale : The relationship described above the terms of various laws will hold good even if all the factors of production are varied in the same proportion. It is observed and recognized that variations in the variable factors alone would not be responsible for operation of the various laws of production ; rather varying the factors in the same proportion and enlarging the scale of production would also subject the resultant outputs to various rates of increases. This could be brought out clearly with the help of the Table No. 3

It is clear from the Table -3 that the marginal returns increase upto the application of the 4^{th} dose of all factors. After this marginal returns remain constant for the 4^{th} & 5^{th} doses. But from the 6^{th} dose onwards, the marginal returns start falling. In fact, the marginal, average and total returns behave in the same manner

Table No.2

Sl. No.	Units of factors used	Total Returns (in Quintals)	Average Returns (in Quintals)	Marginal Return
1.	1 Lab + 1 Acre Land + 1 unit capital + 1 unit organisation	25	25	25
2.	2 Lab + 2 acres Ld +2 2 cpt + 2 Org.	60	30	30
3.	3 Lab + 3 acres Ld + 3cpt + 3 Org.	100	33.3	40
4.	4 Lab + 4 acres Ld + 4cpt + 4Org.	160	40	60
5.	5 units of each factor	220	44	60
6.	6 units of each factor	264	44	44
7.	7 units of each factor	301	43	37

as the laws of production based on change in proportionalist factors. Yet a few of the difference may be pointed out, which are as follows :

(i) Since all factors can be changed in view of their availability, scale of production can be enlarged to take advantage of various economies.

(ii) The law of increasing returns will operate for a pretty long as through increased supplies of various factors and perfect adjustments, the application of the law could be sustained.

(iii) But to say that the law of diminishing returns would not apply, is equally wrong. Ultimately this law would operate.

(iv) The reasons for the ultimate operation of the law of diminishing returns could be found in the limits power after a certain point in the scale of production, the human factor may find it difficult to organize, supervise and control production. Hence, the returns to various doses of investment may successively start falling.

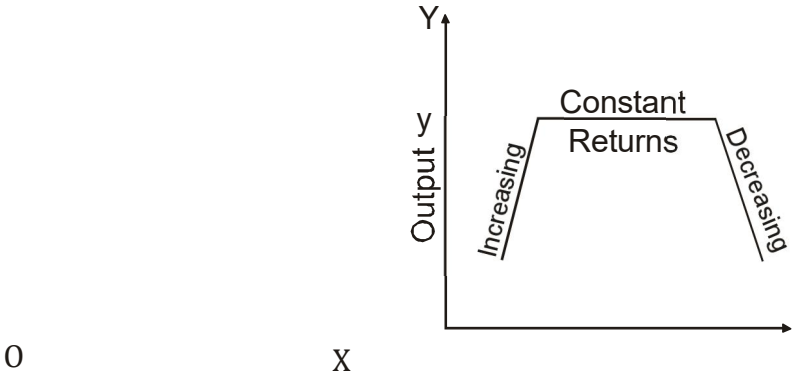


Fig. 2

Fig. 2 shows the increasing constant and decreasing returns to scale as a result of proportionately equal change in the quantities of all the inputs used in the production process.

2.1.3.3 Principle of Diminishing Marginal Returns: Some special feature:

After discussing in detail the returns to proportions and scale, let us explain some special features of the most fundamental law of production i.e. law of diminishing returns.

The special features which deserve our attention are as follows :

1. Assumption of the Law : The law, though very fundamental and universal in nature and operation, is hypothetical. It is based on certain assumptions which are as follows:

2.2 It applies only when a certain stage in production has been reached. This is when the factors are not mixed in exact and right proportions.

2.3 The technique of cultivation should not undergo changes for improvement. Any improvement in methods would prolong the operation of the law of increasing returns and would keep the law of diminishing returns in abeyance.

2.4 Even the soil must not be new.

2. Why does the law apply to Agriculture more than it does to Industry ?

According to Marshall, this law operates after quickly in those situations where nature plays a more important role. And where the man wields a greater role, the law of increasing returns operates. Since agriculture comes under the first category the law of diminishing returns applies here quickly as compared to industry. The reasons are :-

(i) Division of labour and specialisation are not possible in the case of agriculture.

(ii) Since agriculture is spread over vast areas, human supervision is rather difficult.

(iii) Agriculture does not permit use of many technological innovations.

(iv) Since agriculture is an open-air industry the natural factors influence in more and the law in motion.

(v) Land, after a point, becomes scarce.

Thus all these factors explain the operation of the law in relation to agriculture. Its application in industry, where division of labour and specialisation are possible and technological innovations are used frequently, could be explained in terms of greater economies in industry. The law of increasing returns operates for sufficiently long time. Only that far-stretched scale of production would give to the operation of the law of diminishing returns.

3 Importance of these principles particularly of the Law of Diminishing Returns :

As already explained above, the principles of production are of immense importance to the main body of economic theory. The nature of cost curves : average and marginal and also total, is determined by the operation of these principles. The curves both in the short or long period, would exhibit the influence on the price formation through moulding the nature of the supply curves of the industry. It is admitted by all that the application of various laws of the industry would affect the normal price of the product of that industry.

Even a policy of taxation and subsidy be worked out on the basis of the laws of production. Industry subject to the law of increasing cost/diminishing cost/constant

cost would call forth for a measure of taxation/subsidy no action respectively. In many more fields the laws prove their utility. But out of all the laws, the Law of Diminishing Returns is the most fundamental and universal in application.

For example :-

3.1 Law of diminishing returns helped Malthus in formulation of his Theory of Population.

3.2 Law of diminishing returns explains the theory of rent as advocated by Ricardo. Extensive or intensive cultivation results in diminishing returns.

3.3 Law diminishing returns shows the need for new inventions and innovations in the technique of cultivation with a view of increasing the product. In the absence of changes the diminishing returns would set in.

3.4 The law shows the reality of the economic situation. In the absence of its operation, one acre of land would have raised sufficient produce to feed the entire world.

Thus, the law is of a great importance.

2.1.3.4 self check exercise

1. Explain the law of variable proportion?

2.1.3.5 summary :Understanding the production function is crucial for businesses to make informed decisions about resource allocation, optimal input combinations, and production efficiency. Additionally, it is a core concept in the field of economics, helping economists analyze the factors affecting output levels and economic growth.

2.1.3.6 Glossary

1. Production Function: A mathematical representation of the relationship between inputs (such as labor, capital, and raw materials) and the output of goods or services produced by a firm.
2. Inputs: The resources used in the production process, including labor (L), capital (K), materials (M), technology, and other factors.
3. Output: The quantity of goods or services produced by a firm as a result of using various inputs in the production process.
4. Total Product (TP): The total quantity of output produced with a given combination of inputs.
5. Average Product (AP): The output per unit of input. For example, average product of labor (APL) is the output per unit of labor.

2.1.3.7 Exercise

1. State and explain the Law of Variable Proportions.
2. How far is it true to say that various Laws of Production are the phases of the same law i.e. the Variable Proportions.
3. Explain the law of Diminishing Returns alongwith its assumptions and importance
4. Write short note:
   a) Marginal product

b) Total product.

SUGGESTED BOOKS

1) Principles of Economics: perm j. bhutani
2) Principles of economics: Deeparshree

LESSON NO. 2.2 AUTHOR : KHUSHWANT SINGH

CONCEPT OF REVENUE & BREAK EVEN ANALYSIS

2.2.1 Objective: The major objective of every producer is to have maximum revenue which will ensure the survival in long run. After going through this lesson the students will be able to understand the

- Concept of revenue
- Relationships among various types of revenue
- Significance of revenue for producer
- Behavior of revenue under perfect completion, imperfect competition and elasticity demand.

2.2.2 Introduction

Every producer, after producing a product is interested to sell his product in the market. The revenue of a firm, together with its cost, determines profit. In this chapter, we study the concept of revenue. The term 'revenue' refers to the receipt obtained by a firm from the sale of certain quantities of a commodity at various prices.

2.2.3 Total Revenue :

The sale proceeds which a firm receives after selling its output in the market is known as total revenue.

Total Revenue = Price x quantity sold

In the words of Professor Liebhafisky, "Total revenue may be defined generally as the revenue from sales obtained by a seller. It is equal the number of units of the commodity multiplied by the per unit selling price."

2.2.4 Average Revenue :

Average Revenue is the revenue per unit of output sold. It is found by dividing total revenue by the number of units sold. In the words of Prof. Liebhafsky, "Average revenue is define as total revenue divided by the number of units sold. Average revenue is, thus, merely another term meaning price of the product."

$$\text{Average Revenue (AR)} = \frac{\text{Total Revenue}}{\text{No. of units sold}}$$

As a matter of fact, average revenue means price. As consumer's demand curve illustrates the relationship between price and quantity demanded, it also represents the average revenue or the price at which various units of the commodity are sold, since price paid by a buyer constitutes the revenue from the seller's point of view.

2.2.5 Marginal Revenue :

Marginal revenue is addition made to the total revenue by the sale of an additional unit of the commodity. In the words of MC Connel, "Marginal revenue is the addition to total revenue which results from the sale of one more unit of output." Marginal revenue can be expressed as

$MR = TR_n - TR_{n-1}$

Here, MR = Marginal Revenue

TR_n = Total Revenue of n Units

TR_{n-1} = Total Revenue of (n –1) Units

To illustrate the concept of marginal revenue, it by sale of 10 units total revenue equals Rs. 1000 and by the sale of 11 units, total revenue increases to Rs. 1100, then marginal revenue is Rs. 100 (being the difference between Rs. 1100 and Rs. 1000).

2.2.6 Relationship between TR, AR and MR :

Before we study the relationship between AR and MR under different cases, let us understand these concepts with the help of a table and diagram.

Units Sold (q)	Pricer or AR (TR/q)	TR (Pq)	MR ($TR_n - TR_{n-1}$)
1	10	10	10
2	9	18	8
3	8	24	6
4	7	28	4
5	6	30	2
6	5	30	0
7	4	28	– 2
8	3	24	– 4
9	2	18	– 6
10	1	10	– 8

The table shows that as price falls from Rs. 10 to Rs. 1, the output sold increases from 1 to 10. TR increase from 10 to 30, then remains 30 and ultimately falls from 30 to 10. We find that when AR falls, MR falls more than that, i.e., from Rs. 10 to 0

and then becomes negative. TR increases initially at a diminishing rate, it reaches maximum and then starts falling.

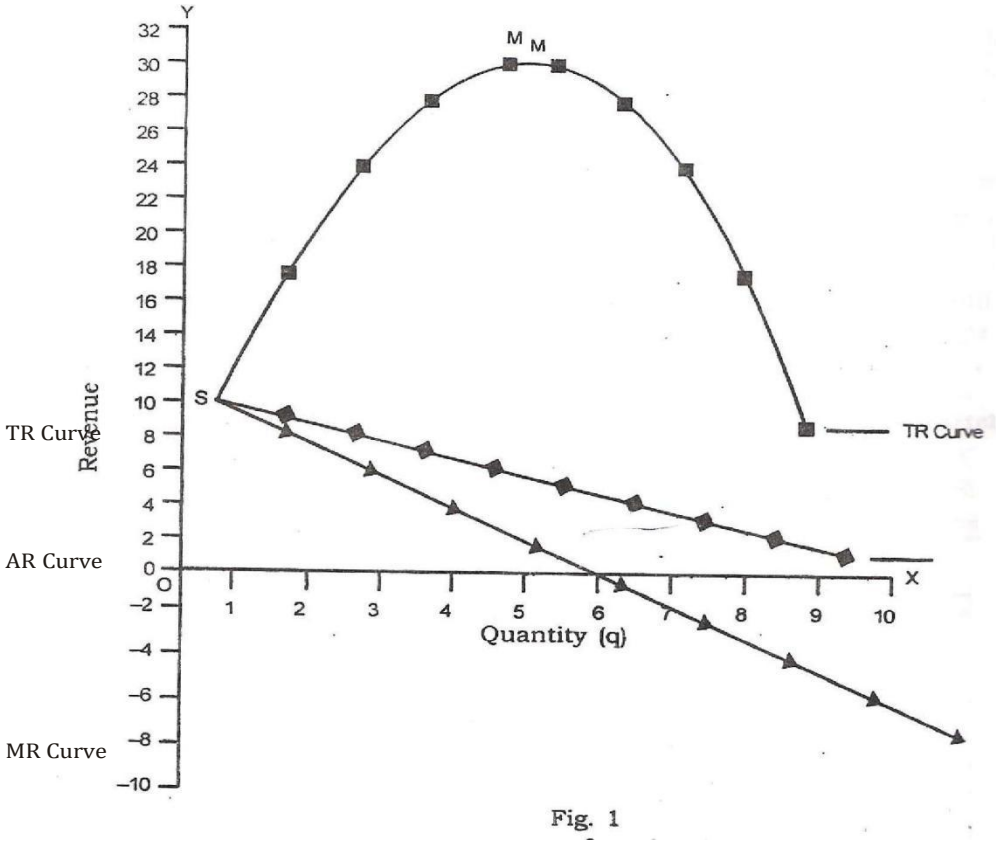


Fig. 1

The Fig. 1 shows that TR curves starts from S. It is known as initial total revenue. The TR rises from S to M. At M, TR is maximum. After that, it falls. Thus, TR rises, reaches maximum and then falls.

In the same figure, AR and MR start from point S. AR falls, MR also falls but MR is much below AR. MR falls, reaches zero and then it becomes negative. AR falls but remains positive throughout. When average revenue functions are linear (straight lines), the rate of fall of marginal revenue is double the rate of fall of average revenue.

2.2.7 Behaviour of AR and MR under Perfect Competition :

If AR is constant, MR will also be constant. In this case AR and MR will be equal. It happens under perfect competition where AR curve and MR curve of the firm will coincide. The curves drawn will be horizontal i.e., parallel to X-axis. Now, we can show with the help of following table and diagram the relationship between TR, AR and MR :

Units Sold	Price (AR)	TR	MR
1	10	10	10
2	10	20	10
3	10	30	10
4	10	40	10
5	10	50	10

As we increase output, price or AR remains the same, i.e. Rs. 10. TR increases but by a constant rate.

MR is also constant i.e., Rs. 10 and it is equal to AR.

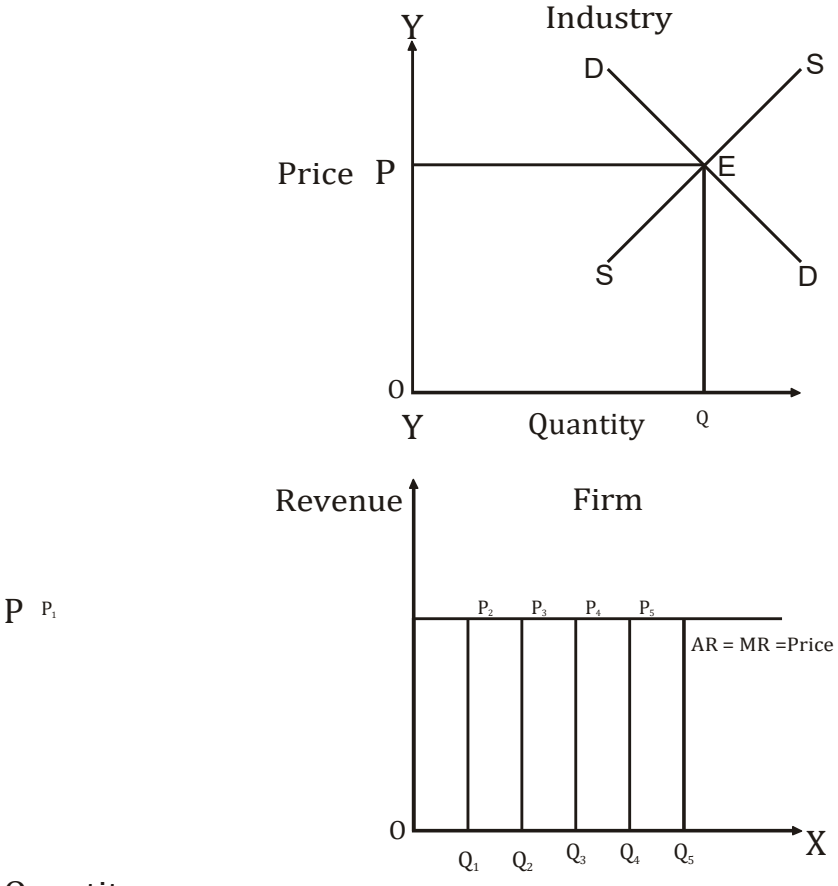


Fig. 2

As shown in Fig. 2 at price, OP, the seller can sell any amount of the commodity. In this case the AR curve is the horizontal line. The MR curve coincides with the AR. It is so because additional units are sold at the same price as before. In that case AR = MR. A noteworthy point is that OP price is determined by Demand and Supply of industry and the firm only follow.

2.2.8 Behaviour of AR and MR under Imperfect Competition :

If AR falls, MR also and MR falls faster than the AR. In that case MR is below AR. The downward slopping of AR and MR curves is actually found in case of a firm. It can be shown with the help of a table and diagram.

Units Sold	Price (AR)	TR (pxq)	AR (TR/q)	MR ($TR_n - TR_{n-1}$)
1	10	10	10	10
2	9	18	9	8
3	8	24	8	6
4	7	28	7	4
5	6	30	6	2

The above table shows that as AR or price falls from Rs. 10 to Rs. 6, the TR increases from Rs. 10 to Rs. 30 at a diminishing rate. MR in this case falls from Rs. 10 to Rs. 2. MR is the rate at which TR changes. When we compare AR with MR, we find that AR falls at a slow rate whereas MR falls at a faster rate. (see Fig. 3)

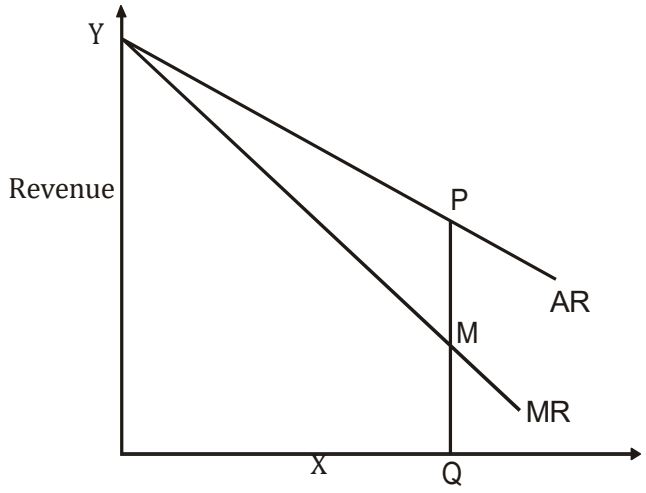


Fig.3

AT OQ output, AR is PQ where as MR is MQ.

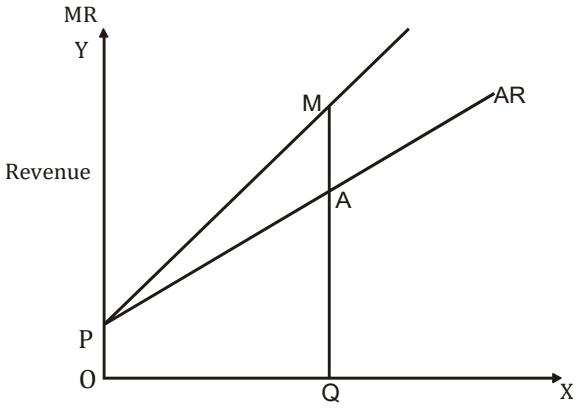
PQ > MQ

AR > MR (Since AR = P)

or P > MR

2.2.9 Relationship between AR and MR :

If AR Curve is rising upward from Left to Right : Then MR curve will also rise upward. This means that MR will be greater than AR. And the revenue curves drawn will show that MR curve is above AR curve (Fig. 4)



Quantity

Fig. 4

In the above diagram, we find that AR and MR starts from the same point P. AR rises upwards from left to right. The MR curve also rises upward and MR curve is above AR curve.

It shows MQ > AQ

Or MR > AQ

If AR Curve is a Straight Line Downward Sloping : Then MR curve will pass through middle of any perpendicular drawn to the Y-axis.

If AR Curve is Convex to the Origin : It means, as more and more of commodities are sold, convexity of the AR shows that AR falls but at a slower rate. In case of MR, the curve will be again convex to the origin. The convexity of the curve shows that MR falls but at a slower speed. But when we compare convex AR with convex MR, MR will be falling faster than AR and MR will be below Ar.

If AR Curve is Concave to the Origin : In that case MR is also concave to the origin. AR curve is concave to the origin, when the curve is sloping downward from left to right, means that AR is falling at a higher rate for additional units, the MR curve will also fall at a higher rate for additional units.

If AR Curve or Demand Curve has Unit Elasticity throughout the Length : In that case MR will be zero throughout. If AR curve is rectangular hyperbola, in that case elasticity of demand is equal to one, it means MR = 0 throughout and MR will coincide with X-axis (Fig. 5)

$$M = A\left(\frac{e-1}{e}\right)$$

if $e = 1$, then

$$M = A\left(\frac{1-1}{1}\right)$$

$$= A(0) = 0$$

$$M = 0$$

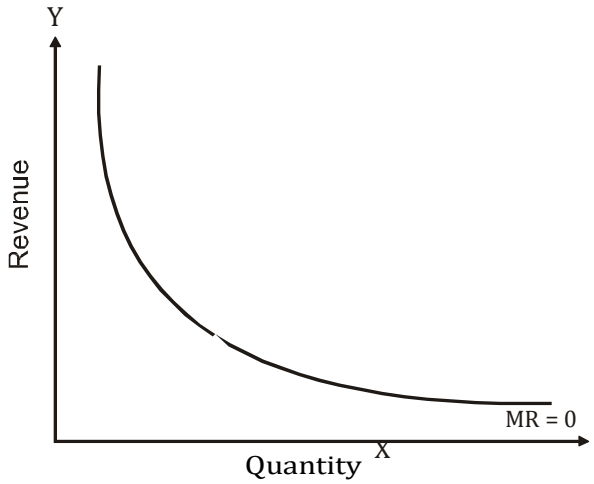


Fig. 5.

2.2.9.1 Self check exercise

1 Explain the concept of various types of revenue?

2.2.10 Relationship between AR, MR and Elasticity of Demand :

AR, MR and elasticity of demand are related to each other in a special way. The preposition that MR equals price minus the ratio of price to elasticity of demand at that price can be proved with the help of fig. 6 :

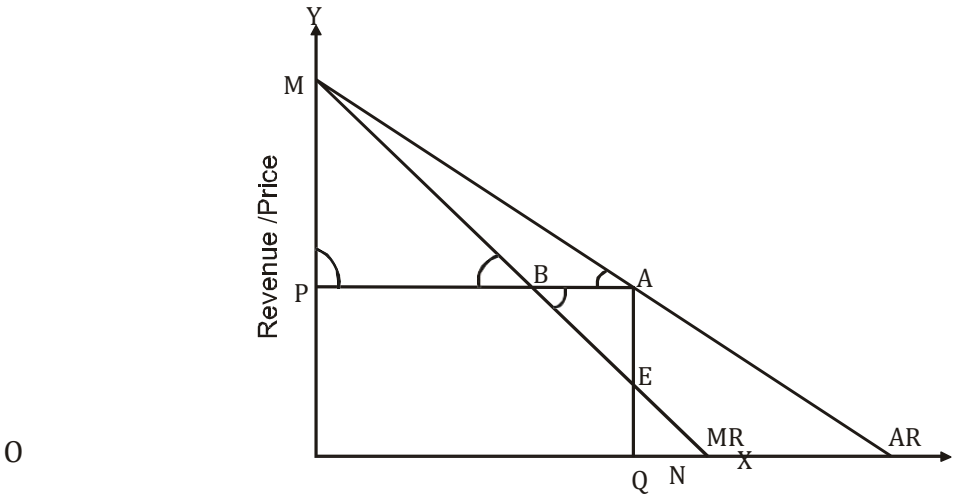


Fig. 6

It has already been explained that AR curve of a firm actually constitutes the demand curve for the firm's product. Therefore, elasticity of demand at any point on a consumer's demand curve amount to the elasticity of demand on the given point on the firm's AR curve. Elasticity of demand at point P on the AR curve in the figure given above equals AN/AM. This measure of point elasticity of demand is helpful in demonstrating the relationship between AR, MR and elasticity of demand at point A on the given demand curve MN.

Elasticity of demand at point A on the given demand curve MN is as follows :

$$\text{E at point A} = \frac{AN}{AM}$$

$$= \frac{AQ}{MP}$$ (AQN and MPA are similar triangles and hence the ratio of their sides is same).

$$= \frac{AQ}{AE}$$ (since MP = AE)

In the above figure QA is price or AR, while AE equals AR — MR. Therefore,

$$\text{E at point A} = \frac{AQ}{AE}$$

$$= \frac{AR}{AR - MR}$$

$$= \frac{A}{A - M}$$

Here, A = Average revenue or Price
M = Marginal revenue
E = Elasticity of demand

With the help of this, we can find out the formula for Price and MR.

$$E = \frac{A}{A - M}$$

By Cross-Multiplication, we get

EA – EM = A
EA – A = EM
A (E – 1) = EM

$$A = \frac{EM}{E - 1}$$

$$\text{or} \quad A = M \frac{E}{E - 1}$$

$$A = MR \frac{E}{E - 1}$$

Similarly, we can find out the value of MR in terms of AR and elasticity of demand.

$$E = \frac{A}{A - M}$$

By cross-multiplying, we get

EA – EM = A
EM = EA – A

Dividing both sides by E, we get

$$M = \frac{A - A}{E}$$

Since AR equals Price

$$M = \frac{P - P}{E}$$

From this relationship, we can maintain that MR equals price minus the ratio of price to elasticity of demand. It is evident from this relationship that MR is always less

than price, with one exception, because it is calculated by substracting some value, represented by P/E from price.

The exception occurs under conditions of perfect competition wherein demand is perfectly elastic because the coefficient of elasticity in infinitely large and the term to be substracted is infinitely small and may be taken as zero.

Through the application of this formula, it can be seen that MR is always positive at any point where elasticity of AR or demand curve is greater than unity and MR is always negative where elasticity of the AR curve or the demand curve is less than unity.

1. Significance of Revenue Curves :

The main points of the significance of AR and MR curves are as under :

2. Estimation of Profits and Losses : A producer finds out whether he is making supernormal profits, normal profits or sustaining losses. For this purpose, he compares AR with AC :

2.2.2.1 IF AR > AC, the firm makes the supernormal profits.

2.2.2.2 IF AR = AC, the firm earns normal profits.

2.2.2.3 IF AR < AC, the firm sustains losses.

3. Equilibrium : The other point of importance of AR and MR curves is to know how much a producer should produce. The firm will be in equilibrium at that point where MR = MC. This is a general condition for the firm under all market situations.

4. Capacity Utilisation : It is through revenue curves that we come to know whether a firm is producing to its full capacity or not e.g. under perfect competition, if AR curves are tangent to AC curve at its minimum point, the firm will be producing at its full capacity.

5. Price Changes : The concepts of AR and MR are also useful to the factor services (such as rent, wages, interest and profits) in determining their prices. In factor pricing, they become inverted U-shaped. The AR and MR curves become ARP and MRP (Average Revenue Productivity and Marginal Revenue Productivity).

BREAK-EVEN ANALYSIS

Break-even analysis reveals the relationship between the volume and cost of production on the one hand and revenue and profits obtained from the sale on the other hand. Break-even analysis involves the study of revenues and cost of a firm in relation to its volume of sales and specifically the determination of that volume at which the firm's cost and revenue will be equal. It magnifies a set of inter-relationship of fixed costs, the level of activity and sales mix to the probability of the concern.

Definition of Break-Even Point

According to Horngren, "The break-even point is that of activity (sales volume) where total revenues and total expenses are equal. It is the point of zero profit."

In words of Matz and Curry, "Break-even analysis indicates at what level cost and revenues are in equilibrium."

The break-even point may be defined as that level of sales where total revenue received from the sale of a product is equal to the total cost of the product. A break-even chart can be defined as an analysis in graphic form the relationship of production and sales of profit. It can be explained with the help of adjoining diagram.

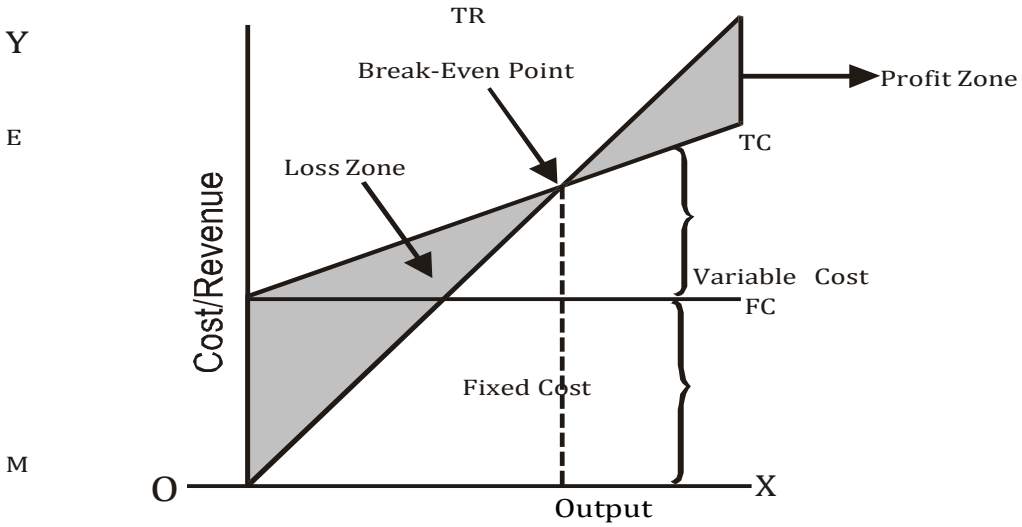


Diagram No. 9

In the diagram 9, fixed cost (FC) curve is parallel to X-axis. TC curve rises upward. Total cost curve and total revenue curve analysis equalises each other at point E which is break-even point. Hence, OM is the break-even output where total cost is equal to total revenue. In the diagram, shaded area before the output OM is loss zone whereas shaded area after point E output OM is profit zone area.

Assumptions of Break-even Analysis

1. All costs are either perfectly variable or absolutely fixed throughout the production process.
2. All revenues are perfectly variable with change in the volume of production.
3. The volume of sale and production are equal. It means whatever is produced is also sold.
4. In case of multi-product firms, the product-mix is stable.

The break-even point can be expressed in terms of units produced or in terms of sales.

Break-even point in terms of physical units

This method is convenient for the single product firm. The break-even volume is the number of units of produce which must be sold to earn enough revenue just to cover all expenses, both-variable and fixed. The break-even points is reached when

sufficient number of units have been sold so that the total contribution margin of the unit sold is equal to the fixed cost. The formula for calculating the break-even point is

$$BEP = \frac{\text{Fixed Costs}}{\text{Contribute margin per unit}}$$

where, the contribution margin is; Selling price – Variable costs per unit. Example : Suppose the fixed costs of factory are Rs. 10,000 per year, the variable costs are Rs. 2.00 per unit and the selling price is Rs. 10,000 per year, the variable costs are Rs. 2.00 per unit and the selling price is Rs. 4.00 per unit. The break-even point would be :

$$BEP = \frac{\text{Rs. } 10{,}000}{(4 - 2)}$$

In other words, the company would not make any loss or profit at a sales volume of 5,000 units as shown below :

Sales		Rs. 20,000
Cost of goods sold variables cost @ Rs. 2.00	Rs. 10,000	
Fixed costs	Rs. 10,000	Rs. 20,000
Net profits		Nil

Break-even Point in Terms of Sale Value

Multi-product firms are not in a position to measure the break-even point in terms of any common unit or product. They fix it conveniently to determine their break-even point in terms of value.

The formula is :

$$\text{BEP is value} = \frac{\text{Fixed Cost}}{\text{P /V ratio}}$$

$$\text{Here, P/V = ratio} = \frac{\text{Contribution}}{\text{Sales}} \quad 100$$

Example, Let Sales = Rs. 10, 000
Variable Costs = Rs. 6,000
Fixed Cost = Rs. 3,000

$$\text{Contribution ratio} = \frac{10{,}000 - 6000}{(10{,}000)} \quad .4$$

BEP value = $\frac{3000}{4}$ = Rs. 7,50

Verification :

Sales value	=		Rs. 7,50
Less variable Cost	=	Rs. 6*7,50 =	Rs. 4,500
Fixed cost	=		Rs. 3,000
Net Profit			Nil

Example : Sales were Rs. 15,000 producing the profit of Rs. 400 in first week of December. In next week, sale goes to Rs. 19,000 and profit to Rs. 1200. Find BEP

Solution : Increase in sale = Rs. 19000
(–) 15000
Rs. 4000

Increase in point 1200 – 400 = 800

Increase in variable cost = 4000 – 800 = Rs. 3200/-

Over sales of Rs. 4000 variable cost = 3200

Hence, VC per Rs. of sale is = $\frac{3200}{4000}$ = .80 paise

Hence, for sale of Rs. 15,000, fixed costs
Will be 20 15000 = Rs. 3000
(–) Profit Rs. 400 = 2600/-
Variable costs = .80 15000 = 12,000

Contribution ratio $\frac{S-V}{S}$

$= \frac{15000 - 12000}{15000}$ 0.2

Now BEP $\frac{FC}{0\text{Contribution ratio}}$

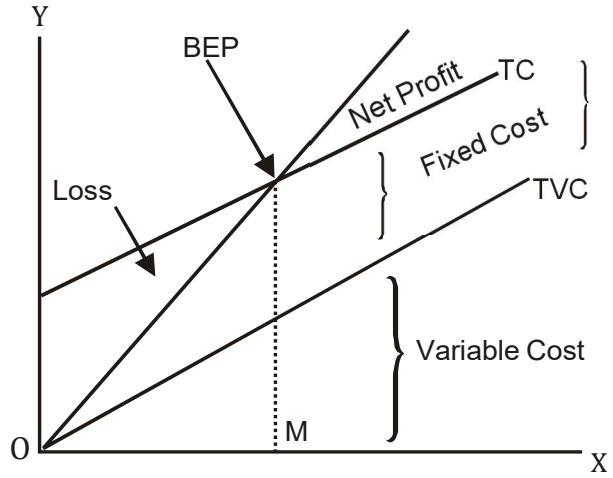
$= \frac{2600}{.2}$ = Rs. 13,000

In break-even analysis, there are certain other concepts, frequently used, also required reference such as :

Contribution

Contribution is the difference between the sale price per unit and the marginal cost per unit. Business manager do not usually think profit in Economic. Sense as the difference between total revenue and total cost. It is the difference between receipts and variable cost. Suppose a commodity is sold for Rs. 20/- and its variable

cost is Rs. 15/- then contribution will be Rs. 5/- (20-15). Thus, contribution first meets fixed cost then think of profit. In the diagram on next page, Total Variable Cost (TVC) + total Net Profit (TNP) + Total Fixed Cost (TFC).



TCP

Output

Therefore, if TNP = 0, then TCM = TFC which occurs at BEP. From the above equation, it becomes clear

TR = TCM + TVC

= (TNP + TFC) + TVC

Total C

Contribution profit (TCP) = TR – TVC

Margin of Safety

It is the difference between the current actual sales and Break Even point output. The formula for margin of safety is

Margin of safety = Total Sales – BEP Sale

Profit

Margin of safety = $\frac{}{\text{P / V ratio}}$

If the margin of safety is more, it is an indicator of the growth of a business. In case margin is narrow, the following steps may be taken to improve unsatisfactory position of the firm :

1. Increase the level of production
2. Increasing the selling price
3. Reduce the fixed or variable or both cost
4. Substitute the existing products by more profitable products.

Profit Volume Ratio

It is , generally, known as P/V ratio. It is a relationship or percentage or contribution in terms of sales or turnover. It can be calculated as follows :

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

P/V ratio is very helpful in pricing policy, Product analysis and Break-Even point etc.

Limitations of Break-Even Analysis

The above discussion provides us a fair idea of the limitation of break-even analysis. The main limitations can be summarized under the following points :

1. Break-even analysis is based on static character which presume constant cost and revenue relationship, but practically constant relationship is not possible.
2. Often we find that input prices undergo a change over time. Such adjustments are generally, avoided in break-even analysis.
3. It is assumed in break-even analysis that the relative share of different products in total output remain same. But in practical situation, it is very difficult to presume this sort of relationship.
4. Break-even analysis implies a horizontal demand curve which is feasible only under perfect competition and not in other market conditions.
5. Factor like plant, size, technology and methodology of production have to be kept constant in order to draw an effective break-even chart, but it is not found in actual life.
6. Break-even analysis is based on accounting data and it suffers from many limitations like ambition of imputed costs, non-scientifically determined depreciation.
7. The break-even analysis ignores the selling cost and only concentrate over production cost.
8. The break-even analysis is not an effective tool for long range use.
9. The area included in the break-even analysis should be limited because it is difficult to apply to too many departments or too many plants.
10. The valuation and allocation of costs in company are usually arbitrary. So it reduces the utility of this analysis.

In view of the above limitations, sometimes doubts are raised about the utility of break-even analysis. The break-even analysis inspite of these limitations is widely used as a method of profit forecasting.

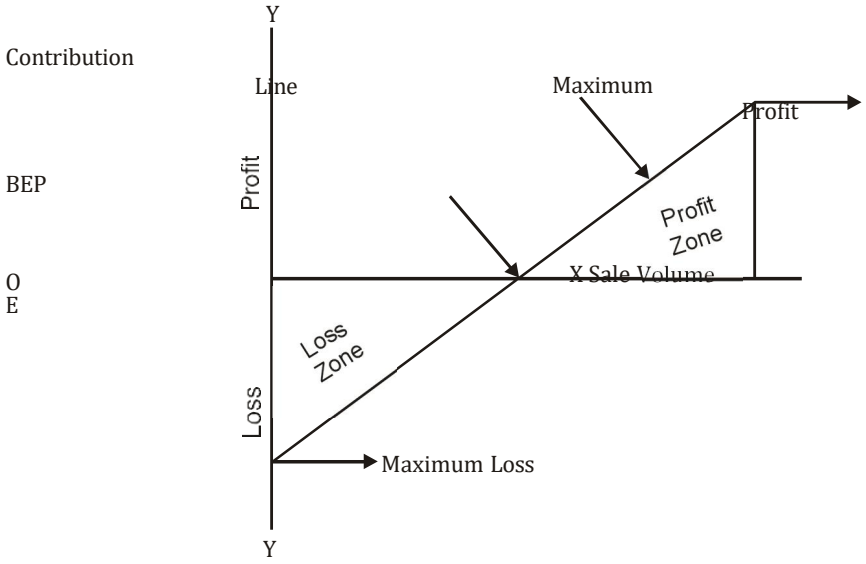
Importance/Significance of Break-Even Analysis

As a tool of planning, break-even analysis plays an immense role. To management, utility of break-even analysis lies in the fact that it presents a micro-

scopic picture of the profit structure of a business economic, strength and weakness, but also sharpens the focus of certain leverages which can be operated upon to enhance its profitability. The break-even analysis brings an ever changing contribution to the modern business. The main importance of break-even analysis to managerial decision making can be given in the following paragraphs :

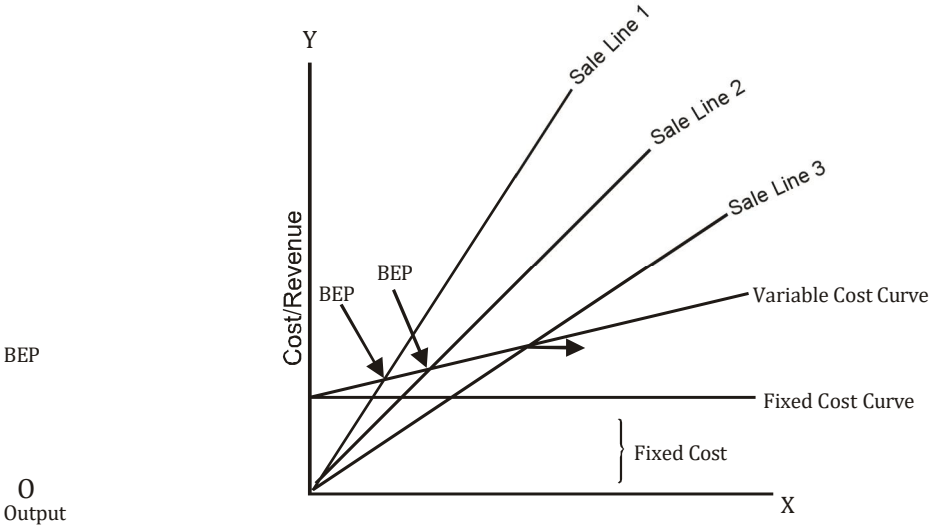
Profit Volume Analysis

It is used to analysis profit volume relationship. The profit volume graph given below shows the relationship of a firm's profits to its volume. In the following diagram, X-axis shows the sale volume and Y-axis profit/loss. At point E, contribution line intersects X-axis determining break-even point. The maximum loss which occurs and zero sales volume is equal to the fixed cost. The maximum profit point is shown on the vertical axis or Y-axis. So the line joining maximum loss point and maximum profit point is known as contribution line.



Forecasting Profit Position of Different Price Levels

The break-even chart can be modified to show the price executive, but his profit position would be at different price levels under the given cost conditions. It can be shown with the help of a diagram given below. In the following diagram as sales line shift downward due to increase in price. It does not mean that profit decreases rather profit will increase. So it is not necessary to take every conceivable price into consideration.



1. Break-even analysis helps in determining optimum level of output which is profitable for the firm.
2. It helps in deciding which product is to be produced and which not to be produced.
3. It is helpful in determining the target capacity for a firm.
4. With the help of break-even analysis, the firm can determine minimum cost for a given level of output.
5. The break-even analysis is helpful in decision making regarding droping or adding a product.
6. It evaluates the percentage financial yield from the project.
7. The break-even analysis can be used in finding the selling price which would prove beneficial to the firms.
8. It is also helpful for the firm to decide from where to start paying dividend to the share holders.

The above study is useful in different fields and its usefulness varies from industry to industry. It is most helpful to the industries which are suffering from frequent changes in input prices, technological changes and constant shifts in product mix. Hence, break-even analysis should be viewed as a guide to decision making and not a substitute for judgement, logical thinking or common sense. Thus, Break- Even Analysis is in principle concerned with the Cost Volume Profit Analysis.

2.2.12 summary

Revenue:

- Revenue, also known as sales or turnover, is the total amount of money a business earns from its core operations over a specific period.
- There are two types of revenue: gross revenue (total sales before deductions) and net revenue (gross revenue minus sales discounts, returns, and allowances).
- Revenue is a crucial indicator of a business's performance and growth potential.

Break-Even Analysis:

- Break-Even Analysis is a financial tool used to determine the point at which a business neither makes a profit nor incurs a loss.
- It calculates the sales volume required for a business to cover all its costs, both variable and

- The key components of Break-Even Analysis are fixed costs (independent of production/sales), variable costs (directly related to production/sales), and the break-even point (where total revenue equals total costs).
- Contribution margin (the difference between sales price per unit and variable cost per unit) is essential in the analysis

2.2.13 Glossary

1. Gross Revenue: Total revenue generated from sales before deducting any costs or expenses.

2. Net Revenue: Revenue obtained after subtracting sales discounts, returns, and allowances from gross revenue.

3. Fixed Costs: Costs that do not vary with the level of production or sales, such as rent, salaries, and insurance.

4. Variable Costs: Costs that change with the level of production or sales, such as raw materials and direct labour costs.

5. Contribution Margin: The difference between the sales price per unit and the variable cost per unit, representing the portion of each sale that contributes towards covering fixed costs and generating profits.

QUESTIONS FOR PRACTICE

1. Explain Break-Even Point. Give its advantages and limitations.
2. Explain the nature and importance of Cost Volume Profit Analysis.
3. How Break-Even Analysis helps in forecasting profit position of different price levels ?

4. Define :
   (a) Margin of Safety
   (b) Break-Even-Point
   (c) Contribution

SUGGESTED READINGS

1.	Economic Analysis	—	Ram Avtar Arora
2.	Business Economic Analysis	—	Vaid, Mehta & Aggarwal
3.	Economic Analysis	—	T.L. Kaushal
4.	Micro Economics	—	T.R. Jain

LESSON NO. 2.3 AUTHOR : DR. KHUSHWANT SINGH

ISO-QUANT CURVES AND PRODUCER'S EQUILIBRIUM

DEFINITION OF ISO-QUANT

2.3.1 objective: following are the objectives which will be fulfilled:

1. Iso Quant Map
2. Marginal rate of technical substitution
3. Producer equilibrium
4. Elasticity of substitution

2.3.2 Introduction: production function with two variable inputs are represented by iso quant that shows different level of outputs with different level of inputs.

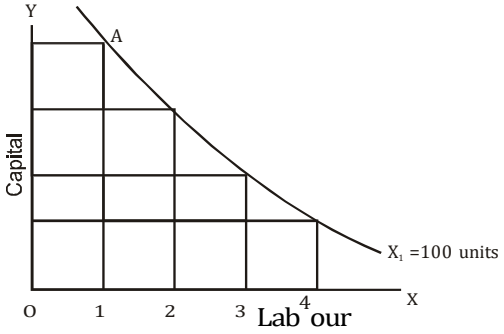
2.3.3 Definition of Iso Quant: An iso-quant represents a production function with two variable inputs. It shows different input combinations that may be used to produce a special level of output. Alternatively, an iso-quant is a curve in input space showing all possible combinations of inputs physically capable of producing a given level of output. In simple words, we may say that iso-quants show different combinations of two resources with which a firm can produce equal amounts of production. Different iso-quants indicate different levels of output that can be obtained from alternative combinations of inputs. Let us suppose that a firm desires to produce hundred units of a commodity. It can do so by employing one of the following alternative combinations of labour and capital :

Equal Product Schedule

A	1	11	- -
B	2	8	3 : 1

Combinations	Units of Labour	Units of Capital	MRS of Labour and capital
C	3	6	2 : 1
D	4	5	1 : 1

A graphic representation of these combinations yield an iso-quant. If we indicate labour along X-axis and capital along Y-axis, the various combinations of labour and capital will yield common points. Connecting these points by a smooth curve, we get an iso-quant showing an output level of hundred units of the commodity.

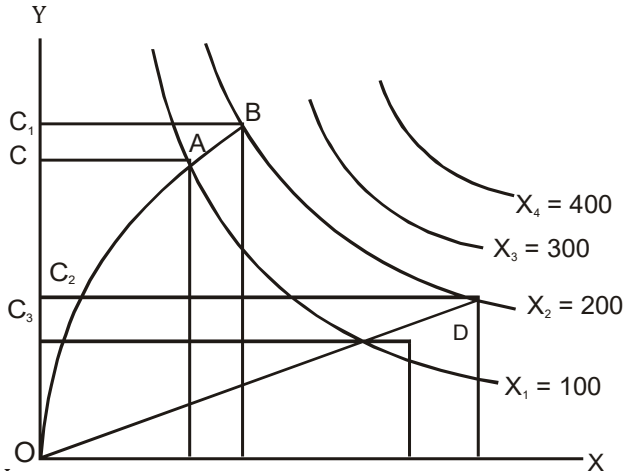


In this figure, X represent an iso-quant. It shows combinations of labour and capital with which a firm can produce hundred units of output. Point A, B, C and D on the iso-quant X, refer to alternative combinations of labour and capital capable of producing hundred units of output.

2.3.4 ISO-QUANT MAP

A group of iso-quant called an iso-quant map. Each iso-quant shows a different amount of output which can be produced with the help of alternative combination of the two inputs.

The following figures represents an iso-quant map. The two axes measure the quantities of labour an capital and the curves show different combinations of labour and capital that can be used to produce 100, 300 and 400 units of the output respectively. It is clear from the figure that farther the iso-quant, the greater is the output associated with it.



Consider first iso-quant X, indicating 100 units of output. Each point shows labour capital combination capable of producing 100 Units of output. For example, OC units of capital and OL_3 units of labour may be used to produce 100 units. Similarly, OC_1 unit of capital and OL_3 units of labour may be used to produce 200 units of the commodity. It is important to note that on the same iso-quant, the level of output remains the same, but capital labour ratio declines continuously as we move from the left to right.

ASSUMPTIONS

The concept of iso-quants is based upon a few assumptions which are as follows :-

1. Production with two Inputs :

The concept of iso-quant is based upon the assumption that output is being produced with the help of two variable inputs. It must have become apparent from

the figures given above that the commodity is being produced with the help of labour and capital alone.

2. Changing Proportion :

The concept of iso-quant is also based upon the assumption that the given amount of output can be produced by effecting a change in the proportion in which two inputs are being used.

3. No change in Technical Conditions :

This assumption implies that technological conditions must remain unchanged i.e., there must not be any improvement or deterioration in the method of production.

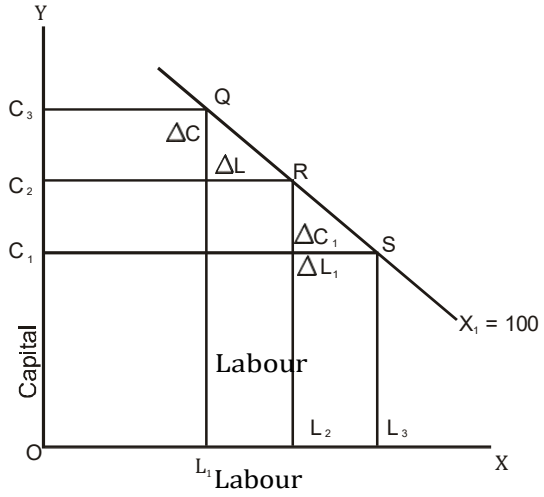
4. Homogeneous Units :

The various units of the inputs must be alike in efficiency. It means that efficiency of all units of labour and that of capital must be equal to each other.

Marginal Rate of Technical Substitution :

Marginal rate of technical substitution of labour for capital is the amount of capital that must be given up in order to use an additional unit of labour under the assumption that level of output remains the same. To illustrate, let us take the help of the following diagrammatic representation.

In moving from point Q to point R on iso-quant X = 100, the firm gives up C Units of capital for one unit of labour i.e. L



Thus Marginal Rate of Technical Substitution of labour for capital ($MRTS_{1k}$) equals $\frac{AC}{AL}$. Similarly from point R to S on the same iso-quant, the MRTS is equal to

$\frac{C_1}{L_1}$

The marginal rate of technical substitution of labour for capital diminishes as more and more labour is substituted for capital. This is so because the less of capital and the more of labour, the firm is using the more difficult it becomes for the firm to substitute labour for capital in production. The fact that marginal rate of technical substitution falls as more labour is substituted for capital means that iso-quants are convex to the origin as is evident from the figure given above.

By definition, as one moves along an iso-quant, output remains constant. This means that gain in output from the usage of little more labour is equal to the loss in output from a little less of capital. The gain in output equals marginal physical productivity of labour time, the little more amount of labour being used $(MPP_1 \quad C)$ The loss in production equals marginal physical productivity of capital units of capital given up $(MPP_C \quad C)$

Accordingly,

$$C.\ MPP_C \quad L.\ MPP_1$$

By simplifying, we get

$$\frac{C}{L} = \frac{MPP_1}{MPP_C}$$

We know that

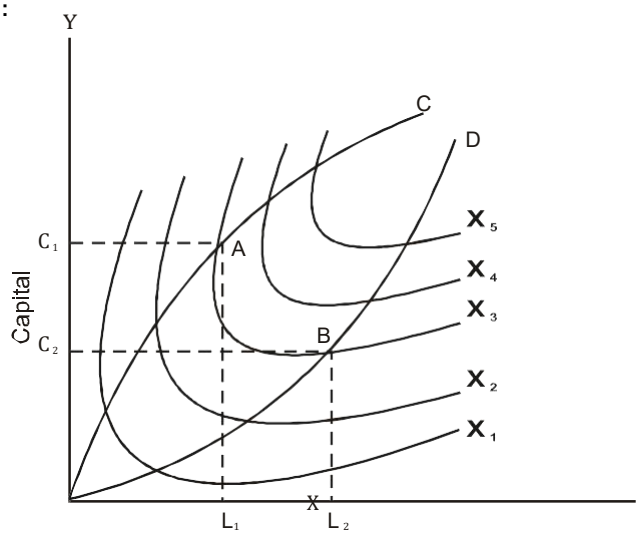
$$MRTS = \frac{C}{L}$$

$$MRTS = \frac{MPP_1}{MPP_C}$$

It follows from the above calculation that marginal rate of technical substitution equals the ratio of marginal physical productivity of labour to that to capital. For example, if the marginal physical productivity of capital is ½ at a particular point on an iso- quant while marginal productivity of labour is 2, this means that one unit of labour is 4 times more productive than one unit of capital at this point. Thus, the firm can given up four units of capital by using one additional unit of labour and still produce the same level of output. Therefore, $MRTS_{lk} = MPP_1/MPP_c = 4$ at the given point.

Economic Region of Production

Many production functions yield an iso-quant map such as shown in the figure given below :



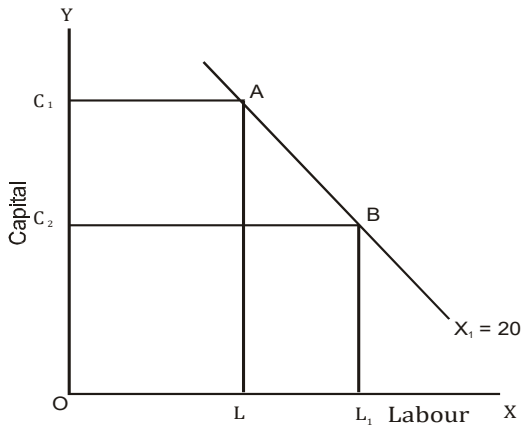
X_1, X_2, X_3, X_4, and X_5 are five iso-quants equal product curves, shown in this diagram. These iso-quants bend back upon themselves or have positively-sloped segments. The parallel-dashed lines indicate the points at which iso-quant bend back upon themselves. The lines OC and OD join these points and form the boundary lines for the economic region of production. In technical terminology, OC and OD lines are known as ridge lines. These ridge lines help the firm in delineating the boundary lines for the economic region of production. Suppose quantity represented by iso-quant X, is to be produced. Production of this amount requires OL irreducible amount of labour along with OC, amount of capital i.e. with OC units of capital OL_1 amount of labour must be used to produce output represented by X_3 iso-quant. Beyond this level of input, additional units of capital along with OL_1 units of labour, would push the producer to a lower iso-quant indicating an uneconomic use of resources.

Similarly, production of X_3 amount of output also requires a certain minimum amount of capital. According to point B on iso-quant X_3, OC_2 is the irreducible amount of capital to be used alongwith OL_2 amount of labour to produce X, output. The X_3 level can not be attained without at least this much amount of capital. Additional usage of labour along with OC, amount of capital, would reduce rather off rational operation.

Characteristics of Iso-Quants :

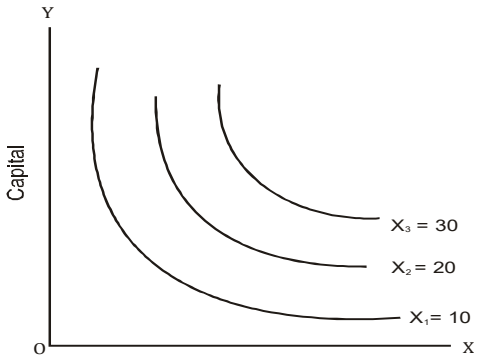
Iso-quants have the same characteristics as indifference curves. A few important characteristics of iso-quants are as given below :

Iso-quants are negatively sloped. Like indifference curves, iso-quant slope downward from left to right. This means that if the firm wants to use less capital, it must use more labour to produce the same level of output.



According to the above given figure, iso quant X = 20 units of output slopes downward from left to right. As producer moves from point A to point B on iso-quant X_1, labour is substituted for capital in such a way that level of output remains the same. The negative slope implies that one output can be substituted for the other in the production of a given amount of output.

2. Higher iso-quant shows higher level of output : An iso-quant that lies above and to the right of another corresponds to a higher output level than the one that lies to the left and below. It means that iso-quants farther from the origin of the graph involves higher levels of output than those nearer to it.



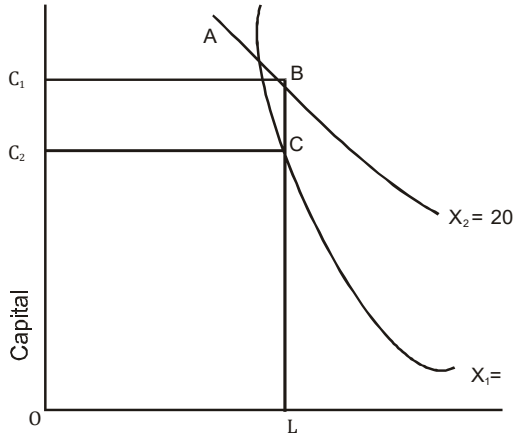
Labour

This iso-quant map contains three iso-quant X_1, X_2 and X_3. Iso-quant X_1 indicate output of 10 units while iso-quant X_3 shows an output level of 30 units. It is evident from the figure that iso-quant lying to the right indicates larger output.

Greater output should flow from the use of large quantities, resources and iso-quants to the right involve larger quantities of capital and labour than those to the left.

3. Iso-quants never cut each other : Like the indifference curves, iso-quants can never intersect, a logical contradiction would develop.

In this figure, consider two iso-quants X_1 and X_2 intersecting at point A. Point A lies on iso-quant X_1, as does C. By definition, the output at C must be the same as at A.



10

Labour

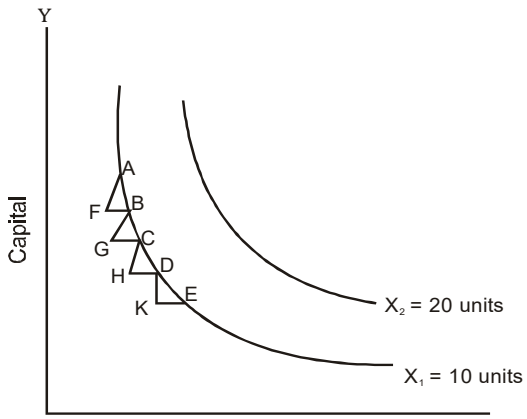
But A is also a point on X_2 and so is B. Again, by definition, the output must be same as A and B. It follows from this that both B and C would produce the same outputs as that a A. But this is not logical because B and C, though contain the same amount of labour, but after in respect of capital. Thus, two combinations of inputs denoted by points B and C never produce the same level of output. It follows from this that two iso-quants can never intersect each other.

4. Iso-quants are convex to the origin : Like indifference curves, iso-quants are also convex to the origin. This is because of the diminishing marginal rate of substitution of one output for the other as we move along an iso-quant from left to right downwards. The marginal rate of technical substitution of labour for capital is the amount of change in capital that is required to be given up for a unit change in labour, if output is maintained at a constant level. This is written as :

C

$$MRTS_{Cl} = \overline{\quad L}$$

In the figures, the amount of labour is varied by one unit represented by FB, GC, HD and KE : the amount of capital that is required to maintain the output becomes less and less.

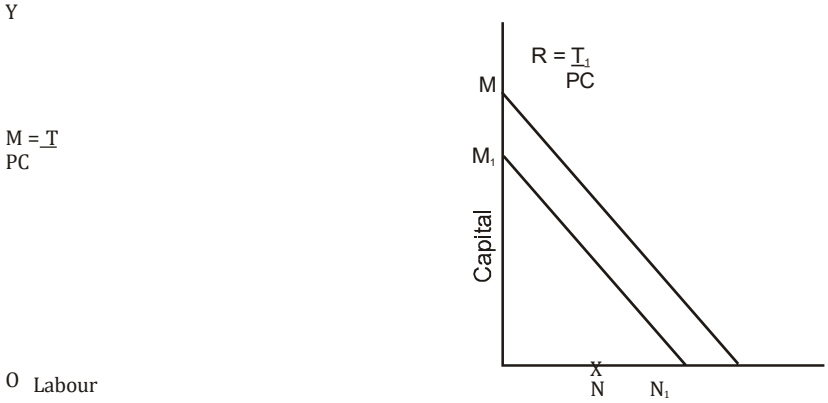


The extent to which capital must decline is shown by vertical distances AF, BG, CH and DK which are successively smaller amounts. This means that marginal rate of technical substitution of labour for capital declines as usage of labour is marginally increased. In fact, the rate at which substitution can be affected with output level remaining unchanged is reflected by the curvature of an iso-quant. As labour is substituted for capital, it increases the difficulty of further substitution of labour for capital. This is expressed by declining marginal rate of technical substitution in terms of the convexity in iso-quants.

Iso-Cost Line :

The concept of an iso-cost is similar to the concept of a budget line.

An iso-cost line shows different combinations of laboru and capital that a firm can purchase, given the total outlay of the firm and the factor prices. Let us suppose that a firm wants to purchase two inputs, labour (L) and capital (C) priced respectively at P_L and Pc as is shown in the following figure. The firm desires to spend outlay (T) on the purchase of both these inputs.



N = $\frac{T}{PL}$ S = $\frac{T_1}{PL}$

If the firm spends the entire amount T on the purchase of capital, it can buy T/P or OM units of capital. If the firm only purchases labour, it can purchase T/Pi or ON units of labour. A straight line joining the points M and N market on Y and X axes respectively shows all combinations of the two inputs that the firm can purchase with its given outlay at the given prices outputs. It is called iso-cost line.

The slope of an iso-cos line is given by

$$\frac{T/P_C}{T/P_1} \quad \frac{T}{\frac{P_1}{P_C}} \quad \frac{T}{P_C}$$

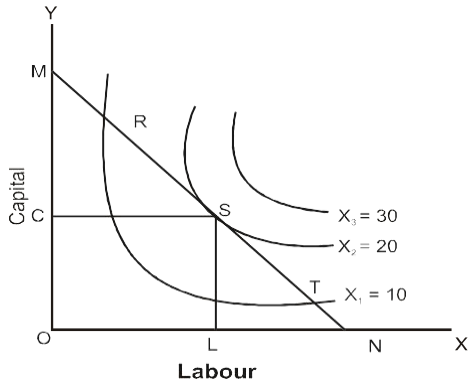
It follows from above that the slope of an iso-cost line equals the ratio of prices of two inputs. Suppose total outlay were to increase from T to T_1. This increases would shift the iso-cost line MN to the right, parallel to the original iso-cost line since there has been no change in the price of the either labour or capital. The new iso-cost line is shown by T_1/P_c, T/P_{1-}. As against this, if total outlay decreases, iso-cost line would shift to the left, parallel to the original iso-cost line since there has been no change in the price of either labour or capital.

2.3.5 PRODUCER'S EQUILIBRIUM

A producer's equilibrium point is one at which he maximizes output for his given total outlay or at which he minimizes cost for his given output. Thus, the problem of determination of producer's equilibrium can be discussed under two sub-heads viz. (a) maximizing output for a given cost and (b) minimizing cost subject to a given output.

MAXIMISING OUTPUT FOR A GIVEN COST

Like indifference curve analysis, iso-quants only tell us what a firm wishes to do, given the production function. It does not tell us what the firm can do. As against this, an iso-cost line shows different combinations of inputs that a firm can purchase given the prices of inputs and constant outlay. By combining the concepts of iso-quants and iso-cost line, the problem of maximizing output for a given cost can be solved.



A rational producer wants to get the largest output for the given outlay. Input combinations denoted by points R, and T are available to the firm under the given constraints i.e. given prices of labour and capital and constant outlay. The firm under consideration would purchase input combination denoted by point S for the reason that this input combination enables the firm to produce maximum amount of output i.e. 20 units subject to the given cost. A greater output is not obtained for the given level of expenditure and a lesser output is irrational because production can be expanded at no extra cost. Hence producer's point of equilibrium is one where iso-cost line is tangent to the iso-quant. At the point of tangency the slope of an iso-quant equals the slope of an iso-cost. That is, at the equilibrium.

$$MRTS = \frac{PL}{} \quad \text{Since} \quad MRTC^{L} \frac{MPP}{MPP_C} \text{ therefore at equilibrium}$$

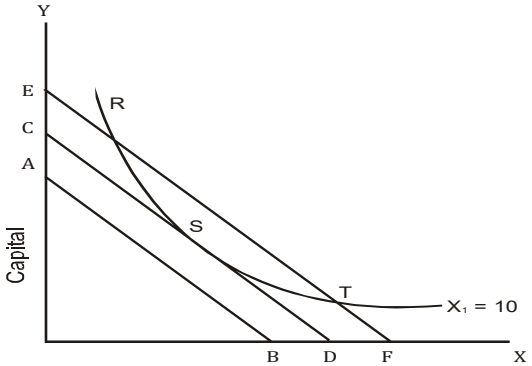
$$^{LC} \quad P_C \qquad\qquad ^{LC}$$

$$\frac{MPP_L}{MPP_C} \quad \frac{PL}{PC}$$

This means that at the equilibrium point, the marginal physical productivity of las rupee spent on labour is the same as the marginal physical productivity of capital.

MINIMISING COST SUBJECT TO A GIVEN OUTPUT

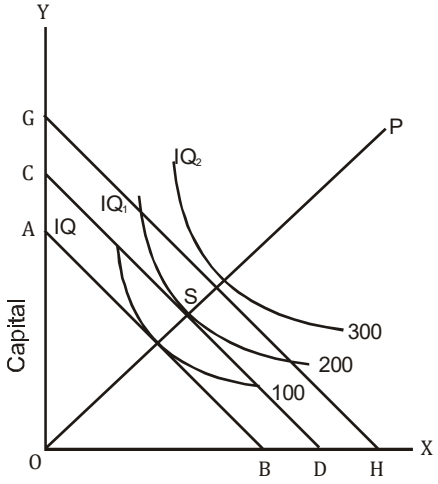
Is the just possible that an entrepreneur might have decided to produce a given amount of output. His endeavour would be to minimize the cost of producing the given output. The problem can be solved graphically as below. Iso-quant X, represents 20 units of output while AB, CD and EF are the iso-cost lines drawn on the assumption that prices of labour and capital remain the same. First observe that level of cost represented by AB is not flexible because input combinations on it do not enable the producer the stipulated output. Next, 10 units of output can be produced with input combinations denoted by points R.S. and T. But input combinations denoted by points R and T are associated with iso-cost line EF whereas input combination denoted by point S is associated with iso-cost line CD.



It is obvious that under the circumstances by employing input combination denoted by point S, the producer can produce ten units of output at the least possible cost. S is a point at which iso-cost line CD is tangent to the iso-quant. Thus, previous conclusion with regard to the producer's equilibrium point stands valid viz., in order either to maximize output subject to a given cost or to minimize cost subject to a given output, the entrepreneur must employ inputs in such amounts as to equate the marginal rate of technical substitution and the input-price ratio.

EXPANSION PATH

With an increase in the financial resources of a firm it would like to increase its output. Quantity of output can increase only if with an increase in the financial resources of the firm, there is no increase in the cost of the factors. The level of total output of a firm increases with increase in its financial resources. Which of the optimum combinations of factors will be used by the firm at different levels of output is indicated by Expansion Path. Expansion path refers to the laws of all such points that shows least cost combination of factors corresponding to different levels of output. In other words, expansion path traces the movement of the firm from one optimum combination of the factors to the other optimum combination of factors when the scale of operation of the firm is expanded .



Expansion path can be explained with the help of above given figure. On Ox-axis units of labour and on OY axis units of capital are shown. The initial iso-cost line of the firm is AB. It is tangent to IQ at point E, which is the initial equilibrium of the firm. Supposing the cost per unit of labour and capital remains unchanged and the financial resources of the firm increase. Consequently, firms new iso-cost line

CD will be parallel to the initial iso-cost line AB and touches IQ, at point E_1 which is the new equilibrium point. If the financial resources of the firm increase further, cost of factors remaining unchanged, the new iso-cost line will be G.H. It will be tangent to iso-quant curve IQ_2 at point E_2 which will be the new equilibrium point of the firm. By joining together equilibrium points E_1 E_1 and E_2 we get a line called expansion path. Briefly, given the factor prices and marginal rate of technical substitution, expansion path of a firm shows how it combines various factor inputs at different levels of output, so that the factor cost is minimizing.

2.3.6 Difference between Indifference Curves and Iso-quants

Although the theory of iso-quants is based upon the concept of indifference curves, yet important points of difference exists between them. These two concepts differ from each other in the following respects :

1. Level versus Amount : The indifference map provides an ordinal ranking of utility levels whereas an iso-quants map provides a cardinal ranking of output levels. Indifference curves are labeled as IC_1, IC_2, IC_3 etc. indicating either a lower or a higher level of satisfaction whereas iso-quants are labeled as X_1, X_2, = 20, X =30 unit of output. Each iso-quant shows a specific amount of output.

2. Objective : To the consumer, the equilibrium point corresponds to utility maximization. It is a point at which a consumer attains his objective of maximum satisfaction. But to a producer, the point of tangency between an iso-cost line and an iso-quant indicates an equilibrium position in the sense tha the input combination of the point of tangency is the one appropriate to the level of outlay expenditure represented by the iso-cost line. It says nothing whatsoever about maximizing profit which is the objective of the producer.

3. Shape : Indifference curves consistently slope downward from left to right but this is not so in respect of iso-quants. Iso-quants bend back upon themselves or have positively sloped segments.

4. Derivation of Demand Curve : A consumer's demand curve can be derived with the help of indifference curves because the successive equilibria yield points at which the consumer attains his objective. But the demand curve for a factor of production cannot be derived from the various points of tangency between iso-cost lines and iso-quants because these points do not correspond to profit maximizing equilibria.

2.3.7 ELASTICITY OF SUBSTITUTION

If, starting from a position of producer equilibrium, price of one input falls, the equilibrium position of the producer will be disturbed. In the process of re-establishing equilibrium, the producer substitutes the cheaper input for the oher. The extent to which one input can be substitutes the cheaper input for the other. The extent to which one input can be substituted for the other depends on the type of relation that exists between the inputs. If the two inputs are perfect complements

and thus have to be used in fixed proportions, there would be no possibility of substitution. As against this, if they are perfect substitutes, then production could be carried on either by using one or the other input alone or by using some combination of the two.

The curvature of an iso-quant, reflects the degree of substitutability. The more convex an iso-quant, the greater the complementary of the factors and less the substitutability. As against this, the less the curvature of an iso-quant, the greater would be the possibility of substitution between factors.

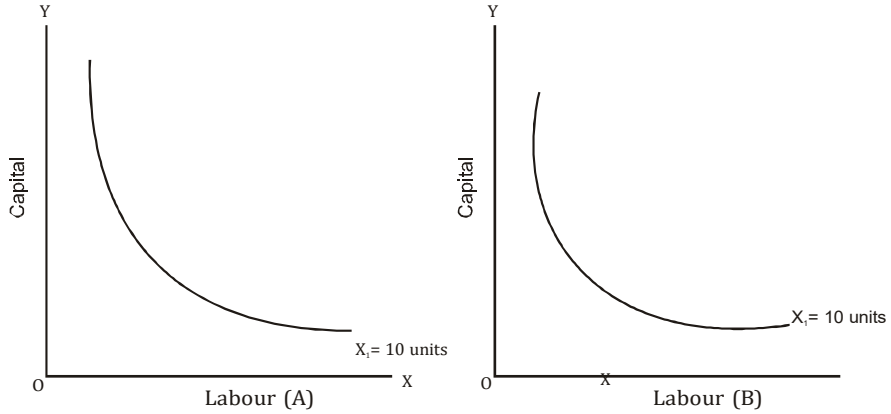


Figure A illustrates a less curved iso-quant. Here possibility of substitution is more. Figure B reflects a more curved iso-quant. Here elasticity of substitution is less.

A coefficient of elasticity of substitution has been developed to measure the degree of substitutability between the two factors of production. The elasticity of substitution measures the relative responsiveness of the capital labour ratio to given proportional change in the marginal rate of technical substitution of labour for capital.

Thus, by formula, elasticity of substitution is

$$E_s = \frac{\text{Percent change in proportion in which inputs used}}{\text{Percent change in marginal rate of technical substitution}}$$

$$= \frac{\text{Percent change in } K / L}{\text{Percent change in MRTS}}$$

$$= \frac{(K / L)}{MRTS / MRTS}$$

If the elasticity of substitution is zero, inputs i.e. labour (L) and capital (K) will be used in fixed proportions. If, however, elasticity of substitution were infinite, then, we can maintain that factors are perfect substitutes. Thus, higher the value of (ES), the higher the degree of substitutability between the factors.

2.3.8 Self check exercise

1. what is MRS?

2. difference between IC and IQ.

2.3.9 Summary: Iso-Quant shows different combinations of two resources with which a firm can produce equal amounts of production. There are few assumptions like production with two inputs, no change in technical conditions, homogeneous units,. marginal rate of technical substitution is the amount of X that must be given up in order to use an additional unit of output remains the same.

2.3.10 Glossary

1. equilibrium: that state in which opposing forces or influence are balanced.

2. Iso quant: Iso-Quant shows different combinations of two resources with which a firm can produce equal amounts of production

QUESTIONS FOR PRACTICE

1. What are Iso-quants? What are the characteristics of iso-quants?
2. Explain the Marginal Rate of Technical Substitution in detail.
3. Define Iso-quants. What is the difference between iso-quants and indifference curves?
4. How will you explain producer's equilibrium with the help of iso-quants ?
5. Explain the nature of AR & MR under perfect competition and Imperfect Competition.
6. Write short notes on:
   a) Total Revenue
   b) Average Revenue
   c) Marginal Revenue

SUGGESTED

1. Economic Analysis — Ram Avtar Arora
2. Business Economic Analysis — Vaid, Mehta & Aggarwal
3. Economic Analysis — T.L. Kaushal
4. Micro Economics — T.R. Jain

LESSON NO. 2.4 AUTHOR : DR. UPINDERJIT KAUR

PRICE DETERMINATION UNDER PERFECT COMPETITION

2.4.1 Objective:

The major objective of this chapter is to make students familiar with the concept of

- Perfect competition
- Features of perfect competition
- Price determination under this form of competition
- Establishing equilibrium under perfect competition.

2.4.2 Introduction

Price determination in perfect competition is a fundamental concept in economics that explains how prices are set in a market where numerous buyers and sellers trade identical products with no barriers to entry or exit. In this market structure, each individual firm is a price taker, meaning they have no control over the market price and must accept the prevailing price determined by market forces

2.4.3 Meaning of perfect competition

By the word competition we mean the action of endeavouring to gain what another individual or firm endeavours to gain at the same time. For example, when two or more individual want to buy the same commodity they are said to compete among themselves. Similarly, when there are two or more sellers of a commodity they will compete with each other in order to sell a large quantity of their commodity. This is the ordinary meaning of competition. Thus, competition would become perfect or pure when all the competing buyers and sellers buy and sell the commodity at the same price and are unable to change that price by their individual actions. This would be possible when the following conditions are satisfied.

(i) Large number of buyers and sellers,

(ii) Homogeneous or identical product.

(iii) Perfect knowledge about price prevailing in the market.

(iv) Freedom of entry and exit from the industry for firms and for factors of production.

(v) Non existence of transport costs.

Thus, purely competitive industry comprises a large number of independent firms producing a standardized product. Pure competition assumes that firms and resources are mobile between different industries. No single firm can influence output to that price. It can sell any amount of output at that prevailing price. Price, therefore, equals marginal revenue. According to Leftwitch, "Perfect competition is a market in which there are many firms selling identical products with no firm large enough relative to the entire market to be able to influence market price".

We now discuss main features of perfectly competitive market, one by one in detail.

(i) Large Number of Buyers and Sellers : For the competition to be perfect, the number of buyers and sellers must be very large. If the number is small, the buyers and sellers would be able to change price by their individual action. This fact we can illustrate with the help of an example :

Suppose the number of sellers of breads in the market is only ten and each one of them supplies one thousand breads every day. The total supply of all of them

taken together is ten thousand breads. Suppose the demand in the market is also for ten thousand units of breads. By this balance between demand and supply of breads a single price would be determined. Now if any one of the sellers of breads decides to double his supply, he can change the price in the market. The additional supply, when the demand for bread is the same can be sold only at a lower price. Hence an individual seller is able to change the price by his individual action.

But this would not be possible when the number of sellers is very large. If number of sellers in the market is one thousand and each of them is selling only ten breads daily then total supply of breads is again ten thousand breads. Now if one of the sellers decides to double his supply then the total supply in the market becomes ten thousand ten breads. An increase by ten breads is only an insignificant part of the total supply and so this action of the seller will not make any effect on the price. Hence the importance of the large number of sellers in perfect competition. The case of consumers can also be explained similarly.

(ii) Homogeneous Product: Second condition for competition to be perfect is that the product brought and sold is homogeneous or identical. By identical product, we mean that all the units of that product are similar in every respect so that the consumers find no reason to prefer one to the other product. For example, if the breads produced and sold in the market are of the same quality or size and bear the same label on them would be sold at the same price. But if there is some difference in quality or size under which they are sold, a single price would not be possible. There will be as many prices as qualities and brands of breads of bread.

(iii) Perfect Knowledge : Perfect knowledge about the price prevailing in various parts of the market on the part of buyers and sellers is another condition of perfect competition. This, in simple words, means that both buyers and sellers have complete knowledge about the price at which the various goods are sold in the market. Absence of this knowledge would mean that some buyers would be buying at higher price, while others would be able to have the commodity at the lower price. So there may be more than one price for the same product in the market. For example, if sellers in one part of the market sell breads at Rs. four per bread and in another part sell at Rs. five, the buyers would continue to pay different prices unless they have knowledge about the difference in price. The benefit of the knowledge to the buyers would be that they buy in the cheapest market and to the seller would be that they sell in the dearest market. The effect of this would be that ultimately one uniform price would be established in the market.

(iv) Free Entry and Exit for Firms : Fourth and equally important condition of perfect competition is the absence of restriction for the individual producer or firms to move to various fields of production in search of higher profits and for the factors

of production like labour and capital for higher rewards in the form of wages and interest payments. The importance of this condition lies in the fact that abnormal profits disappear in the long run with the free entry of new products into the field of production. Conversely, if the number of firms has exceeded the desired number, then firms last to enter the industry would have to undergo losses. For these firms also there is no restriction to move out to the field where they would be saved from these losses.

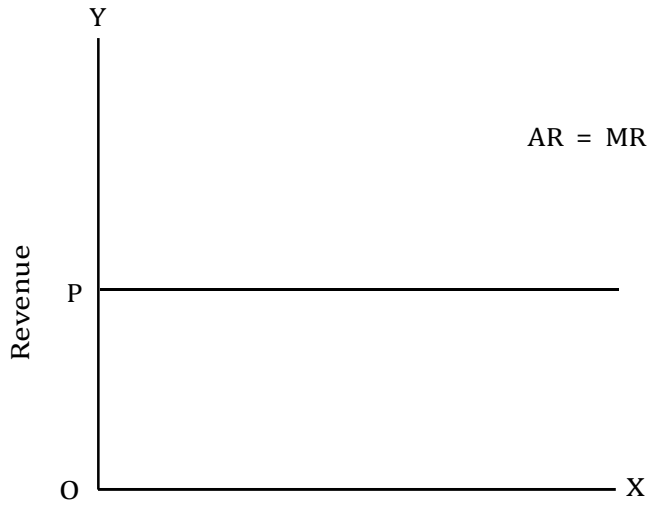
The condition is also significant for bringing a balance between the total demand and total supply of a commodity. In order to achieve this balance the free mobility of factors of production like labour and capital also becomes essential between various occupations or fields of production. For example, if the total supply is less than the total demand then the existing firms would expand the scale of their production for which they would also require more of these factors. Thus the existence of perfect mobility of factors is essential for perfect competition.

(v) Non-existence of transport costs : A perfectly competitive market also assumes the non-existence of transport costs. If the cost of transport is there, price must rise in different sectors of the market. A single uniform price for the same product cannot exist in the market if transport cosra are to be incurred.

Having discussed the meaning of perfect competition and the conditions under lying it, we now proceed to discuss the process of determination of prices under such conditions. In other words, we are to discuss now how an individual firm and the industry as a whole attain their equilibrium positions.

Nature of demand curve for its product : We have noted above that an individual seller cannot change the price of the"commodity by his individual action. He has to sell his product at a given price in the market. This, in other words, means that the demand for the product of an individual seller of firm is perfectly elastic. So he would continue to sell his product at the given price. This may be explained with the help of a diagram also.

In diagram no. 1 we represent the demand for output on X-axis and revenue (Price) on Y-axis. At the same price (OP) any amount of commodity can be sold. When the price per unit remains the same, the average revenue also remains the same. Our knowledge of the average and marginal revenue tells us that, when average revenue is constant, the marginal revenue (revenue or price received by the sale of the unit sold last of all) is also constant and both are equal. So that same curve represents both the AR and MR.



Demand

Fig. No. 1

Size of its output : If the firm cannot change the price of the commodity it must try to minimise costs in order to maximise profits. The cost can be minimised by an appropriate combination of various factors of production like land, labour aid capital including raw materials etc. These factors can be broadly classified under tvo categories, fixed and variable factors. For example, land and capital are fixed factor, while labour, raw material etc. variable factors. Accordingly, we have the fixed costs and the variable costs. By adding these costs we got the total costs of production.

Now the question before us is which cost should be minimised in order to be sure that the firm has attained the optimum scale of output. Certainly it is the average total cost (also known as average cost of production) which, at its minimum point would indicate the ideal scale of output of firms. The actual scale of output of the firm would be determined by the marginal cost of production which means the cost of production of the additional unit of output. It is also defined as the addition made to the total cost when one more unit of output is produced.

In diagram no. 2, we have taken four cost curves; average fixed cost, average variable cost, average total cost and the marginal cost. The behaviour of marginal cost curve shows that it cuts the AVC and ATC at their lowest points and the minimum point on AVC is below the minimum point on ATC. These four cost curves are called short period cost curves because, over the long period, we take only two cost curves i.e. ATC and MC.

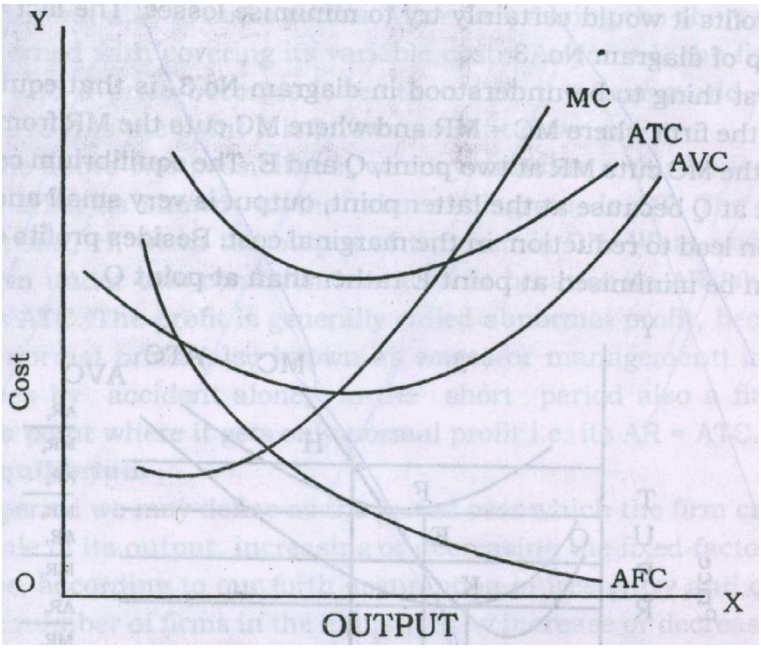


Fig. No. 2

The Equilibrium of the Firm : After analysis of the nature of demand and the nature and, behaviour of costs we are in a position to find out the equilibrium of the firm. By the term equilibrium we mean a state of rest or absence of change. The equilibrium may be short lived or stable for quite some time depending on the time element. Time element means the period at the disposal of a firm. This time period may be short or long and accordingly, we have short period equilibrium and long period equilibrium. We may now turn to the discussion of the conditions of equilibrium and the determination of equilibrium output of a firm in the short and their in the long periods.

Two conditions are necessary for determination of equilibrium : the marginal cost of production must be equal to the marginal revenue and secondly, from point of view of ideal scale of production and maximum profits, marginal cost must cut the marginal revenue curve from below.

2.4.3.2 Short-run Equilibrium

In short period a firm in equilibrium may face any of the following three situations:

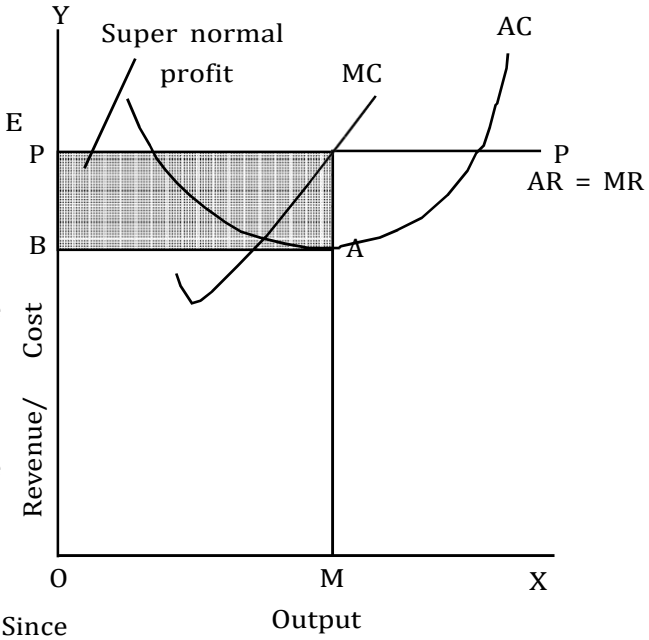
(1) It may earn super-normal profit because in the short period new firms cannot enter in the industry.

(2) It may earn normal profits.

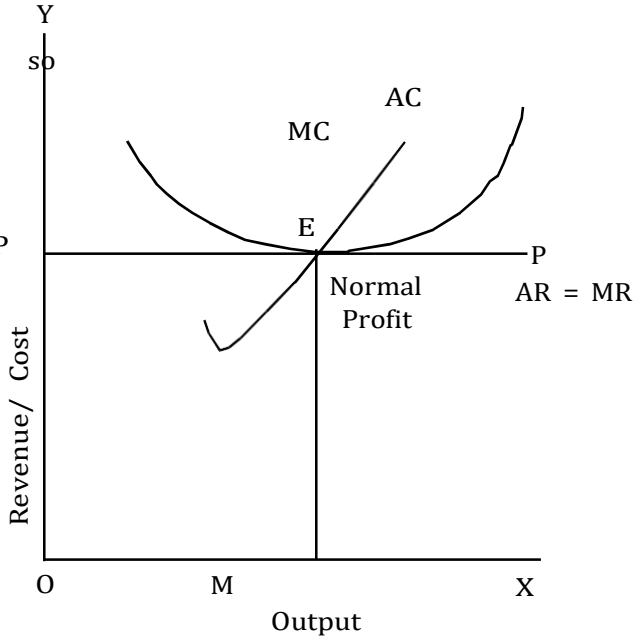
(3) It may even suffer minimum losses, because in the short run firm may not stop production even when prices of the product falls. In case, it stops production temporarily, it will have to bear the loss of fixed cost.

All the three situations faced by the firm in equilibrium in short run are explained diagrammatically.

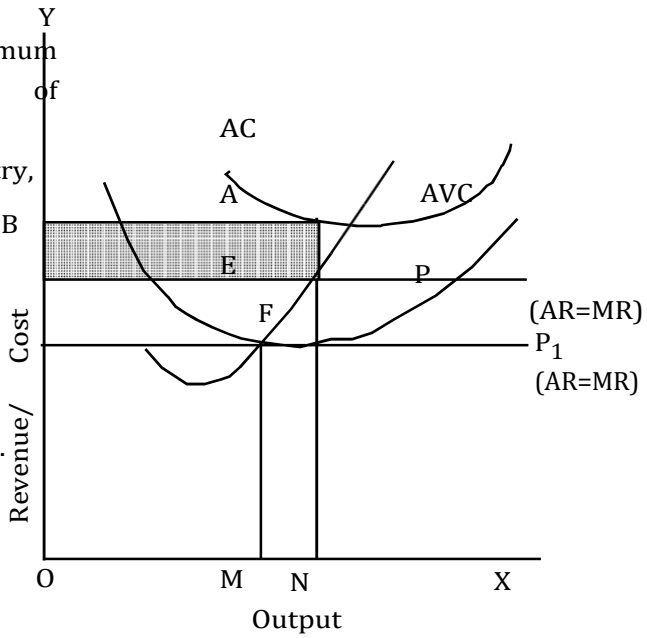
1. Super-Normal Profit : A firm in equilibrium earns super normal profit, when average revenue determined by the industry is more than its average cost. In the figure output of the firm is shown an OX axis and cost/revenue on OY axis MC is marginal cost and AC is average cost curve. PP is average revenue and marginal curve (AR = MR). Supposing OP is the price determined by the industry firm's equilibrium will be at point E where MC is equal to MR and MC curve cut MR curve from below equilibrium output is OM. At this output AR = EM and AC = AM. Since AR> AC so firm is earning EA super normal profit (SNP), so EABP the shaded area in SNP.



2. Normal Profit : A firm in equilibrium earns normal profit when its AC is equal to AR. It is shown in figure 4. At OP Price determined by industry, firm's equilibrium is at point E and OM is the equilibrium output. At point E, MC and MR are equal and MC curve cuts MR curve from below. Firms earn normal profit at OM output because at this output its MC=MR=AR=AC. In other words, AC and price per unit are equal.

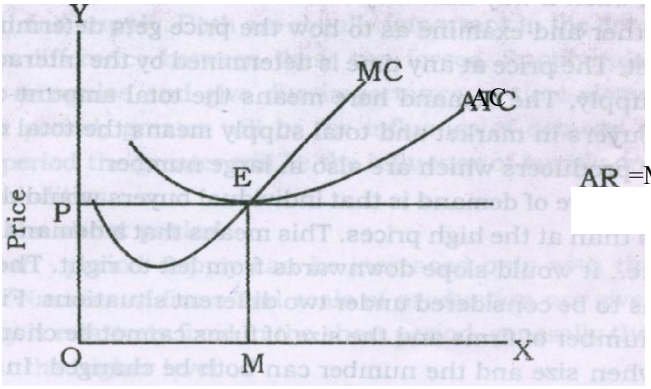


3. Minimum Loss : A firm in equilibrium may incur minimum loss when the average cost of equilibrium output is more than price (AR) determined by industry, by an amount equal to fixed cost i.e. when price (AR) is equal to average variable cost (AR=AVC). Even if the firm discontinues its production, it will have to bear the loss of fixed cost. Loss of the fixed cost is the minimum loss of the firm. As long as AR is more than or equal to AVC the firm will continue with its production. If AR is less than AVC the firm will prefer to shutdown the unit.



2.4.3.3 Long Period Equilibrium

The long period we may define as the period over which the firm can expand and contract the scale of its output, increasing or decreasing the fixed factors as the need may be. Besides, according to our forth assumption of free entry and exit during the long period, the number of firms in the industry may increase or decrease in order that a balance between the total demand and the total supply is achieved. Besides the two conditions of short period equilibrium examined above, a third condition is also required to be fulfilled for the long period equilibrium also known as "Full Equilibrium". This condition is that the price AR is not only equal to MR and MC but is also equal to the ATC.



Output

Fig. No. 4

In diagram no. 4, we find that all the above conditions of equilibrium are met at the point E. So E is the point of stable and full equilibrium. The equilibrium output is OM and equilibrium price OP or what is the samething, EM. There are no abnormal profits. The firm earns only normal profits which are included in the ATC. Thus over the long period the price charged by the firm is equal to both the MC (=MR) and the AC i.e.

Price - MR = MC = AC = AR

Secondly, the firm attains the optimum scale of its output as it produces OM output at the minimum ATC shown by EM in the diagram. At this point, by coincidence, the industry (all these firms taken together) also attains equilibrium because the total demand for product is fully met by the total supply of product made available by all firms taken together. This is called "Full Equilibrium", because the supply of the product in the market exactly balances the demand for it.

Imagine for a moment that the supply is either less or more than the demand. "Full Equilibrium" would be achieved in this case. If the supply is less than the demand, some of the firms would get abnormal profits which would make them expand the size or scale of their output or attract new firms to enter that industry. This tendency would continue till supply becomes equal to the demand for the commodity. Conversely, if the supply exceeds the demand the marginal firms will undergo losses and they will leave that industry and go to some other field or industry. This tendency would also continue till the balance between demand and supply is achieved.

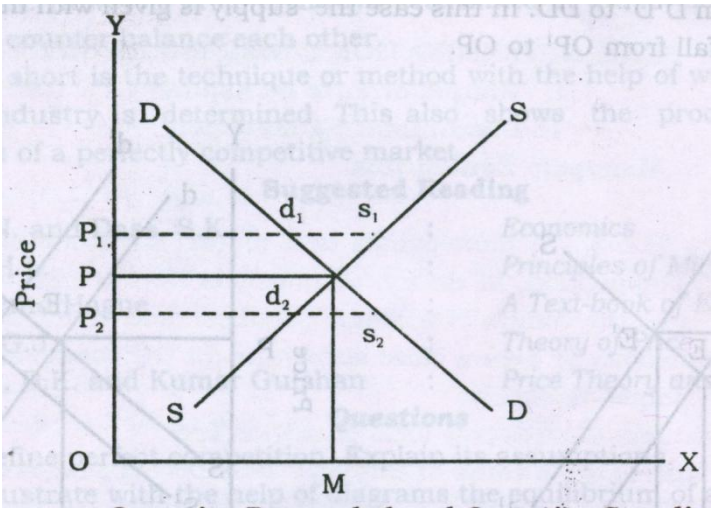
4. Case of Industry

So far, it has been explained that the price of the commodity is constant in the market and the individual firms adjust their output by combining the fixed and variable factors in such a way that they attain a minimum cost combination. Now we may go a step further and examine as to how the price gets determined in a perfectly competitive market. The price at any time is determined by the interaction of the forces of demand and supply. The demand here means the total amount demanded by the large number of buyers in market and total supply means the total quantity supplied by all the firms or producers which are also in large number.

The general nature of demand is that individual buyers would demand more only at the lower prices than at the high prices. This means that a demand curve could have a negative slope i.e., it would slope downwards from left to right. The supply curve on the other hand has to be considered under two different situations. Firstly, in the short period wen the number of firms and the size of firms cannot be changed, secondly, in the long period, when size and the number can both be

changed. In the short period, the supply curve would slope upwards to the right but in the long period it could be sloping upwards to the right or could be a horizontal straight line depending upon the operation of laws of returns.

Thus, in a perfectly competitive market, price would be determind at a point where quantity demanded and quantity supplied are equal to each other. This is known as equilibrium price. Demand and supply are the two contracting forces which move in opposite directions, price settles at a point where these two forces are equal.



Quantity Demanded and Quantity Supplied Fig. No. 5

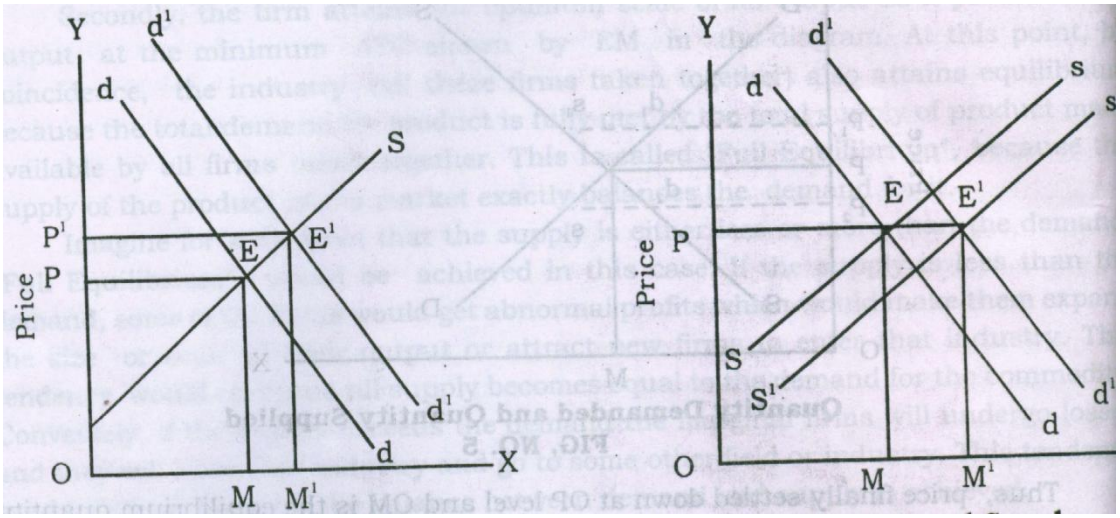
Thus, price finally settled down at OP level and OM is the equilibrium quantity. At price OP_1 supply exceeds demand so price is pushed downwards. On the other hand, at OP_2 price, demand exceeds supply, so price is pushed upwards. Ultimately, equilibrium is established at the point where demand and supply are equal to each other. Whenever there is deviation from this level it will be restored by the automatic forces of demand and supply. Both are equally important in the determination of price. But there is one difference between these two forces. Supply takes time to change. Thus we are to recognise and give due importance to time element. Generally, the shorter the time period, greater will be the influence of demand on pricing and the longer the time period the greater will be the influence of supply on the determination of prices of commodities.

Equilibrium in the short period

In the short period supply can be increased only with the increased use of

variable factors. Number of firms and scale of production are given during the short period. As supply is relatively fixed in the short period, generally the short period price would be fixed at the higher level.

Besides every increase in demand would lead to a rise in the price because the supply cannot be adequately increased. The DD and SS curve in the diagram 6 (next page) represent demand and supply curves of the industry. As supply is somewhat inelastic, the price is fixed at a high level, i.e, at E. Now a rise in a demand leads to rise in price from OP to OP^1 because a similar rise in supply is not neither the number of firms in the industry can be increased nor the size of firms in the industry can undergo a major change. The change would happen when the demand falls from D^1D^1 to DD. In this case the supply is given with the fall in demand the price would fall from OP^1 to OP.



Demand and Supply
Fig. No. 6

Demand and Supply
Fig. No. 7

Self-check exercise 1

1 Explain the features of perfect competition in detail?

2.4.3.3 Long Period Equilibrium

Over the long period, the supply becomes elastic meaning there by that the output can be increased by the existing firms or supplemented by the new firms entering the industry. With the supply becoming elastic and the demand not showing much change over the long period, the price might be fixed at a lower level. This can also be shown with diagram no. 7.

DD and SS are original demand and supply curves intersecting at point E_1 Equilibrium price is OP and equilibrium output OM. Now with the increase in demand

by D^1D^1 the supply can also be increased from SS to S^1S^1. The price may remain at the same level if increase in supply is equal to increase in demand. If increase in supply is more than the increase in demand the price may fall below OP also. The laws of returns will affect the position of the new supply curve.

The long run supply curve slopes upward to the right in increasing cost industry, is horizontal straight line in constant cost industry and slopes downward to the right in decreasing cost industry. Long run normal price is determined by the equilibrium between a demand curve and long run supply curve Le. when supply is fully adjusted to a given demand. Long run price is equal to the minimum long run average cost. Then all the firms within the industry earn only normal profits and industry is also in equilibrium. Whether long run price rises or remains constant or falls depends upon whether the industry is experiencing law of increasing cost, constant cost and decreasing cost. However, price is always determined at the level where demand and supply forces counter balance each other.

This, in short is the technique or method with the help of which equilibrium of competitive industry is determined. This also shows the process of the price determination of a perfectly competitive market.

2.4.4 Summary

Perfect competition is a market structure with numerous buyers and sellers, producing identical products. There are no barriers to entry or exit, and participants have perfect information about prices and products. In perfect competition, individual firms are price takers. They have no control over the market price and must accept the prevailing price set by the forces of supply and demand. The market price, also known as the equilibrium price, is the price at which the quantity demanded by buyers equals the quantity supplied by sellers in the market. It is determined by the intersection of the demand and supply curves. Overall, price determination in perfect competition is determined solely by market forces, leading to an efficient allocation of resources and zero economic profits in the long run due to the absence of barriers to entry and exit.

2.4.5 Glossary

1. Economic Profit:

Economic profit is the total revenue minus both explicit costs (such as rent, labour, and materials) and implicit costs (the opportunity cost of the resources provided by the firm's owner). In perfect competition, economic profit tends to zero in the long run due to the ease of entry and exit.

2. Shut-Down Price:

The shut-down price is the price at which a firm in perfect competition decides to temporarily cease production in the short run. It occurs when the market price falls below the minimum average variable cost, making it more cost-effective to stop production temporarily.

3. Break-Even Price:

The break-even price is the price at which a firm in perfect competition covers all its average total costs but earns zero economic profit. It is the price at which the firm reaches its break-even point.

4 Perfect competition- Perfect competition is a market structure where there are numerous buyers and sellers, and all firms produce identical products, facing the same market price.

There are no barriers to entry or exit, and participants have perfect information about prices and products.

2.4.6 Questions

1. Define perfect competition. Explain its assumptions.
2. Illustrate with the help of diagrams the equilibrium of a firm in short run and long run under conditions of perfect competition.
3. Describe the effect of a change in demand on the price of product in short run and long run.
4. Short questions
5. a) Perfect competition
6. b) Price taker
7. c) Equilibrium

2.4.7 Suggested Reading

1. Sen, S.N. and Dass, S.K. : *Economics*
2. Ahuja, H.L. : *Principles of Micro-economics*
3. Stonier and Hague : *A Text-book of Economic Theory*
4. Stigler, G. J. : *Theory of Price*
5. Sharma, B.K. and Kumar Gulshan : *Price Theory and Distribution*

LESSON NO. 2.5 AUTHOR : DR. UPINDERJIT KAUR

PRICE DETERMINATION UNDER MONOPOLY AND MONOPOLISTIC COMPETITION

(PART - A)

PRICE DETERMINATION UNDER MONOPOLY

2.5.1 Objectives

Monopoly is a market structure where there is a single seller of goods selling products with no close substitutes. The major objective of this lesson is to make students familiar with the

- Concept of monopoly and its features
- Equilibrium situation under monopoly
- Discriminating monopoly situation

2.5.2 Introduction

In economics, a monopoly is a market structure in which a single seller or manufacturer controls the supply of a certain product or service throughout an entire industry. In contrast to perfect competition, in which there are numerous sellers and no single business has considerable market power, a monopoly has great market power, allowing it to influence market pricing and operate with minimal competition.

2.5.3 MEANIG

According to Dooley, "A monopolists is a market with one seller". Monopoly means absence of competition. In theory, monopoly is said to exist when the supply of a commodity is in the hands of a single producer and there is no other firm producing the commodity or even a close substitute for the commodity. This is what is called pure or simple monopoly.

2.5.4 FEATURES OF MONOPOLY MARKET

The main featuers of monopoly form of market are :

(i) One Seller and Large Numbe of Buyers : Monopoly is said to exist when there is only one seller of a product in a market. A monopolist may be the only person, a few partners or in the form of a joint stock company. In simple monopoly, the number of buyers is assumed to be large. No single buyer can influence the price by his individul actions.

(ii) No Close Substitutes : The second condition of monopoly is that there should not be any close substitute of the product sold by the monopolis. If it is not so, a monopolist can't charge a price according to his own desire. So, he can't be a price maker.

(iii) Restriction on the Entry of New Firms : In a monopoly type of market, there is a strict barrier on the entry of new firms. A monopolist faces no competition.

(iv) Selling Costs : In monopoly, selling costs are incurred in the beginning. These are done to give information to the buyers about the product. Under perfect competition an individual producer or firm cannot change the price in the market because of the presence of a large number of producers and keen competition among all of them. Again, this monopoly is a one firm industry and it does have the power to influence the price in the market by increasing or decreasing the supply. We will now examine the price and output policy that a monopolist would generally adopt.

2.5.5 MONOPOLY EQUILIBRIUM

Like any other producer a monopolist also aims at maximization of his profits. In order to achieve this objective he would so adjust the scales of his production that not only produces a required output at the minimum possible cost, but he also sells that output at the minimum possible price. To understand the price and output policy of a monopolist we must analyse the forces underlying the demand for and supply of the commodity produced by tbe monopolist.

(a) Nature of Demand

The demand curve for the product of a seller under perfect competition is perfectly elastic and so it is a horizontal straight line. But, under monopoly the demand curve would slope downwards from left to right, implying that more of a commodity is sold at lower price than at a higher price. In other words, a monopolist can charge a higher price only be selling a smaller output. The demand curve has a negative slope or slopes downwards to the right, the marginal revenue curve also slopes downwards and lies below the average revenue curve. If we assume for the sake of simplicity that AR curve is a straight line then the corresponding MR curve would also be straight line and the latter would lie halfway between AR and Y axis. This we may show with the help of a diagram.

In the diagram no. 1 we take AR as a straight line. Its behaviour shows that more output can be sold only when the price is reduced. The MR curve also has a similar shape and behaviour but it would always lie halfway between the AR and Y axis. This we may prove with the help of an example.

Draw a perpendicular from point P or Y axis meeting it at point R. Now bisect the line PR. The point Q lies in middle of P and R. The marginal revenue curve would pass through this point.

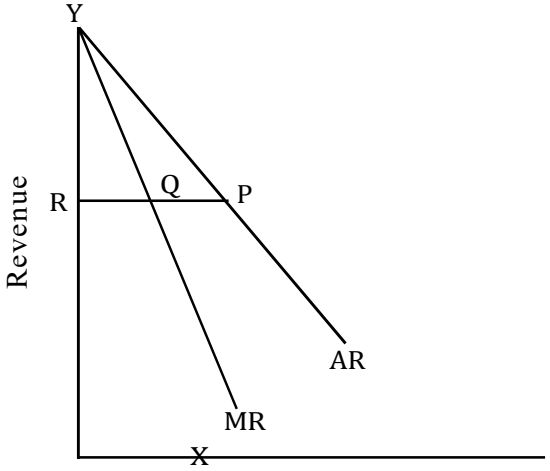


Fig. No. 1

Another point to be noted here is that the demand or AR curve may be more or less elastic. If it is more elastic then its slople shall be less steep but, if it is less elastic it shall have a more steep slope. When the demand is elastic then the monopolist would generally find it difficult to charge a high price. Conversely, when demand for his product is some what inelastic he can charge a high price by restricting his output. In other words, the power of a monopolist or what is the same thing as degree of monopoly depends on the elasticity of demand. The lower the elasticity of demand, the greater the degree of monopoly profits.

(b) Nature of Costs

The cost curves of a monopoly firm are similar to those of a competition firm. This is so because the same principles are involved in the case of cost of a firm producing under monopoly and competition conditions. There is no difference however, between the two. We generally do not take the average variable cost of monopoly firm. Instead we take the ATC and MC into consideration. This is so because the monopolist being the only producer can fix the price of his product at a level higher than even the ATC. In this sense the time element would not have much effect on the price and output policy of the monopolist.

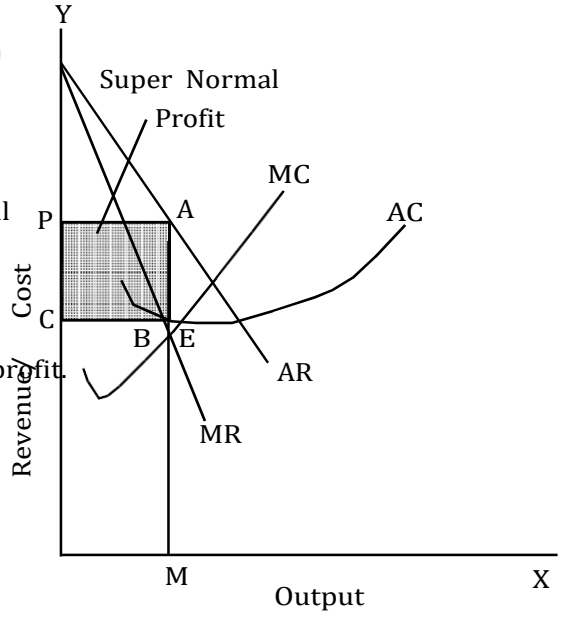
3. THE EQUILIBRIUM

Under monopoly also the main condition of equilibrium is the equality between the MR and the MC at which point the profits of the monopolist are maximised.

(a) Price determination under short period :

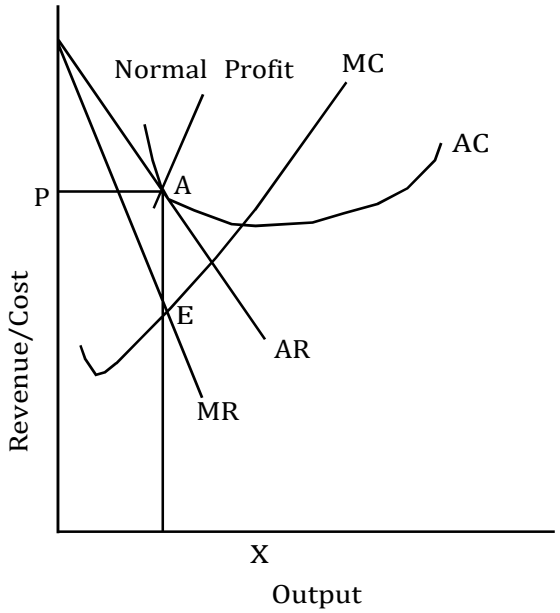
A monopolist in equilibrium may face any of the given three situation in the short period.

1. Super Normal Profit : If the price (AR) fixed by the monopolist in equilibrium is more than his average cut then he will get super normal profits. The monopolist will produce upto the extent where MC=MR. If the price of equilibrium output is more than AC then monopolist will earn super-normal profit. The monopolist will produce OM units of output and sell it at AM price which is more (AC) BM by AB per unit. (AM – BM = AB).

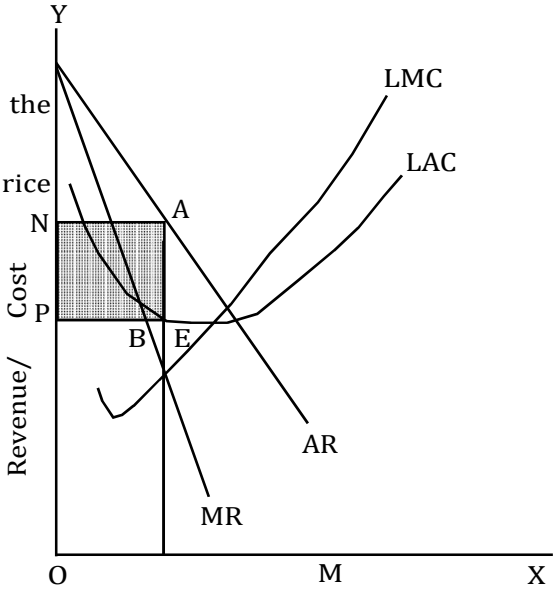


Y

2. Normal Profit : If in the short period equilibrium (MC=MR) the monopolist price (AR) is equal to its AC i.e. AR=AC then he will earn normal profit. Equilibrium of the monopoly firm in the short run is shown in figure. At point A AC curve touches AR, Monopoly firm earns normal profit in equilibrium situation as at equilibrium output at AC=MR.



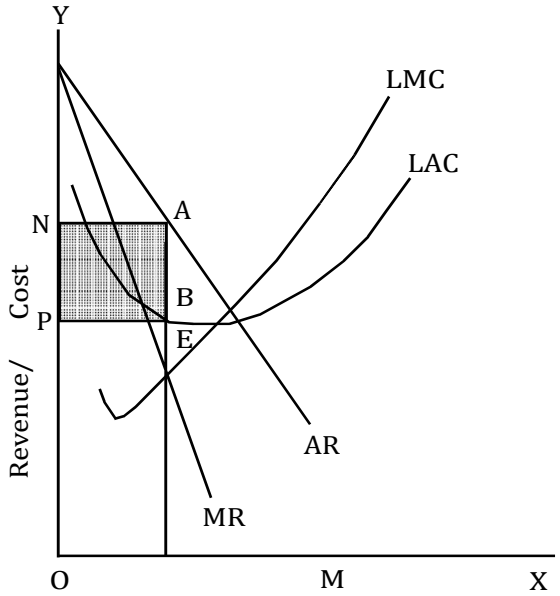
3. Minimum Loss : In the short run the monopolist may incur loss also. If in the short run price falls due to depression or fall in demand, the monopolist may continue his production so long as the low price covers his average variable cost (AVC). Accordingly, a monopolist in equilibrium in the short period may bear minimum loss equivalent to fixed costs. The monopolist will have to bear this loss even if he chooses to discontinue production in short period. Thus Minimum loss = AR – AVC.



(b) Determination of Long-Run Equilibrium :

In the long-run, the monopolist will be in equilibrium at a point where his long-run marginal cost is equal to marginal revenue (LMC=MR). In the long-run a monopolist earns super-normal profit. Monopoly firm in the long run is not contented with normal profit alone, as the firms under perfect competition do, rather it in a position to earn super-normal profit. Super normal profit refers to a situation where

AR>AC. At point E, MR = ?MC, hence OM is the equilibrium output and ON (=AM) is the equilibrium price. Monopolist earns AM – BM = AB super normal profit per unit. ABPN shaded area is super normal profit.



Equilibrium under Decreasing Cost Conditions

In the diagram no. 4 the AR, MR, MC curves are all taken as straight lines for the sake of simplicity. The equilibrium point is E where the MC = MR. The equilibrium output is OM. The equilibrium price is OP. Profit per unit of output it TS. Total monopoly profit is PTRS.

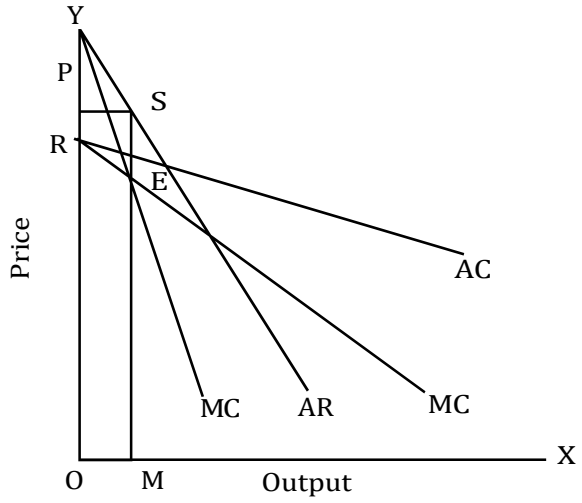


Fig. No. 4

Constant Cost Conditions

Under the constant cost conditions both the average and marginal cost are equal and thus the same horizontal line represents both of them, as show in diagram No. 5 given below. With the AR and MR curves also given, we can find out the equilibrium position.

In this case also equilibrium is established at the point R where MR = MC. The equilibrium output is OM and equilibrium price PM. Per unit profits is PR while the total profit is PRST.

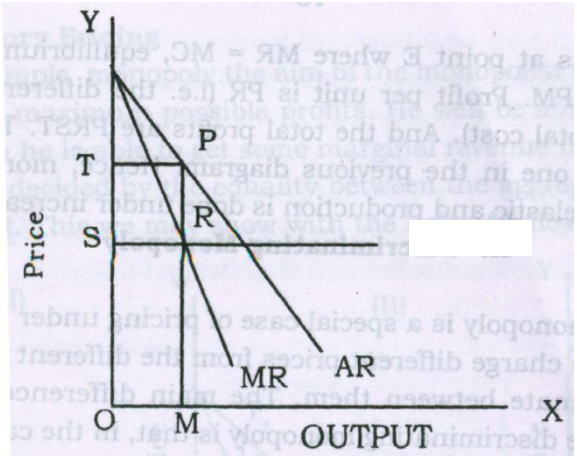


Fig. No. 5

Increasing Cost Conditions

Under this condition the average and marginal costs rise, we already when the average cost rises, the marginal cost rises faster than the average cost and thus it is more than the ATC. In the diagram No. 6 we find that when the average cost curve is rising the marginal cost curve increases at a faster rate and it is above the average cost. The equilibrium is established at point E. The equilibrium output is OM and equilibrium price PM. In this case the profits are more than those in the previous two cases, as clearly indicated by rectangle PRST. The per unit profit is also more than the same under decreasing and constant cost conditions. So the monopolist would prefer this situation as his profit is more in this case. He would benefit more if the demand for this product is inelastic because in this case his profit would be still higher. This may be shown with the help of diagram No. 7.

INCREASING COSTS CONDITIONS

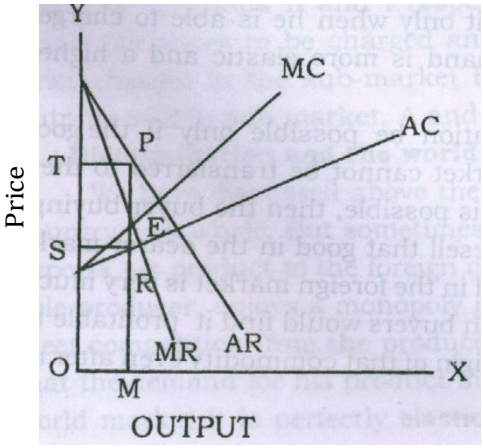
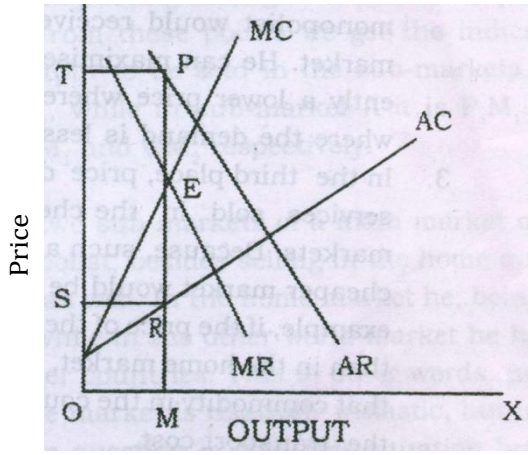


Fig. No. 6

INCREASING COSTS CONDITIONS



(Less Elastic Demand)

Fig. No. 7

The equilibrium is at point E where MR = MC, equilibrium output is OM and equilibrium price is PM. Profit per unit is PR (i.e. the difference between average revenue and average total cost). And the total profits are PRST. This rectangle is certainly bigger than the one in the previous diagram. Hence, more profits are earned when the demand is inelastic and production is done under increasing cost conditions.

2.5.6 DISCRIMINATING MONOPOLY

(A) Meaning :

Discriminating monopoly is a special case of pricing under Monopoly. Whenever the monopolist tries to charge different prices from the different buyers or customers he is said to discriminate between them. The main difference between simple or pure monopoly and the discriminating monopoly is that, in the case of former uniform price is charged by the monopolist from all the customers while under the latter, he charges different price from them. Now the question arises as to how he is able to practice price discrimination. For the price discrimination to succeed, certain conditions must be fulfilled :

1. The first condition for discrimination is that the market should be divisible into sub-markets. As the buyers generally try to buy at the lowest prices, the monopolist can charge different price only if he succeeds in dividing the market into two or more sub-markets for example, doctor may charge more from a rich patient than from a poor patient for the same type of medicine. Similarly, an electricity company may charge different rates for the electricity

used for lighting and for cooking purpose. In this way the monopolist has many markets as the number of prices he is able to charge.

2. Second condition of price discrimination is that the elasticity of demand in the different markets is considerably different. Discrimination would not at all be profitable if the elasticity of demand is the same, because the monopolist would receive the same marginal revenue or price in each market. He can maximise his profit only when he is able to charge differently a lower price where the demand is more elastic and a higher price where the demand is less elastic.

3. In the third place, price discrimination be possible only if the goods and services sold in the cheaper market cannot be transferred to the dearer markets. Because, such a transfer is possible, then the buyer buying in the cheaper market would be able to resell that good in the dearer market. For example, if the price of the good sold in the foreign market is very much lower than in the home market, the foreign buyers would find it profitable to resell that commodity in the country of origin of that commodity even after meeting the transport cost.

(B) Discriminatory Pricing

As under simple monopoly the aim of the monopolist under price discrimination is also to get the maximum possible profits. He well be able to receive the maximum profits only when he is able to get some marginal revenue from each market. His total output would be decided by the equality between the aggregate marginal revenue and the marginal cost. This we may show with the help of following diagrams.

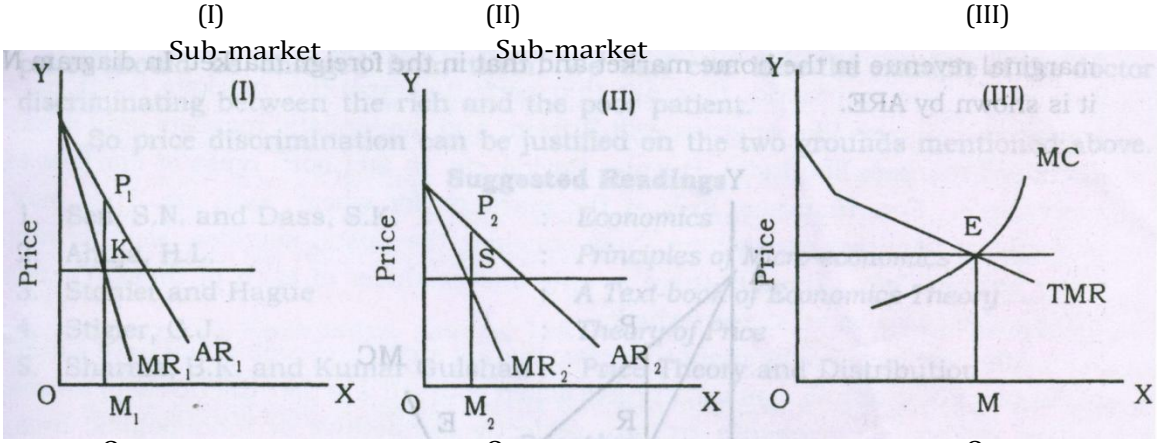


Fig. No. 8

In diagram No. 8 we find that the demand in the sub-market A is less elastic,

while it is more elastic in the sub-market B. In order to find out equilibrium for the monopoly firm we combine the MRI and MR2 and get TMR. The MC and TMR are equal at point E, so this shows the equilibrium of the firm. The equilibrium output is OM for purpose of the profit maximisation the monopolist would equal the marginal revenue in both the sub-markets. In order to find that, we drew a straight line from equilibrium point E, parallel to the X-axis and passing through M2 and M1 at point S and K in diagrams II and I respectively. From these points we get the indication about the prices to be charged and the output to be sold in the sub- markets. The price charged in the sub-market B is P_2M_2, while in sub-market A it is P_1M_1. The outputs sold in sub market. A and B are OM_1 and OM_2 respectively.

(C) Discrimination and the world market

We have discussed above the case of two sub-markets of a main market of the country as a whole. But sometimes a monopolist, besides selling in the home market exports his product to the foreign countries as well. In the home market he, being the sole producer, enjoys a monopoly position while in the other world market he has to meet competition from the producers of other countries. This in other words, means that the demand for his product in the home market is relatively inelastic, but in the world market it is perfectly elastic. Now the question is with this situation how he attains equilibrium and how much output he produces and sells in the two markets.

As perfect competition prevails in the market, so the AR_F and MR_F are equal and represented by a horizontal straight line. In the home market, on the other hand, AR_H and MR_H slope downwards as shown in diagram No. 9.

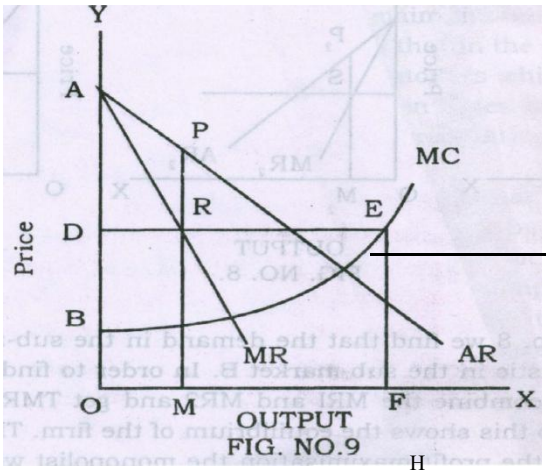


FIG. NO.9

$AR_F=MR_F$

The equilibrium for the discrimination monopoly firm is attained at point E where marginal cost is equal to aggregate marginal revenue, aggregate marginal revenue

is obtained by adding the marginal revenue in the home market and that in the foreign market. In diagram No. 9 it is shown by ARE.

In order to maximise profits the monopolist equates the marginal revenue in the home and world markets shown by EF and RM. The price charged in home market is PM and output sold is OM. The price charged in the world market is EF, and the output sold is MF. The monopoly profit is equal to area AREB.

It is generally felt that price discrimination is bad because a monopolist in his greed for profit tries to fleece the people, both rich and poor alike, by changing discriminatory prices. So price discrimination of all types in all the case is not desirable. But it may be desirable in certain cases.

The price discrimination can be justified on the ground of larger producing and larger employment resources. For example, when there is no descrimination the output produced by the monopolist would be small and so the cost of production and price would be high. Under price discrimination the output of the commodity may increase because the commodity may have to be supplied to more than one market. Sometimes, output becomes possible only with price discrimination. There is also a possibility that due to increase in production, costs may go down and consequently the product may be sold at a cheaper price both at home and abroad. Besides this, larger production would mean greater employment of labour, capital and other resources.

Secondly, we justify price discrimination on grounds of equity or equality. As the rich have high incomes and high purchasing power, they can and should pay higher prices. But as the poor people have low income and low purchasing power, lower prices should be charged from them. We can cite here the example of the doctor discriminating between the rich and the poor patient.

So price discrimination can be justified on the two grounds mentioned above.

2.5.6.1 self check exercise

1.Explain the meaning and features of monopoly

4. SUGGESTED READINGS

1. Sen, S.N. and Dass, S.K. : *Economics*
2. Ahuja, H.L. : *Principles of Micro-economics*
3. Stonier and Hague : *A Text-book of Economics Theory*
4. Stigler, G.J. : *Theory of Price*
5. Sharma, B.K. and Kumar Gulshan : Price Theory and Distribution

6. SELF CHECK QUESTIONS

1. Define Monopoly and give the nature of demand and cost curves of a firm under monopoly.
2. Show equilibrium of a firm under the conditions of price discriminating monopoly.
3. What principles would the monopolist keep in mind while adopting price and output policy so that he maximise his profits.

(PART-B)

PRICE DETERMINATION UNDER MONOPOLISTIC COMPETITION

By now you have learnt all about the process of price determination under perfect competition and monopoly. As you must be knowing perfect competition and monopoly are two extreme examples of market structures (system) that may or may not exist in the real world. It is not that perfect competitive markets exists only in advanced countries like America and Britain, and monopOlistic markets only in under developed markets like India, Burma, Ceylon etc. In fact both types of markets exist everywhere. For instance, look at the markets, for wheat, salt, etc. They may be perfectly competitive everywhere. Now consider the postal services, electric supply, water supply, etc. Usually there is only one producer of each of them. Therefore, monopolies can also exist. everywhere.

After you have learnt about these two market structures, you might have a number of doubts. For example, you might have asked yourself whether the markets for soaps, radios, readymade garments etc. are perfectly competitive or monopolistic because such markets have some features of perfect competition and others, of monopoly. These doubts are quite genuine.

As a matter of fact such markets are known as imperfectly competitive or monopolistically competitive markets. According to Leftwitch, "Monopolistic competition is a market situation in which there are many sellers of a particular product but the product of each seller is in some way differentiated in the minds of consumers from the product of every other sellers.

2.5.7 FEATURES

We shall now search for some general (common) features of such markets so that whenever we find these features in the market for any commodity we can say that this market is imperfectly competitive.

(i) Large Number of Sellers : The number of sellers is sufficiently large that there is no feeling of mutual interdependence among them. Each firm acts independently without caring for any effect which its action may have upon its comeptitors.

(ii) Differentiated Products : There is large number of buyers who are offered differentiated productrs and consequently have preference for the products of particular sellers. Differentiation of the product may be real or fancied. Real or physical differentiation is done through differences in materials used, design, colour or workmanship or physical prodct may be the same and imaginary differences can be built up through packaging, advertising, use of trade marks and brand

names. Further, the differentiation of the product may be linked up with the conditions of his sale : the location of his shop, the couteous and smiling disposition of its salesman or a reputation for fair dealing etc.

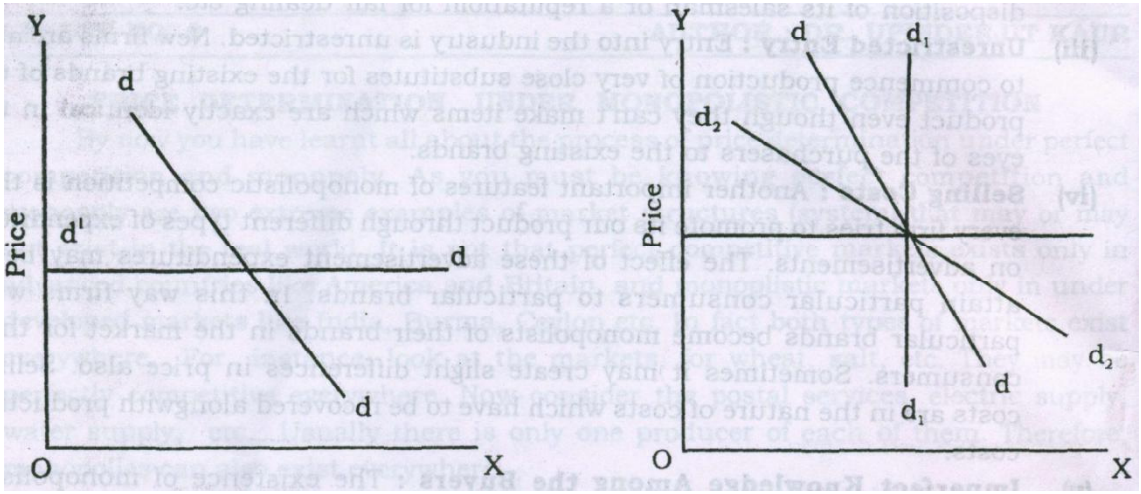
(iii) Unrestricted Entry : Entry into the industry is unrestricted. New firms are able to commence production of very close substitutes for the existing brands of the product even though they can't make items which are exactly identical in the eyes of the purchasers to the existing brands.

(iv) Selling Costs : Another important features of monopolistic competition is that every firm tries to promote its our product through different types of expenditure on advertisements. The effect of these advertisement expenditures may be to attain particular consumers to particular brands. In this way firms with particular brands become monopolists of their brands in the market for their consumers. Sometimes it may create slight differences in price also. Selling costs are in the nature of costs which have to be recovered alongwith production costs.

(v) Imperfect Knowledge Among the Buyers : The existence of monopolistic competition depends upon imperfections in the knowledge of the buyers. Much of the selling cost is simply meant to create imaginary superiority in the minds of consumers. The producers may really be the same but consumers may come to know a particular brand name more than the others.

(vi) Non-Price Competition : Another very important feature of monopolistic competition is the non-price competition, through which firms in the market try to win over customers. There are definite methods of competing rivals within a particular time, after sales service, a gift schemes with particular purchases, a discount not declared in the price list or transport free of cost. All these methods are secret ways of attracting customers to particular brands.

Thus we can conclude that the demand curve faced by a firm operating in an imperfectly competitive market, is not perfectly elastic curve (that is horizontal as in the case of perfectly competitive market) but downward sloping curve as shown by dd in the figure No. 1.



QUANTITY
FIG. NO. 1

QUANTITY
FIG. NO. 2

Now what determines the steepness of the demand curve dd ? When do we have a less steep demand curve like d_2d_2 (figure no. 2) which is closer to perfectly competitive demand curve and when do we have a more steep demand curve like d_1d_1 which is far away from the perfect competitive demand curve.

A moment's thinking will convince you that the steepness depends on the degree of product differentiation or on the elasticity of demand. Generally speaking, the less differentiated is the product from the products of other competitors the less steep or more elastic is the demand curve and vice versa, if there is no differentiation at all (that is all products are identical) the demand curve will have zero slope, for an individual seller in perfect competition.

At this point, we must note one thing. The market structure effects only the shape of demand curve of a firm. It has no effect on the cost curve. The average total cost curve and the marginal cost curve are 'U' shaped whether the market is perfectly competitive or imperfectly competitive. Now if we want to know how a firm's equilibrium, price and output are determined in an imperfectly competitive market, we should put the cost and demand curves together as done below in figure No. 3.

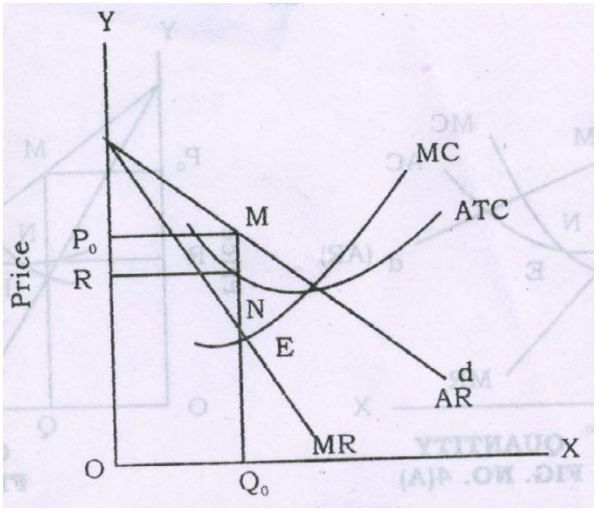


Fig. No. 3

You must have learnt by now that firms aim at maximising their profits. Their profits are maximum when there marginal revenue is equal to marginal cost. This point of equality is known as the equilibrium point. This is called equilibrium point because firm feels satisfied at such a point (because profits are maximum) and it is not thinking of increasing or decreasing its output.

If this is so, diagram no.3 tells us that at point E, the firm is in equilibrium. The equilibrium output is OP_0 and price OQ_0. It is now obvious that this short-run equilibrium of the firm is similar to that of a monopolist.

Now we know the short run equilibrium of the firm, we may say in what way the long run equilibrium of the firm is determined.

From diagram no. 3 it is clear that the firm is earning super normal profits. While OR (= Q_0N) is the cost per unit of output, the firm is selling each unit at a price OP_0 (=Q_0M). Thus P_0R (=MN) is the excess profit per unit. As the firm is producing OQ (=RN =P_0M) units the total excess profits are given by profit per unit multiplied by the total number of units, which is equal to the area of the rectangle $RNMP_0$.

Now what are the consequences?

As more firms enter the industry the total demand for the output must be shared by all the firms (old and new). As a result each firm will have a smaller share of the market. That is to say, at a given price each firm can now sell less than what it sold earlier (i.e. before the industry expanded). Therefore, the demand curve for the firm's product will shift down. This is shown in figure No. 4b. Figure No. 4a is similar to Figure No. 4b. They are put side by side to show the effects to expansion of the industry.

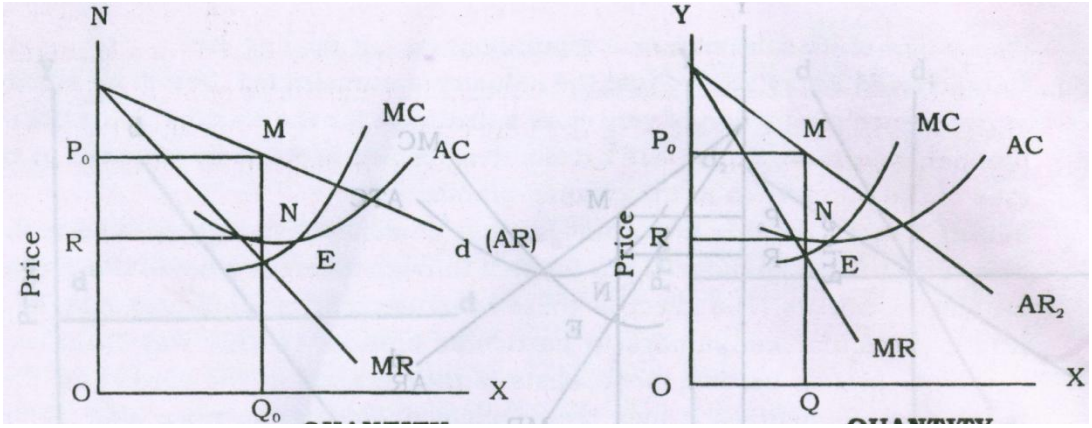


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Fig. No. 4(a)

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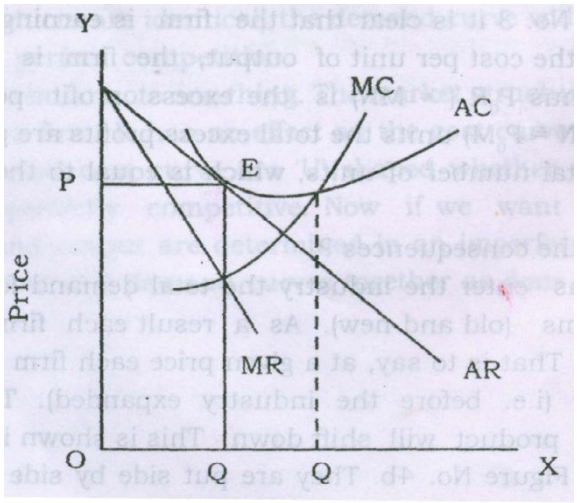
Fig. No. 4(b)

It is clear from diagram no. 4b that, as the industry expands, the output, price and excess profits of each firm decrease. The industry continues to expand as long as there are excess profits. Ultimately the industry stops expanding (that is in equilibrium). When the demand curve of each firm shifts sufficiently downwards so there is excess profit. This is shown in figure No. 5.

As soon as the typical firm's demand curve is tangent to the AC at E, excess profits vanish. Therefore, the industry is in equilibrium.

It is now clear that each firm in the industry functioning in an imperfectly competitive market is not able to produce that equilibrium output for which average cost is minimum (represented by OQ in diagram no. 5). This is so because a downward sloping demand curve be tangential only to the left of such minimum point on the cost curve.



QUANTITY
Fig. No. 5

As a result of Q_0Q part of capacity of the firm (from Q_0 to the dotted line) remains unutilised. In other words, there will be some excess capacity in each firm and therfore in the whole industry. When the market is imperfectly competitive or monopolistically competitive. This is something different from the case under perfect competition where there is such excess capacity and the plants are used to their optimum capacity.

There is another feature of monopolistic competition which does not exist under perfect competition. It may be to the advantage of a firm if it is engaged in non-price competition. Consider now a firm in perfectly competitive market. It can sell as much as it wants at the given price and it is of no use to spend money on advertisement (No farmer advertises when he wants to sell his wheat or rice). But a firm operating in an imperfectly competitive market can spend money on advertisement or to improve the quality of its product so that the demand curve for the product goes up. Such activities will increase the short run profits of firm. Thus, firms operating in an imperfectly competitive market compete each other in their advertisement outlays with the quality improvement of their product rather than in price reduction. They engage themselves on price competition.

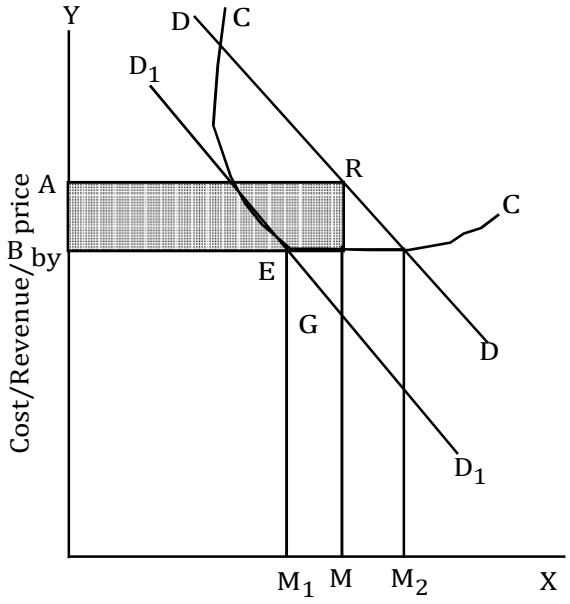
2.5.8 Group Equilibrium :

Under perfect competition there are large number of firms producing homogeneous products. These firms are called industry. Under monopolistic competition there are many firms producing close substitution. In other words there is product differentiation. Chamberlin has used the term "group" instead of industry, for the group of such firms as product differentiated products.

Determination of group equilibrium :

We study group equilibrium on the basis of two assumptions

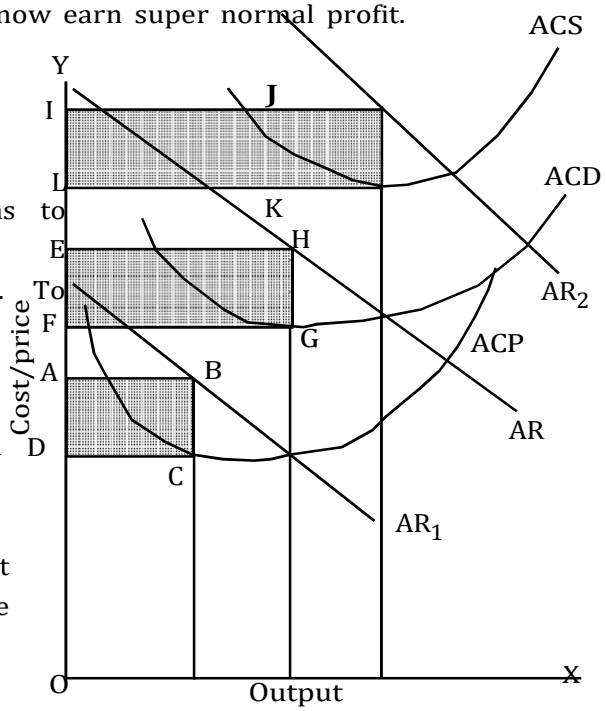
1. Demand and costs of all the firms of group are the same.
2. Number of firms in the group is so large that no individual firms its own decision can influence the price and output of other firms. In the figure DD is demand curve and CC is cost curve. Each producer would like to fix price equal to OA, because at this price difference between revenue



and cost is the maximum such a price will yield super normal profit equivalent to BARG. This profit will tempt many new firms to join the group which will make Demand Curve to shift to the left as D_1D_1 which become tangent to cost curve CC. This will happen at point E. No firm will now earn super normal profit.

Selling Costs and Firm's Equilibrium:

To study firm's equilibrium under monopolistic competition it is assumed that price of the commodity and selling costs both undergo a change. Firm has to decide about the price of the commodity and the selling costs to be incurred. facilitate our study, it is assumed that demand for the product increases due to increase in selling costs, resulting into extra profits for the producers. So Demand Curve shifts to the right as a result of increase in selling costs. It proves that both output and price increase on account of selling costs. In figure OX axis price and cost on OY axis. AR curve and average cost of production ACP is shown in figure.



Supposing firms spend Rs. 500 on advertisement etc. by way of selling costs. Total cost will increase and so will increase average cost. So ACS is the new average cost curve that include cost of production and selling cost. Demand for the product increase as a result of selling cost and shifts to the right as shown by AR_2 curve so firm will therefore earn profit equivalent to EFGH shaded rectangle which is bigger than ABCD. It prefer that as a result of selling costs, quantity of output price (AR) of the product and profit of the firm will increase.

2.5.9 Summary

In economics, a monopoly is a market arrangement in which a single seller or manufacturer dominates the entire industry. It is distinguished by the lack of competition, which gives the monopolistic corporation enormous control over price and supply. Monopolies have substantial economic consequences, and their influence on consumer welfare and market efficiency is a hotly debated topic. When considering monopolies, economists and policymakers frequently evaluate the benefits of economies of scale and innovation against the possible negative impacts on pricing and customer choice.

2.5.10 Glossary

1 Monopoly: A market arrangement in which only one seller or manufacturer of a certain commodity or service exists. It is distinguished by the absence of competition and the monopolistic firm's enormous market dominance.

2 Market power- Market power is a company's capacity to affect pricing, output levels, and market circumstances as a result of its dominating position in the market.

3 Price Maker: Instead of being a price taker, a monopolist becomes a price maker. It

can set the pricing of its goods depending on its profit-maximizing approach.

4Profit Maximization: A monopolist's purpose is to maximise profits. To achieve this goal, it finds the quantity of production at which marginal income equals marginal cost.

2.5.11 Exercise

1. Describe how price is determined under monopolistic competition.
2. Explain the characteristics of Monopolistic Competition and also determination of price and output under such a market condition.
3. Differentiate between (a) Monopolistic Competition and Perfect Competition (b) Monopolistic Competition and Monopoly.
4. Short note:

a) Price maker
b) Market power
c) Monopoly

2.5.12 SUGGESTED READINGS

1. Sen, S.N. and Dass, S.K. : *Economics*
2. Ahuja, H.L. : *Principles of Micro-economics*
3. Stonier and Hague : *A Text-book of Economic Theory*
4. Stigler, G.J. : *Theory of Price*
5. Sharma, B.K. and Kumar Gulshan : *Price Theory and Distribution*

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BUSINESS ECONOMICS

LESSON NO. 2.6 AUTHOR : DR. UPINDERJIT SINGH

PRICING AND OUTPUT UNDER OLIGOPOLY

2.6.1 Objective: the following objectives will be fulfilled by reading this chapter:

1. Meaning and characteristics of Oligopoly
2. Collusion and independent actions
3. Markey sharing cartel

2.6.2 Introduction

Oligopoly is a market structure where there are a few sellers selling either identical products or differentiated products. If the products are identical, it is the case of pure oligopoly; if the products are differentiated, it is the case of differentiated oligopoly. A single seller occupies a position of sufficient importance in the product market as changes in his price activities do have repercussions on the others in the market. The other sellers react to the market activities of the one, and their reactions in turn, have repercussions on him. The individual seller is aware of this interdependence and in changing his price, output sales promotional activity, or quality of product, he must take the reactions of other into account. Thus, a few sellers in oligopoly make all the decisions, in the sense that each seller is producing a large and a significant portion of the market output so that its actions and reactions are of importance to the other sellers. It is very unlike a firm in perfect competition, where it is producing a small and insignificant portion of the market output and where it cannot influence the price by its own individual action.

Meaning : Oligopoly pricing is not as neat and precise as the theories of perfect competition and monopoly. It is due to the uncertainty with regard to the rival's reaction to the various kinds of activities on his part. It is also due to the fact that oligopoly covers a wide range of cases, each with it unique characteristics. Thus, the oligopoly situation cannot be generalised like the position of other market structures. As such, several models will be developed which cover a large part of the oligopoly situations in the real world.

2.6.4 Characteristics of Oligopoly :

1. Interdependence : The most important feature of oligopoly is the interdependence in decision making of new firms which comprise the industry. This is because when the number of competitors is few, any change in price, output, product etc. by a firm will have a direct effect on the fortune of its rivals, which will then retaliate in changing their own prices, output or products as the case may be.
2. Importance of advertising and selling costs : A direct effect of interdependence of oligopolists is that the various firms have to employ various aggressive and defensive marketing weapons to join a greater share in the market or to prevent a fall in their market share. For this various firms have to incur a good deal of costs on advertising and on other measurer

of sales promotion.

3. Group behaviour : Further another important feature of olyopoly is that for the proper solution to the problem of determination of price and output under it analysis of group behaviour is important. Theories of perfect competition, monopoly and monopolestic competition present no difficult problem of making suitable assumption about human behaviour. But the theory of oligopoly is a theory of group behaviour not of mass or individual behaviour and assume profit-maximising behaviour on the part of a producer of group may not be very valid.

Interminateness of demand curve facing an oligopolist :

Another important feature is the indeterminateness of the demand curve facing an oligopolist. The demand curve shows that amounts of its product a firm will be able to sell at various prices. Under perfect competition monopoly, monopolistic competition demand curve is easy to define. But under oligopoly situation is quite different because of interdependence of the firms, a firm cannot assume that its rivals will keep their prices unchanged when it makes changes in its own prices. Cost, Demand and Product Differentiation

Here it is assumed that oligopolistic firms buys its resource competitively. Its cost curves are like those of purely competitive firm and pure monopolist. In other words, he costs of a firm in oligopoly can be rising upwards.

It is the demand conditions that differentiate oligopoly from other market structures. Since what one firm is able to do in the market is conditioned by ways in which other firms react to the market activities of the one. The extent of this oligopolistics uncertainty is highly variable from case to case. In certain cases, the firm knows the actions and reactions and so can be certain about its demand curve, while in most other cases these actions and reactions are not known and knowable and it is very difficult to perdict the demand curve under such a situation. Thus, when the firm does not possess this knowledge, the position and the shape of the demand curve it faces, are highly conjunctural. What makes oligopolistic market structure different from others is the interdependence of demand among the firms of an industry.

Pure and Differentiated Oligopoly

When the firms in oligopoly are selling identical products, it is called pure oligopoly and when they are selling slightly differentiated products, it is called differentiated oligopoly. The distinction between differentiated oligopoly and pure oligopoly does not really matter in our analysis of pricing and output. As a practical matter, sellers in most oligopolistic industries sell differentiated products. Nevertheless, some of the fundamental principles of differentiated oligopoly, as well

as pure oligopoly, are seen most clearty when we assume that pure oligopoly exists. For example, instead of a single market price, under differentiated oligopoly, a cluster of prices may occur. Televisions may range between Rs. 5000 to 25000. The various price levels reflect consumer's views regarding the respective qualities of the different seller's wares and the availability of different markets. The analysis is simplified if we assume that pure oligopoly exists. It does not distort the basic pricing principles seriously, by reducing a cluster of prices to single market price for the product.

Collusion Versus Independent Action

There is a tendency among the oligopolistic firms to form a collusion although collusive arrangements are very difficult to maintain. This tendency towards collusion is indicated by the three types of incentives that exist in the oligopolistic market structure. First, the firms in oligopoly can increase their profits by decreasing the competition and acting in a more or less monopolistic fashion. Secondly, collusion can decrease the oligopolistic uncertainly which is so much the characteristic of oligopolies and which reduce the profits considerably by not enabling the firms to act in the monopolistic manner. Thirdly, collusion among the firms already in the industry will facilitate blocking of newcomers from entering into that industry. However, once the collusion comes into existence, there is also tendency on the part of a single firm breaking away from the collusion in order to enhance the profits. It is possible to classify oligopoly on the basis of the degree of collusion present in its structure. The following three forms may be distinguished.

I. Perfect Collusion

II. Imperfect Collusion

III. Independent Action on the part of Individual Firms

I. Perfect Collusion

Perfect collusion can taken the shape of cartel arrangements. A cartel is a formal organisation of the producers within a give industry. Its purpose is to transfer certain management decisions and functions of individual firms to a central association in order to improve the profit position of individual firm. Cartels are prohibited in some countries but they have existed extensively in some countries and on an international plane. The extent of the functions transferred to the central organisation varies in different cartels situations. We will make a mention of only two representative cartel situations. The first is the Centralised Cartel ; it implies a complete cartel control over the member firms. The second is the Market Sharing Cartel meaning thereby that only fewer functions are transferred to the central association.

The centralized cartel implies that decision making with regard to pricing output, sales and distribution of profits is accomplished by the central association,

which markets the product, determines the prices, determines the output that each firm is to produce and divides profit among member firms. Member firms are represented in the central association and cartel's policies presumably result from exchange of ideas, negotiations and compromises. The market sharing cartel is a somewhat looser form of organisation. The firm forming the cartel agrees on market shares with or without any understanding regarding prices. Member firms do their own marketing, but are careful to observe the cartel agreement.

II. Imperfect Collusion

Very often cartels are not allowed and there is a legal ban on the formation of cartels. So formal organisation having the shape of a cartel cannot exist. Things cannot be settled in black and white. As such, informal agreements are arrived at in order to avoid the legal implications. Under such form of agreements, the firms agree to fix prices and outputs and thus, escape from prosecution under the anti trust laws. The price leadership arrangements of a number of industries-steel, automobiles, sugar and others are typical of this class. Tacit unorganised collusion can occur in many other ways also, Gentlemen's agreements of various sorts with regard to pricing, output, market sharing and other activities of the firms within the industry can be worked out on the lunch table or on some social occasions of different kinds.

III. Independent Action

Many a time, collusive agreements are not arrived at, instead firms of an industry go it alone. There are two possible outcomes of such independent action. First, the firms acting despondently often do not know the reactions of other firms to its own price formation. It very often invokes retaliatory action which results into price wars. Second, in some industries independent action may be consistent with industry's stability over time. Firms may have learnt by experience what the reactions of rivals will be to actions on their part and may voluntarily avoid any activity that will rock the boat. It is just possible that the management of each firm is well satisfied with present prices, outputs and profits and is content to let things continue as they are rather than change and start a chain reaction in the shape of a price war. Such a situation is described as Price Stability.

We shall take now these models one by one.

1. Perfectly Organised Collusive Oligopoly Models

Let us first take up the two cases of perfectly organised collusive oligopoly for the purpose of determining price and output. The analysis assumes short-run where the individual firms do not have the time to change their plant size nor it is possible for new firms to enter the industry.

(i) The Completely Centralized Cartel : It refers to collusion in its most

complete form. Its purpose is the joint or monopolistic maximization of industry profits by several firms of the industry. Ideal or complete monopolistic price and output determination by the cartel will rarely be achieved in real world, although it may be approached in some instances.

In a completely centralised cartel, individual firms in an industry surrender the powers to make price and output decisions to a central association. Quotas to be produced are determined by the association and so is the distribution of industry's profits. Policies adopted are to be those which will contribute most to total industry profits. To simplify the analysis, let us take two firms in an industry producing identical products. These two firms join and form a central association to which they delegate the authority to decide not only the total quantity and the price at which it must be sold so as to attain maximum group profits, but also the allocation of production among the cartel members and the distribution of the maximum joint profits among the participating members. The authority of the central association is complete, clearly the central association will have access to the cost figures of the individual firms and for the purpose of the present model we unrealistically assume that the association can have its market demand curve and the corresponding MR curve. From the horizontal summation of the MC curves of the individual firms, the market MC curve is derived. The firm acting as a mutliplant monopolist, will set the price as defined by the intersection of the industry MR and the MC curves.

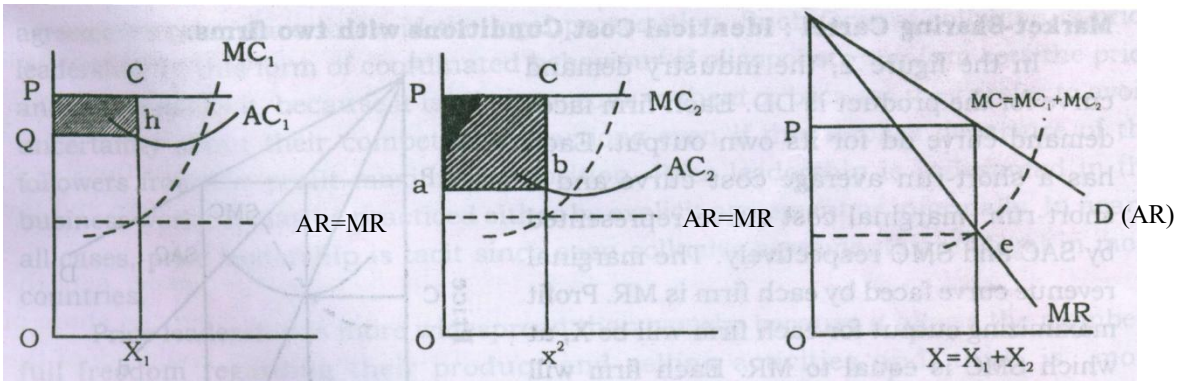


Fig. No. 1-A Fig. No. 1-B Fig. No. 1-C

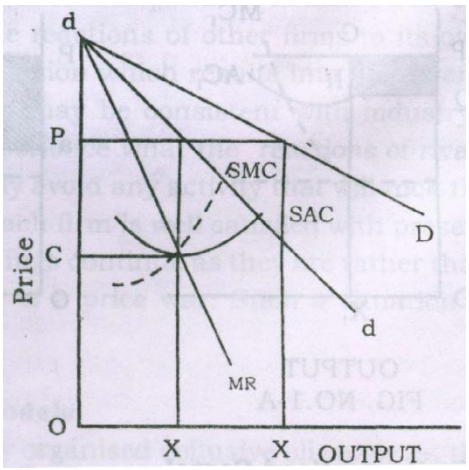
The Centralised Cartel

The cast structures of the individual firm are shown in the fig. 1-A and 1-B. From the horizontal summation of the MQ curves we obtain the market MC curve. This is implied by the profit maximization goal of the cartel : each level of the industry output should be produced at the least possible cost. Thus, if we add the output of A and B that can be produced at the same MC, clearly the resulting

total is the output that can be produced at this common lowest cost. Given the demand curve DD in fig. I-C; the monopoly solution which maximises joint profits is determined by the intersection of MR and MC at the point e. The total output is X and it will be sold at price P. Now the central association allocates the production among firm A and firm B as a monopolist will do, that is by equating the MR with the individual MCs. Thus, firm A will produce X and firm B will produce X . Note that the firm with lower costs produces a large amount of output. However, this does not mean that it will also take a larger share of the attained joint profit. The total industry profit is the sum of the profits from the output of the firms denoted by the shaded areas of figures I-A and I-B. The distribution of profits is decided by the central association of the cartel.

(ii) The Model of Market-Sharing Cartel : This form of collusion is more common in practice because it is more popular. The firms agree to share the market, but keep a considerable agreement of freedom concerning the style of their output, their selling activities and other decisions. We illustrate the market-sharing cartel with the determination of quotas. This method of sharing the market is the agreement on quotas, that is, agreement on the quantity that each member may sell at the agreed prices. If all firms have identical costs the monopoly solution will emerge with the market being shared equally by the member firms. For example, if there are only two firms with identical costs, each firm will sell at the monopoly price one-half of the total quantity demanded in the market at that price. Suppose establish the rule of a single price in the product market.

Market-Sharing Cartel : Identical Cost Conditions with two firms.



In the figure 2, the industry demand curve for the product is DD. Each firm faces demand curve dd for its own output. Each has a short-run average cost curve and a short-run marginal cost curve represented by SAC and SMC respectively. The marginal revenue curve faced by each firm is MR. Profit maximizing output for each firm will be X, at which SMC is equal to MR. Each firm will want to charge price P. Together the firms will produce an industry output of X that will fill the market at price P. Such will be the case since dd lies halfway between the market demand curve and the price axis.

Another popular method of sharing the market is the definition of a region in which each firm is allowed to sell. In this case of geographical sharing of the market, the price as well as the style of the product may differ. There are many examples of regional market-sharing cartels, some operating at international level.

However, even a regional split of the market is inherently unstable. The regional agreements are often violated in practice, either by mistake or intentionally, by the low-cost firms who have always the incentive to expand their output by selling at a lower price openly defined or by secret price concessions or by reaching adjacent markets through advertising.

It should be obvious that the cartel models of collusive oligopoly are 'closed models. If entry is free the inherent instability of cartels is intensified : the behaviour of the entrant is not predictable with certainty. It is not certain that the new firm will join the cartel. On the contrary, if the profits of the cartel members are lucrative and attract new firms in the industry, the newcomer has a strong incentive not to join the cartel, because in this way its demand curve will be more elastic, and by charging a slightly lower price than at the cartel, it can secure a considerable share in the market on the assumption that the cartel members will stick to their agreements. Cartels being aware of the danger of entry, will either charge a low price so as to make entry unattractive or may threaten a price war on the newcomer. If entry occurs and the cartel carries out its threat of price war the newcomer may still survive, depending on his cost advantage, and his financial strength in withstanding possible losses during the initial of his establishment, until he reaches the size which will allow him to reap the full scale economics that he has over those enjoyed by the existing firms.

II. Unorganized Collusive Oligopoly Models

When cartels are not allowed to take shape, some tacit or gentleman's agreements take place to avoid the legal prosecution. Such form of collusion is price leadership. In this form of coordinated behaviour of oligopolists one firm sets the price and others follow it, because it is advantageous to them or because they prefer to avoid uncertainty about their competitor's reactions even if this implies departure of the followers from the profit maximising position. Price leadership is widespread in the business world. It may be practiced either by explicit agreement or informally. In nearly all cases, price leadership is tacit since open collusive agreements are illegal in most countries.

Price leadership is more widespread than cartels because it allows the members full freedom regarding their product and selling activities and, thus, is more acceptable to the followers than a complete cartel, which requires the surrendering of all freedom of action to the central association.\

Self check exercise :

1. Explain price rigidity
2. Explain Market sharing cartel

If the product is homogeneous and the firms are highly concentrated in a location the price will be identical. However, if the product is differentiated, prices will differ, but the direction of their change will be the same, while the same price differentials will broadly be kept. There are various forms of price leadership. The

most common types of leadership are given here :

(i) The Model of the Low-Cost Price Leader : Let us suppose that there are two firms in the industry, that a tacit market sharing arrangement has been established with each firm assigned half the market; the product is homogeneous, and that one firm has lower cost than the other. A conflict of interests occurs with regard to the desirable price to be changed.

Price Leadership by a Lowest Cost Firm

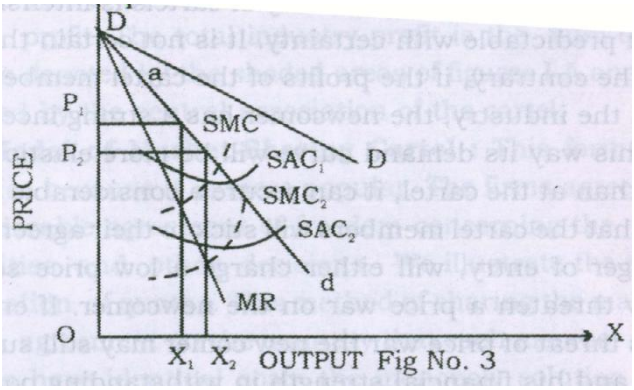


Fig No. 3

In figure 3. the market demand curve is DD. Each firm faces demand curve ad. The cost curves of the high-cost firm are SAC and SMC_1 and those of the low-cost firm are SAC_2 and AMC_2. The marginal revenue curve of each firm is MR. The high-cost firm will want to produce an output of X_1 and charge a price of P_1 whereas the low-cost firm will want to produce an output of X_2 and charge a price of P_2.

Since the low-cost firm can afford to sell at a lower price that the high-cost firm can, the latter will have no option but to sell at the price set by the low-cost firm. Thus, the low-cost firm becomes the price leader. This sort of situation has several ramifications depending on the comparative cost structures of the firms, the number of firms in the industry, the shape and the position of the market demand curve and the share of market that each firm is to receive.

Although the price leadership model stresses the fact that the leader sets the price and the follower adopts it, it is clear that the firms must also enter the share of the market agreement, formally or informally, otherwise the follower could adopt the price of the leader, but produce a lower quantity than the level required to maintain the price set by the leader in the market, and thus push (indirectly, by not producing enough output) the leader to a non-profit maximising position. In this respect the price follower is not completely passive : he may be coerced to adopt the leader's price, but unless tied by a quota-share agreement (formal or informal), he can push the leader to a non-profit maximising position.

(II) The Model of the Dominant Firm as Price Leader : In this model, it

is assumed that there is a large dominant firm which has considerable share of the total market, and some smaller firms, each of them having a smaller market share. To avoid large-scale price cutting, tacit collusion may occur in the form of price leadership by the dominant firm. Suppose the dominant firm sets the price for the industry and allows the small firms to sell what they desire at that price. The dominant firm then fills out the market.

Under the situation, each small firm will behave as if it were in a competitive market. It can sell all it wants to sell at the price set by the dominant firm. It faces a perfectly elastic demand curve at the level of the established price. The marginal revenue curve of the small firm coincides with the demand curve faced by it : hence to maximise profits the small firm should produce the output at which its marginal cost equals marginal revenue and the price set by the dominant firm.

A supply curve for all small firms combined is obtained by summing the marginal cost curves of all the small firms horizontally. It shows how much all small firms together will place on the market at each possible price. The curve is labelled MCs in Figrue 4. Price Leadership by a Dominant Firm.

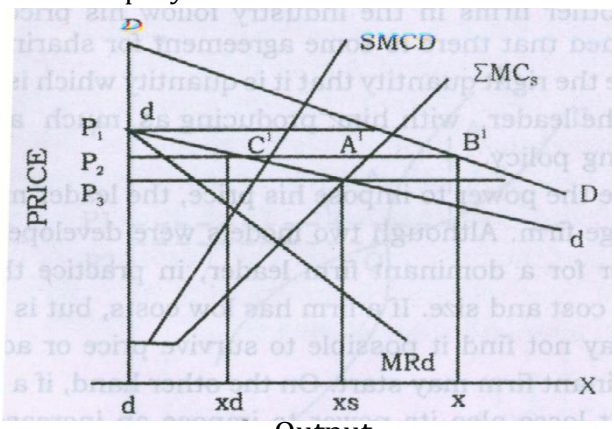


Fig. No. 4

The demand curve faced by the dominant firm can be derived from this information. The market demand curve DD shows quantity of the product, consumers will take off the market at each possible price, whereas the uMC_s curve shown how the small firms combined will sell at each possible price. The horizontal difference between the two curves at all possible prices show how much the dominant firm can sell at these prices. The demand curve faced by the dominant firm is dd and is obtained by subtracting the OMC_s curve from the DD curve horizontally. To show in detail how dd is obtained suppose the dominant firm sets the price of P. At this price, the small firms will fill the market leaving no sales for the dominant firm. At a price of P_2 the small firms will have the quantity P_2 A_1 leaving A_1B_1 for the dominant

firm to sell. In order to place the demand curve for the dominant firm's product in proper relationship to the quantity and price axis of the figure, we can set point 'C[f] so that P_2C equals A B . $_1$ This process can be repeated at various assumed prices. A line joining all these points thus, will be dd, the demand faced by the dominant firm. At any price below their respective average variable costs, the smaller firms will drop out of the market, leaving the entire market to the dominant firm.

The marginal revenue curve of the dominant firms is MRd and its marginal cost curve is SMCd. Profits are maximum for the dominant firm at an output level Xd at which SMCd equals MRd. The price charged by the dominant firm is P_2. Each small firm maximises profits by producing that output at which its marginal cost is equal to its marginal revenue which for each small firm is equal to its price P_2. The total output for the small firms combined is xs, the output at which OMC_s equals P_2. Total industry output is Xd + Xs which is equal to X. Profit the dominant firm is Xd time the difference between price P_2 and dominant firm's average cost at output. Average cost curve is not shown in figure 4.

The price leadership model will lead to a stable equilibrium if the leader has the power to make the other firms in the industry follow his price increases or price decreases arid provided that there is some agreement for sharing the market so that the followers produce the right quantity that it is quantity which is required to maintain the price set up by the leader, with him producing as much as is compatible with this profit maximising policy.

In order to have the power to impose his price, the leader must be enjoying both the low cost and large firm. Although two models were developed, one for a low cost leader and another for a dominant firm leader, in practice the power of a leader depends both on his cost and size. If a firm has low costs, but is very small compared with the leader it may not find it possible to survive price or advertising or product design war that dominant firm may start. On the other hand, if a dominant firm loses its cost advantage, it loses also its power to impose an increase in price, since the smaller firms having lower costs, will normally not follow price increases.

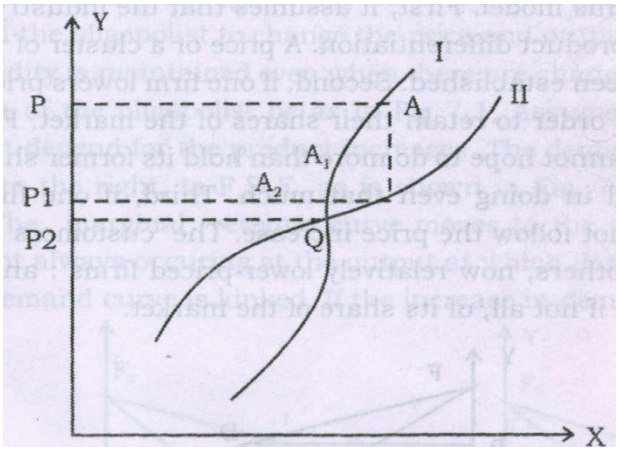
III. Unorganised Non-Collusive Oligopoly Models

In the case of unorganised non-collusive oligopoly, the formal or tacit agreement is not possible and the firms act independently. Since there are a few firms in oligopoly and this make the firms interdependent of each other, the output that one firm can sell by changing its price depends on the manner in which other firms react to this price change. The range of possible reactions is fairly broad. Rivals may just meet the price change, they may change price in the same direction but by less than the change of the original seller, they may exceed the price change; they may improve the quality of their products, they may engage in extensive advertising campaigns or they may react in many other ways. Inability of the individual seller to predict, which reactions will occur and in what degree will they

occur, results in an absolutely uncertain behaviour on the part of the firm. It leads to either price war or price rigidity. Let us analyse these situations.

(i) The Model of Price Wars : A persistent danger of price wars exists in oligopolistic industries characterised by independent action on the part of individual firms. One seller may lower his price to increase his sales. But this move takes customers away from the rivals, and the rivals, may retaliate with a vengeance. The price war may spread throughout the industry, with each firm trying to undercut others. The end result may well be disastrous for some individual firms.

The specific case of price wars are varied. But they originate from the interdependence of sellers. A new firm opening up in a locality or an existing firm attempting to revive lagging sales may be the initiating factor. Surplus stocks at existing prices and limited storage facilities have touched off price wars in many industries. In a young industry, sellers may not have learnt what to expect of rivals or they may be scrabbling to secure an establishment place in the industry and may inadvertently start a price war.



The best price that Firm A would like to change given the price of B.

Fig. No. 5

In fig. 5 we note two reaction curves : The curve I shows A's reactions to price set by the firm B or it shows the best price that firm A would like to charge given the price of B. The curve II shows B's reaction to the price set by A or in other words, it shows the best price that firm B would like to charge given the price of A. If firm B charges a price P_1 firm A would like to charge a price of PA. And if firm A sets this price of PA, firm B would like to charge a price of P to which A's reaction would be that it would like to charge a price of P A and the reaction of firm B to this new price of PA set by A would be that it would set a price of P and so we go on approaching the equilibrium point Q at the intersection of the two reaction curves. With the curves as drawn the equilibrium is stable. We may note

here that the reaction curves themselves may not be stable ; for instance at Q both firms are unprofitable. Either one may eliminate or absorb the other, or there may be collusion or a new set of curves to raise the prices to higher levels.

Maturity on the part of the long established industry may substantially lessen the dangers of price wars. Individual firms may atleast have learnt what not to do and may carefully avoid any activities that conceivable could touch off price wars. They may have established a price or a cluster of prices that is tolerable to all from the point of view of profits. Such prices are thought by many to be rather rigid over time, although there is no clear cut evidence that this is the case. Individual firms are thought to engage in non-price competition rather than in price rivalry in order to increase their respective shares of the market and profit.

(ii) The Model of Price Rigidity : An analytical device frequently used to explain oligopolistic price rigidity is the kinked demand curve. There are a few assumptions of this model. First, it assumes that the industry is a mature one either with or without product differentiation. A price or a cluster of prices fairly satisfactory

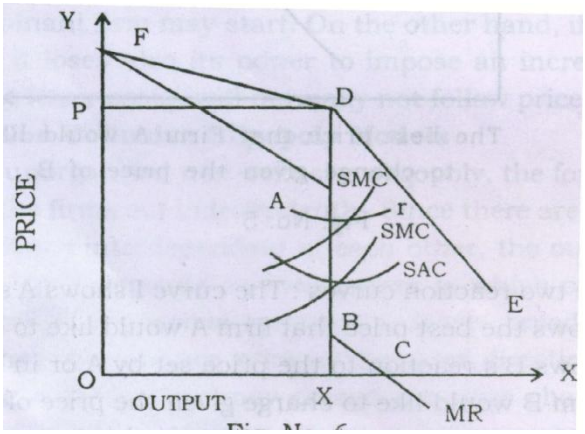


Fig. No. 5

to all firms has been established. Second, if one firm lowers price other firms will follow or undercut it in order to retain their shares of the market. For price decreases, the individual firm cannot hope to do more than hold its former share of the market and it may not succeed in doing even that much. Third, if one firm increases price, the other firms will not follow the price increase. The customers of the price raising firm will shift to the others, now relatively lower-priced firms : and the price-raising firm will have to part, if not all, of its share of the market.

The demand curve in such a situation will take the shape of FDE as in fig. 6. The firm has established price P. If it decreases the price below P, the other firms follow and it retains only its share of the market. For price decreases then, the demand curve faced by the firm is DE and it will have about the same

elasticity at different prices as the market demand curve. Should the firm increase the price above P, other firms will not follow and it loses a part or all of its share of the market to other firms. The demand curve faced by the firm for price increases is FD and at each possible price it will have considerably greater elasticity than the market demand curve. The demand curve FDE is not smooth one. It has a kink in it at the established price P.

Corresponding to the kinked demand curve FDE, the marginal revenue curve (FABC line) is discontinuous at output *X.* Given the cost structure represented by SAC and SMC cuts MR in the discontinuous portion. Output *X* and price P are the profit maximising output. This is a fairly rigid price in the sense that any changes for example represented by SAC_t and SMC_t which cut the MR within the discontinuous portion AB, give no incentive to the oligopolistic firm either to change the price or the output. But in case the cost changes are sharp enough to cut the MR either in the FA or BC cost portions, it will compel the oligopolist to change the price and output.

Similar price regidity is maintained even when there are changes in the demand. Let the initial position of the oligopolist be as in Fig 7.1. Assume his costs do not change and the market depend for the product increases. The demand curve faced by the oligopolist, shifts to the right, to $F_1D_1E_1$ as is shown in fig. 7.2, but it remains kinked at price P. The marginal revenue curve moves to the right also with its discontinuous segment always occuring at the output at which demand curve moves to the right at which demand curve is kinked. If the increase in demand is limited one so that MR cuts MC in the discontinuous portion (A B) the firm will continue to maximise profits at the price P, but at a large output XI. A decrease in market demand shifts the firm's demand curve to the left, to $F_2D_2E_2$ *as* is shown in fig. 7.3. Here again there is no incentive to change the price although output

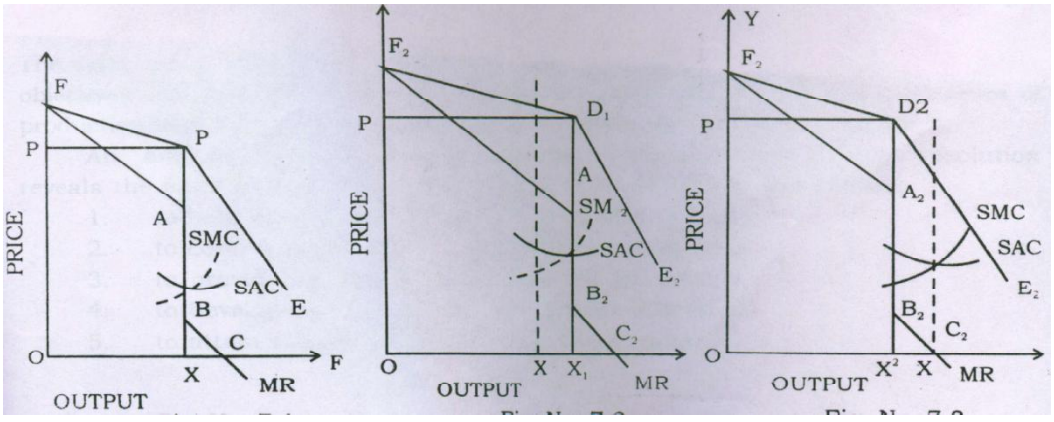


Fig. No. 7.1 Fig. No. 7.2 Fig. No. 7.3

decreases, until the demand curve shifts far enough to the left for the MC curve

to intersect the B_2C_2 segment of the MR curve. Thus price remains stable at P level.

2.6.5 summary : when there are few seller selling either identical products or differentiated products that market is called 'oiligopoly'. Under oligopoly situation, a firm cannot assume that its rivals will keep their prices unchanged when it makes changes in its own prices. The demand curve formed in oligopoly market is called kinked demand curve which is also called model of price rigidity.

2.6.6 Glossary

1. cartel: a group established by producers with the goal of restricting competition.

2. Collusive: unlawful cooperation or action beyween two parties that seems to be not true

3. Rigidity: the quality of being stiff.

2.6.7 Questions

1. Define an Oligopoly. What are the features of oligopoly. How is price determined in a collusive oligopoly?
2. What is an oligopoly? Give different types of oligopoly. What are the causes of emergence of an oligopoly?
3. What do you mean by oligopoly? Why is price indeterminate in oligopoly?
4. What is Kinked Demand Curve? How does it explain price rigidity?
5. Critically examine the theory of Kinked Demand Curve.
6. Short notes:
   1. Features of oligopoly
   2. Difference between monopoly and oligopoly
   3. Three examples of oligopoly market.

Suggested Readings

1. Sen, S.N. and Dass, S.K. : *Economics*
2. Ahuja, H.L. : *Principles of Micro-economics*
3. Stonier and Hague : *A Text-book of Economic Theory*
4. Stigler, G.J. : *Theory of Price*
5. Sharma, B.K. and Kumar Gulshan : *Price Theory and Distribution*

Type setting :
Computer Lab, Deptt. of D.E., Pbi. Univ., Patiala.

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