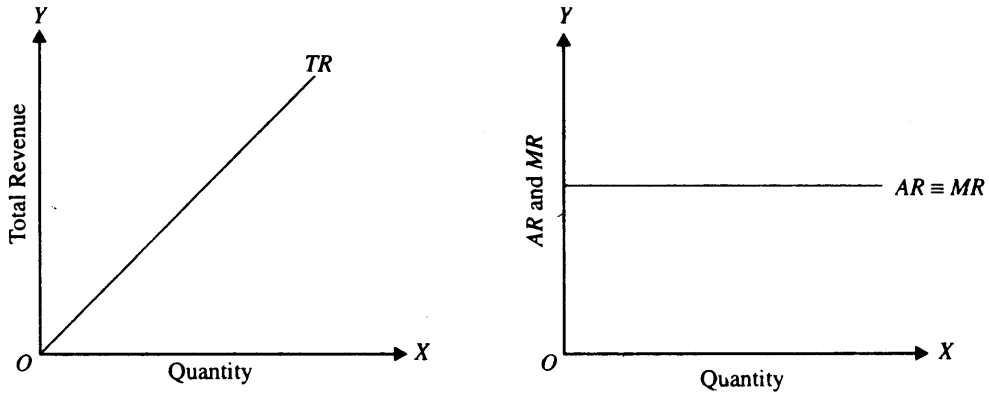
individual firm is perfectly elastic and the price is beyond the control of a firm, average revenue remains constant. If the price or average revenue remains the same when more units of a product are sold, the marginal revenue will be equal to average revenue. This is so because if one more unit is sold and the price does not fall, the addition made to the total revenue by that unit will be equal to the price at which it is sold since no loss in revenue is incurred on the previous units in this case. Consider Table 18.3. In this table, price remains constant at the level of Rs. 16 when more units of the product are sold. Col. III shows the total revenue when various quantities of the product are sold. Total revenue has been found out by multiply the quantity sold by the price.

Table 18.3. Average and Marginal Revenues Under Perfect Competition

No. of Units Sold	*Price (or AR)*	*Total Revenue (Price × Output)*	*Marginal Revenue (MR)*
I	II	III	IV
1	16	16	16
2	16	32	16
3	16	48	16
4	16	64	16
5	16	80	16
6	16	96	16
7	16	112	16
8	16	128	16
9	16	144	16
10	16	160	16

It will be found from taking out the difference between two succesive total revenues that marginal revenue in this case is equal to the price, *i.e.*, Rs. 16. Thus when two units of the goods are sold instead of one, the total revenue increases from Rs. 16 to Rs. 32, the addition made to the total revenue *i.e.*, marginal revenue will be equal to Rs. 32 – 16 = Rs. 16. Similarly, when three units at theproduct are sold, the total revenue increases to Rs. 48, and the marginal revenue will be equal to Rs. (48 – 32) = Rs. 16. Likewise, it will be found for further units of the product sold that marginal revenue is equal to price. The case of perfect competition when for an individual firm average revenue (or price) remains constant and marginal revenue is equal to average revenue is graphically shown in Fig. 18.2. In panel (*a*) of this figure we



Panel (a) Total Revenue Curve of a Firm under Perfect Competition

Panel (b) Average and Marginal Revenue Curve under Perfect Competition

Fig. 18.2. *Total Revenue, Average Revenue and Marginal Revenue under Perfect Competition*

have shown the total revenue curve *TR* of a firm which is a straight line from the origin. This means that slope of this *TR* curve is constant and therefore *MR* of the firm will remain constant.

Further, since this straight line *TR* curve starts from the origin, average revenue *AR* (which indicates price) will remain constant and marginal revenue *MR* will be equal to it. This is because as we have explained above that a firm working under perfect competition takes the price of the product as given and constant.

Average and marginal revenue curves under perfect competition are shown in panel (*b*) of Fig. 18.2. Average revenue curve in this case is a horizontal straight line, (*i.e.*, parallel to the *X*-axis). Horizontal-straight line average revenue curve (*AR*) indicates that price or average revenue remains the same at *OP* level when quantity sold is increased. Marginal revenue (*MR*) curve coincides with average revenue (*AR*) curve since marginal revenue is here equal to average revenue.

Geometry of AR and MR Curve under Imperfect Competition

We have seen above that in monopoly and in the various forms of imperfect competition, average revenue (*AR*) curve slopes downward and marginal revenue curve *MR* lies below it. An important fact about the position of *MR* curve corresponding to the downward-sloping straight line *AR* curve should be remembered. *When a straight-line average revenue curve slopes downward, marginal revenue curve MR which lies below it will pass through the middle of the distance between the AR curve and the Y-axis.* In other words, when both *AR* and *MR* curves are straight lines, if a perpendicular is drawn from a point on the *AR* curve to the *Y*-axis, *MR* curve will cut this perpendicular at its middle point. Consider Fig. 18.3, where both *AR* and *MR* curves are downward-sloping straight lines. Point *A* is taken on the average revenue curve and a perpendicular *AB* is drawn to the *Y*-axis. *MR* curve cuts the perpendicular *AB* at point *C*. Now, if *MR* curve cuts halfway the distance between *AR* curve and the *Y*-axis, then *AC* must be equal to *BC*. From this, we also learn the way of drawing *MR* curve corresponding to a given straight line *AR* curve. If any straight line *AR* curve is given to you, and you are asked to draw *MR* curve corresponding to it, then you should first extend the *AR* curve so that it meets the *Y*-axis (if it is not already so). After that you should draw *MR* curve strating from the *Y*-axis so that it bisects any perpendicular line drawn from a point on the *AR* curve to the *Y* axis.

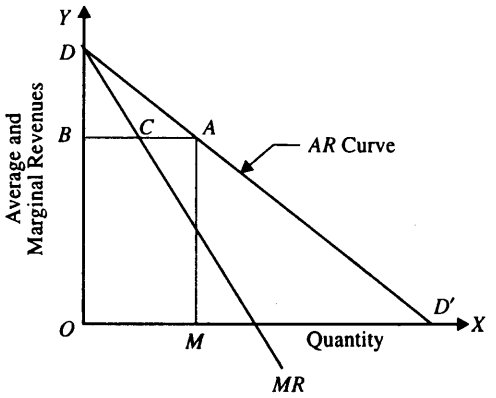


Fig. 18.3 *Position of Straight Line AR and MR Curves under Imperfect Competition*

Non-Linear AR and MR Curves

Marginal revenue curve corresponding to a convex or concave average revenue curve is not

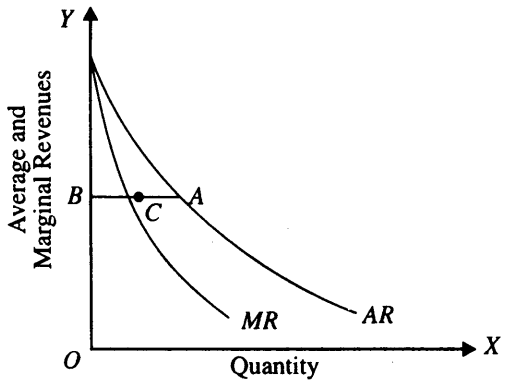


Fig. 18.4. *Position of MR Curve when AR Curve is Convex to the Origin.*

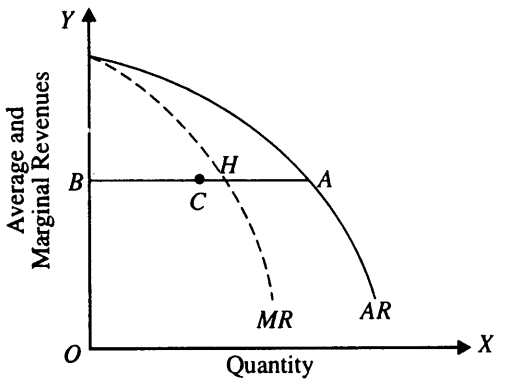


Fig. 18.5. *Position of MR Curve when AR Curve is Concave Towards Origin.*

of straight-line shape but is either convex or concave to the origin. What relationship *MR* curve will have to *AR* curve when average and marginal revenue curves are either convex or concave? In either of these cases the marginal revenue curve will not lie halfway between the average revenue curve and the *Y*-axis. If the average revenue curve is convex to the origin as in Fig. 18.4. the marginal revenue curve *MR* will also be convex to the origin and will cut any perpendicular drawn from *AR* curve to the *Y*-axis *more than halfway* as measured from the average revenue curve. On the other hand, if the average revenue curve is concave to the origin as in Fig. 18.5, the marginal revenue curve will also be concave and will cut any perpendicular line from the average revenue curve to the *Y*-axis *less than halfway* as measured from the average revenue curve. In Figs. 18.4 and 181.5, *C* is the middle point on the perpendicular line *AB*.

AVERAGE REVENUE, MARGINAL REVENUE AND PRICE ELASTICITY OF DEMAND

There is a very useful relationship between price elasticity of demand, average revenue and marginal revenue at any level of output. We will make use of this relation extensively when we come to the study of price determination under different market conditions. Let us study what this relationship is.

We have stressed above that the average revenue curve of a firm is really the same thing as the demand curve of consumers for the firm's product. Therefore, elasticity of demand at any point on a consumer's demand curve is the same thing as the price elasticity of demand at that point on the firm's average revenue curve. We know that elasticity of demand at point *C* on the average revenue curve *DD'* in Fig. 18.6 = $\frac{RD'}{RD}$. With this measure of point elasticity of demand we can derive the following relationship between average revenue, marginal revenue and price elasticity of demand at any level of output.

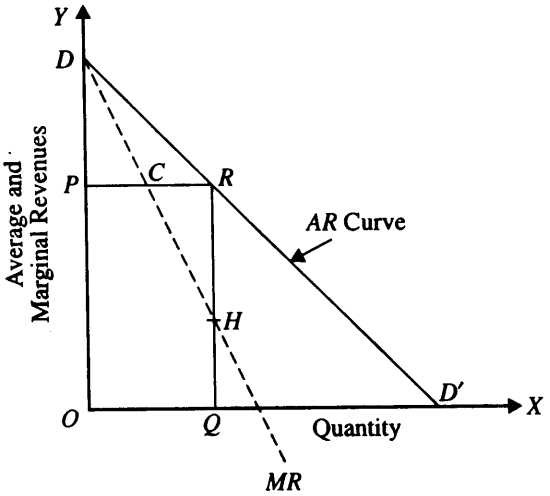


Fig. 18.6. *Relationship between AR, MR and Price Elasticity of Demand*

$$\text{Elasticity at } R = \frac{\text{Average Revenue}}{\text{Average Revenue} - \text{Marginal Revenue}}$$

If *A* stands for average revenue
M stands for marginal revenue
e stands for point price elasticity on the average revenue curve,

then $$e = \frac{A}{A - M} \quad \text{...(1)}$$

From this we can derive

$$A = M\left(\frac{e}{e-1}\right) \quad \text{....(2)}$$

And also $$M = A\left(\frac{e-1}{e}\right) \quad \text{...(3)}$$

Proof. Let us see how the above three relations can be derived. These relations between *AR*, *MR* and price elasticity of demand can be proved with the help of Fig. 18.6 where *DD'* or *AR* curve represents the demand or average revenue curve of a business firm, *MR* is the marginal revenue curve corresponding to it. Price elasticity of demand (e_p) at point *R* on the

demand or average revenue curve DD' or AR is given by

$$e_p = \frac{RD'}{RD}$$

Now, in traingles PDR and QRD'

$$\angle DPR = \angle RQD' \text{ (right angles)}$$
$$\angle DRP = \angle RD'Q \text{ (corresponding angles)}$$
$$\text{Third } \angle PDR = \angle QRD'$$

Therefore, triangles PDR and QRD' are equiangular

Hence $$\frac{RD'}{RD} = \frac{RQ}{PD} \quad ...(i)$$

In the traingles PDC and CRH

$$PC = RC$$
$$\angle PCD = \angle RCH \text{ (vertically opposite angles)}$$
$$\angle DPC = \angle CRH \text{ (right angles)}$$

Therefore, triangles PDC and CRH are congruent (*i.e.*, equal in all respects).

Hence $$PD = RH \quad ...(ii)$$

From (i) and (ii), we get

$$\text{Price elasticity at } R = \frac{RD'}{RD} = \frac{RQ}{PD} = \frac{RQ}{RH}$$

Now, it is seen from Fig. 18.6 that

$$\frac{RQ}{RH} = \frac{RQ}{RQ - HQ}$$

Hence, price elasticity at point $R = \frac{RQ}{RQ - HQ}$

It will be seen from Fig. 18.6 that RQ is the average revenue (AR) and HQ is the marginal revenue (MR) at the level of output OQ corresponding to point R on the demand or average revenue curve DD'. Therefore,

$$\text{Price elasticity at point } R = \frac{AR}{AR - MR}$$

If A stands for average revenue (AR)
M stands for marginal revenue (MR)
e stands for point price elasticity of demand

Then $$e = \frac{A}{A - M} \quad ...(iii)$$

$$eA - eM = A$$
$$eA - A = eM$$
$$A(e - 1) = eM$$
$$A = \frac{eM}{e - 1}$$

or $$A = M \frac{e}{e - 1} \quad ...(iv)$$

Rearranging we have

$$M = A \frac{e - 1}{e} \quad ...(v)$$

Thus we obtain the three alternative formulations (iii), (iv) and (v) which describe the relationship between average revenue, marginal revenue and point price elasticity of demand at

a level of output of a firm. With the help of these formulae we can find out marginal revenue at any level of output from average revenue at the same output provided we know the point elasticity of demand on the average revenue curve. If the demand elasticity of a firm's average revenue curve at a point is equal to one, marginal revenue is equal to zero. This can be shown as under:

$$M = A\left(\frac{e-1}{e}\right)$$
$$= A\left(\frac{1-1}{1}\right)$$
$$= A \times 0 = 0$$

Similarly, when price elasticity of demand at a point on a firm's average revenue curve is 2, the marginal revenue equals half of the average revenue. Thus putting the value of price elasticity equal to 2 in formula (v) above we have

$$M = A\left(\frac{e-1}{e}\right)$$
$$= A\left(\frac{2-1}{2}\right)$$
$$= A\left(\frac{1}{2}\right) = \frac{1}{2}A$$

It follows from above that marginal revenue from the sale of a product depends on the average revenue and price elasticity of demand at any given level of output.

By applying the formula for various elasticities of demand at different points (or at different levels of output) on the average revenue curve it will be found that marginal revenue is always positive at any point or output where the elasticity of the average revenue curve is greater than one, and marginal revenue is always negative where the elasticity of the average curve is less than one. Thus

$$|e_p| > 1,\ MR > 0$$
$$|e_p| = 1,\ MR = 0$$
$$|e_p| < 1,\ MR < 0$$

Relationship between Three Types of Revenue (AR, MR, TR) and Price Elasticity of Demand

We are now in a position to describe the relationship between three types of revenue, namely, *AR*, *MR*, and *TR* on the one side and price elasticity of demand on the other. From the formula $MR = AR\left(\frac{e-1}{e}\right)$ we can know what would be the marginal revenue, if elasticity and *AR* are given to us. When the elasticity is equal to one, it follows from the above formula that marginal revenue will be equal to zero.

Thus
$$MR = AR\left(\frac{e-1}{e}\right)$$
$$MR = AR\left(\frac{1-1}{1}\right)$$
$$MR = AR \times 0 = 0$$

Likewise, it can be proved that,

If $e > 1$, *MR* is positive, and

If $e < 1$, *MR* is negative.

In a straight-line demand curve we know that the elasticity at the middle point is equal to one. It follows that marginal revenue (*MR*) corresponding to the middle point of the demand curve (or *AR* curve) will be equal to zero. Consider Fig. 18.7. *C* is the middle point of the

average revenue or demand curve DD'. At point C elasticity is equal to one. Corresponding to C on the AR curve, marginal revenue will be zero. Thus MR curve is shown cutting the X-axis at point N which corresponds to point C on the AR curve. At a greater quantity than ON, elasticity of the AR curve is less than one and the marginal revenue is negative beyond ON which means that total revenue will diminish if a quantity greater than ON is sold. Total revenue will be increasing up to ON output, since upto this marginal revenue remains positive. It follows, therefore, that total revenue will be maximum where elasticity is equal to one. Thus at the bottom of Fig. 18.7 TR curve is shown to be at its highest level corresponding to the point C on AR curve or ON output where marginal revenue is zero and price elasticity of demand is equal to one.

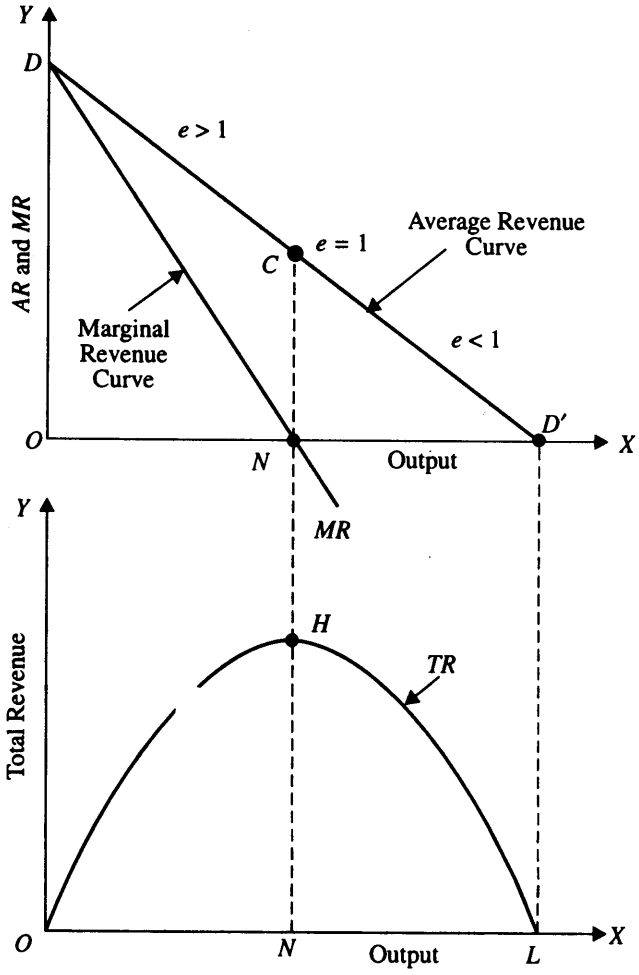


Fig. 18.7. *Relationship between AR, MR, TR Curves and Price Elasticity*

We can also show that total revenue is maximum corresponding to the unit elasticity point on the AR curve even without bringing in the marginal revenue. We know from the relationship between elasticity and total outlay (or total revenue) that the total revenue increases when elasticity is greater than one and total revenue diminishes when elasticity is less than one. Thus, in Fig. 18.7 beginning from point D on the average revenue curve AR and coming down to the middle point C, elasticity remains greater than one and therefore the total revenue will go on increasing as we descend from point D to point C on average revenue curve AR. Below point C on the AR curve, elasticity is less than one, the total revenue will, therefore, be diminishing as we descend from point C downward. It, therefore, follows that corresponding to the middle point C on the AR curve where elasticity is equal to one, the total revenue will be maximum.

It will be seen from the bottom of Fig. 18.7 that total revenue curve starts from the origin and goes on rising till it reaches its peak at point H. After point H it starts declining until it meets the point L on the X-axis. It means that at output OD' or OL, the total revenue is zero. This is because at output OD' average revenue or price is zero.

QUESTIONS AND PROBLEMS FOR REVIEW

1. Define Market. Does it necessarily mean a particular price where goods and services are bought and sold?
2. Into what main categories market structures are classified? Explain the basis of such classification.
3. Differentiate between perfect competition, monopoly and monopolistic competition. Briefly explain their features with regard to
   (1) the number of firms
   (2) the nature of product being produced
   (3) freedom to enter the industry
   (4) control over the price of the product.
4. What is meant by cross elasticity of demand? Explain how it is used as a basis for classifying various market structures.
5. Explain the concepts of average revenue, marginal revenue and total revenue. Show how they are related to each other.
6. Show that in case of linear demand curve marginal revenue curve cuts *half-way the distance* between the average revenue curve and the *Y*-axis. Prove geometrically.
7. Explain how average revenue and marginal revenue are related to each other through price elasticity of demand.
8. Show how marginal revenue and total revenue depend on the price elasticity of demand on a demand curve. Represent this relationship graphically.
9. Explain and illustrate with diagrams the nature of average and marginal revenue curves of a firm working under :
   (*a*) Perfect competition
   (*b*) Monopoly
   (*c*) Monopolistic Competition
10. Define marginal revenue. How is it related to (*a*) average revenue, and (*b*) total revenue?
11. Complete the following table.

Price (Rs.)	*Output (Units)*	*Total Revenue Rs.*	*Marginal Revenue Rs.*	*Price Elasticity Demand*
6	0			
5	1			
4	2			
2	4			
1	5			
0	6			

12. Why is marginal revenue curve of a firm under perfect competition identical with average revenue curve? Explain.
13. When average revenue curve of a firm is falling, marginal revenue curve lies below it. Why?
14. When marginal revenue is zero, total revenue is maximum. Why ? Explain.

Problems

1. *Suppose $Q = 20 - 2P$ where Q is output and P is price. Find the marginal revenue function.*

Solution: To obtain *MR* we have first to find total revenue function. For obtaining total revenue function we have to obtain *inverse demand function*, that is *price expressed as a function of output.*

From the given function $Q = 20 - 2P$, we obtain

$$P = 10 - 0.5Q$$

$$TR = P.Q = 10Q - 0.5Q^2$$

Marginal revenue is the firest derivative of total revenue function.

Thus,

$$MR = \frac{dTR}{dQ} = 10 - Q$$

2. *Total revenue from the sale of the good X is given by the equation $R = 60Q - Q^2$ for $0 \leq Q \leq 60$ (where R is the total revenue and Q is the quantity bought at price P). Calculate MR and AR functions.*

Solution : To obtain *AR* function we divide total revenue function, by output. Thus

$$AR = \frac{60Q}{Q} - \frac{Q^2}{Q}$$

$$= 60 - Q$$

To obtain *MR* we differentiate the total revenue function ($R = 60Q - Q^2$) with respect to output. Thus,

$$MR = \frac{dR}{dQ} = 60 - 2Q$$

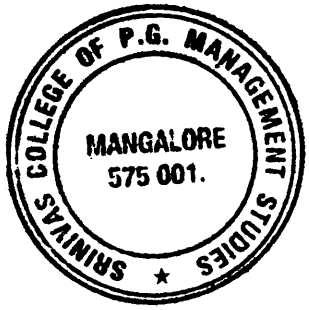
19

Objectives of Business Firms

It is important to know what a business firm wants to achieve. It is when a firm is achieving its objective that it will be in equilibrium and will therefore have no tendency to change its level of output. Like that of a consumer, it is assumed in economics that an entrepreneur or a firm behaves in a rational manner. However, what is a rational behaviour on the part of a firm has been a subject of great controversy in recent years. Moreover, the nature of a business firm has undergone a sea change. In the olden days, the entrepreneur was the owner of the firm and it was assumed that he aims at maximisation of money profits. In these days in corporate firms we find a *separation between ownership and management.* In these corporate firms, owners are shareholders who bear risk and uncertainty of business and the management work is done by a professional manager. Now, an important question is whether a manager will maximise profits for shareholders or maximise their own utility. Thus, in the traditional economic theory the rationality on the part of a firm was generally understood to imply that a firm attempts to maximize its profits and maximisation of profits was considered to be the valid objective of a firm. However, in recent years apart from profit maximization, several other objectives of the firm have been pointed out by several economists. The various alternative objectives of the firm that have been stressed by different economists are:

1. Profit Maximisation
2. Motive of long-run profit maximisation or survival
3. Satisficing behaviour
4. Sales Maximisation
5. Maximisation of Utility
6. Staff Maximisation
7. Maximisation of Growth

We explain below the above objectives of business firms.



Profit Maximisation

Profit-maximisation objective about the behaviour of the firm is one of the most fundamental assumptions of economic theory. The attempt of the entrepreneur to maximise his profits is regarded as a rational behaviour. It has been said that as the rationality on the part of the consumer means that he tries to maximize his satisfaction, the rationality on the part of the entrepreneur implies that he tries to maximise his profits.

It should be carefully noted as to what the entrepreneur is supposed to maximise under profit maximisation objective. An entrepreneur's income consists of two elements. First, he gets wages for his work of routine management and supervision which he is supposed to pay to himself and include them in his regular cost calculations. Thus, the total cost of output comprise not only the costs incurred on other factors by the entrepreneur but also the entrepreneur's own wages of routine management and supervision. When we say that the entrepreneur tries to maximise the difference between total revenue and total costs, these total costs include entre-

preneur's wages of management and supervision. Thus, entrepreneur's wages of management do not form part of that income which the entrepreneur tries to maximise. Secondly, the entrepreneur gets what is left after meeting all costs (including his own wages of routine management). This surplus of total revenue over total cost is the residual income which is the profits of entrepreneurship proper. It is always only his residual income which is his true or net profits that the entrepreneur is assumed to maximize. Thus, we see that the entrepreneur's income comprises his own wages of routine management and the residual income which accrues to him.

Marshall called entrepreneur's wages of management and supervision as normal profits, and the residual income as supernormal profits. This dichotomy of entrepreneur's income is very fundamental in the theory of firm. *The normal profits are the minimum income which the entrepreneur must get in order to stay in a business or industry.* As has been just said above, the normal profits are included in costs and do not come under the maximizing problem. *It is the supernormal profits, i.e., true or pure profits which is the residual income which the entrepreneur aims at maximising.*

Profits (π) is the difference between total revenue (TR) and total cost (TC) which are function of output. Thus

$$\pi = TR - TC \qquad ...(i)$$

where $TR = f(Q)$, and

$TC = f(Q)$

Profits (π) are maximised at the level of output where the first derivative of profit function is zero. Thus profits are maximised when

$$\frac{\Delta\pi}{\Delta Q} = \frac{\Delta TR}{\Delta Q} - \frac{\Delta TC}{\Delta Q} = 0$$

How a firm achieves its objective of profit maximisation is illustrated in Table 19.1 and Fig. 19.1. A firm will go on increasing its output if its profits are thereby increasing. It will fix its output at the level where it is making maximum money profits. Therefore, a firm will maximise its profits at a level of output where the difference between total revenue and total cost is the largest. Consider Table 19.1 which shows the changes in total revenue and total cost when it raises its output from one to 10 units.

It will be seen from the table that when firm is producing 2 units of output, its total revenue is Rs. 90 and total cost is Rs. 80. This yields profits of Rs. 10. Now, when the firm raises its output level to 7 units, its profits go up to Rs. 108. Increase in output beyond 7 units

Table 19.1. Maximizing Profits by a Firm

Output	*Total Revenue*	*Total Cost*	*Total Profits*
1	45	50	–5
2	90	80	+10
3	135	90	+45
4	180	105	+75
5	225	130	+95
6	270	165	+105
7	315	207	+108
8	350	270	+80
9	375	385	–10
10	395	505	–110

lowers its profits, and further if it raises output beyond 8 units losses will accrue to the firm. It is therefore clear that profits are maximum when the firm produces 7 units of output. Thus the firm will be in equilibrium when it producing 7 units of output.

Figure 19.1 portrays what is called break-even chart by businessmen. In this we have shown total revenue curve *TR* and total cost curve *TC*. Total revenue curve *TR* starts from the origin which means that when no output is produced revenue is zero. Total revenue goes on increasing as more output is produced. However, it will be noticed that total cost curve *TC* starts from a point *F* which lies above the origin. In other words, it is assumed that even when there is no production the firm has to incur some costs equal to *OF*. For instance, when the firm has to stop production in the short run, it has to bear the fixed cost. Thus our Fig. 19.1 depicts short-run total revenue and total cost curves of the firm. As a firm starts from zero output and increases its production of the good, in the initial stages total cost is greater than total revenue and the firm is not making any profits at all. When it produces *OL* level of output, total revenue just equals total cost and the firm therefore makes neither profits nor losses, that is, the firm is only breaking even. Thus the point *S* corresponding to *OL* output is called *Brak-Even Point.*

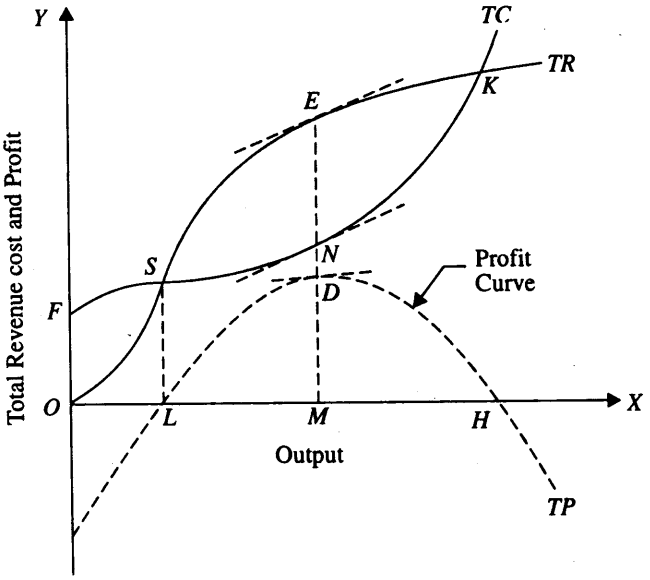


Fig. 19.1. *Profit Maximization by a Firm*

When the firm increases its output beyond *OL*, total revenue becomes larger than total cost and profits begin to accrue to the firm. It wil be seen from the figure that profits are rising as the firm increases production to output *OM*, since the distance between the total revenue curve (*TR*) and total cost curve (*TC*) is widening. At *OM* level of output, the distance between the *TR* curve and *TC* curve is the greatest and therefore the profits will be maximum. Thus the firm will be in equilibrium at the *OM* level of output. The firm will not produce any output larger than *OM* since after it the gap between *TR* and *TC* curves goes on a narrowing down and therefore the total profits will be declining. At *OH* level of output *TR* and *TC* curves again intersect each other, which means that total revenue is equal to total cost also at output *OH*. Thus point *K* (corresponding to *OH* output) is again a break-even point. Beyond output *OH*, total revenue is less than total cost and the firm will make losses if it produces any output larger than *OH*.

From above it is clear that the firm will be maximising profits at *OM* level of output where the total revenue exceeds total cost by the largest amount. Another way to find out the profit-maximizing output is to draw directly total profit curve showing the difference between total revenue and total cost at various levels of output. In Fig. 19.1, *TP* is such a total profit curve which indicates the distance between total revenue and total cost at various levels of output. The level of output at which this profit curve stands highest from the *X*-axis will be the profit-maximizing level of output.

It will be noticed from Fig. 19.1 that total profit curve *TP* lies below the *X*-axis upto point *L* which shows that the firm is making negative profits (*i.e.*, losses) upto *OL* level of output. At *L*, the profit curve cuts the *X*-axis indicating that at output *OL*, the profits are equal to zero. As the firm increases its output beyond *OL*, profits curve is rising which indicates that total profits are increasing. At output *OM*, profit curve stands highest from the *X*-axis and beyond

OM the profit curve slopes downward indicating that total profits are declining when output is raised beyond *OM*. It may also be pointed out that tangent drawn to point *D* on the profit curve (corresponding to output *OM*) will be parallel to the *X*-axis which indicates the greatest distance between the profit curve and the *X*-axis at output *OM*. It follows that at output *OM* the firm will be making maximum profits and hence will be in equilibrium position. The profits earned at *OM* level of output are equal to *NE* or *MD*.

The profit-maximization objective has been subjected to severe criticisms in recent years. It has been pointed out that all firms do not maximise profits. Further, some economists have asserted that apart from making profits, firms in the real world also try to achieve other objectives. Some other alternative objectives have been pointed out by prominent economists. First, Prof. Rothschild has asserted that entrepreneurs try to achieve *security or survival* or what he calls maximisation of long-run profits Prof. Baumol has put forward the view that firms try to *maximise sales i.e.,* the money value of the sales subject to a Prof. Scitovsky, Reder and *B.* Higgins have asserted that firms or entrepreneurs try to *maximise utility or satisfaction.*

Achieving Maximum long-run Profits

Prof. Rothschild[1] maintains that maximization of profits short-run may be the valid objective to be pursued by the firms working under conditions of perfect competition and monopolistic competition when a large number of firms are competing with each other to sell a product and under monopoly when a single-firm controls the supply of a product which has no close substitutes. Under these market conditions, firms do not feel insecure in making profits over a long period as they do not have to face effective competition and do not expect their profits will be competed away by the actions of their *existing* rivals. But under conditions of oligopoly where the firms are quite interdependent and face a lot of uncertainty regarding the activities of their few rivlas, the firms desire to obtain secure profits or maximum long-run profits. This is because in deciding about his price and output policies the entrepreneur does not maximize his profits at a particular time or for a short period of time but tries to have a *steady flow of profits* over a long period of time.

It is generally conceded that under conditions of oligopoly the firms strive for maximising secure or long-run profits, rather than maximum profits at a particular point of time.

Sales Maximization

Prof. Baumol has also challenged the assumption of profit maximization. He has argued that maximization of sales rather than of profits is the ultimate objective of the firm. He says that the firm tries to promote sales not merely as a means to further its other objectives, namely, operational efficiency and profits, but for businessman "sales have become an end of themselves." He, therefore, thinks that sales maximization is the most valid assumption about the behaviour of a firm. By sales he means the total revenue earned by selling the product.

Prof. Baumol thinks that empirical evidence for his hypothesis that sales rank ahead of profits as the main object of the oligopolist's concern is quite strong. He says, "Surely it is common experience that when one asks an executive, 'How's business?' he will answer that his sales have been increasing (or decreasing), and talk about profits only as an after-thought, if at all." Thus Prof. Baumol very strongly believes that sales maximization has become the ultimate objective of the firms and therefore they direct their energies in promoting and maximizing sales instead of profit.

But Prof. Baumol softens his sales maximisation hypothesis by pointing out that in their attempt to promote sales businessmen do not completely disregard costs incurred on output and profits to be made. He also concedes that there is some conflict between the firm's sales goal and its profit objective. He points out that in the actual word, businessmen usually promote sales subject to the limitation that costs incurred are covered plus a usual rate of return on

1. K.W. Rothschild, Price Theory and Oligopoly, *The Economic Journal,* September 1947, pp. 299-320.

investment made. According to him, "management is not concerned to obtain profits higher than this. Once this minimum profit level is achieved, sales rather than profits become the overriding goal."[2] Thus Prof. Baumol asserts that "the typical oligopolist's objective can usefully be characterized approximately *as sales maximization subject to minimum profit constraint.* Doubtless this premise overspecifies a rather vague set of attitudes but I believe it is not too far from truth. So long as profits are high enough to keep stockholders satisfied and contribute adequately to the financing of company's growth, management will bend its efforts to the augmentation of sales revenue rather than to further increase its profits."[3]

It may be objected that maximization of sales instead of profits means irrational behaviour of the entrepreneur. But Prof. Baumol rightly points out that his hypothesis in no way conflicts with the assumption of rationality. He presents a different conception of rationality which is more scientific. According to him, rationality does not consist in choosing the ends, it only means *pursuing the ends efficiently and consistently.* He says, "People's objectives are whatever they are. Irrationality surely must be defined to consist in decision patterns which make it more difficult to attain one's own ends that are for some reason considered to be right. Unless we are prepared to determine other people's values, or unless they pursue incompatible objectives, *we must class behaviour as rational if it efficiently pursues whatever goals happen to have been chosen."*[4] Thus he think that, given the sales-maximization as objective, the entrepreneur will be rational if he works most efficiently and consistently towards maximizing his sales.

Utility Maximization

Since satisfaction or utility is the ultimate end which an individual aspires to get some economists have pointed out that owners entrepreneur and managers of joint stock companies try to maximize their utility rather than money profits. The objective of utility maximization has been discussed whith reference to the two types of firms. First, in the context of firms owned and managed by the entrepreneur himself, the utility maximization implies that in choosing an output level, the entrepreneur-owner not only considers the money profits which he will make but also the sacrifice of leisure which he would have to make in doing the necessary activity for producing that level of output. Secondly, the objective of utility maximisation by managers of corporate firms owned by shareholders has been discussed.

Utility Maximization by Entrepreneur-Owner.

It has been pointed out by some economists as Higgins, Reder and Scitovsky that profit maximization does not necessarily mean utility or satisfaction maximization. If the entrepreneur is supposed to maximize his utility, then not only the satisfaction which he gets from material goods which are obtained with the money profits earned from putting in entrepreneurial work, but also the satisfaction which he obtains from the leisure at his

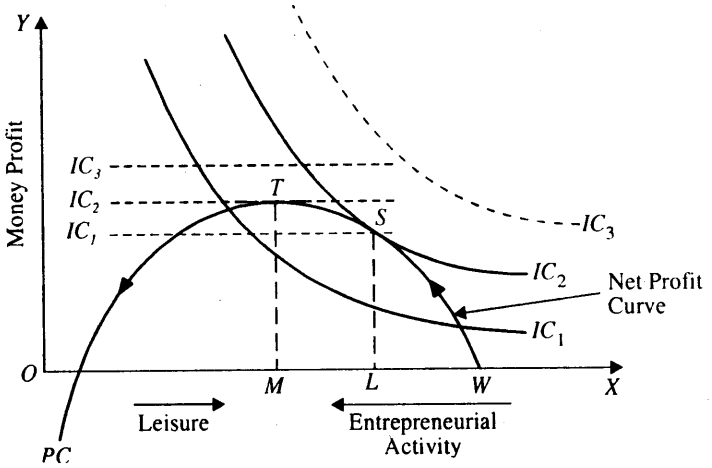


Fig. 19.2. *Utility Maximization vs. Profit Maximization*

2. W.I. Baumol, *Business Behaviour, Value and Growth,* p. 49.
3. *Ibid,* pp. 49-50.
4. *Ibid,* p. 47.

disposal. The leisure or what Hicks calls '*quiet life*' is an essential ingredient of an individual's welfare. But more activity or work put in by the entrepreneur, the less leisure he will be able to enjoy. The preference for leisure must be incorporated into the analysis of an entrepreneur who is supposed to maximize his satisfaction or utility.

We now proceed to show that as long as we do not make a special assumption about the entrepreneur's psychology or behaviour pattern regarding work and leisure, maximization of profits will not ensure maximum utility. Let us draw the entrepreneur's indifference map between net money profits[5] and leisure. In Fig. 19.2 money profits are measured on the *Y*-axis and leisure (from left to right) is measured on the *X*-axis. An indifference curve in such a diagram will represent the *various combinations of money profits and leisure* which will give the entrepreneur equal amount of satisfaction. The higher the level of such an indifference curve, the greater the level of entrepreneur's satisfaction.

We further assume that entrepreneurial activity (*i.e.*, work) is a variable factor, that is, we assume entrepreneurship to be divisible but whose quantity per unit of output is fixed. In this way, we can measure entrepreneurial activity in terms of output. The greater the amount of output produced, the greater the amount of entrepreneurial activity done to earn net money profits. More entrepreneurial activity and therefore more output means less leisure. Point *W* in Fig. 19.2 represents zero output which means that entrepreneur does not put in any activity and spends the whole time in enjoying leisure. In other words, *OW* represents total leisure or entrepreneurial inactivity. At *W* he does not work at all and therefore produces zero output with the result that he spends whole of his time in leisure. When he puts in some entrepreneurial activity, he will produce some output and will earn some net profits. These net profits are the difference between his total revenue and total costs and in these total costs are also included his own wages of routine management (*i.e.*, normal profits). In Fig. 19.2 net profit curve *PC* starting from *W* is drawn which shows the net profits made by the entrepreneur by producing various levels of output or, in other words, by putting in various amounts of entrepreneurial activity which is measured from left to right from point *W*.

Now, the entrepreneur who wants to maximize his satisfaction or utility would try to reach the highest possible indifference curve. He would get maximum possible satisfaction where his net profit curve is tangent to an indifference curve. It will be seen from the figure that net profit curve is tangent to indifference curve IC_2 at point *S*. Therefore, at point *S* he is getting maximum possible utility or satisfaction by putting in *WL* amount of entrepreneurial activity. In this maximum utility position, he is getting total net money profits equal to *LS*. *OL* represents the leisure which he will be enjoying. It should be noted that at point *S* where his utility is maximum, his net profits are not maximum. Net profits are maximum when he is producing *WM* output or putting in entreprenurial activity equal to *WM*. *MT* is the greatest difference between net profit curve and the *X*-axis, *T* being the highest point of the net profit curve. It is, therefore, clear that satisfaction-maximizing output which is equal to *WL* is less than profit-maximizing output which is equal to *WM*. We thus see that when leisure enters into preference function of the entrepreneur he will fix the level of output below the profit-maximizing output level.

A little reflection will show that maximization of utility or satisfaction can be achieved at point *T*, the profit-maximizing point, only if we assume that instead of convex indifference curves as IC_1, IC_2 in Fig. 19.1, the entrepreneur has horizontal indifference, curves (between money profits and leisure). But horizontal indifference curves between money profits and leisure will mean that it does not make any difference to the entrepreneur's satisfaction whether he has more or less leisure, that is, if leisure does not enter into his preference function.

Utility Maximization by Managers of Large Business Firms

According to O.E. Williamson, managers or business executives of large firms are motivated

5. Note that the term '**net** profits' are used here to emphasize that they are exclusive of normal profits.

by self-interest and they maximize their own utility function. The utility function of the managers and the factors on which it depends can be written as under:

$$U = f(S, N, M, I_d)$$

where, U = utility of a manager,

S = the salary and other forms of monetary compensation which a manager obtains from a business firm,

N = the number of staff under the control of a manager,

M = management slack which means the amount of non-essential management perquisites such as lavishly furnished offices, luxurious company cars, large expense accounts, etc.

I_d = the amount of discretionary investment expenditure by the manager.

Thus the managers maximize the above utility function, that is, the composite utility derived from the above mentioned four factors. However, the objective of utility maximization by a manager is subject to the constraint that after-tax profits are large enough to pay acceptable dividends to the shareholders and also to pay for economically necessary investments (as discretionary investment expenditure by the managers).

Hall and Hitch's Mark-up Pricing Approach : Seeking Normal Profits

Further, reference may also be made to the empirical study made by Oxford economists. Hall and Hitch who interviewed some thirty-eight entrepreneurs on price policy. From their empirical study Professors Hall and Hitch concluded that the businessmen did not try to maximize profits. They also concluded from their study that businessmen charged prices according to what is known as *"make-up pricing principle"*. According to this principle, businessmen charge prices that cover their average cost of production and they add *profit mark-up* to this average cost to fix the price of their products. According to this principle, businessmen do not seek abnormal profits, that is, more than conventional profits which are considered as reasonable. Thus the mark-up observance of which Hall and Hitch found in their enquiry, is claimed to be opposed to the principle of profit maximization. It may however be pointed out that the market situation in which businessmen of Hall and Hitch enquiry were placed was one of monopolistic competition with an admixture of oligopoly elements. In such a market situation, the desire to obtain secure profits in the long run greatly governs the businessmen in charging prices of their products. If they try to earn large economic profits by charging high prices, new firms will invade their field. Thus in a market situation where the obstacles for new-comers to enter the field are very small and as a result the businessmen already in the field fear that new-comers will enter the industry they will not seek to maximise economic profits.

It is thus asserted that the practice of mark-up pricing contradicts the hypothesis of profit maximisation. However, it may be noted that a relevant question in this regard is what will determine the profit mark-up on the basis of which price will be fixed. On the face of it, it appears that since in this mark-up pricing principle demand is not taken into account in determining the profit mark-up it cannot possibly lead to the maximisation of profits. However, in our view this profit mark-up is not a fixed magnitude but varies depending on the price elasticity of demand or the intensity of competition in the market. In actual practice, businessmen determine this profit mark-up keeping in view the price elasticity of demand for their product or the intensity of competition from rival products. Empirical studies made in the USA confirm this varying profit mark-up in case of different products. For example, in an empirical study made for pricing by the U.S. Steel Corporation, it was found that profit mark-up or margins fixed in case of steel rails was relatively high because this was the product in which US steel faced little competition. On the other hand, profit mark-up fixed in case of stainless steel and tin plates was low because for them competition from aluminium and lumber-products were

quite strong. We thus see that mark-up principle of price fixation can be consistent with the hypothesis of profit maximization.

Satisficing Behaviour

According to the satisficing hypothesis, corporate managers aim at achieving *satisfactory rate of profits* rather than maximising profits. The advocates of this hypothesis say that a corporate manager sets for himself a minimum standard for performance or what is called the aspiration level. Once this satisfactory rate of profit according to this *aspiration level* is achieved, the firm will slack off.

H.A. Simon[6], one of the pioneers of the behavioural approach to the theory of the firm, points out that most psychological theories assume that instead of *maximising,* rational men normally *satisfice.* Applying this to the business decisions of the firm, he suggests that instead of *maximising profits,* firms aim at *satisficing,,* that is, want to achieve *satisfactory level or rate of profit.* Simon has further postulated that a firm has normally an *'aspiration level'.* An aspiration level of a firm is based on its goal as well as its past experience, and in fixing it uncertainties are duly taken into account. If the actual performance of the firm reveals that a given aspiration level can be easily achieved, it will be revised upward. On the other hand, if it is found that a given aspiration level is difficult to be achieved, it will be lowered. Simon points out that when the actual performance of a firm falls short of an aspiration level, *'search' activity* is started to find out the ways of better performance in the future and therefore achieving the aspiration level. But, according to Simon, there is a limit to 'searching activities' which a firm will undertake because for searching activities such as obtaining of information firms have to incur cost. And therefore the gain from search activity must be balanced against its cost. That is why if searching activities relatively cost more, aspiration level is adjusted downward to a level which is more likely to be achieved. Since the firm limits its searching activity on account of its cost, it does not maximize profits. Therefore, the firms behave rationally when they aim at *'satisficing'* rather than *'maximizing'.*

According to an other prominent satisficing theory put forward by Cyert and March[7], in these days of large-scale corporate type of business firms, we can no longer consider them as a *single major decision makers* (*i.e.,* the entrepreneur), but instead we should look at them as complex group or complex organisation composed of various individuals whose interests may conflict with each other. Cyert and March call this complex organisation or group as *organisational coalition* which may include managers, stockholders, workers, customers and so on. They assert that all of these different individuals participate in setting the *goals* of the organisation. Another argument for satisficing behaviour on the part of the corporate managers advanced is that top management serves as trustees of the organisation which has a responsibility not only to shareholders but also to employers, customers, creditors, suppliers etc. Thus, corporate managers pursuing a satisficing goal strike a statesman like balance among the claims of shareholders for dividends and higher share price, the demands of employees for higher wages, the pressures from consumers for lower prices and better quality products.

Thus, the hypothesis of satisficing behaviour implies that instead of maximizing profits for owners, corporate managers strive for attaining satisfactory rate of profit. The satisficing model of behaviour of the corporate managers rightly stresses that the problem of decision making in large firms, especially in oligopoly environment, is quite complex as they have to reconcile the interests of various pressure groups in the organisation. But the major problem with the satisficing hypothesis is that it does not provide a clear definition of *satisfactory*

6. Important works by H.A. Simon, in which he has developed his behavioural theory of the firm are: (1) A Behavioural Model of Rational Choice, *Quarterly Journal of Economics.* Feb. 1955. (2) Theories of Decision Making in Economic and Behavioural Sciences, *American Economic Review.* June 1959. (3) *Models of Men,* Wiley, New York, 1957.

7. R.M. Cyert and J.C. March, *A Behavioural Theory of the Firm.* Prentice-Hall, 1963.

rate of profits. A number of standards of profits which may be considered as satisfactory may be mentioned. Thus, on the one hand, a satisfactory rate of profit may be that which is *high enough* to attract outside capital on a sustained basis. On the other hand, the firms may fix their satisfactory rate of growth at a *low level* so as to prevent the entry of new firms which may offer a strong competition and erode their profits. The satisfactory rate of profits may also be fixed at a low level in order to prevent the government control and regulation. Thus the standard of satisfactory profit may vary a good deal depending on the nature of competition and environment in which a particular firm may find itself. The satisficing model, therefore, does not provide us any general guideline for determination of satisfactory rate of profits for the fixation of output and price.

Staff Maximisation

In the present days of corporate form of business organisation where there is separation of management from ownership managers do not always work in the best interest of owners, *i.e.*, the shareholders, and try to maximise their utility. This is also so because monitoring and controlling the managers by the owners also involve a good amount of cost and therefore in actual practice this is not done. Therefore, a complex organisational and managerial set up of modern corporate firms which Prof. J.K. Galbraith calls as technostructure wields a great deal of power and influence with regard to policies pursued by these firms. In their bid to maximise their utility managers often sacrifice *some* profits of the owners. The two important factors, namely, sales maximisation and a desire for adequate leisure and quiet life on the part of the managers have been discussed above. Another important factor which increases the utility of the managers of large corporate firms is the number of subordinate staff under their supervision and control. The greater the number of subordinate staff, the greater their utility. Thus, given the separation of ownership from control, the managers often strive to maximize their utility by employing more subordinate staff and in this process they even sacrifice some profits of the owners. We can depict this *trade off* between owners' profits and the number of subordinate staff for the managers in terms of indifference curves, U_1, U_2, U_3 in Fig. 19.3 where on the horizontal axis the number of subordinate staff of a manager and on the vertical axis profits are measured. *PC* is the total profits curve. It will be seen from this figure that manager's indifference curves between owners' profits and number of subordinate staff are convex to the origin. It will be further seen that up to OS_1 number of staff, profits to the owners increase. This implies that addition of staff up to OS_1 improves efficiency of the firm and therefore causes profits to increase until OS_1 staff is employed at which maximum profits equal to S_1M are earned. With the number of staff OS_1 and profits equal to S_1M, manager's utility is

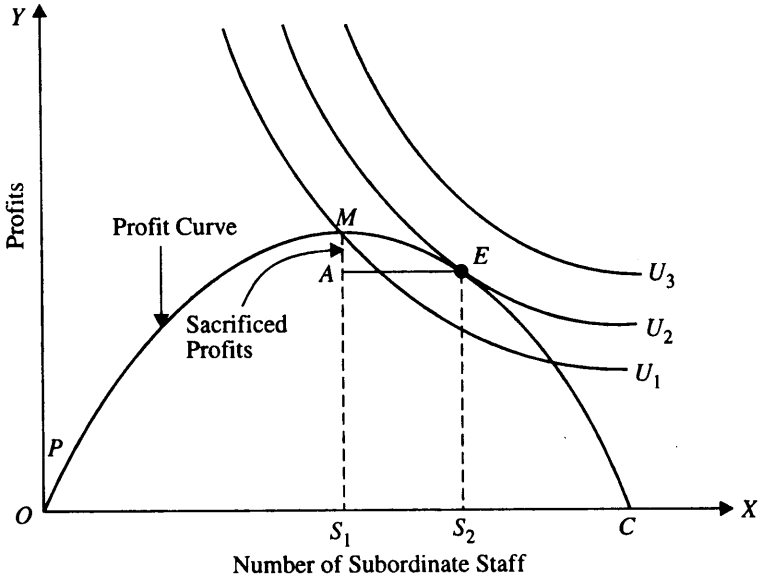


Fig. 19.3. *Staff Maximization versus Profit Maximization*

indicated by indifference curve U_1. When the number of staff increases beyond OS_1, profits to the owners decrease but manager's utility increases until he reaches the higher indifference curve U_2 which is tangent to the profit curve at point E. In the absence of effective monitoring and control by the owners, the manager would like to operate at point E where he is employing OS_2 number of staff and, given the owners profits curve, at the highest possible indifference curve U_2. It will be seen as compared to the profits S_1M with the staff equal to OS_1 profits with OS_2 staff are lower. This means that profits equal to AM have been sacrificed for the additional employment of AE staff by the manager so as to increase his utility.

Growth Maximisation

Another objective which is often mentioned is that the corporate manager tries to maximise the *rate of growth of output or total sales revenue* rather than maximising profit. If managers think that their salaries are related to the rate of growth of output, they will make every effort to ensure the highest possible growth of output or sales revenue. However, the goal of maximisation of growth of output is pursued by the managers subject to the constraint of the minimum profits which they must obtain for the owners (*i.e.*, shareholders) otherwise they will lose their job or run the risk of the firm being taken over by others.

It may be noted that a noted American economist, Prof. J.K. Galbraith who has made an indepth study of big modern corporations has found that managers, which he calls *technostructure,* pursue *multiple goals* in which along with sales maximisation and utility maximization, the objective of achieving the highest possible growth of output is paramount[8]. Further, Galbraith points out that managers of the big business corporations make every effort to increase their prestige, market power and technical superiority. In his view, the corporate technocrats who are highly skilled persons are able to pursue these multiple goals as they can greatly influence the consumers through effective advertising on a large scale. Prof. Galbraith further points out that the highly salaried managers or technocrats of the modern business corporations desire to have an easy life for themselves and try to avoid risk and for that purpose extensive business planning is done by them for taking appropriate decisions.

Case for the Objective of Maximising Profits

We have explained above the various alternatives to profit maximization objective. However, the various alternatives to profit maximisation are not free from drawbacks and no comprehensive theory of the firm has been developed on the basis of non-profit maximising assumption so that till now the theory of the firm based on profits-maximizing behaviour dominates the economic theory. Several reasons can be given in favour of the assumption of profit-maximizing behaviour of the firms.

In the first place there is a question of *survivorship*. The firm which is working in a very competitive environment if it does not maximize profits it will run the risk of not being able to survive in the long run. Thus, profit maximizing is quite a rational behaviour in the fields where intense competition prevails. It may appear under certain circumstances that the firms are not maximizing profits, but they may be doing so only for the short run. For instance, the firms working in oligopolistic or monopolistic market structures do not maximise profits in the short run in order to prevent the potential competitors to enter industry. Under these circumstances, the firms try to *maximise profits in the long run.* Similarly, some other goals such as maximising the growth of output, sales maximization, increasing the market share are only the means to achieve maximum profits in the long-run and therefore from the long-run point of view, they are not inconsistent with the goal of profit-maximisation.

In defence of profit maximisation hypothesis, it may also be noted that the managers are not permanent in a firm and are likely to be changed by the owners (shareholders in the corporate firms) if they feel that managers are not providing them adequate return or profits on their

8. See his two will-known works (1) *The New Industrial State,* and (2) *Economics and the Public Purpose.*

investment. Thus, given the fact that managers are liable to be changed, if they deviate much from profit maximisation, they will not be allowed to continue for long in the firm. Of course, if control over management is absent, the managers may continue to behave in a non-profit maximizing manner. However, if the managers of corporate firms are not maximizing profits in the long run, the prices of its shares will fall greatly and it may be taken over by others who will change the current management and install a new team of managers who are efficient and try to maximise profits in the long run.

Finally, it may be said that no model, nor its assumptions can be completely *realistic*. Models are built and assumptions are made so as to bring out the crucial aspects and relations of the economic phenomena. For this purpose we need not fully take into account the massive and confusing details of the real world. We must abstract from reality to draw purposeful conclusions which can adequately explain the economic phenomenon. This is true of the profit maximization assumption. The profit maximization may not truly reflect the behaviour of the managers in the real world, but on the basis of the profit maximization assumption, correct predictions regarding determination of prices and outputs of commodities have been made. In this regard we may refer again to the viewpoint of Friedman[9] who has argued that the ultimate test of the validity of an assumption is its *capability to predict correctly*; the assumption itself may be unrealistic. Defending the assumption of profit maximisation on these grounds he writes, "unless the behaviour of businessmen in some way or other is approximated behaviour consistent with the maximization of returns, it seems unlikely that they would remain in business for long"[10] He points out that profit maximization assumption is valid because predictions regarding changes in prices and output based on it have been shown to be correct.

QUESTIONS AND PROBLEMS FOR REVIEW

1. Critically examine important objectives of a business firm. Are they consistent with each other?
2. What is meant by profit maximisation? On what grounds it has been criticised by some economists.
3. Critically evaluate profit-maximisation objective of business firms. What arguments would you give in defence of profit maximisation?
4. What is meant by economic profits? Is profit maximisation an appropriate goal for owners of a firm? For managers? What tends to happen if owners are not themselves managers ?
5. Two Oxford economists, Hall and Hitch contended that businessmen did not maximise profits but follow "*mark-up pricing principle*" to obtain only normal profit. Is mark-up pricing principle consistent with profit-maximisation principle? Examine.
6. Given the separation of ownership from control in the modern corporate form of business organisation, managers often strive to maximise their utility rather than maximising profits for the owners. Evaluate critically. Also mention the factors that enter into the utility functions of managers.
7. According to Prof. Baumol sales maximisation rather than profit maximisation is the valid objective of business executive today. Examine critically. Is it not irrational on the part of business managers to seek sales maximisation rather than profit maximisation?
8. H.A. Simon, one of the pioneers of the behavioural approach to the theory of the firm, suggests that instead of maximising profits, managers of business firms aim at '*satisficing*'. Discuss and explain what is meant by satisficing.

9. Milton Friedman, "The Melhodology of Positive Economics" in *Essays in Poskitive Economics*, University of Chicago Press, Chicago, 1953
10. *Ibit.*

9. Write short critical notes on the following objectives of firm,
   1. Security objective (*i.e.*, survival objective)
   2. Maximisation of Growth
   3. Staff maximisation

10. What is meant by equilibrium of the firm ? Using total revenue and total cost approach explain how firm maximises profits to attain equilibrium.

11. "Profit maximising output is smaller than the sales maximising output". Explain.

12. An author is to receive 10% of the sales revenue of a book as royalty. Would he favour a price which is lower than the one suggested by profit maximising publishers ? Why?
   [**Hints:** Author's royalty will be maximum when sales revenue is maximum. The price is lower at the output level where total sales revenue is maximum as compared to that at profit-maximising level of output. Therefore, the author will prefer a lower price].

20

Equilibrium of the Firm and Industry Under Perfect Competition

In the preceding chapters we have explained the various types of market structures that prevail in a modern economy. We have also examined the alternative objectives of business firms. The analysis of determination of equilibrium price and output through demand and supply is made by assuming that perfect competition prevails in the market. But this analysis is conducted by considering the demand for a product and its supply by the whole perfectly competitive industry, keeping the individual firms in the back ground. In the present chapter we shall explain the equilibrium of the individual firm under perfect competition, that is, what level of output an individual firm will decide to produce. It will be recalled that pure or perfect competition is said to prevail in the market when there is a large number of firm producing a homogeneous product and there is free entry into and free exit from the industry. As a result, no single firm in a purely competitive market can change the prevailing price as determined by demand for and the supply of industry's product.

Meaning of Equilibrium of the Firm

But what is precisely meant by the equilibrium of the firm. *A firm is said to be in equilibrium when it has no tendency to change its level of output, that is, when it has no tendency either to increase or contract its level of output.* The firm will produce the equilibrium output and will charge the price at which this equilibrium output can be sold. But now the question arises as to when a firm will have no tendency to change its level of output. In this regard economists make an important assumption about the objective of the firm or the entrepreneur controlling it. It is that *a firm aims to maximise its profits.* The attempt of the entrepreneur to maximise profits is regarded as a rational behaviour and is one of the most fundamental assumption of economic theory.

The profits are the difference between total cost incurred and total revenue obtained from the sale of the output produced. It may be noted that total costs include not only the costs incurred on labour, raw materials, capital equipment, land etc., but also the wages of management and supervision done by the entrepreneur himself. These wages of management and routine supervision of the entrepreneurs are often called normal profits. These *normal profits are the minimum income that must be earned by the entrepreneur if he is to stay in an industry.* The pure or economic profits are thus the excess of income or revenue over all costs including normal profits. In other words, pure economic profits are *supernormal profits.* It is the economic profits which an entrepreneur tries to maximise under our assumption of profit maximisation.

EQUILIBRIUM OF THE FIRM UNDER PERFECT COMPETITION

As stated above, a firm is said to be in equilibrium when it has no tendency either to increase or to contract its output. Since we assume that the firm aims to maximise its profits it will therefore be in equilibrium when it is producing the amount of output at which it is

making maximum money profits. There are two ways of explaining how a firm reaches its equilibrium position by maximizing profits. In the first method we use the concepts of total cost and total revenue. In the second method we use the concepts of marginal revenue and marginal cost. We explain below the equilibrium of the firm in these two ways.

Firm's Equilibrium : Total Revenue and Total Cost Approach

As said above, a firm will fix its output at the level where it is making maximum money profits. The profits are the difference between total revenue (*TR*) and total cost (*TC*). Therefore, a firm will maximise its profits at a level of output where the difference between total revenue and total cost is the largest. Consider Table 20.1 which shows the changes in total revenue and total cost when a firm raises its output from one to 10 units. Note that the total revenue increases at a constant rate since for a firm under perfect competition price remains constant and in this table it is equal to Rs. 45 per unit.

Table 20.1. Firm's Equilibrium : Maximising Profits

Output	*Total Revenue*	*Total Cost*	*Total Profit*
1	45	50	-5
2	90	80	+10
3	135	90	+45
4	180	105	+75
5	225	130	+95
6	270	165	+105
7	315	205	+110
8	360	265	+95
9	405	325	+80
10	450	410	+40

It will be seen from the table that when the firm is producing 2 units of output, its total revenue is Rs. 90 and total cost is Rs. 80. This yields profits of Rs. 10. Now, when the firm raises its output level to 7 units, its profits go up to Rs. 110. If the firm increases its output beyond 7 units, profits decline. It is therefore clear that profits are maximum when the firm produces 7 units of output. Thus the firm will be in equilibrium by producing 7 units of output.

At what level of output a firm will be in equilibrium by maximising its profits is graphically shown in Fig. 20.1. *TR* represents total revenue curve and *TC* represents total cost curve. Total revenue curve starts from the origin which means that when no output is produced, revenue is zero. As output is increased total revenue goes on increasing at a constant rate. This is because price for a firm working under perfect competition remains constant whatever its level of output. Consequently, total revenue curve *TR* is a

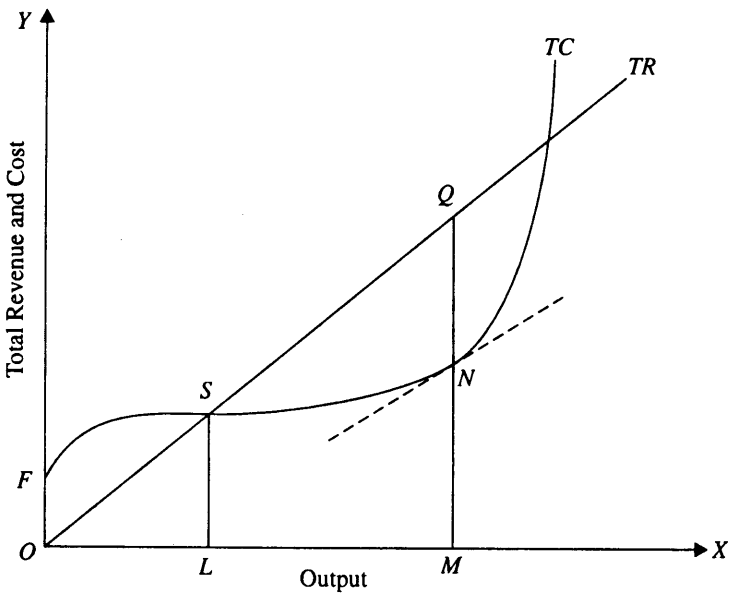


Fig. 20.1. *Profit Maximization by a Firm*

straight line from the origin. However, it will be noticed that the total cost curve *TC* starts from a point *F* which lies above the origin. It means that *OF* is the fixed cost which the firm has to incur even if it stops production for a short time. It will be seen from Fig. 20.1 that as the firm raises its output in the initial stages total cost is greater than total revenue and the firm is not making any profits at all. When it produces *OL* level of output, total revenue just equals total cost and the firm is therefore neither making profits nor losses. That is, the firm is only breaking even at the output level *OL*. Thus the point *S* or output level *OL* is called a *Break-Even Point.*

When the firm increases its output beyond *OL*, total revenue becomes larger than total cost and profits begin to accrue to the firm. It will be noticed from the figure that profits are increasing as the firm increases production to *OM*, since the distance between the total revenue curve (*TR*) and total cost curve (*TC*) is widening. At *OM* level of output, the distance between the *TR* curve and *TC* curves is the greatest and therefore profits will be maximum. The total economic profits earned at *OM* level of output are equal to *NQ*. Thus the firm will not produce any output larger than *OM* since after it the gap between *TR* and *TC* curves goes on narrowing down and therefore the total profits will be declining. It is therefore clear that the firm will be in equilibrium at *OM* level of output where total revenue exceeds total cost by the largest amount and hence its profits are maximum. This method of finding out profit-maximising level of output by curves of total revenue and total cost seems to be quite reasonable and is also often used by businessmen, but it has some limitations. First, the largest vertical distance between total revenue and total cost curves is difficult to find out at a glance. Second, in this method price per unit of output cannot be known at first sight from the diagram since price is not directly shown in the diagram. With these limitations, complicated problems of the equilibrium analysis of the firm cannot be easily discussed with this method. Therefore, in modern economics, the concept of marginal cost and marginal revenue are used to explain the conditions of equilibrium of the firm. We now turn to explain this alternative method.

Firm's Equilibrium : Marginal Revenue-Marginal Cost Approach

Owing to the shortcoming of the method of explaining firm's equilibrium with total revenue and total cost curves, an alternative method of explaining firm's equilibrium has been developed. This method uses the concepts of marginal revenue and marginal cost. In an earlier chapter we have explained in detail the concepts of marginal revenue and marginal cost. Marginal revenue means the addition made to the total revenue by producing and selling an additional unit of output and marginal cost means the addition make to the total cost by producing an additional unit of output. Now, a firm will go on expanding its level of output so long as an extra unit of output adds more to revenue than to cost since it will be profitable to do so. The firm will not produce an additional unit of the product which adds more to cost than to revenue because to produce that unit will mean losses. In other words, it will pay the firm to go on producing additional units of output so long as the marginal revenue exceeds marginal cost. The firm will be increasing its total profits by increasing its output to the level at which marginal revenue just equals marginal cost. It will not be profitable for the firm to produce a unit of output for which marginal cost is greater than marginal revenue.

The firm will be making maximum profits by expanding output to the level where marginal revenue is equal to marginal cost. If it goes beyond the point of equality between marginal revenue and marginal cost, it will be incurring losses on the extra units of output and will therefore be reducing its total profits. Thus, the firm will be in equilibrium position when it is producing the amount of output at which marginal revenue equals marginal cost. *It will be earning maximum profits at the point of equality between marginal revenue and marginal cost.* Therefore, the condition for the equilibrium of the firm is that marginal revenue should be equal to marginal cost (*MR = MC*).

How a firm reaches its equilibrium position and accordingly fixes its level of output can be easily understood by considering Table 20.2. In column 3 of this table we have calculated marginal cost (*MC*) of the various units of output by calculating the successive differences in total costs. It will be seen from column 3 that marginal cost initially falls from Rs. 50 to Rs. 10 and then it goes or rising to Rs. 80 at 10 units of output.

Table 20.2. Firm's Equilibrium : Equating Marginal Revenue with Marginal Cost

Output (Quintals)	*Total Cost (TC)*	*Marginal Cost (MC)*	*Price or Marginal Revenue (MR)*	*Marginal Profits (Profits : +) (Loss : -)*
1	2	3	4	5
1	50	50	45	-5
2	80	30	45	+15
3	90	10	45	+35
4	105	15	45	+30
5	130	25	45	+20
6	160	30	45	+15
7	205	45	45	0
8	265	60	45	-15
9	340	75	45	-30
10	420	80	45	-35

Since *for an individual firm under perfect competition the price of the product is given and remains constant whatever its level of output, marginal revenue (MR) of the product is equal to its price.* Suppose the price of a product is Rs. 45. Since this price will remain the same, the marginal revenue at all levels of its output will also be equal to Rs. 45.

It will be seen from the Table 20.2 that when one unit of output is produced marginal cost is equal to Rs. 50 which is greater than marginal revenue (Rs. 45). At first sight it appears that why the firm should produce this product at all when its first unit has greater marginal cost than marginal revenue. However, a close look at the table would show that marginal cost is declining when output is expanded and falls below marginal revenue of Rs. 45 with 2 units of output and remains below it till 6 units of output are produced. With 7 units of output marginal cost is equal to marginal revenue. This shows that the firm can add to its total profits by expanding production to 7 units. It will be observed from table that production of 2nd, 3rd, 4th, 5th and 6th units of output yields marginal profits of Rs. 15, Rs. 35, Rs. 30, Rs. 20 and Rs. 15 respectively. Therefore, by expanding production to the 6th unit, the firm will be *increasing its total profits.* The production of 7th unit does not add to its total profits, nor does it cause losses. This is because marginal cost of 7th unit of output equals its marginal revenue. However, if production is expanded beyond 7th unit, each extra unit causes some monetary loss. Therefore, a firm which aims to maximise it profits would not go beyond 7th unit of output. Hence the firm will be in equilibrium when it produces seven units of output where its marginal revenue is equal to its marginal cost and with this it is maximising its profits.

The whole argument can be better understood with the aid of Fig. 20.2 which depicts marginal revenue and marginal cost curves of the firm. Since under perfect competition demand curve facing a firm is perfectly elastic at the prevailing price in the market, the average and marginal revenue curves are horizontal straight lines and coincide with each other. In Fig. 20.2 *MR* is the marginal revenue curve of the firm and *MC* is the marginal cost curve. It will be seen from the figure that marginal revenue and marginal cost curves of the firm intersect at point *E* corresponding to the output level *OM*. Up to output *OM* marginal revenue exceeds marginal cost and at *OM* the two are just equal to each other. The firm will be maximizing its profits by producing output *OM*. The total profits will be less if it produces less than or more

than *OM*. For instance, if the firm produces *OL* level of output (which is less than *OM*), its total profits will be less than at *OM*, because by producing *OL* it will be forgoing the opportunity to earn more profits which it can if it raises output to *OM*. This is because additional units between *L* and *M* add more to revenue than to cost (*i.e.*, their *MR* is greater than *MC*) and it will therefore be profitable for the firm to produce them. The extra units between *L* and *M* can give to the firm extra profits equal to the area *ABE* which it would be forgoing if it produces *OL* output.

It is now clear that at any output level which is less than *OM*, the profits will be smaller than that at *OM*. Likewise, profits will be smaller if the firm produces more than *OM*. Thus, at the greater output *OH*, profits will be less than at *OM*. This is so because extra units beyond *OM* add more to cost than to revenue (*i.e.*, their marginal cost is greater than their marginal revenue) and therefore the firm will be incurring a loss on these extra units with the result that its total profits will be reduced to that extent. On the units from *M*th to *H*th, the firm will be incurring a loss equal to the area *CDE* and total profits made by producing output *OH* will therefore be less than that at output *OM*. It is thus clear that total profits at output *OH* will be less than at output *OM*. By expanding output to *OM* level the firm is availing of the whole opportunity for making profits and therefore its profits are maximum at output *OM*.

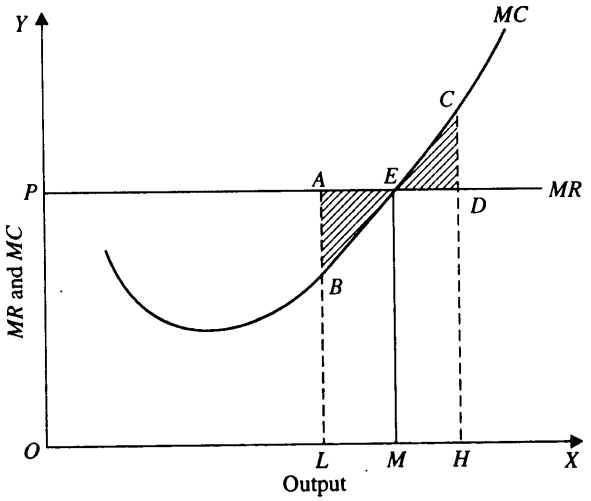


Fig. 20.2. *Equilibrium of the Firm under Perfect Competition: Profit Maximising Output*

To conclude, the firm will be making maximum profits and will therefore be in equilibrium at the level of output at which marginal revenue is equal to marginal cost, or where the marginal revenue and marginal cost curves intersect each other. It is worth mentioning that since under perfect competition marginal revenue is the same as price (average revenue) the firm will equalize marginal cost with price to maximise its profits. Thus, under perfect competition the rule for the equilibrium of the firm namely, $MR = MC$ becomes:

$$\text{Price} = MR = MC$$

or

$$\text{Price} = MC$$

Short-run Equilibrium of the Firm under Perfect Competition

We have explained above the equilibrium of the firm under perfect competition in general terms, that is, without reference to the short run or the long run. It is useful to understand the equilibrium of the firm separately in the short run and long run.

In order to know whether the firm is making profits or losses and how much of them, average cost curve must be introduced in the figure. This has been done in Fig. 20.3 where *SAC* and *SMC* curves are short-run average cost and short-run marginal cost curves respectively. Profit per unit of output is the difference between average revenue (price) and average cost. In Fig. 20.3, at the equilibrium output *OM*, average revenue is equal to *ME*, and average cost is equal to *MF*. Therefore, the profit per unit of output is *EF*, the difference between *ME* and *MF*. The total profits earned by the firm will be equal to *EF* (profit per unit) multiplied by *OM* or *HF* (total output). Thus, the total profits will be equal to the area *HFEP*. Because normal profits are included in average cost the area *HFEP* indicate super-normal profits.

As mentioned before, short run means period of time within which the firms can alter their level of output only by increasing or decreasing the amount of variable factors such as labour and raw materials, while fixed factors like capital equipment remain changed. Moreover, in the short run, new firms can neither enter the industry, nor the existing firms can leave it. Short-run equilibrium of the firm under perfect competition is depicted in Fig. 20.3.

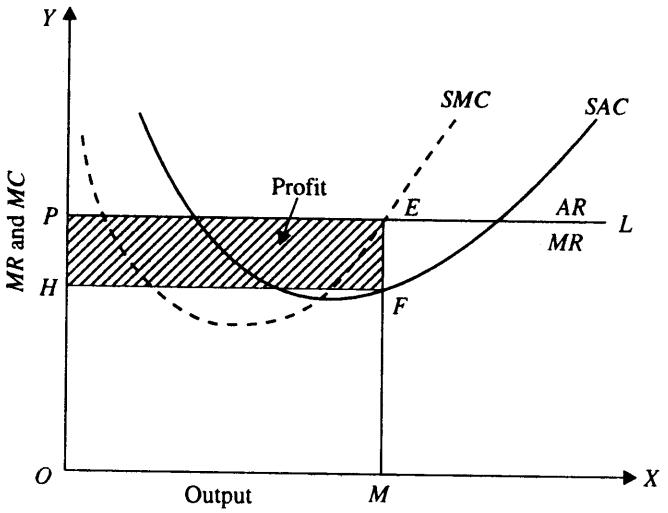


Fig. 20.3. *Short-Run Equilibrium with Profits under Perfect Competition*

Since we are assuming that all firms in the industry are working under same cost conditions and also for all of them price is *OP*, all will be earning super-normal profits equal to the area *HFEP*. Thus, while all firms in the industry will be in short-run equilibrium, but the industry will not be in equilibrium since there will be a tendency for the new firms to enter the industry to compete away the super-normal profits. But the short run is not a period long enough for the new firms to enter the industry. The existing firms will therefore continue earning super-normal profits equal to *HFEP* in the short period. It is evident that in the situation depicted in Fig. 20.3 all firms will be in equilibrium at *E* and each will be producing *OM* output but the tendency for the new firms to enter the industry will be present, though they cannot enter during the short period.

Short-run Equilibrium of a Perfectly Competition Firm : Minimising Losses

Now, suppose that the prevailing market price of the product is such that the price line or average and marginal revenue curve lies below average cost throughout. This case is illustrated in Fig. 20.4 where the prevailing market price is *OP'*, which is taken as given by the firm, *P'L'* is the price line which lies below *AC* curve at all levels of output. The firm will be in equilibrium at point *E'* at which marginal cost is equal to price (or marginal revenue) and marginal cost curve is rising. Firm would be producing *OM'* output but would be making losses since average revenue (or price) which is equal to *M'E'* is less than average cost which is equal to *M'F'*. The loss per unit of output is therefore equal to *E'F'* and total loss will be

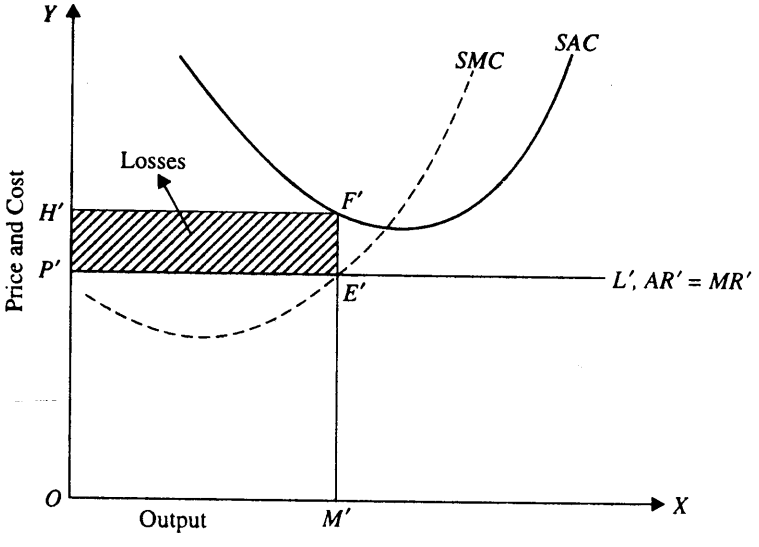


Fig. 20.4. *Short-Run Equilibrium : Minimising Losses*

equal to $P'E'F'H$ which is the minimum loss that a firm can make under the given price-cost situation. Since all the firms are working under same cost conditions, all would be in equilibrium at point E' or output OM' and every one will be making losses equal to $P'E'F'H'$. As a result, the firms will have a tendency to quit the industry in order to make a search for earning at least normal profits elsewhere. We thus see that at price OP' firms will be in equilibrium at E' but there will be a tendency for firms to leave it though they cannot quit it during the short period.

But the question arises as to why all the firms should continue producing the product when they are making losses. In the short run if they cannot go out of the industry by disposing of the plant, why do they not at least close down, that is, stop producing, when they are making losses. In other words, why do they not suspend production during the short period while remaining in the industry. We discuss below this question in detail.

Shutting-down Decision in the Short-run

Our analysis of the equilibrium of a firm under perfect competition provides us an important insight into the decision-making of firms to shut down in certain situations. A firm under perfect competition is in equilibrium at a level of output at which marginal cost equals price (MC= Price). But the equality of marginal cost with price does not always guarantee positive economic profits. A firm may be in equilibrium when it is making maximum economic profits or incurring minimum losses. Now, an important question is why a firm should continue operating when it is incurring losses. The answer lies in the concept of fixed cost which have to be borne by the firm even if it stops production in the short run. Therefore, in the analysis of firm's decision to continue operating or to shut down in the short run, the difference between variable costs and fixed costs is important. It will be remembered that variable costs are costs incurred on factors such as labour, raw materials, fuel or electricity which can be easily varied in the short run. When a firm shuts down in the short run and stops producing the commodity, the variable costs also fall to zero. On the other hand, a firm cannot escape from fixed costs even if it ceases to produce in the short run. It should be noted that fixed costs are costs incurred on those factors which cannot be varied in the short run. Thus rent of factory building, costs on machinery purchased, wages of a certain minimum managerial staff are some examples of fixed costs. *When a firm stops production, that is, shuts down in the short run, it will bear losses equal to the fixed costs.* Therefore, it will be wise to continue operating in the short run when firm's total revenue exceeds total variable costs because in that case it will be recovering some fixed costs and therefore its losses will be less than the fixed costs. To make our analysis simple, we examine the question in three parts.

1. Situation when a firm decides to continue operating in the short run even when incurring losses.
2. Situation when a firm decides to shut down in the short run.
3. Situation when it is not rational for the firm to operate and produce in the short run.

1. **Situation when a firm decides to continue operating when incurring losses.** A firm working under conditions of perfect competition has no control over the price of the product. It takes the prevailing price in the market as given and decides what level of output it should produce. When price in the market falls below average total cost, it will suffer losses. To avoid losses if it shuts down and stops producing the commodity in the short run, its total revenue as well as variable costs will fall to zero. But it will have to bear losses equal to the total fixed costs. Therefore, it is prudent on the part of the firm to continue producing in this situation when losses are less than total fixed costs. But it will minimise losses by producing a level of output at which price equals marginal cost ($P = MC$). This situation is illustrated in Fig. 20.5 where the various short-run cost curves SAC, AVC and SMC are shown. Price of the product prevailing in the product is OP which is taken as given by the firm. The firm is in equilibrium at point E where it produces OQ output at which the given price OP is equal to short run

marginal cost of production (*SMC*). It will be seen from Fig. 20.5 that at the equilibrium output *OQ*, average variable cost (*AVC*) is *QL*, which is less than the price *OP* (=*QE*) or Price > *AVC*. This means the firm is recovering variable costs plus a part of the fixed cost. Total revenue (*TR*) earned by producing output *OQ* is equal to the area *OPEQ*, while the total costs are equal to the area *ORTQ*.

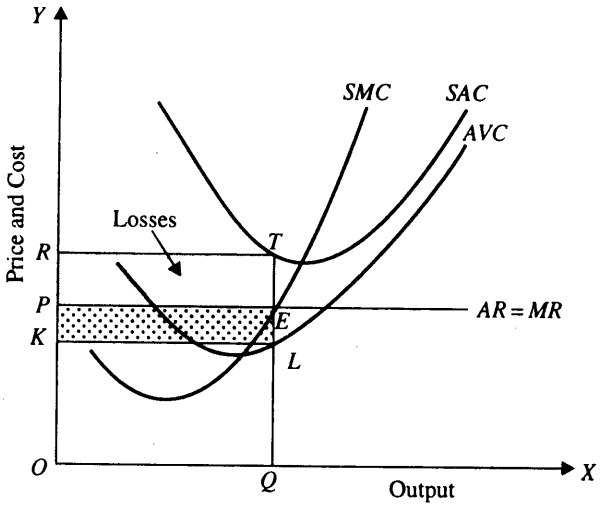


Fig. 20.5. *It is rational to operate; Losses < TFC.*

It is evident from Fig. 20.5 that when price is *OP* total revenue is less than the total costs and the firm is making losses equal to the area *RTEP*. It should be noted that average fixed cost at output level *OQ* is given by the vertical distance *TL* between short-run average total cost (*SAC*) and the average variable cost (*AVC*). Multiplying this average fixed cost by output *OQ* (= *KL*) we get the total fixed costs being equal to the area *RTLK*. It is thus clear by working at point *E* and producing output *OQ*, the firm is recovering the entire variable costs equal to the area *OQLK* and a part of the fixed cost equal to the dotted area *KLEP*. Thus losses made which are equal to the area *RTEP* are less than the total fixed costs equal to the area *RTLK*. If a firm shuts down in the short run and ceases to produce the product, its losses will be equal to the total fixed costs *RTLK*. It will therefore be a rational decision on the part of the firm to continue operating as shutting down in this situation will mean greater losses equal to the total fixed cost.

To conclude, *the firm will continue operating in the short run at a loss when total revenue exceeds total variable costs. This enables the firm to earn revenue large enough to cover not only the variable costs but also to cover a part of the fixed costs.* We state below the condition when it is rational for the firm to continue production in the short run even when it is incurring losses:

$$TR > TVC$$

Since $TR = P.Q$, and

$$TVC = AVC.Q$$

Therefore

$$P.Q > AVC.Q$$

$$P > AVC$$

2. **Situation when a firm decides to shut down in the short run.** This situation is depicted in Fig. 20.6 where it will be seen that price has fallen to the level OP_1. With price OP_1, equilibrium is attained at point *D* corresponding to output OQ_1 at which price is equal to both marginal cost (*MC*) and minimum average variable cost. By producing OQ_1 output and selling it at price OP_1, the firm earns total revenue equal to the area OQ_1DP_1. The total cost of producing OQ_1 output is equal to the area OQ_1HB. Thus at price OP_1 the firm is incurring losses equal to the area P_1DHB. It should be noted that average fixed cost is *DH* at OQ_1 output, that is, the vertical distance between *SAC* and *AVC*. The total fixed cost is then given by the area P_1DHB. Thus when price falls to OP_1, firm's losses are equal to the total fixed cost. Even when the firm closes down, its losses will be equal to the total fixed cost. Therefore, *if price falls below* OP_1 which is equal to the minimum possible average variable cost (*AVC*), the losses will become greater than the fixed costs and the firm will shut down. Point *D* which indicates the minimum possible average

variable cost represents the *shut-down point.* The situation when firm actually shuts down when price falls below average variable cost is explained in the next situation.

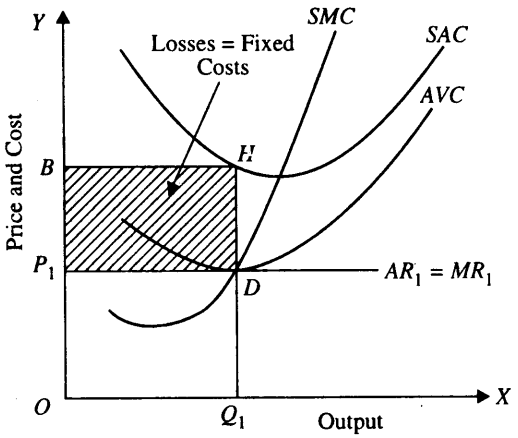


Fig. 20.6. *When P = Minimum AVC, losses are equal to fixed costs. If price falls below it, firm will shut down.*

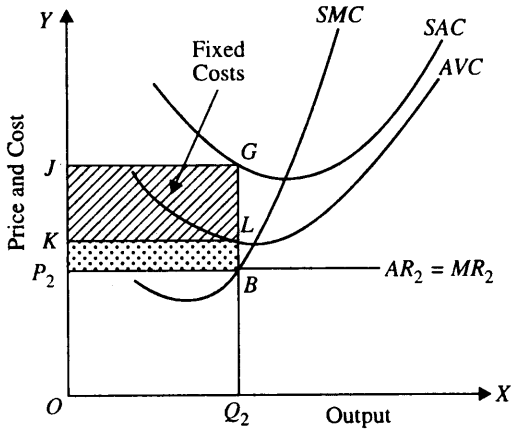


Fig. 20.7. *When price falls below minimum AVC, firm shuts down (Losses > Fixed Costs).*

3. **Situation when firm actually shuts down and does not operate.** When price of the commodity falls below minimum possible average variable cost, the losses would exceed total fixed cost at the output for which price equals marginal cost. This means that the firm will not fully recover even variable costs which can be avoided by stopping operations. This is illustrated in Fig. 20.7 where price has fallen to OP_2 which lies below the minimum possible point of average variable cost curve *AVC.* Price OP_2 is equal to marginal cost at point *B* corresponding to output OQ_2. As will be seen from Fig. 20.7 the total losses (*TR – TC*) are equal to the area $JGBP_2$, while total fixed costs are *JGL K*. Thus total losses exceed total fixed cost by the dotted area $KLBP_2$ which is a part of the variable costs not being recovered. Since losses are greater than fixed costs, it is not rational for the firm to continue operating. Therefore, the firm will shut down in the short run and bear losses equal to the fixed costs. In the short run firm cannot go out of the industry but will wait for the better time to come.

We conclude therefore that as long *as price exceeds average variable cost, the firm should continue operating in the short run.* But if the price falls below average variable cost, the firm will suffer losses equal to the fixed costs plus some of its variable costs, that is, it will incur losses greater than the total fixed costs. Under such circumsatnces, it will be rational for the firm to close down, because by suspending production it can avoid losses incurred on variable costs. We conclude therefore that if the firm is not able to recover even its variable costs fully it will shut down even in the short run to avoid unnecessary losses.

Long-run Equilibrium of the Firm Under Perfect Competition

The long run is a period of time which is sufficiently long to allow the firms to make changes in all factors of production. In the long run, all factors are variable and none fixed. The firms, in the long-run, can increase their output by changing their capital equipment; they may expand their old plants or replace the old lower-capacity plants by the new higher-capacity plants or add new plants. Besides, in the long run, new firms can enter the industry to compete the existing firms. On the contrary, in the long run, the firms can contract their output level by reducing their capital equipment; they may allow a part of the existing capital equipment to wear out without replacement or sell out a part of the capital equipment. Moreover, the firms can leave the industry in the long run. The long-run equilibrium then refers to the situation when free and full adjustment in the capital equipment as well as in the number of firms has

been allowed to take place. It is therefore long-run average and marginal cost curves which are relevant for deciding about equilibrium output in the long run. Moreover, in the long run it is the average total cost which is of determining importance, since all costs are variable and none fixed.

As explained above, a firm is in equilibrium under perfect competition when marginal cost is equal to price. But for the firm to be in long-run equilibrium, besides marginal cost being equal to price, the price must also be equal to average cost. This is because if the price is greater or less than the average cost, there will be tendency for the firms to enter or leave the industry. If the price is greater than the average cost, the firms will earn more than normal profits. These supernormal profits will attract other firms into the industry. With the entry of new firms in the industry, the price of the product will go down as a result of the increase in the supply of output and the cost will go up as a result of the more intensive competition for factors of production. The new firms will continue entering the industry until the price is equal to average cost so that all firms are earning only normal profits.

On the contrary, if the price is lower than the average cost, the firms would make losses. These losses will induce some of the firms to quit the industry. As a result, the output of the industry will fall which will raise the price. On the other hand, with some firms going out of the industry, cost may go down as a result of fall in the demand for certain specialised factors of production. The firms will continue leaving the industry until price is equal to average cost so that the firms remaining in the field are making only normal profits. It, therefore, follows that for a perfectly competitive firm to be in long-run equilibrium, the following two conditions must be fulfilled:

(1) *Price = Marginal Cost*

(2) *Price = Average Cost*

If price is equal to both marginal cost and average cost, then we have a double condition for long-run equilibrium of a firm:

Price = Marginal Cost = Average Cost

But from the relationship between marginal cost and average cost we know that marginal cost is equal to average cost only at the minimum point of the average cost curve. Therefore, the condition for long-run equilibrium of the firm can be written as:

Price = Marginal Cost = Minimum Average Cost

Figure 20.8 represents long-run equilibrium of the firm under perfect competition. The firm cannot be in the long-run equilibrium at a price greater than *OP* in Fig. 20.8. If price is greater than *OP*, then the price line (demand curve) would be somewhere above the minimum point of the average cost curve (LAC) so that marginal cost and price will be equal where the firm will be earning more than economic profits. Since there will be tendency for

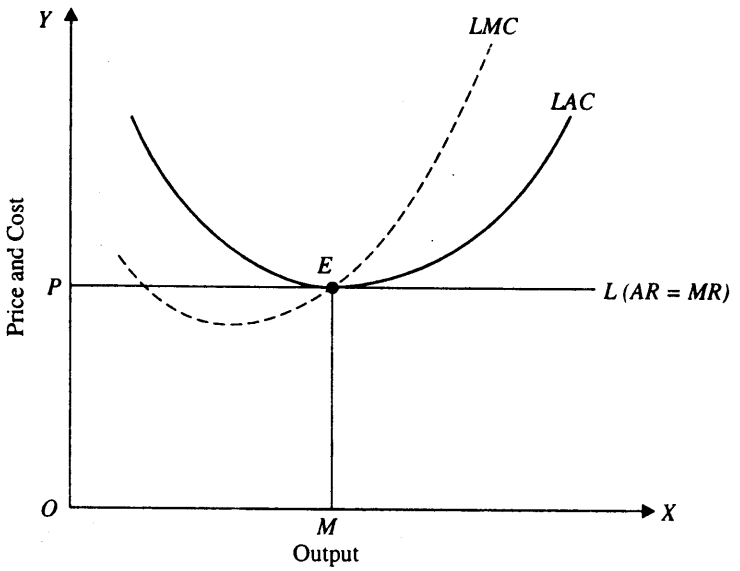


Fig. 20.8. *Long-Run Equilibrium of the Firm under Perfect Competition*

new firms to enter the industry and compete away these supernormal profit, the firm cannot be in long-run equilibrium at any price higher than *OP*. Likewise, the firm cannot be in long-run equilibrium at a price lower than *OP* under perfect competition. If price is lower than *OP*, the demand curve facing the firm will lie below the average cost curve (*LAC*) so that the marginal cost and price will be equal at a point where the firm is making losses. Therefore, there will be tendency for some of the firms in the industry to go out with the result that price will rise and the firms left in the field make at least normal profits. We therefore conclude that the firm can be in long-run equilibrium under perfect competition only when price is at such a level that the horizontal demand curve is tangent to the long-run average cost curve so that price equals average cost and firm makes only normal profits.

It should be noted that a horizontal demand curve can be tangent to a U-shaped average cost curve only at the latter's minimum point. Since at the minimum point of the average cost curve the marginal cost and average cost are equal, price in long-run equilibrium is equal to both marginal cost and average cost. In other words, double condition of long-run equilibrium is fulfilled at the minimum point of long-run the average cost curve.

It is clear from above that *long-run equilibrium of the firm under perfect competition is established at the minimum point of the long-run average cost curve.* Operating at the minimum point of the long-run average cost curve signifies that *firm is of optimum size*, that is, it is producing output at the lowest possible cost. The fact that the firms, working under conditions of perfect competition, tend to be of optimum size in the long run is beneficial from the social point of view in two ways. First, working at optimum size implies that the resources of the society are being utilized in the most efficient way. Second, it signifies that the consumers are getting the goods at the lowest possible price.

EQUILIBRIUM OF THE INDUSTRY

Since the price of a product under perfect competition is determined by the intersection of demand and supply curves of the product of an industry, we need to know the nature and shape of the supply curve of a product under perfect competition. In our chapters on demand theory we have already explained how the market demand curve for a product is derived and what shapte it normally takes. We shall now explain how the supply curve of a product under condition of perfect competition is derived and the shape it takes both in the short-run and the long-run. Before explaining the derivation of the supply curve, we shall discuss the concept of the equilibrium of the industry under perfect competition. It should be noted that the concept of industry is only relevant in case of perfect competition since only under perfect competition, a large number of firms produce identical or homogeneous products.

An industry is in equilibrium when there is no tendency on the part of the industry to vary its output, that is, neither to expand output and nor to contract it. Now, the essential condition for the absence of any tendency for expansion or contraction of output of an industry is that the demand for the product of the industry and the supply of it by the industry are in balance or in equilibrium. Unless the quantity demanded of the industry's product and the quantity supplied of it are equal, there will always be a tendency for output of the industry to vary. If at the given price the quantity demanded of the product exceeds the quantity supplied of it by the industry, price of the product will tend to rise and also the output of the industry will tend to be increased. On the other hand, if at a price the quantity demanded of the product falls short of the quantity supplied of it, the price and output of the industry will tend to fall. Thus, only when the quantity demanded and quantity supplied of the product of an industry are equal, there will be no tendency for the industry either to expand its output or to contract it. We therefore conclude that *industry is in equilibrium at the level of output at which the quantity demanded and quantity supplied of its product are equal,* or in other words, at which the demand curve for the product of the industry and the supply curve of it by the industry intersect each other.

Now, the output or supply of the product of an industry can vary in two ways. First, the output of an industry can vary if the existing firms in it vary their output levels. Secondly, the output and therefore the supply of the product of the industry can vary by a change in the number of firms in it; the industry output will increase if new firms enter the industry and the industry output will decline if some of the existing firms leave it. Thus, given the external conditions regarding demand, an industry would be in equilibrium when neither the individual firms have incentive to change their output nor there is any tendency for the new firms to enter or for the existing firms to leave it. Therefore, besides the equality of demand and supply of the industry's product, two conditions which must be satisfied if there is to be the equilibrium of the industry. First, each and every firm should be in equilibrium. This will happen at the output of a firm where marginal cost is equal to marginal revenue and marginal cost curve cuts the marginal revenue curve from below. Secondly, the number of firms should be in equilibrium, *i.e.*, there should be no tendency for the firms either to move into or out of the industry. This will happen when all the entrepreneurs, *i.e.*, owners of the firms of the industry, are earning only *'normal profits' that is, profits which are just sufficient to induce them to stay in the industry and when no entrepreneur outside the industry thinks that he could earn at least normal profits if he were to enter it.*

Thus, the concept of normal profits is important in defining and describing equilibrium of the industry. If we assume that all entrepreneurs in a certain industry have the same transfer earnings if they leave the industry, then there would be a fixed amount of normal profits for the whole industry. Every entrepreneur must earn at least this fixed amount of normal profits if he is to stay in the industry. If all the firms in the industry are earning profits above normal, there will be incentive for the firms outside the industry to enter it since there is every reason for the entrepreneurs outside the industry to expect that they would be able to earn at least normal profits if they enter it. Thus, there will be a tendency for the firms in that industry to increase. On the other hand, if the firms in the industry are earning profits below normal (*i.e.*, when they are having losses), they will leave the industry and search for normal profits elsewhere. Thus, the number of firms in that industry will tend to diminish. In conclusion, we can say that equilibrium of the industry or *full equilibrium,* as it is sometimes called, would be attained when the number of firms in the industry is in equilibrium, (*i.e.*, no movement into or out of the industry) and also all the individual firms in it are in equilibrium, *i.e.*, they are equating marginal cost with marginal revenue, and *MC* curve cuts *MR* curve from below.

It should be noted that normal profits of the entrepreneur are included in the average cost of production. Therefore, if the price is equal to the average cost of production, it means that the entrepreneur is earning only normal profits.

Short-Run Equilibrium of the Industry

We must distinguish between the *short-run and the long-run equilibrium of the industry.* In the short run only existing firms can make adjustment in their output while the number of firms remains the same, that is, no new firms can enter the industry and nor any existing firms can leave it in the short run. Since, in the short run, by definition, the entry or exit of the firms in an industry is not permitted; for short-run equilibrium of the industry, the condition of making only normal profits by the existing firms (or, in other words, the equality of average cost with average revenue) is not required. Thus, the industry is in short-run equilibrium when the demand for and short-run supply of the industry's product are equal and all the firms in it are in equilibrium. In the short-run equilibrium of the industry, though all firms must be in equilibrium, all may be making super-normal profits or all may be having losses depending upon the demand conditions for the industry's product.

Short-run equilibrium of the industry is illustrated in Fig. 20.11 in which in the right hand panel, industry's short-run demand and supply curves *DD* and *SS* respectively are shown. These curves intersect at point *E* and thereby determine the equilibrium price OP_1 and the equilibrium

output OQ_1 of the industry. Firms will take price OP as given and will adjust their output at the profit-maximising level. The left hand panel of Fig. 20.11 shows that a firm in the industry will be in equilibrium at OM output. (It should be noted that the scale on the X-axis of the diagrams in the right-hand and left hand panels are different). With OM output, the firm is making profits equal to the area $KRST$. If it is assumed, as is being done here, that all firms in the industry are alike in respect of cost conditions, then all firms like the one shown in Fig. 20.9 (left-hand panel) will be making profits. Thus, while the industry is in short-run equilibrium, that is, the demand and supply of its product are equal and also all firms in it are in equilibrium; the firms are making supernormal profits.

If the demand conditions for the product of the industry are not so favourable, for instance, if the demand curve of the industry's product is at a much lower position than shown in Fig.

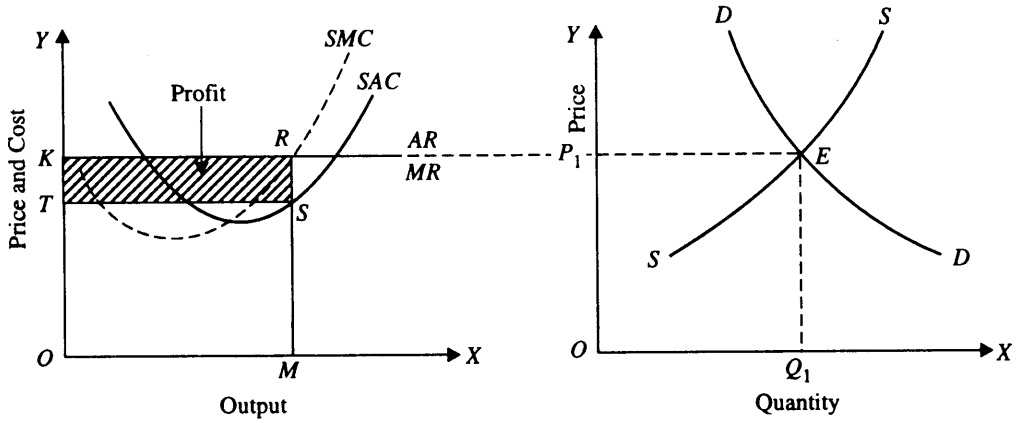


Fig. 20.9. *Short-Run Equilibrium of the Industry*

20.9, then the intersection of demand and supply curves may take place at the price at which the firms will be having losses in their equilibrium position. In this case too the industry will be in short-run equilibrium. We, therefore, reach the following two conditions for the short-run equilibrium of the industry under perfect competition.

1. *The short-run demand for and supply of the product of the industry must be equal.*
2. *All firms in the industry should be in equilibrium whether they are making profits or having losses.*

Long-Run Equilibrium of the Industry

In the long-run, number of firms can vary. Lured by the super normal profits earned by the existing firms in the short run, the new firms will enter the industry and compete away these abnormal profits. As a result of the entry of new firms, the supply of the product will increase which will result in lowering the price of the product. New firms will continue entering the industry until price of the product becomes equal to the minimum run average cost (LAC). Thus, all firms will be in long-run equilibrium at the minimum points of their long-run average cost curve and will therefore be making only normal profits. In the short run, if the existing firms make losses, some of the firms will leave the industry so that the output of the industry will fall and as a result the price will go up to the level of average cost. Thus, as a consequence of the exit of some firms, the remaining firms come to be in long-run equilibrium where they are earning only normal profits.

The industry is in long-run equilibrium when besides the equality of long-run supply of and demand for the industry's product, all firms are in equilibrium and further there is neither a tendency for the new firms to enter the industry, nor for the existing firms to leave it. The long-run equilibrium of the industry is depicted in Fig. 20.10 in which, in the right hand panel,

demand curve D_1D_1 and short-run supply curve SRS_1 of the industry are shown which intersect at point E_1 and thereby determine the price OP_1. It will be seen that with price OP_1 the firm is in equilibrium at F, the minimum point of the long-run average cost curve LAC and is making only normal profits. Since all firms in the industry have identical cost conditions, all will be making only normal profits. Under these circumstances, there will be no tendency for the firms to enter or leave the industry.

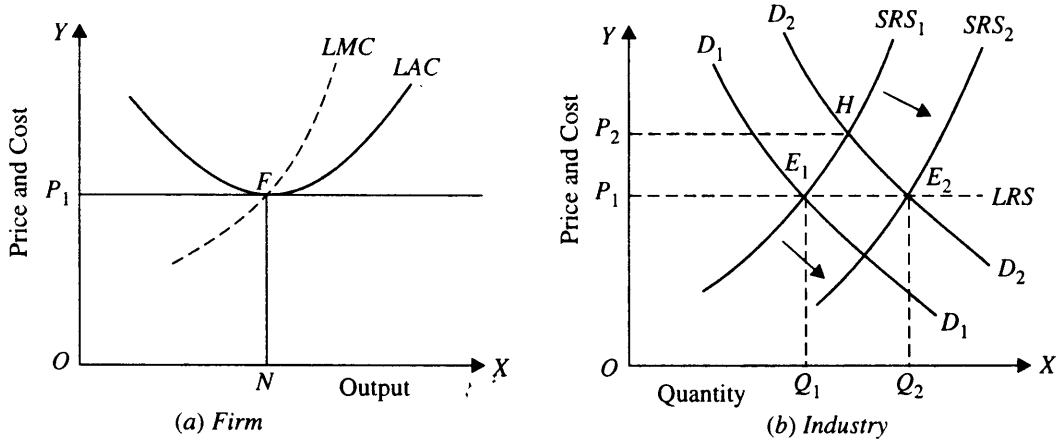


Fig. 20.10. *Long-Run Equilibrium of the Industry*

Thus, with price OP_1 and the quantity OQ_1 produced by the industry and output ON by each firm in the competitive industry represents a long-run equilibrium of industry (Note that in case of the industry, the scale taken on the X-axis is different from that of the firm, while the scale on the Y-axis for the industry and the firm is the same).

In order to further clarify the long-run equilibrium of a competitive industry and to differentiate it from the short-run equilibrium of the industry let us assume that demand curve shifts upward from D_1D_1 to D_2D_2. As will be seen from the right-hand panel of Fig. 20.10 the new demand curve D_2D_2 cuts the short-run supply curve SRS_1 at point H. Thus, as a result of increase in demand price rises to OP_2. With this new higher price, the firms will be making supernormal profits, as their cost curves remain unchanged. Thus, equilibrium at point H is a new short-run equilibrium of the industry with the individual firms making supernormal profits.

Now, lured by these supernormal profits, new firms will enter the industry in the long run. Entry of new firms will increase the supply of the commodity and will therefore cause the short-run supply curve of the industry to shift to the right. This increase in supply, given the new demand curve D_2D_2 will cause the price to fall. *Suppose the industry in question is a constant cost industry.* A constant-cost industry is one which when expands as a result of the entry of new firms, external economies and external diseconomies, if any, cancel out each other so that cost curves of the firms do not shift and therefore remain unchanged. In this case, the new firms will go on entering the industry and consequently the short-run supply curve will shift to the right until it reaches the position SRS_2 which intersects the new demand curve D_2D_2 at point E_2 and again determines the original price OP_1 but a grater quantity supplied by the industry equal to OQ_2. The long-run equilibrium of the firm will again be reached at point F where each firm produces ON. Thus, with price OP_2 and quantity supplied equals to OQ_2 the industry is again in long-run equilibrium with each firm achieving equilibrium at the minimum point of their LAC. *If we join points E_1 and E_2, we get the long-run supply curve of the industry which is a horizontal straight line as we are considering a constant cost industry.* We therefore arrive at the following three conditions for the equilibrium of the industry:

1. The long-run supply and demand for the product of the industry should be in equalibrium.

2. All firms in the industry should be in equilibrium.
3. There should be no tendency for the new firms to enter the industry or for the existing firms to leave it. In other words, number of firms should be in equilibrium.

SHORT-RUN SUPPLY CURVE OF THE PREFECTLY COMPETITIVE FIRM

As is known, the short run is a period in which more quantity of the good is produced by working the given capital equipment or plant more intensively by employing more amounts of the variable factors. We have seen above that the firm under perfect competition produces that amount of the good at which marginal cost equals price. Since the price for a perfectly competitive firm is given and constant for it, price line will be a horizontal straight line. The horizontal coordinate of a point on the rising marginal cost curve measures the quantity of the good that the firm will produce at that price. The short-run marginal cost curve of the firm therefore indicates the quantities which a firm will produce in the short run at different prices.

Thus at price *OP*, the firm will produce and offer for sale *OM* quantity of the good, because at *OM* quantity of the good, price *OP* equals marginal cost. Similarly, at price *OU* the quantity produced or supplied will be *ON*, since price *OU* equals marginal cost at output *ON*. Likewise, at price *OS*, the firm will produce and supply *OL* quantity of the product. It is thus clear that *short-run marginal cost curve of the firm is in fact the short-run supply curve of the firm.* The firm will not produce any output at a price below *OD*, since it will not be fully recovering its variable costs. Thus, *only the part of the marginal cost curve which lies above the average variable cost curve forms the short-run supply curve of the firm.* In Fig. 20.11 the thick portion of the short-run marginal cost curve *SMC* represents the short-run supply curve of the firm. Since under perfect competition marginal cost must be rising at the equilibrium output, the short-run supply curve of the firm must always slope upward to the right.

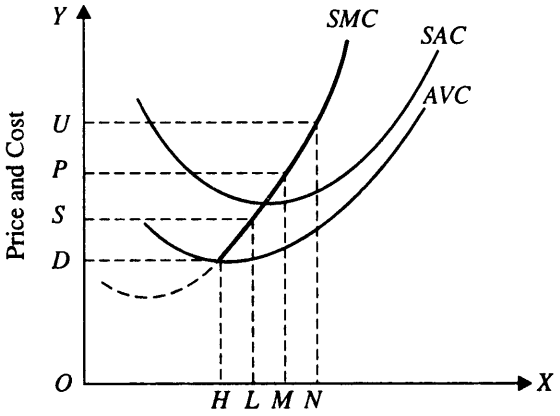


Fig. 20.11. *Derivation of Short-Run Supply Curve of the Firm*

It should be noted that in our analysis of deriving short-run supply curve of the firm, we have assumed that following the rise in price when the firm expands its output or supply, prices of resources or inputs it uses for production do not go up. It is a valid assumption because an individual firm under perfect competition is only one among many and its demand for inputs or resources is insignificant part of the total market demand for them and therefore the increase in demand for these resources by it as it expands will have no effect on their prices.

SHORT-RUN SUPPLY CURVE OF THE COMPETITIVE INDUSTRY

We now proceed to derive the short-run supply curve of the competitive industry. As the market demand curve is found by the horizontal summation of demand curves of all individual consumers of a product, similarly the short-run *supply curve of the industry is obtained by lateral summation (horizontal addition) of short-run supply curves of all individual firms in the industry.* How the short-run supply curves (short-run marginal cost curves) of the firms are added to obtain the short-run supply curve of the competitive industry is illustrated in Fig. 20.12. Suppose there are 200 firms in the competitive industry. We further assume that all firms are alike in respect of cost of production. In Fig. 20.12 (*a*), *SMC* represents short-run supply curve of an individual firm. At price OP_1, an individual firm will produce and supply OM_1 quantity of the product. Since there are 200 such firms in the industry, the whole industry will

produce and supply 200 × OM_1 quantity of the product. Therefore, in Fig. 20.12 (*b*), ON_1 which is equal to 200 × OM_1, quantity is plotted against the price OP_1. It should be carefully noted that in Fig. 20.12 (*a*) and (*b*) while the scale on the *Y*-axis is the same, the scale on the *X*-axis differs very much. The scale on *X*-axis in Fig. 20.12 (*b*) has been compressed very much to accommodate large quantities. At price OP_2, the individual firm will produce and supply OM_2

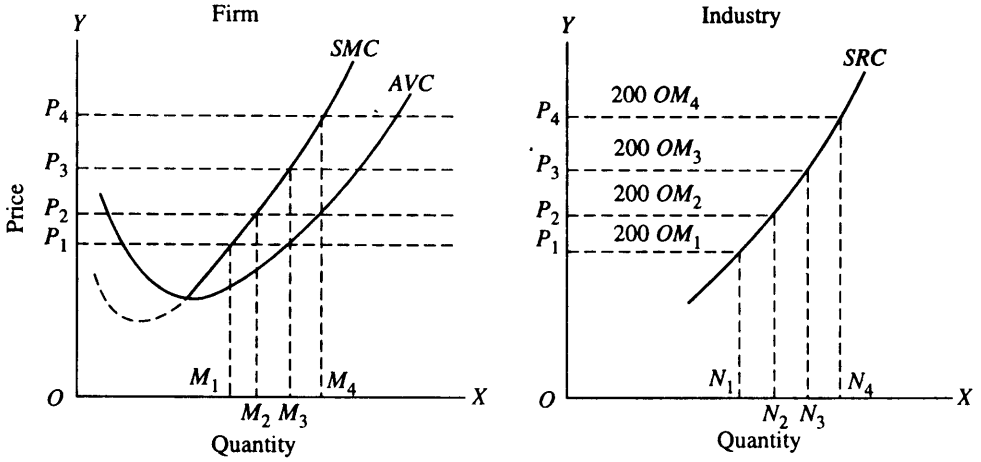


Fig. 20.12. *Derivation of the Short-Run Supply Curve of the Industry*

amount of the good, while the whole industry will supply ON_2 which is equal to 200 × OM_2 amount of the product. In the same way, industry will produce and supply 200 × OM_3 = ON_3 output at price OP_3, and 200 × OM_4 = ON_4 at price OP_4. Likewise, the industry's supply can be determined for all other prices. The *short-run supply curve of the industry will always slope upward.* This is because the short-run marginal cost curves of the firms (*i.e.*, their short-run supply curves) always slope upward above the minimum point of the average variable cost curves. The slope and the elasticity of short-run supply curve of the industry will obviously depend on the slope and elasticity of the marginal cost curves of individual firms in the industry.

That the short-run supply curve of the industry under perfect competition is a lateral or horizontal summation of the short-run supply curves (*i.e.*, *SMC*) of firms in it subject to an important qualification. This is that the simultaneous expansion of output by all firms in it (*i.e.*, the expansion of output by the industry) and therefore the increase in demand for the resources or inputs to be used for production does not have any effect on the prices of these resources, that is, for the industry these resources or inputs are perfectly elastic. But whereas the expansion or contraction of output of an individual firm and therefore changes in its demand for resources is not likely to affect their prices, the simultaneous expansion or contraction of all firms in the industry may mean a significant change in the demand for these resources which will therefore affect their prices. If expansion of an industry output and therefore the increase in demand for resources raises the prices of these resources, the cost curves of the individual firms will shift upward. On the other hand, if expansion of the industry brings about a fall in the prices of resources, the cost curves of individual firms will shift downward. This can happen when the industry is getting its resources from the other industries which are enjoying increasing returns. It may be that prices of some resources may rise and some others may fall with the expansion of the industry. In that case, the shift in the cost curves of the firms will depend upon whether the increase or decrease in resource prices is predominant.

When the cost curves of individual firms shift due to the change in resource prices, then the supply curve of industry cannot be obtained by summing up laterally the short-run supply curves of the firms, because then with every increase in the industry output, cost curves of

firms change. In this case, therefore, when external effects are present, that is, when resource prices change with expansion of the industry, short-run supply curve of the industry can be obtained by summing up the *equilibrium outputs* with different cost curves of all firms at each possible market price of the product.

LONG-RUN SUPPLY CURVE UNDER PERFECT COMPETITION

In the long run the firms can change their capital equipment and the other fixed factors and also the number of firms can vary in response to changes in the demand for a commodity. In the long run, when new firms can enter and old ones can leave the industry the firm is in equilibrium at the minimum point of the long-run average cost curve at which the long-run marginal cost curve intersects it. Thus a firm under perfect competition in the long-run equilibrium is forced to produce only at one point of the long-run marginal cost curve at which it cuts the average cost curve. Price in the long run is equal to both long-run marginal cost and the minimum long-run average cost. Therefore, a firm in the long-run equilibrium will produce and supply an output indicated by the minimum point of its long-run average cost curve, that is, its optimum size. Of course, this optimum size of the firm may change with the change in the number of firms in the industry. The long-run supply in the industry can be affected by the changes in the optimum size of the firms (that is, long-run supply of output by individual firms) but it is mainly determined by the variation in the number of firms at different prices in the industry.

It should be noted that long-run supply curve of a industry is defined as the supply by the existing as well potential firms in the industry in the long run. A little reflection will show that the long-run supply curve of the industry cannot be the lateral summation of the long-run marginal cost curves of a given number of firms. This is because of three reasons. First, as explained above, *whole* of the long-run marginal cost *curve* does not constitute the long-run supply curve of an individual firm, *only one point* of the long-run marginal cost curve at which it cuts the long-run average cost curve (that is, the minimum point of the long-run average cost curve) constitutes long-run supply of the individual firm. Secondly, the number of firms varies at different prices or demand conditions in the long run.

Thirdly, we cannot sum up any existing long-run marginal cost curves of the firms to obtain the long-run supply curve of the industry because with the expansion of the industry in the long run cost curves of the firms shift due to the *emergence of external economies and diseconomies.* In order to know the output supplied by the firms of an industry in the long run, we need to know the position or level of the cost curves of the firms as well as the number of firms in the industry at a given demand and price of the product.

As explained in a previous chapter, *external* economies and diseconomies are those which are realised by all firms in an industry as a result of the expansion of the industry as a whole. The creation of external economies by an expanding industry will shift the cost curves of the firms downward. On the other hand, the creation of external diseconomies will shift the cost curves of the firms upward. Whether a given industry will experience upward or downward shift in the cost curves depends upon the *net or combined effect* of the external economies and diseconomies. When with the expansion of an industry the external economies outweigh the external diseconomies so that there are *net external economies*, cost curves of the firms will shift downward. On the other hand, if with the expansion of an industry external diseconomies are stronger than the external economies so that there are *net external diseconomies*, cost curves of the firms will shift upward.

In a previous chapter, we mentioned the important examples of external economies which may accrue to the firms of an expanding industry. To repeat in brief, main examples of external economies which an expanding industry may reap are : (*i*) the availability of tools, machinery, raw materials etc., at lower prices, (*ii*) discovery and diffusion of a superior technical knowledge, and (*iii*) economic use of the waste-products.

With the growth of an industry some raw materials, tools, capital equipment etc. may become available at lower prices because some specialised subsidiary and correlated firms may be set up which produce them on a large scale and are therefore in a position to supply them at lower prices. Thus, while explaining the reasons for falling costs in a industry due to external economies. Professor Robert Heilbroner writes: "The source of these changes in cost does not lie within the firm, in the relative efficiency of various factors mixed. Rather they are changes thrust upon the firm—for better or worse—by the interaction of the growing industry of which it is a part and the economy as a whole. A new industry, for example by its very expansion may bring into being satellite firms that provide some of its necessary inputs; and as the main new industry grows, the satellites also expand and thereby realise economies of scale that will benefit the main industry itself. The automobile industry was surely an instance of such long-run falling costs (for a long period, at least) resulting from the economies of scale enjoyed by makers of tires, makers of batteries, and other equipment."[1] Further, as the industry expands, trade journals may appear which help in discovering and spreading technical knowledge. Again, with the growth of an industry some specialised firms may come into existence which work up its waste products. The industry can then sell them at better prices. There is every possibility of external economies to be reaped when a young industry grows in a new territory.

On the contrary, when a well-established and good-sized industry expands further, it may experience external diseconomies. As more firms enter the industry, competition among them may push up the prices of scarce raw materials, skilled labour and other scarce inputs. Moreover, the additional units of productive inputs being obtained by the industry may be less efficient than the previous ones. All these external diseconomies will raise the average and marginal curves of the firms. To quote Professor Heilbroner again, "Industries may also experience long-run rising costs if their expansion pushes them up against factor scarcity of a stubbornly inelastic kind. Extractive industries, for example, may be forced to use progressively less accessible mineral deposits; or agricultural industries may be forced to use progressively less fertile or less-conveniently located land. Such industries would experience a gradual rise in unit costs as their output is increased."[2]

We thus see that external economies and diseconomies play a vital role in shaping the long-run supply curve of an industry. Whether a particular industry on expansion will experience the phenomenon of rising costs or falling costs or constant costs will depend upon the net result of external economies and diseconomies. The long-run supply-curve of a perfectly competitive industry will therefore have different shapes depending upon whether the industry in question is a (*i*) constant cost industry; (*ii*) increasing cost industry; (*iii*) decreasing cost industry.

It follows from above that at a given price the quantity supplied by an industry in the long run will be determined by the optimum output of a firm in the long run (*i.e.*, output corresponding to minimum long-run average cost) multiplied by the number of firms in the industry at that price. With the change in the price of the product following a change in demand conditions, the *number of firms in the industry will change and also the cost curves of the firms will shift on account of the creation of external economies and diseconomies.* As a result, the quantity supplied by the industry will change at a new price. The long-run supply curve of the industry may either be sloping upward, or a horizontal straight line, or sloping downward depending upon whether expansion of the industry in question experiences increasing costs, constant costs, or decreasing costs. How the long-run supply curve under these types of cost conditions is obtained is explained below.

(*i*) Long-run Supply Curve of the Increasing Cost Industry

We have explained above the reasons for increasing costs or rising supply price as the

1. Robert L. Heilbroner, *The Economic Problem,* Prentice-Hall, 1970, p. 512.
2. *Op. cit.* p. 512.

industry expands. As stated above, if an industry is already well-established and of appreciable size so that its demand for certain productive inputs constitutes a sufficiently large part of the total demand for them, then further expansion of this industry will cause the prices of these inputs to rise. The wages of labour, the prices of raw materials, tools, capital equipment will generally rise as an old well-established industry further expands. These are the external diseconomies which firms of an expanding industry are to encounter. The expansion of an industry may give rise to some external economies but in case of the increasing-cost industry, external diseconomies outweigh the external economies.

The derivation of long-run supply curve of the increasing-cost industry is depicted in Fig. 20.13. To begin with, suppose price of the product is OP_1. At the price OP_1, the firm will be in long-run equilibrium at output OM where it is equating the given price with its long-run marginal and average costs. Suppose all firms are alike in respect of cost curves, then each of them will be producing OM output. Therefore, if we multiply the output OM with the number of firms in the industry at the price OP_1, we will get the quantity supplied of the product by the industry at price OP_1. Suppose there are 100 firms in the industry at price OP_1, then the quantity supplied by the industry at price OP_1, will be equal to $OM \times 100$ which we represent by OQ_1 in panel (*b*). Now suppose that the price of the product rises to OP_2. This will attract new firms in the industry and as a result the number of firms in the industry will increase, say to 200. Moreover, with the entry of new firms and the resultant expansion of the industry will

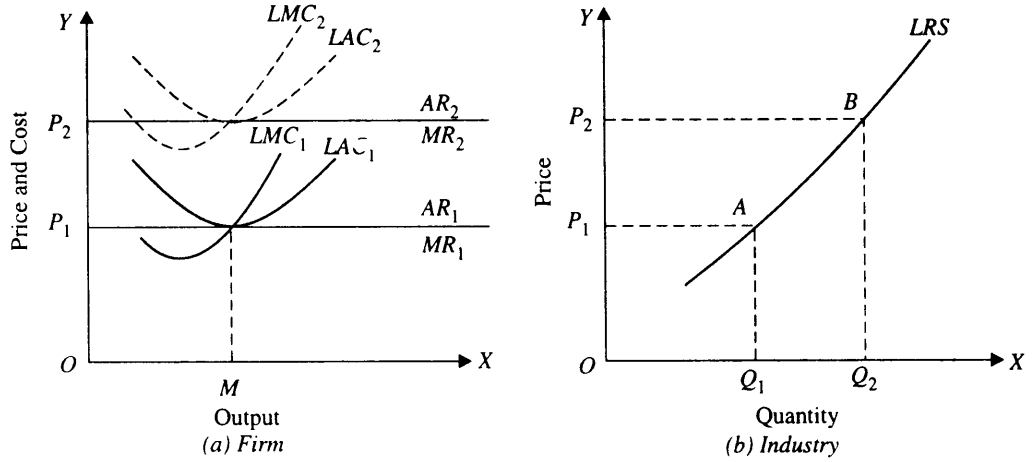


Fig. 20.13. *Derivation of the Long-Run Supply Curve of the Increasing Cost Industry*

give rise to net external diseconomies on account of which *LAC* and *LMC* curves of the firms will shift upward as shown in Fig. 20.13 (*a*). It will be seen in Fig. 20.13 (*a*) that at price OP_2, each firm is producing OM output at which price OP_2 is equal to their new long-run marginal and average costs. The quantity supplied by the industry at the higher price OP_2 will be equal to $OM \times 200$ which we represent by OQ_2 in panel (*b*). It will be seen that following the upward shift in the cost curves the optimum output of each firm remains the same but the quantity supplied by the whole industry, that is ($OM \times 200$) or OQ_2 at price OP_2 is greater than the OQ_1 because now there are many more firms than before.[1] Thus the quantity supplied by the industry at price OP_1 is OQ_1 and at price OP_2 is OQ_2 which is larger than OQ_1. This gives us an upward-sloping long-run supply curve *LRS* of the increasing-cost industry. Upward-sloping long-run supply curve of the industry implies that an additional supply of the product by the industry can be obtained only at a higher price.

1. Note that due to external economies and diseconomies even *optimum size or output* of firms can change which will affect the long-run supply of output by an industry. However, the *main factor* affecting long-run supply of output by the industry is the *change in the number* of firms due to entry or exit of firms.

(*ii*) Long-run Supply Curve of the Constant-Cost Industry

A constant-cost industry will be one whose expansion creates neither external economies nor external diseconomies so that costs of the firms constituting the industry remain the same as it expands. Obviously, as the industry expands by the entry of new firms in it, the demand for its productive inputs such as raw materials, specialised labour, capital equipment etc. will increase and as a result the price of these inputs and costs of the firms are likely to go up. Therefore, a constant-cost industry can be one if its demand for productive inputs is insignificant part of the total demand for them so that when the industry expands, their prices do not rise.

The pencil-making industry might be a case in point. This industry uses such an insignificant proportion of the total demand for wood and lead—the main inputs of pencil-making industry—that a relatively large increase in its demand for wood and lead will not affect their prices. Similarly, the increase in demand for labour as a result of the expansion of the pencil-making industry will not raise the wages of labour employed by it.

Even when the expansion of an industry gives rise to external diseconomies and external economies, it can be a constant-cost industry if these external diseconomies and economies are of equal strength and therefore cancel each other. With this the firms of the expanded industry will not experience any shift in their cost curves.

The derivation of the supply curve of a constant-cost industry is illustrated in Fig. 20.14 (*a*). It will be seen on the left-hand side of this figure that with price *OP* a firm is in long-run equilibrium by producing output *OM* at which it is equating price with long-run marginal and average costs of production. If we assume that there are now 100 firms in the industry and all are equal in respect of cost curves, at price *OP* the whole industry will supply *OM* × 100 quantity of the product which we represent by OQ_1 in Fig. 20.14 (*b*). (It should be noted that the scale on the horizontal axis in Fig. 20.14 (*a*) and (*b*) is not the same).

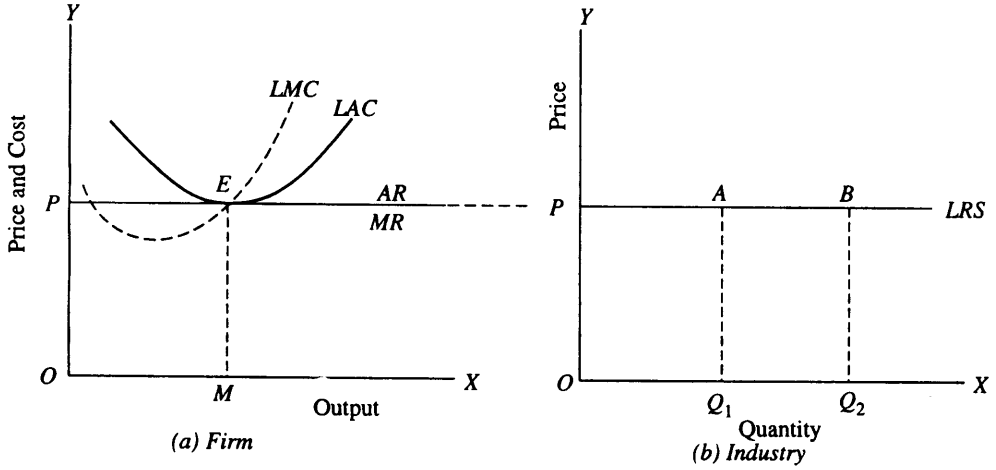


Fig. 20.14. *Derivation of Long-Run Supply Curve of the Constant-Cost Industry*

Now, if the demand for the product increases, more firms will enter the industry in the long run to meet the increased demand. Since we are considering a constant-cost industry, the expansion of the industry by the entry of new firms will not alter the cost curves and all existing as well as new firms will be in long-run equilibrium by producing *OM* output. Since the position of cost curves has not changed, the price will remain at *OP*. But with the increase in the number of firms (suppose to 200), the quantity supplied by the industry will increase to *OM* × 200 which we represent by OQ_2 in Fig. 20.14 (*b*). We thus see that in the long run more quantity of the product will be supplied by the industry at the same price *OP* which is equal to the minimum long-run average cost.

It follows from above that in the case of constant-cost industry quantity supplied by the industry in the long run will increase at the same price (= minimum *LAC*) by the increase in the number of firms in it. The old as well as the new firms will, in the long run, be producing at the minimum long-run average cost which, due to constant-cost conditions, remains unchanged. Since in the long run any quantity will be supplied at the price equal to the minimum long-run average cost, the long-run supply curve of the constant-cost industry is a horizontal straight line (*i.e.*, perfectly elastic) at the level of minimum long-run average cost.

It will be noticed in Fig. 20.14 that *in this case of constant cost industry while the long-run marginal cost curve LMC of firms is sloping upward in its relevant portion, the long-run supply curve of the industry LRS is a horizontal straight line at price OP.* It is, therefore, now abundantly clear that the long-run supply curve of the industry cannot be obtained by summing up the long-run marginal cost *curves* of all the firms in the industry.

(*iii*) Long-run Supply Curve of the Decreasing-Cost Industry

The existence of decreasing-cost industry in practice is a great controversial issue which we shall discuss in a later chapter. But it is theoretically conceivable that an industry might enjoy decreasing costs due to the *net external economies.* As has been stated above, it is generally believed that when a new or a young industry grows in a new territory, it is likely that the external economies which are created may outweigh the external diseconomies and therefore with the expansion of the industry costs of the firms (old as well as the new ones) are reduced, that is, the cost curves of the firms shift downward. We have already mentioned above the various types of external economies which can arise with the expansion of an industry.

In this case of decreasing-cost industry, the long-run supply curve of the industry is downward sloping, the derivation of which is illustrated in Fig. 20.15. Suppose, to begin with, the

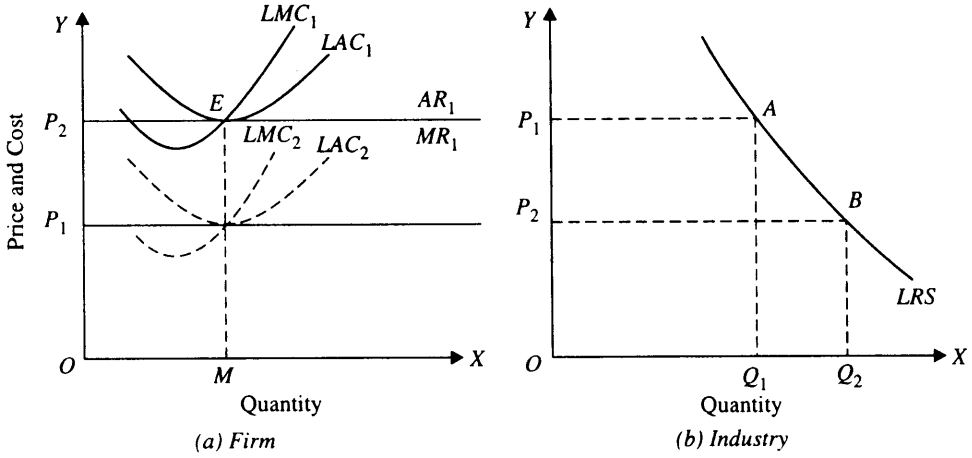


Fig. 20.15. *Derivation of Long-run Supply Curve of the Decreasing-Cost Industry*

price of the product is OP_1. With price OP_1 the firm will be producing OM in long-run equilibrium. At price OP_1, suppose there are 100 firms with identical cost conditions in the industry. Therefore, at price OP_1 the whole industry will supply $OM \times 100$ quantity of the output which we represent by OQ_1 in Fig. 20.15 (*b*). Suppose now the demand for the product of the industry increases and in order to meet this increase in demand more firms enter the industry. But with expansion of the industry cost curves shift downward due to the *net* external economies. New long-run equilibrium will be established with such a number of firms in the industry that are able to meet the increased demand by producing and supplying output at a lower price corresponding to the new lower minimum long-run average cost. Since the cost curves have shifted downward due to the net external economies, the new minimum long-run average cost and

hence price OP_2 will be lower than the old price OP_1. This is evident from Fig. 20.15 (b). With OP_2 price, a firm is producing OM in its long-run equilibrium and if now the number of firms has increased to 200, then the whole industry will supply $OM \times 200$ quantity of output which we represent by OQ_2 in Fig. 20.15 (b). Thus the quantity supplied OQ_2 (= $OM \times 200$) at a lower price OP_2 will be larger than the quantity supplied OQ_1 (=$OM \times 100$) at price OP_1. We, therefore, get a downward sloping long-run supply curve *LRS* of a decreasing-cost industry.

It will be seen in Figs. 20.13, 20.14 and 20.15 that the extra supply of output in the long run is forthcoming at the minimum long-run average cost which is changing in cases (*i*) and (*iii*) with the expansion of the industry and remains constant in case (*ii*). In Fig. 20.13 with the expansion of the industry minimum long-run average cost increases, in Fig. 20.14 it remains constant and in Fig. 20.15, it decreases.

QUESTIONS AND PROBLEMS FOR REVIEW

1. Explain the various features of a perfectly competitive market. How is price of a commodity determined under it ?
2. What is meant by firm's equilibrium ? Explain the conditions of short-run equilibrium of a firm under perfect competition. Is equality of marginal revenue with marginal cost sufficient condition for equilibrium of the firm ?
3. Can a firm under perfect competition operate in the short run when it is making losses ? If so, under what conditions ?
4. When does a firm working under perfect competition decide to (*a*) shut down in the short-run, (*b*) leave the industry in the long run.
5. Explain the conditions of long-run equilibrium of a firm operating under conditions of perfect competition. A firm operating under perfect competition tends to be of optimum size. Explain. What is significance of this for the consumer and the community as a whole?
6. "If there is free entry of new firms in the competitive industry, price must fall to the level of minimum long-run average cost." Explain.
7. *Suppose a firm is operating under perfectly competitive conditions in the market in the short run. It faces the following revenue and cost conditions :*

$$TR = 12Q$$
$$TC = 2 + 4Q + Q^2$$

Determine the equilibrium level of output and total profits made.

[**Hints** : Profits are maximised when the firm equates marginal cost (*MC*) with *MR* and marginal cost is rising. Thus, in order to obtain the equilibrium output we equate $MC = MR$.

$$TR = 12Q$$

$$MR = \frac{dTR}{dQ} = 12$$

$$MC = \frac{dTC}{dQ} = 4 + 2Q$$

In equilibrium,

$$MC = MR$$
$$4 + 2Q = 12$$
$$Q = 4$$

Total profits (p) = $TR - TC = 12Q - (2 + 4Q + Q^2)$

Substituting $Q = 4$, we have

$$p = (12 \times 4) - 2 - 4 \times 4 - 16$$
$$= 48 - 34 = 14$$

Note that in order to ensure the fulfillment of second order condition, we have to test whether *MC* is rising. For this, we take the derivative of *MC*, that is, the second derivative of *TC* function.

Thus, $$MC = \frac{dTC}{dQ} = 4 + 2Q$$

$$\frac{d^2TC}{dQ^2} = +2$$

The positive sign of the second derivative of *TC* function implies that *MC* is rising.

8. "In the long-run equilibrium, every firm in a competitive industry earns zero profits. Thus, if the price falls, all of these firms will be unable to stay in business." Examine this statement.

9. A perfectly competitive firm has the following total cost function :

Total output (Units)	*Total cost (Rs)*
0	20
1	30
2	42
3	55
4	69
5	84
6	100
7	117

How much the firm will produce if the price of the product in the market is Rs. 14 per unit? How will it change its output if price rises to Rs. 16 per unit ?

[**Hints** : Under perfect competition *MR* = Price which is given to be equal to Rs. 14 or Rs. 16. For equating this *MR* or Price with *MC*, make the third column in the above table calculating *MC* at various level of output and see at what output level *MC* = *MR*.]

10. (*a*) Explain the concept of supply curve. How is this relevant only under perfect competitive ?

(*b*) Derive a short-run supply curve of the firm operating under perfect competition. Explain that short-run supply curve of a firm *always* slopes upward.

11. What is the short-rule supply curve of a competitive firm ? What is its likely shape and why ?

12. What is meant by equilibrium of the industry ? How would you derive short-run supply curve of the competitive industry ? Does it always slope upward ?

13. What are external economies and external diseconomies ? Give some examples. What role do they play in determining the long-run supply curve of a competitive industry ?

14. Explain why a firm working under perfect competition is in equilibrium at the level of output at which marginal cost is equal to price and also at which marginal cost is rising.

15. Show for a perfectly competitive firm to be in long-run equilibrium price should not only be equal to marginal cost but must also be equal to long-run average cost of production.

16. Explain under perfect competition how the conditions of firm's long-run equilibrium differ from those of short-run equilibrium.

17. What are external economies and external diseconomies ? Give some examples. What role

do they play in determining the long-run supply curve of a competitive industry ?

18. Firms working under perfect competition earn *zero economic profits* in their long-run equilibrium. Why then firms do not quit the industry in the long run ?

19. *Tick the right answer.* The demand curve for a perfectly competitive firm :
(*a*) is a horizontal straight line (*b*) is downward sloping
(*c*) is perfectly inelastic (*d*) is positively sloping

20. *Tick the right answer.* Price in equilibrium of a perfectly competitive firm
(a) equals marginal cost (*MC*) of production.
(b) is greater than *MC* (c) is less than *MC*

21. Which ones of the following are correect ? Perfectly competitive firms :
(*a*) are price makers (*b*) are price takers
(*c*) are quantity adjusters, but not price makers
(*d*) do not earn even normal profits in the long run.
[**Hint.** Both (*b*) and (*c*) are correct answers.]

22. Which of the following is *not correct* in case of long-run equilibrium of a firm under perfect competition.
(*a*) It occurs where average revenue curve of a firm is tangent to its long-run average total cost curve (*LAC*).
(*b*) It occurs when a firm earns zero economic profits.
(*c*) It occurs when a firm makes only nromal profits in the long run.
(*d*) It occurs even of a firm may suffer losses.
[**Hint.** (*D*) is incorrect because firms leave the industry in the long run if they suffer losses.]

23. Short-run supply curve of a perfectly competitive firm :
(*a*) It is a horizontal straight line (*b*) It always slopes upward
(*c*) It can slope downward
Give reasons for the correct answer.

24. Which is correct in case of long-run supply curve of a perfectly competitive industry :
(*a*) is a lateral summation of the long-run marginal cost curves of the firms
(*b*) always slopes upward
(*c*) is always perfectly elastic (*d*) none of the above

25. Explain whey a perfectly competitive firm has a *horizontal demand curve* ? Does it imply that a firm can sell as much as it likes at the given price ? If so then why does not a perfectly competitive firm expand its output and sales without limit at the current given price ?

26. Which of the following features of perfect competition is primarily responsible for a firm's zero economic profits in the long run ?
(*a*) A large number of firms operating in it (*b*) Identical costs
(*c*) Freedom of entry and exit (*d*) Perfect informtion on the part of firms and buyers.
[**Hint.** (*c*) is the correct answer]

21

Pricing in a Perfectly Competitive Market

Introduction

We are now in a position to explain how equilibrium price and quantity under perfect competition are determined. In the preceding chapters we have explained in detail the forces of demand and supply which by their interaction determine the equilibrium price and quantity of the product. In the discussion of the theory of demand we assumed that an individual buyer is unable to influence the price of the product and therefore takes the prevailing price of the product as a given and constant for him. Further, we assumed that a consumer spends so much money on various goods as to obtain maximum satisfaction from his total outlay. On this assumption we derived the demand curve for a product. In the previous chapters we have also explained the nature of supply curve which depends upon the physical production conditions as well as changes in prices of inputs as output is expanded. We found that in most cases supply curve of a product slopes upward from left to right which indicates more is supplied at a higher price and *vice versa.*

Now, the intersection of demand and supply curves determines the price of a product under perfect competition. It is not the demand of a single buyer and the supply of a single seller that go to determine the price of a product. Instead, it is the demand of all buyers of a product taken together (*i.e.*, market or industry's demand curve) and the supply of all firms selling the product taken together (*i.e.*, the supply curve of the industry) that determine the price of the product. Demand curve for an industry shows the various quantities of the good which will be demanded at different prices. On the other hand, the industry's supply curve shows the various quantities of the good that the industry will be ready to supply the product at different prices. That particular price at which quantity demanded is equal to quantity supplied will finally settle down in the market. *This price of a product at which quantity demanded is equal to quantity supplied of a product is called equilibrium price.* When this equilibrium price has come to settle in the market there will be no more tendency for the price of the product either to rise or to fall, provided the demand and supply conditions remain the same. We shall explain below how the equilibrium price and equilibrium quantity are determined by the interaction of demand and supply.

It may be noted that in our analysis of determination of equilibrium price in this chapter we shall assume that perfect competition prevails in the market. Therefore, before explaining how equilibrium price and quantity are determined it is important to understand what is meant by market in economics and what are the conditions necessary for a perfectly competitive market.

Meaning of Market

Market is generally understood to mean a particular place or locality where goods are sold and purchased. However, in economics, by the term market we do not mean any particular place or locality in which goods are bought and sold. The idea of a particular locality or geographical place is not necessary to the concept of the market. What is required for the market to exist is the contact between the sellers and buyers so that transaction (*i.e.*, sales and purchase

of a commodity) at an agreed price can take place between them. The buyers and sellers may be spread over a whole town, region or a country but if they are in close communication with each other either through personal contact, exchange of letters, telegrams, telephones, etc. so that they can sell and buy a good at an agreed price, the market would be said to exist. Further, it is noteworthy that because in a market there is close and free communication between various buyers and sellers price of a homogeneous commodity settled between different sellers and buyers tends to be the same. Thus *by the term market economists understand not any particular market place in which things are bought and sold but the whole of any region in which buyers and sellers are in such free contact with one another that the price of the same good tends to equality easily and quickly.*

Thus, the essential features of a market are:

(*a*) a commodity which is sold and bought;

(*b*) the existence of buyers and sellers;

(*c*) a place, be it a certain region, a country or the entire world; and

(*d*) such contact between buyers and sellers so that only one price should prevail for a commodity at the same time.

Market structure differs for different industries or products. The type of market structure is based on three elements : (1) The number of firms producing a product, (2) the nature of product produced by the firms in an industry, that is, whether the products of various firms in an industry are homogeneous or differentiated, and (3) the ease or difficulty with which new firms can enter the industry.

It may be noted that the concept of price elasticity of demand for a firm's product, which depends on the number of competitive firms as well as the possibility of substitution between the products produced by them is also an important feature of different types of market.

Perfect Competition

Perfect competition is said to prevail when there is a large number of producers who produce a homogeneous product. The maximum output which an individual firm can produce is relatively very small to the total demand of the industry's product so that a firm cannot affect the price by varying its supply of output. With many firms and homogeneous product under perfect competition, no individual firm in it is in a position to influence the price of the product and therefore the demand curve facing it is a horizontal straight line at the level of the prevailing price of the product in the market, that is, demand for a single firm working under perfect competition is perfectly elastic.

Perfect competition, as it is generally understood, is said to prevail when the following conditions are found in the market:

1. There is a large number of firms producing and selling a product.
2. The product of all firms is homogeneous.
3. Both the sellers and buyers have perfect information about the prevailing price in the market.
4. Entry into and exit from the industry is free for the firms.

We shall discuss below in detail the above four conditions of perfect completion.

A large number of firms. The first condition of perfect competition is that there is a large number of firms in the industry. The position of a single firm in the industry containing numerous firms is just like a drop in the ocean. The existence of a large number of firms producing and selling the product ensures that an individual firm exercises no influence over the price of the product. The output of an individual firm constitutes a very small fraction of the total output of the whole industry so that any increase or decrease in output by an individual firm has a negligible effect on the total supply of the product of the industry. As a result, a single firm is not in a position to influence the price of the product by increasing or reducing

its output. The individual firm under perfect competition therefore takes the price of its product as a given datum and adjusts its output to earn maximum profits. In other words, a firm under perfect competition is price taker and output adjuster.

Homogeneous products. The second condition of perfect competition is that the products produced by all firms in the industry are fully homogeneous and identical. It means that the products of various firms are indistinguishable from each other; they are perfect substitutes for one another. In other words, cross elasticity between the products of the firms is infinite. In case of homogeneous products trade marks, patents, special brand labels etc. do not exist since these things make the products differentiated. It should be noted that if there are many firms, but they are producing differentiated products, each one of them will have influence over the price of his own variety of the product. The control over price is completely eliminated only when all firms are producting homogeneous products.

But whether or not products are homogeneous should be judged from the viewpoint of the buyers. Products would be homogeneous only when the buyers consider them to be so. Even if the buyers find some imagined differences between the products, the products would not be homogeneous, however physically alike they may be. Anything which makes buyers prefer one seller to another, be it personality, reputation, convenient location, or the tone of his shop differentiates the product to that degree.

Perfect information about the prevailing price. Another condition for perfect competition to prevail is that both the buyers and sellers are fully aware of the ruling price in the market. Because all buyers know fully the current price of the product in the market, sellers cannot charge more than the prevailing price. If any seller tries to charge a higher price than that ruling in the market, then the buyers will shift to some other sellers and buy the good at the ruling price since they know what the ruling price in the market is. Similarly, all sellers are also aware of the prevailing price in the market and no one will charge less price than this.

Free entry and exit. Lastly, perfect competition requires that there must be complete freedom for the entry of new firms or the exit of the existing firms from the industry in the long-run. There must be no barriers to the entry of firms. Since, in the short run, firms can neither change the size of their plants, nor new firms can enter or old ones can leave the industry, the condition of free entry and free exit applies only to the long-run equilibrium under perfect competition. If the existing firms are making supernormal profits in the short run, then this condition requires that in the long run new firms will enter the industry to compete away the profits. If, on the other hand, firms are making losses in the short run, then some of the existing firms will leave the industry in the long run with the result that the price of the product will go up and the firms left in the industry will be earning at least normal profits.

The Demand Curve of a Perfectly Competitive Firm

The first three conditions ensure that a single price must prevail under perfect competition and the demand curve or average revenue curve faced by an individual firm under perfect competition is perfectly elastic at the ruling price in the market. Perfectly elastic demand curve signifies that the firm does not exercise any control over the price of the product but can sell any amount of the product as it likes at the ruling price. If the firm raises its price slightly above the ruling price, it will lose all its customers to its rivals. Because it can sell as much as it likes at the prevailing price it has no incentive to lower

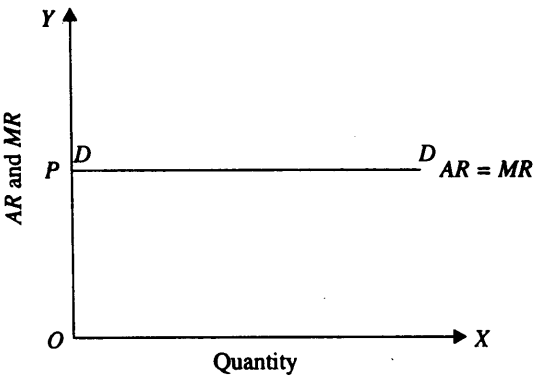


Fig. 21.1. *Demand Curve Facing a Perfectly Competition Firm*

it. Without being able to raise the price and having no incentive to lower it, the firm is content to accept the ruling price in the market. Once the price in the market is established, the firm accepts the price as a given datum and adjusts its output level which gives it maximum profits. Consider Fig. 21.1. Suppose *OP* is the price of a commodity which prevails in the market. An individual firm having no influence over the price will take the price *OP* as given and constant and therefore demand curve or average revenue curve facing it will be perfectly elastic at the prevailing price *OP*. If the price changes, the demand curve facing the firm will change but it will be perfectly elastic at the new price.

The fourth condition of perfect or pure competition, namely, free entry and free exit, ensures that the firm will make only normal profits. On the one hand, supernormal profits will disappear by the entry of new firms in the industry, and on the other, losses will disappear as a result of some firms leaving the industry.

DETERMINATION OF EQUILIBRIUM PRICE

There was a dispute among earlier economists as to whether it is supply of a good or the demand for it that determines its price. Broadly speaking, there were two schools of thought in this regard. One school of thought believed that it was cost of production, that is, the force working on the supply side, which determined the price of the product. The other school of thought held the view that it was the utility or more precisely the marginal utility that determined the demand and therefore the price of the product. But each school of thought took one-sided view of the pricing problem.

The credit of finding the true answer to the pricing problem goes to an eminent English economist. Alfred Marshall who held that both demand and supply were equally important in determining the price of a product. In other words, Marshall said that both the marginal utility of a product and the cost of producing it took part in determining price. He likened the price determination to the cutting of a piece of a paper by a pair of scissors. This famous analogy is worth quoting here. "We might as reasonably dispute whether it is the upper or the lower blade of a pair of scissors that cuts a piece of paper as whether value is governed by utility or cost of production. It is true that when one blade is held still and the cutting is effected by moving the other, we may say with careless brevity that the cutting is done by the second, but the statement is not strictly accurate and is to be excused only so long as it claims to be merely a popular and not a strictly scientific account of what happens."[1]

Neither the upper blade nor the lower one taken individually can cut the paper, both are required to do the work of cutting. The lower blade may be held stationary and only the upper one may be moved, yet both are indispensable for cutting the paper. Similarly, both demand and supply are essential forces for determining the equilibrium price and quantity.

We know that the demand curve of a commodity normally slopes downward. In other words, with the fall in price quantity demanded rises and *vice versa.* We have also studied that the supply curve of a commodity usually slopes upward. In other words, an industry will offer to sell more quantity of a good at a higher price than at a lower one. The level of price at which demand and supply curves intersect each other will finally come to stay in the market. In other words, the price which will come to prevail in the market is one at which quantity demanded is equal to quantity supplied. *The price at which quantity demanded equals quantity supplied is called equilibrium price* because at this price the two forces of demand and supply exactly balance each other. *The quantity of the good which is purchased and sold at this equilibrium price is called equilibrium amount.* Thus, the intersection of demand and supply curves determines price-quantity equilibrium.

Only at the equilibrium price wishes of both the buyers and sellers are satisfied. If price is greater or less than the equilibrium price, the buyers and sellers' wishes would be inconsistent;

1 A. Marshall, *Principles of Economics*, 8th edition, p. 344.

either the buyers would demand more than the amount offered by sellers, or the selllers would be ready to supply more than the amount demanded by the buyers. If price is greater than the equilibrium price, quantity supplied would exceed quantity demanded. It means some of the sellers will not be able to sell the amount of the good they wanted to supply. The unsatisfied sellers would try to dispose of the unsold amount of the good by bidding down price. The price will go on declining until the quantity demanded equals quantity supplied.

On the other hand, if price is lower than the equilibrium price, the quantity demanded would exceed quantity supplied. Some buyers would not be able to obtain the amount of the good they wanted to purchase at the prevailing price. They will therefore bid up price in their effort to get all that they desired to buy. The price will go on rising till the quantity demanded and quantity supplied are again equal. We thus see that the price which will settle down can be neither greater nor less than the equilibrium price. It is the equilibrium price which will finally come to stay in the market.

MARKET EQUILIBRIUM : BALANCE BETWEEN DEMAND AND SUPPLY

We now turn to examine how market equilibrium is reached by bringing together demand for and supply of a commodity. As stated above, market is arrangement through which buyers and sellers contact each other to do transactions. Consumers bring demand to the market for buying goods to satisfy their wants. Producers or sellers bring supply of their goods to the market to sell them and earn profits. The market demand and supply determine prices of goods and the quantities exchanged between the buyers and sellers. Market equilibrium is reached when market demand for and supply of a good are in balance and as a result equilibrium prices and quantities are determined.

The term equilibrium in economics means that forces working on a variable are in balance so that there is no tendency for it to change. The variables with which we are concerned in connection with market equilibrium are *prices* of goods and the *quantities* exchanged between buyers and sellers. Prices serve as signals for the buyers and sellers to communicate their wants to buy and sell different quantities of goods. How the market demand and supply determine price and quantity exchanged are illustrated in Table 21.1, which has also been graphically shown in Fig. 21.2, in which along the X-axis quantity demanded and supplied and along the Y-axis price is measured.

Table 21.1. Market Equilibrium

Price Rs.	*Quantity Demanded (Quintals)*	*Quantity Supplied (Quintals)*	*Surplus (+) Shortage (–)*	*Pressure on price*
425	100	500	+ 400	↓
375	200	400	+ 200	↓
325	300	300	Market clears	–
275	400	200	– 200	↑
225	500	100	– 400	↑

It will be seen from the above table and Fig. 21.2 that at price Rs. 325 per quintal the quantity demanded equals quantity supplied of wheat. Thus, at price Rs. 325 the two forces of demand and supply are in balance. Price of Rs. 325 at which quantity demanded equals quantity supplied is called the *equilibrium price* and the quantity of wheat equal to 300 quintals at this equilibrium price is called the *equilibrium quantity.* Thus, the market equilibrium determines price of wheat equal to Rs. 325 per quintal and the quantity exchanged equal to 300 quintals in the given period.

However, this equilibrium between demand and supply is not reached at once. There is a process of changes and adjustments which ultimately results in equilibrium price and quantity. For example, if the price of wheat, to begin with, happens to be Rs. 275, it will be

seen from Table 21.1 and Fig. 21.2 representing it that at this price the sellers are willing to make available in the market 200 quintals of wheat, whereas the buyers want to buy or demand 400 quintals of wheat. Thus, at price of Rs. 275 per quintal the quantity demanded by the buyers exceeds the quantity which the sellers are willing to supply. Thus, at price Rs. 275, there emerges excess demand, which is also often called *shortage of commodity,* equal to 200 quintals of wheat. Due to this shortage of the commodity at price Rs. 275, all the buyers would not be able to buy the quantity which they want. This shortage of commodity and consequently unsatisfied wants of the buyers, and competition between them to satisfy their wants will exert upward pressure on price. In order to get the desired quantity, some buyers would offer higher price for the commodity.

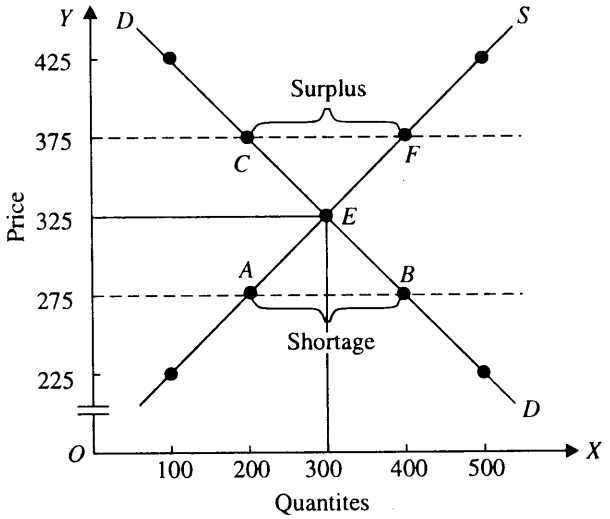


Fig. 21.2. *Market Equilibrium : Balance between Demand and Supply*

Thus, shortage of the commodity at this lower price and consequently competition among the buyers to get the commodity will lead to the rise in price of the commodity. As the price of the commodity rises, its quantity supplied by the sellers will increase and its quantity demanded by the buyers will decrease and consequently the shortage of the commodity will tend to get eliminated. In this way price of wheat will go on rising until the shortage is completely eliminated and the price of Rs. 325 is established at which quantity demanded by the buyers equals quantity supplied of the commodity by the sellers. At this price the buyers' and sellers' wants are satisfied. The buyers are able to buy what they want at the equilibrium price Rs. 325 and the sellers are able to sell what they are willing to sell at this price. Thus, neither buyers, nor sellers would have tendency to change the price. That is why Rs. 325 is the equilibrium price which will settle down in the market.

On the contrary, if price happens to be above the equilibrium price of Rs. 325, say Rs. 375, the quantity of wheat which the buyers want to purchase at this price equals 200 quintals, whereas the quantity which the sellers are willing to sell equals 400 quintals. Thus, at price Rs. 375 per quintal, the *surplus* of 200 quintals of wheat will emerge. That is, at price Rs. 375, the sellers would not be able to self all the quantity of wheat which they are willing to sell at this price. This surplus will therefore make unintended addition to the inventories or stocks of wheat. The emergence of this surplus leading to the unintended addition to the inventories will set in motion the operation of the forces which will exert downward pressure on the price of wheat. Thus, the surplus of the commodity and undesired accumulation of inventories will lead to competition among the sellers to dispose of the excess inventories which will cause the price to fall. As the price of wheat falls, the quantity demanded will increase and quantity supplied will decrease which will tend to reduce the surplus. The surplus gets completely eliminated as the price falls to Rs. 325 at which quantity demanded equals quantity supplied.

It follows from above that it is through the process of adjustment in price and quantities that ultimately equilibrium price and quantity transacted are determined at which forces of demand and supply are in balance. At the equilibrium price there is neither a shortage nor a surplus of the commodity and as a result market clears. In this equilibrium situation forces which tend to change the price and quantity stop operating.