ADVANCED MICRO ECONOMICS – I

UNIT – IV Theory of Cost: Traditional Theory of Cost – Modern Theory of Cost – Analysis of Economies of Scale – Theories of firms: Price and Output determination under Perfect Competition – Supply Curve of Firm and Industry under perfect Competition.

UNIT – V Short Run and Long Run Equilibrium of the Monopoly firm – Bilateral Monopoly - Price and Output determination under Monopolistic Competition – Product Differentiation – Selling Cost.

UNIT – IV

TRADITIONAL THEORY OF COST

Traditional theory distinguishes between the short run and the long run. The short run is the period during which some factors is fixed; usually capital equipment and entrepreneurship are considered as fixed in the short run.

The long run is the period over which all factors become variable.

SHORT-RUN TRADITIONAL THEORY OF COST

According to the traditional theory of the costs, the costs are divided into three types:

- Total Cost
- Average Cost
- Marginal Cost

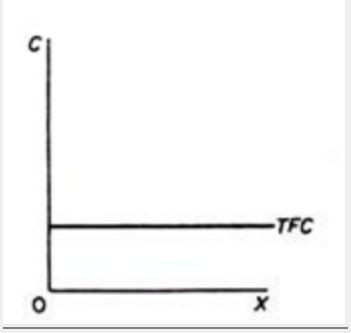
TOTAL COST

Total cost is the total expenditure incurred by a firm during the production process. Total cost will change with the change in the ratio of output to input. Such changes may be the result of the changes in the efficiency of conversion process or changes in the prices of inputs. Total cost is a positively sloped curve.

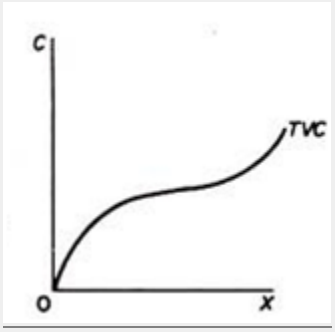
Total cost to a producer for the various levels of output is the sum of total fixed cost and total variable cost, i.e.,

TC = TFC + TVC.

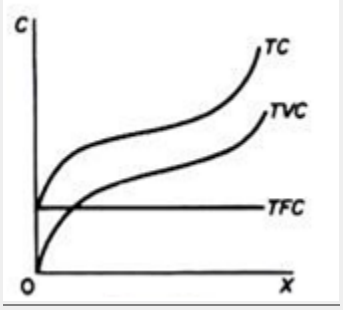
TOTAL FIXED COST: Total fixed costs refer to those costs which are unable to vary. For example: land, buildings, machinery etc. Even the output is zero fixed costs will be there. Because, this cannot be variable with respect to the level of production. So, it is also called invariable cost. Since fixed costs are fixed or rigid it can be represented through a curve having horizontal shape to output axis. This can be shown with the help of following diagram:



TOTAL VARIABLE COST: Variable cost is incurred on the employment of variable factors like raw materials, direct labour, power, fuel, transportation, sales commission, depreciation charges associated with wear and tear of assets, etc. It varies directly with output.The curve of variable cost can be shown as follows:



From the curves of fixed cost and variable costs, the total cost can be derived as follows:



AVERAGE COST

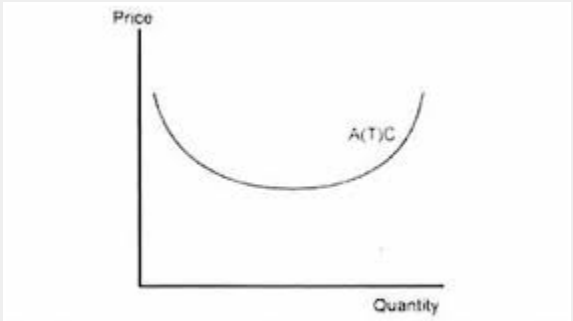
Average total cost is the sum of the average fixed cost and average variable cost. Alternatively, ATC is computed by dividing total cost by the number of units of output.

Therefore,

ATC or AC = AFC + AVC

=TC/Q

Average cost is also known as unit cost, as it is cost per unit of output produced. It can be shown as follows:



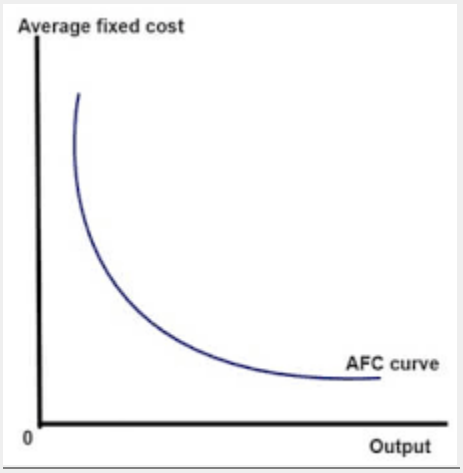
The short-run average total cost curve (SATC or SAC)

Average cost is inclusive of Average Fixed Cost and Average Variable Cost.

AVERAGE FIXED COST: AFC is the average of total fixed costs. AFC can be obtaining by dividing the total fixed cost by total quantity of output each time produced. Mathematically,

AFC = TFC /quantity

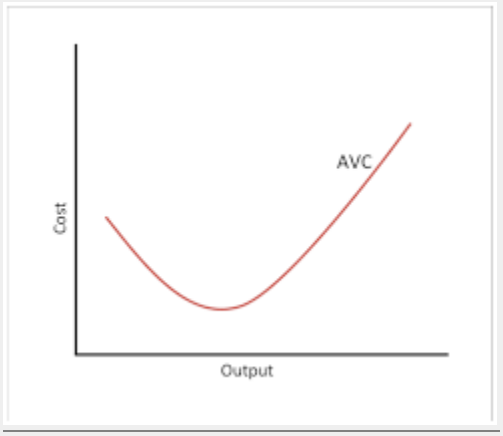
TFC will be always fixed. So AFC will reduce and never reaches zero. Its curve is as follows:



AVERAGE VARIABLE COST: AVC is the average of total variable cost. It can be find out by using the following formula.

AVC = TFC / quantity

AVC curve will be a 'U' shaped which is showing that when the output is raises the cost will decline, but after a certain level the cost starts to increases. That is why due to the variable proportion.



WHY AC IS U SHAPED?

In the short-run average cost curves are of U-shape. It means, initially it falls and after reaching the minimum point it starts rising upwards. It can be on account of the following reasons:

1. BASIS OF AVERAGE FIXED COST AND AVERAGE VARIABLE COST

Average cost is the aggregate of average fixed cost and average variable cost (AC = AFC + AVC). To begin with, as production increases, initially the average fixed cost and average variable cost falls. But after a minimum point, average variable cost stops falling but not the average cost. It is due to this reason that average variable cost reaches the minimum before AC.

The point, where AC is minimum is called the optimum point. After this point, AC begins to rise upward. The net result is the increase in AC. Therefore, it is only due to the nature of AFC and AVC that AC first falls, reaches minimum and afterwards starts rising upward and hence assume the U-shape.

2. BASIS OF THE LAW OF VARIABLE PROPORTION

The law of variable proportion also results in U-shape of short run average cost curve. If in the short period variable factors are combined with a fixed factor, output increases in accordance with the law of variable proportions. In other words, the law of 'Increasing Returns' applies.

Similarly, if employ more and more variable factors are employed with fixed factors the law of Diminishing Returns is said to apply. Thus, it is due to the law of variable proportions that the average cost curve assumes the shape of U.

3. INDIVISIBILITIES OF THE FACTORS

Another reason due to which the average cost curve forms U-shape is the indivisibilities of factors. When in the short-run a firm increases its production due to indivisibilities of fixed factors, it gets various internal economies. It is these economies which cause the average cost curve to fall in the initial stage. Generally, there are three types of internal economies which help to bring down the cost viz., technical economies, marketing economies and managerial economies.

MARGINAL COST

It is the addition to total cost required to produce one additional unit of a commodity. It is measured by the change in total cost resulting from a unit increase in output. For example, if the total cost of producing 5 units of a commodity is Rs. 100 and that of 6 units is Rs. 110, then the marginal cost of producing 6^{th} unit of. Commodity is Rs. 110 – Rs. 100 = Rs. 10. The formula for marginal cost is

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

It means that marginal, cost of 'n' units of output (MC_n) can be obtained by subtracting the total cost of production of 'n-l' units (TC_{n-1}) from the total cost of production of 'n' units (TC_n). Alternatively, marginal cost can be expressed as

$MC = \Delta TC / \Delta Q$.

Here, ΔTC stands for change in total cost and ΔQ stands for change in total output.

This can be shown as follows:

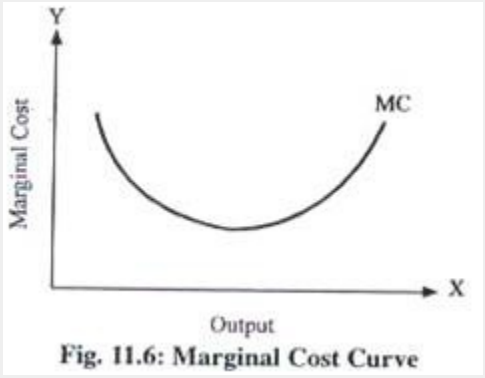


Fig. 11.6: Marginal Cost Curve

LONG RUN COSTS OF TRADITIONAL THEORY

In the long run all factors are assumed to become variable. Long-run cost curve is a planning curve, in the sense that it is a guide to the entrepreneur in his decision to plan the future expansion of his output. The long-run average-cost curve is derived from short-run cost curves.

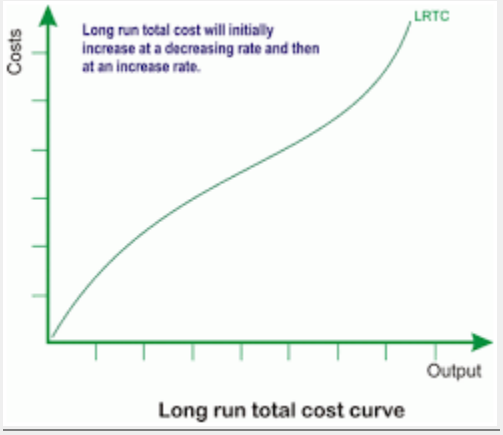
The long run costs are categorised as follows:

- Long run total cost
- Long run average cost
- Long run marginal cost

LONG RUN TOTAL COST

Long run Total Cost (LTC) refers to the minimum cost at which given level of output can be produced. According to Leibhafasky, "the long run total cost of production is the least possible cost of producing any given level of output when all inputs are variable." LTC represents the least cost of different quantities of output. LTC is always less than or equal to short run total cost, but it is never more than short run cost.

This can be shown as follows:

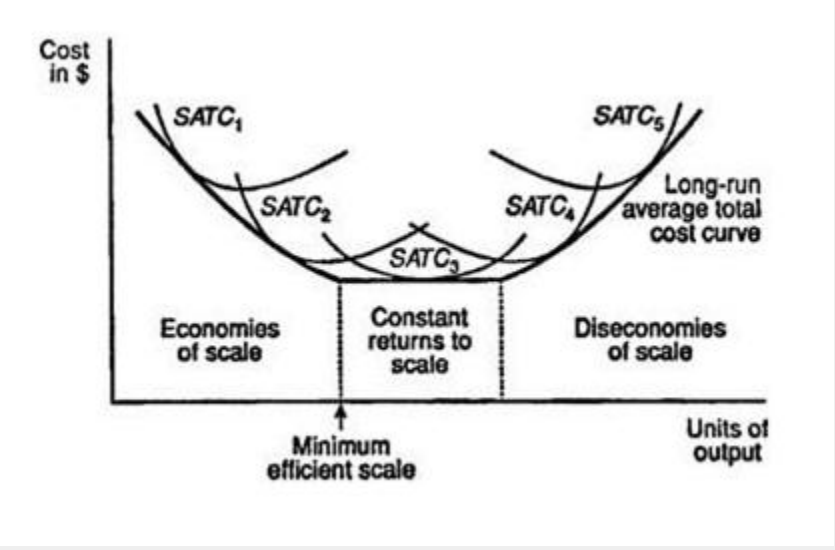


Long run total cost curve

LONG RUN AVERAGE COST

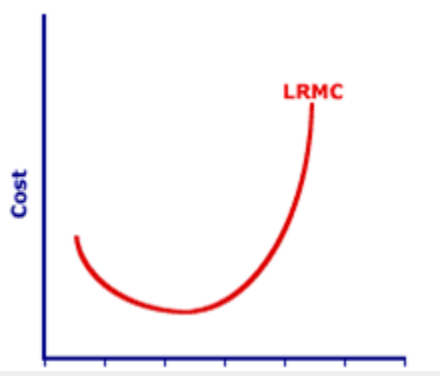
Long run Average Cost (LAC) is equal to long run total costs divided by the level of output. The derivation of long run average costs is done from the short run average cost curves. In the short run, plant is fixed and each short run curve corresponds to a particular plant. The long run average costs curve is also called

planning curve or envelope curve as it helps in making organizational plans for expanding production and achieving minimum cost.



LONG RUN MARGINAL COST

Long run Marginal Cost (LMC) is defined as added cost of producing an additional unit of a commodity when all inputs are variable. This cost is derived from short run marginal cost. On the graph, the LMC is derived from the points of tangency between LAC and SAC.



MODERN THEORY OF COST

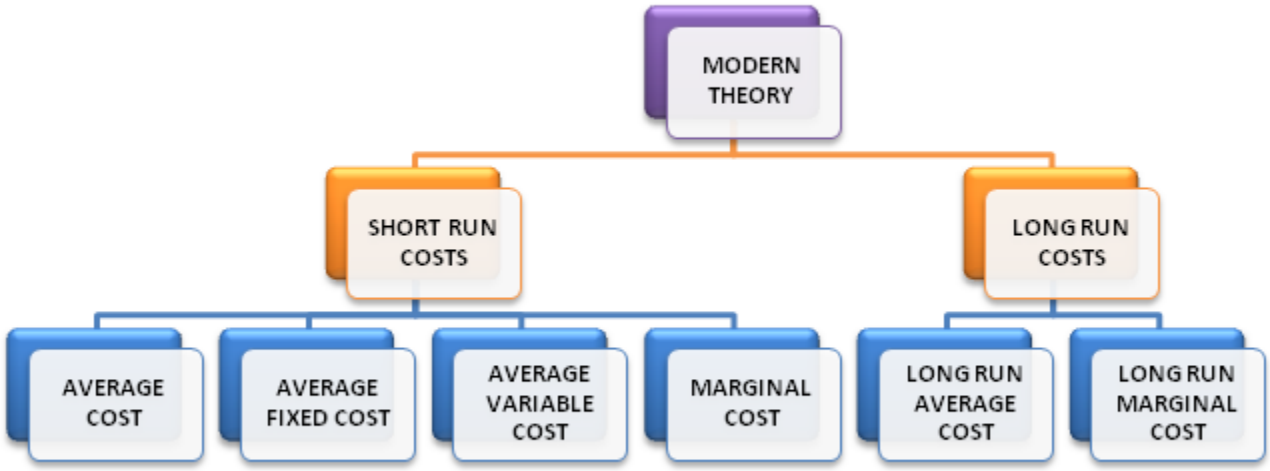
Modern economists including **Stigler, Andrews and Friedman** have questioned the validity of U-shaped cost curves both theoretical as well as on empirical grounds. Also the long run costs in modern theory are not U- shaped but L- shaped.

The Modern theory suggests the existence of 'built- in- reserve capacity 'which imparts flexibility and enables the plant to produce larger output without adding to the costs. Built –in- reserve capacity are planned by firms.

The short-run cost curve has a saucer- type shape whereas the long-run Average cost curve is either L-Shaped or inverse J-shaped.

The Modern theory of cost stresses on the role of economies of scale, which significantly enables the firm to continue production at the lowest point of average cost for a considerable period of time. The firm checks dis-economies of scale by planning in advance and enjoys the gains of production in comparison to the traditional theory where the average cost rises after the firm reaches the optimal level of output.

TYPES OF COSTS AS PER MODERN THEORY



SHORT RUN COSTS

AVERAGE FIXED COST

The fixed costs include the costs for:

- The salaries and other expenses of administrative staff.
- The wear and tear of machinery.

- The expenses for maintenance of building.
- The expenses for the maintenance of land on which the plant is installed or operates.

As in the traditional theory of cost, the average fixed costs in modern microeconomics, also plots as a rectangular hyperbola. This is shown as follows:

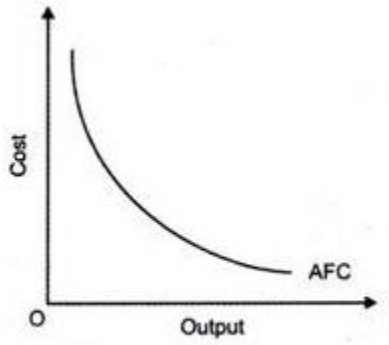
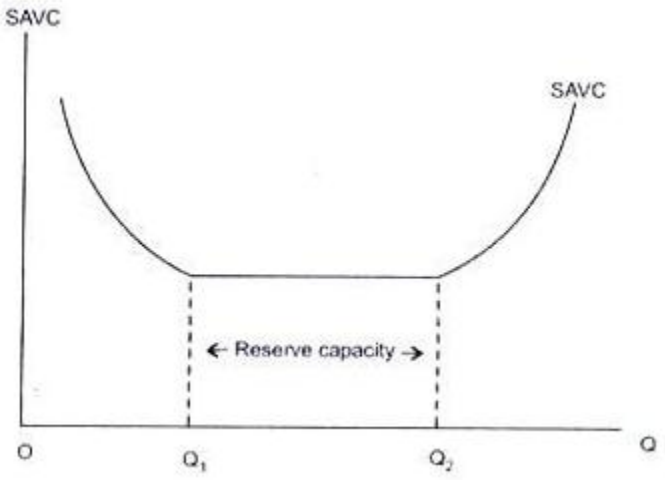


Figure-6: AFC Curve

AVERAGE VARIABLE COST

In modern theory, Average variable cost is not U shaped rather it is saucer shaped and has a flat stretch over a range of output. This flat stretch represents the 'built in reserve capacity' of the firm to meet seasonal and cyclical changes in the demand. The average variable cost curve is as follows:



AVERAGE COST

The short-run Average costs consist of the Average fixed costs and Average variable costs. The short-run average variable cost curve at each level of

output. The smooth and continuous fall in the average cost curve is due to the fact that the AFC curve is a rectangular hyperbola and the AVC curve first falls and then becomes horizontal within the range of reserve capacity. Beyond that it starts rising steeply. The curve of average cost is as follows:

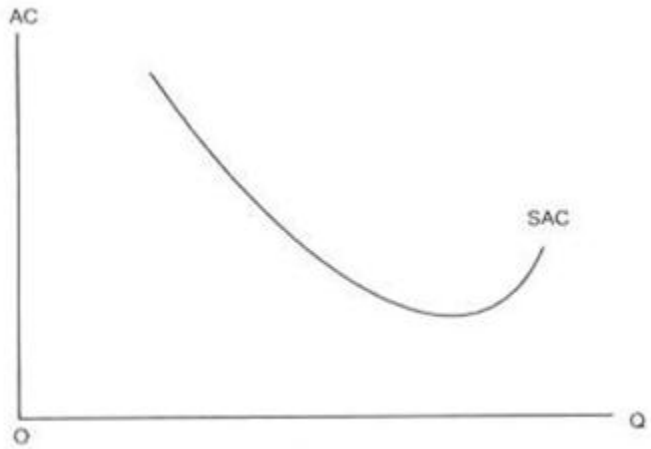


Fig. 5.13: *The short run AC in the modern theory of costs.*

LONG RUN COSTS

LONG RUN AVERAGE COST

Modern economists divide long run costs into production costs and managerial costs/ In the long run, all costs are variable and they given rise to a long run average cost curve which is roughly L- shaped. This curve rapidly slopes downwards in the beginning but later remains flat or slopes gently downwards at its right-hand cost. The long run average cost curve is as follows:

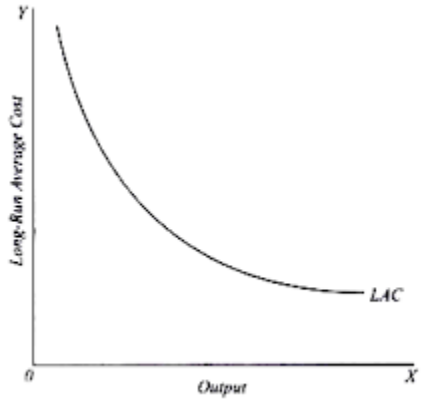


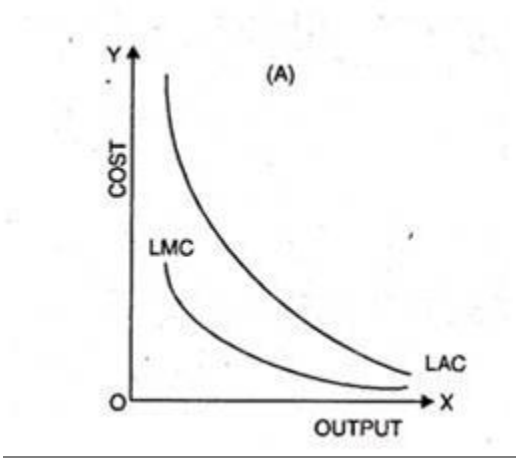
Fig. 19.17. L-*Shaped Long-Rum Average Cost Curve*

The Long run average costs curve has two main features:

- It does not rise at every large scale of output.
- It does not envelope the Short run Average Cost but intersects them.

LONG RUN MARGINAL COST

According to modern theory, shape of long-run marginal cost curve corresponds to the shape of long-run average cost curve. The given figure shows that when LAC is L- shaped and LAC curve is falling then LMC curve will also be falling and its falling portion will be below the falling portion of LAC curve.



ANALYSIS OF ECONOMIES OF SCALE

What are Economies of Scale?

Economies of Scale refer to the cost advantage experienced by a firm when it increases its level of output. The advantage arises due to the inverse relationship between per-unit fixed cost and the quantity produced. The greater the quantity of output produced, the lower the per-unit fixed cost. Economies of scale also result in a fall in average variable costs (average non-fixed costs) with an increase in output. This is brought about by operational efficiencies and synergies as a result of an increase in the scale of production.

Economies of scale can be implemented by a firm at any stage of the production process. In this case, production refers to the economic concept of production and involves all activities related to the commodity, not involving the final buyer. Thus, a business can decide to implement economies of scale in its marketing division by hiring a large number of marketing professionals. A business can also

adopt the same in its input sourcing division by moving from human labor to machine labor.

Effects of Economies of Scale on Production Costs

1. It reduces the per-unit fixed cost. As a result of increased production, the fixed cost gets spread over more output than before.
2. It reduces per-unit variable costs. This occurs as the expanded scale of production increases the efficiency of the production process.

The graph above plots the long-run average costs faced by a firm against its level of output. When the firm expands its output from Q to Q_2, its average cost falls from C to C_1. Thus, the firm can be said to experience economies of scale up to output level Q_2. (In economics, a key result that emerges from the analysis of the production process is that a profit-maximizing firm always produces that level of output which results in the least average cost per unit of output).

Types of Economies of Scale

1. Internal Economies of Scale

This refers to economies that are unique to a firm. For instance, a firm may hold a patent over a mass production machine, which allows it to lower its average cost of production more than other firms in the industry.

2. External Economies of Scale

These refer to economies of scale enjoyed by an entire industry. For instance, suppose the government wants to increase steel production. In order to do so, the government announces that all steel producers who employ more than 10,000 workers will be given a 20% tax break. Thus, firms employing less than 10,000 workers can potentially lower their average cost of production by employing more workers. This is an example of an external economy of scale – one that affects an entire industry or sector of the economy.

Sources of Economies of Scale

1. Purchasing

Firms might be able to lower average costs by buying the inputs required for the production process in bulk or from special wholesalers.

2. Managerial

Firms might be able to lower average costs by improving the management structure within the firm. The firm might hire better skilled or more experienced managers.

3. Technological

A technological advancement might drastically change the production process. For instance, fracking completely changed the oil industry a few years ago. However, only large oil firms that could afford to invest in expensive fracking equipment could take advantage of the new technology.

Diseconomies of Scale

Consider the graph shown above. Any increase in output beyond Q_2 leads to a rise in average costs. This is an example of diseconomies of scale – a rise in average costs due to an increase in the scale of production.

As firms get larger, they grow in complexity. Such firms need to balance the economies of scale against the diseconomies of scale. For instance, a firm might be able to implement certain economies of scale in its marketing division if it increased output. However, increasing output might result in diseconomies of scale in the firm's management division.

Frederick Herzberg, a distinguished professor of management, suggested a reason why companies should not blindly target economies of scale:

"Numbers numb our feelings for what is being counted and lead to adoration of the economies of scale. Passion is in feeling the quality of experience, not in trying to measure it."

PRICE AND OUTPUT DETERMINATIO UNDER PERFECT COMPETITION

Perfect competition refers to a market situation where there are a large number of buyers and sellers dealing in homogenous products.

Moreover, under perfect competition, there are no legal, social, or technological barriers on the entry or exit of organizations.

In perfect competition, sellers and buyers are fully aware about the current market price of a product. Therefore, none of them sell or buy at a higher rate. As a result, the same price prevails in the market under perfect competition.

Under perfect competition, the buyers and sellers cannot influence the market price by increasing or decreasing their purchases or output, respectively. The market price of products in perfect competition is determined by the industry. This implies that in perfect competition, the market price of products is determined by taking into account two market forces, namely market demand and market supply.

In the words of Marshall, "Both the elements of demand and supply are required for the determination of price of a commodity in the same manner as both the blades of scissors are required to cut a cloth." As discussed in the previous chapters, market demand is defined as a sum of the quantity demanded by each individual organizations in the industry.

On the other hand, market supply refers to the sum of the quantity supplied by individual organizations in the industry. In perfect competition, the price of a product is determined at a point at which the demand and supply curve intersect each other. This point is known as equilibrium point as well as the price is known as equilibrium price. In addition, at this point, the quantity demanded and supplied is called equilibrium quantity. Let us discuss price determination under perfect competition in the next sections.

Demand under Perfect Competition:

Demand refers to the quantity of a product that consumers are willing to purchase at a particular price, while other factors remain constant. A consumer demands more quantity at lower price and less quantity at higher price. Therefore, the demand varies at different prices.

Figure-1 represents the demand curve under perfect competition:

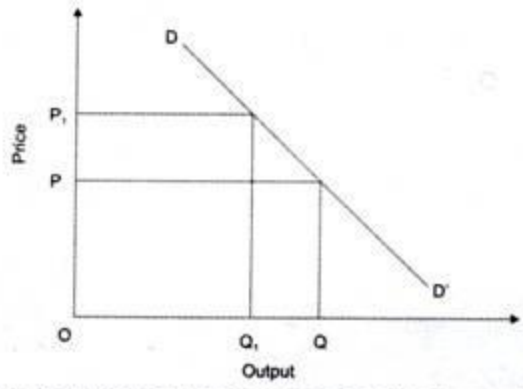


Figure-1: Demand Curve under Perfect Competition

As shown in Figure-1, when price is OP, the quantity demanded is OQ. On the other hand, when price increases to OP1, the quantity demanded reduces to OQ1. Therefore, under perfect competition, the demand curve (DD') slopes downward.

Supply under Perfect Competition:

Supply refers to quantity of a product that producers are willing to supply at a particular price. Generally, the supply of a product increases at high price and decreases at low price.

Figure-2 shows the supply curve under perfect competition:

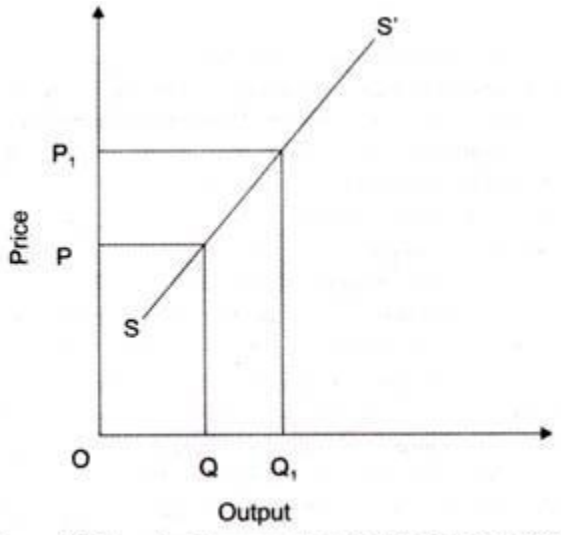


Figure-2: Supply Curve under Perfect Competition

In Figure-2, the quantity supplied is OQ at price OP. When price increases to OP1, the quantity supplied increases to OQ1. This is because the producers are able to

earn large profits by supplying products at higher price. Therefore, under perfect competition, the supply curves (SS') slopes upward.

Equilibrium under Perfect Competition:

As discussed earlier, in perfect competition, the price of a product is determined at a point at which the demand and supply curve intersect each other. This point is known as equilibrium point. At this point, the quantity demanded and supplied is called equilibrium quantity.

Figure-3 shows the equilibrium under perfect competition:

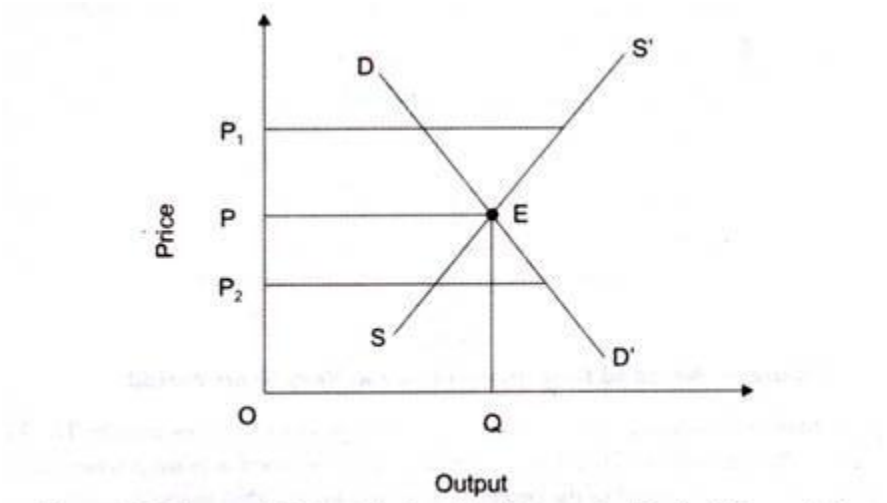


Figure-3: Price and Output Determination under Perfect Competition

In Figure-3, it can be seen that at price OP1, supply is more than the demand. Therefore, prices will fall down to OP. Similarly, at price OP2, demand is more than the supply. Similarly, in such a case, the prices will rise to OP. Thus, E is the equilibrium at which equilibrium price is OP and equilibrium quantity is OQ.

SUPPLY CURVE OF THE FIRM AND INDUSTRY UNDER PERFECT COMPETITION

Supply Curve of a Firm and Industry: Short-Run and Long-Run Supply Curve!

Supply curve indicates the relationship between price and quantity supplied. In other words, supply curve shows the quantities that a seller is willing to sell at different prices.

According to Dorfman, "Supply curve is that curve which indicates various quantities supplied by the firm at different prices". The concept of supply curve applies only under the conditions of perfect competition.

Supply curve can be divided into two parts as:

A. Short Run Supply Curve

B. Long Run Supply Curve

A. Short Run Supply Curve

(i) Short Run Supply Curve of a Firm:

Short run is a period in which supply can be changed by changing only the variable factors, fixed factors remaining the same. That way, if the firm shuts down, it has to bear fixed costs. That is why in the short run, the firm will supply commodity till price is either greater or equal to average variable cost. Thus a firm will continue supplying the commodity till marginal cost is equal to price or average revenue. Under perfect competition average revenue is equal to marginal revenue, so the firm will produce up to that point where marginal revenue and marginal cost are equal.

Short run supply curve of a perfectly competitive firm is that portion of marginal cost curve which is above average variable cost curve. According to C.E. Ferguson, "The short run supply curve of a firm in perfect competition is precisely its Marginal Cost Curve for all rates of output equal to or greater than the rate of output associated with minimum average variable cost."

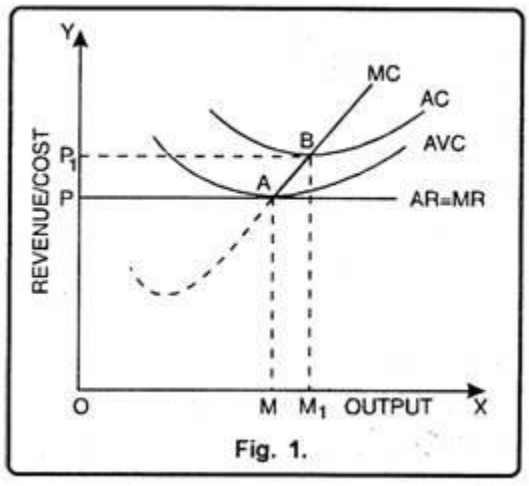


Fig. 1.

Prof. Bilas has defined it in simple words, "The Firm's short period supply curve is that portion of its marginal cost curve that lies-above the minimum point of the average variable cost curve." However, short run supply curve of a firm can be shown with the help of fig. 1.

From fig. 1 it is clear that there is no supply if price is below OP. At price less than OP, the firm will not be covering its average variable cost. At OP price, OM is the supply. In this case, firms' marginal revenue and marginal cost cut each other at A, OM is equilibrium output. If price goes up to OP1, the firm will produce OM1 output. This firm's short run supply curve starts from A upwards i.e., thick line AB.

(ii) Short Run Supply Curve of an Industry:

An industry is a blend of firms producing homogeneous goods. That way, supply curve of an industry is a lateral summation of all firms. This can be made clear with the help of a Fig. 2.

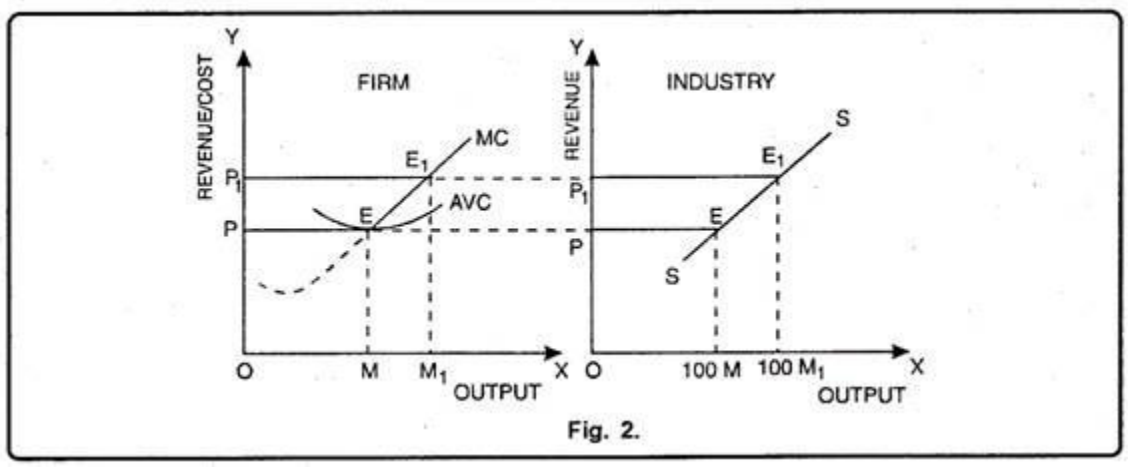


Fig. 2.

Here, we have assumed that different firms in the industry are producing identical products.

Each firm at OP price is producing OM output. It is because all firms have identical costs. At OP price, supply of industry is 100 x M = 100M.

Similarly at OP_1 price, all the firms of industry are producing 100 xM_1 =100M_1 quantity of output. These quantities will be called supply or output of industry. SS is the supply curve of industry. Point E shows that at OP price firm's supply is OM and an industry's total supply is 100 × M = 100M.

At OP_1 price, firm's supply is OM1 and industry's supply is 100M). We get industry's supply curve by joining points E and E_1.

Thus, under perfect competition, lateral summation of that part of short run marginal cost curves of the firms which lie above the average variable cost constitutes the supply curve of the industry. According to Stonier and Hague, "short run supply curve of a competitive industry will always slope upwards since the short run marginal cost curve of the industrial firms always slope upward."

B. Long Run Supply Curve:

Long run supply curve can also be analyzed from firm and industry's point of view:

1. Long Run Supply Curve of a Firm:

Long run is a period in which supply can be changed by changing all the factors of production. There is no distinction between fixed and variable factors. In the long run, firm produces only at minimum average cost. In this situation, long run marginal cost, marginal revenue, average revenue and long run average cost are equal i.e., LMCMR (= AR)LAC (minimum). The firm is enjoying only normal profits.

So that position of marginal cost curve will determine the supply curve which is above the minimum average variable cost. The point where minimum average cost is equal to marginal cost is called optimum production. Thus Long Run Supply Curve of a firm is that portion of its marginal cost curve that lies above the minimum point of the average cost curve.

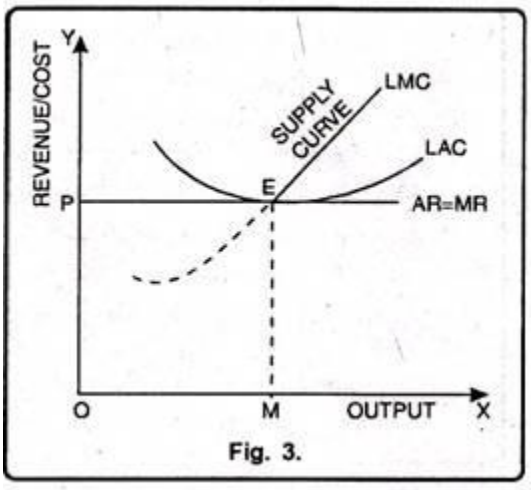


Fig. 3.

In figure 3 the firm is in equilibrium at point E where MRLMC (=AR). AC is minimum corresponding to this point. This point E is also called optimum point because at this point MR=LMCAR minimum LAC. That portion of LMC which is above E is called long run supply curve.

2. Long Run Supply Curve of an Industry:

In the long run, industry's supply curve is determined by the supply curve of firms in the long run. Long run supply curve in the long run is not lateral summation of the short run supply curves. Industry's long run supply curve depends upon the change in the optimum size of firms and change in the number of firms.

It is on account of two reasons:

(i) In the long run, firms continue to enter into and exit from the industry,

(ii) Firms get economies and diseconomies of scale. This displaces the long run marginal cost (LMC).

Due to these reasons, long run supply curve of industry is not the lateral summation of supply curve of firms. In reality, long run supply curve of industry can be known from the long run optimum production of firms multiplied by the number of firms in an industry.

LRS_{i}, = Q x N

Where LRS_1 is long run supply curve of industry. Q is the optimum output of a firm and N, the number of firms.