

COST CONCEPTS



- A profit maximizing firm needs to monitor continuously about its cost and revenue. In order to maximize profit a firm has to increase its revenue and minimize its cost.
- The level of revenue to a large extent is determined by market forces, and therefore a firm's ability to influence market revenue is limited.
- On the other hand, the cost can be brought down either by producing optimum level of output using the least cost inputs combination or by improving productivity of inputs.
- Thus cost of production is most important factor that determines supply of a product.



A. MONEY COST – IMPLICIT AND EXPLICIT

- **Implicit Costs:** They are due to the factors which the entrepreneur himself owns and employs in the firm. In other words, they are the imputed value of the entrepreneur's own resources and services.
- The wage or salary for the service of the entrepreneur, interest on the money capital invested by him and the money rewards for other factors owned and used by him in the firm are known as implicit costs.
- If these services or factors are sold elsewhere by the entrepreneur he would have earned an income. Thus, implicit costs are the opportunity costs of the factors of production owned and used by the entrepreneur.
- Since direct cash payments are not made for them they are called as implicit costs.
- They are also called indirect costs.
- **IC = Imputed cost of resources owned by the entrepreneur = Opportunity cost of resources owned by the entrepreneur = Indirect cost**



- **Explicit costs** are the contractual cash payments made by the firm for purchasing or hiring the various factors.
- In other words, explicit costs refer to the actual expenditures of the firm to hire, rent, or purchase the inputs it requires into production.
- They include wages and salaries, payments for raw materials, power, light, fuels, advertising, transportation and takes into account only the payments and charges made only by the firm to the suppliers of various productive factors.
- Explicit cost also refer to **out-of-pocket cost or direct cost**.
 - **EC = Expenditure on hiring or purchasing inputs = out of pocket = Direct cost**



B. ACCOUNTING COST AND ECONOMIC COST

- **Accounting cost** refers only to the firm's actual expenditures or explicit costs. Accounting costs are important for financial reporting by the firm and for tax purposes.
- **Economic cost** includes both explicit as well as implicit costs. Economic cost is important for managerial decision-making.
- From an economist's point of view profit is the difference between total revenue and economic costs. On the other hand, accounting profit is the difference between total revenue and accounting costs.
- **Accounting Profit = Total Revenue – Explicit Cost**
- **Economic Profit = Total Revenue – Total Cost (Implicit + Explicit Cost)**



C. FIXED, VARIABLE AND TOTAL COST

- **Total Cost (TC):** TC of the firm is a function of output. It will increase with the increase in output, i.e. it varies directly with the output.

$$TC = f(Q)$$

- The total Cost can be divided into two components – Total Fixed Cost (TFC) and Total Variable Cost (TVC).

$$TC = TFC + TVC$$



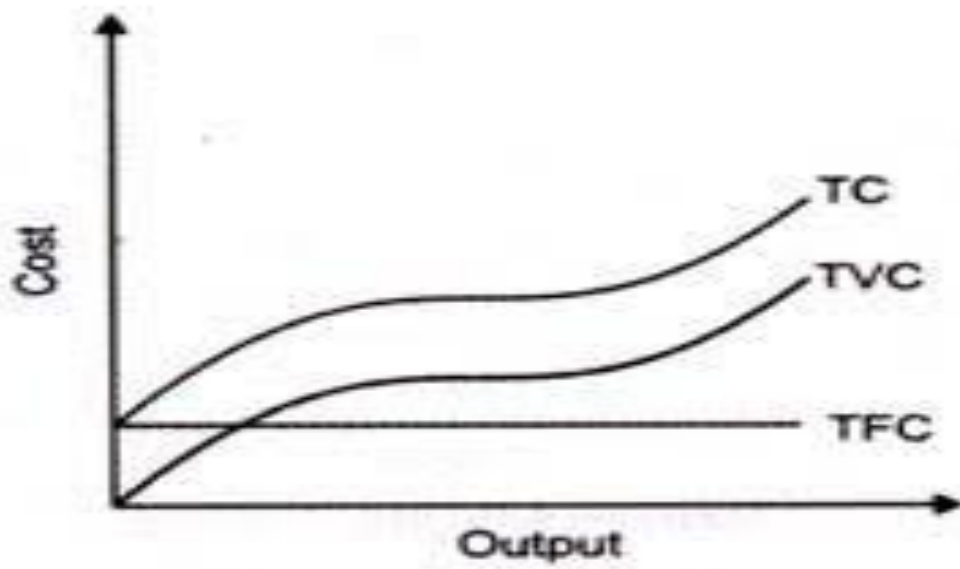
- **Fixed Costs:** Fixed Costs are those which are independent of output. They must be paid even if the firm produces no output. They will not change even if output changes. They remain fixed whether output is large or small.
- Fixed costs are also called **overhead costs** or **supplementary costs**.
- Such costs include rent, interest, insurance, depreciation charges, maintenance costs, property taxes, administrative expenses like salary etc.
- In the short run, the total amount of these fixed costs will not increase or decrease when the volume of the firm's output rises or falls.

- **Variable Costs:** These are ones which are incurred on the employment of variables factors of production. They vary with the level of output. They increase with the rise in output and decrease with the fall in output. Variable costs remain zero when output is zero.
- However, the relation between variable costs and output may not be linear. i.e. variable cost may not increase by the same amount as output.
- They include payments for wages, raw materials, fuel, power, transport etc.
- They are also called as **prime costs** of production.



Output (units)	TFC	TVC	TC	AFC (TFC/Q)	AVC (TVC/Q)	ATC (TC/Q)	MC
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	100	0	100	--	--	--	--
1	100	25	125	100	25	125	25 (125-100)
2	100	40	140	50	20	70	15(140-125)
3	100	50	150	33.3	16.6	50	10 (150-140)
4	100	60	160	25	15	40	10(160-150)
5	100	80	180	20	16	36	22(180-160)
6	100	110	210	16.3	18.3	35	30(210-180)
7	100	150	250	14.2	21.4	35.7	40(250-210)
8	100	300	400	12.5	37.5	50	150(400-250)
9	100	500	600	11.1	55.6	66.7	200(600-400)





Total cost and TVC increase at a diminishing rate in the beginning but later they increase at a faster rate. This is because of operation of law of variable proportions.



TOTAL, AVERAGE AND MARGINAL COST

- Total Cost (TC): TC of the firm is a function of output. It will increase with the increase in output, i.e. it varies directly with the output.

$$\mathbf{TC = f(Q)}$$

- Average Total Cost (ATC or AC): $\frac{\text{Total Cost}}{\text{Output}} = \frac{TC}{Q}$
- Since, $TC = TFC + TVC$

$$\mathbf{ATC = AFC + AVC}$$

- Average Fixed Cost (AFC): $\frac{TFC}{Q}$
- Average Variable Cost (AVC): $\frac{TVC}{Q}$
- Marginal Cost (MC) :

$$\mathbf{(TC_n - TC_{n-1})}$$



COST FUNCTION

- Cost Function is a function derived from production function.

$$C = f(Q, T, P_f)$$

C = Total cost

Q = Output

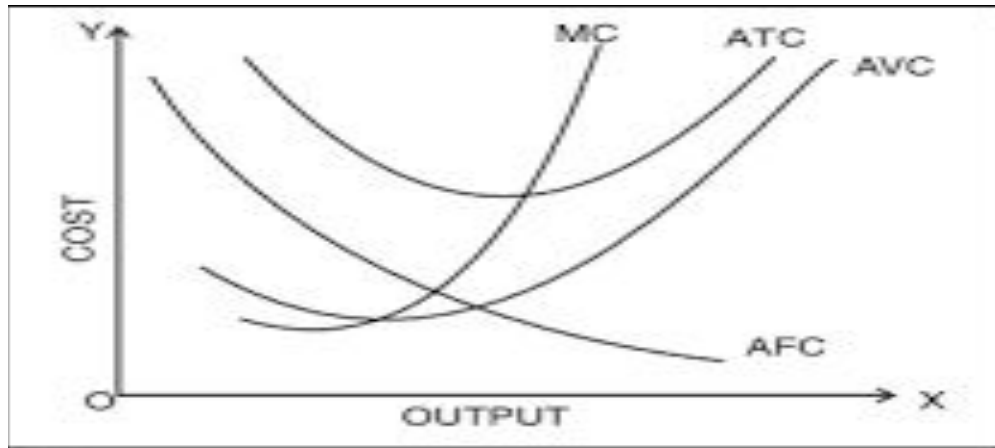
T = Technology

P_f = Price of Factors



SHORT RUN COST - OUTPUT RELATIONSHIP

Relationship between AC, AFC, AVC and MC



- Since average cost falls with the rise in output, AFC curve is downward sloping. AFC curve is a rectangular hyperbola. It means that if we multiply any point on this curve with the corresponding quantity, we will get the same total fixed cost.
- The AVC curve falls initially, reaches a minimum and then rises as output increases. It falls slowly as the firm's output rises from zero to the normal capacity level.
- Once normal capacity output is reached, AVC rises sharply with increase in output.
- This is due to the fact that over and over use of variable factor will lead to overcrowding and the problems of management.
- If AVC and AFC curves are added together, we obtain AC curve.
- In the beginning, when output rises, AC falls due to predominance of AFC. At higher levels of output AVC rises quite sharply, therefore, AC rises after a point.
- The continuous fall in AFC will be too small to offset it. Thus, AC is U-shaped
- MC curve is also U shaped in the diagram. MC falls initially, then reaches a minimum and finally rises.
- **Shape of the MC curve is determined by the Law of Variable Proportions. i.e.** by the behaviour of MP of the variable factor.



- MC intersects AC and AVC at their minimum. This is due to the important relation between marginal and average costs.
- Relation between AVC, AC, and MC can be summarised as –
 1. Because MC is the cost of producing the next unit, when it is below AVC, AVC must be falling. AVC falls because MC is the cost of the next unit produced; therefore, when the next unit costs less than the average, it must be pulling the average down.
 2. By the same logic, when MC is above AVC, it is pushing the average up so AVC must be rising. When the marginal unit costs more than the average, the average has to increase. By definition, then, the MC curve intersects the AVC curve at the minimum point on the AVC curve. At the intersection, MC and AVC are equal.
 3. AVC, ATC and MC fall first, then reach a minimum and finally rise as output increases.



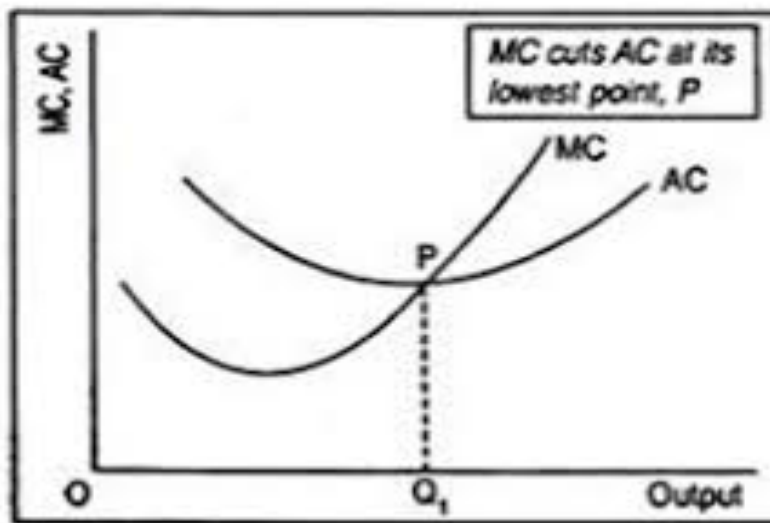
4. The rate of change in MC is greater than that in AVC and thus the output at which MC is lowest is lower than the output at which AVC is lowest.
5. AC falls for a longer range of output than AVC and thus the minimum AC is at a larger output than the minimum AVC.
6. AC and AVC come closer to each other but never intersect because the gap between the two, i.e. AFC can never be zero.
7. $MC = AVC$, when AVC is lowest.
8. $MC = AC$, when AC is minimum.



RELATION BETWEEN AC AND MC

1. If MC is below AC, then AC must be falling. This is because, if MC is below AC, then the last unit produced costs less than the AC of all the earlier units produced. If the last unit costs less than the earlier ones, then the new AC must be less than the old AC. Hence, AC must be falling.
2. If MC is above AC, then the cost of the last unit produced will be higher than the AC of the earlier units. Hence, the new AC must be higher than the old AC. Therefore, when the MC is higher than AC, AC must be rising.
3. If MC is equal to AC, the last unit costs exactly the same as the AC of all earlier units. Hence the new AC is equal to the old AC. Thus, AC curve is flat when MC equals AC.





Let's assume that a cricket player's batting average is 40. If in her next innings she scores 30, then her average score will fall because her marginal score is less than her average score.

MC curve cuts AVC curve too when it is lowest. It is exactly for the same reason as that is given above for relation between MC and AC.



SHORT RUN AVERAGE COST AND OUTPUT

- SAC curve is a U-shaped curve. As production increases, average cost declines, reaches the lowest point, indicating the maximum output at minimum cost.
- Any more production results in an increase in average cost per unit. Short run average cost-output relationship is explained with the following diagram.

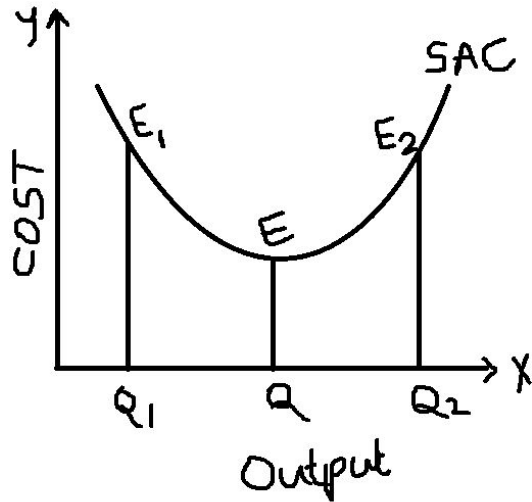


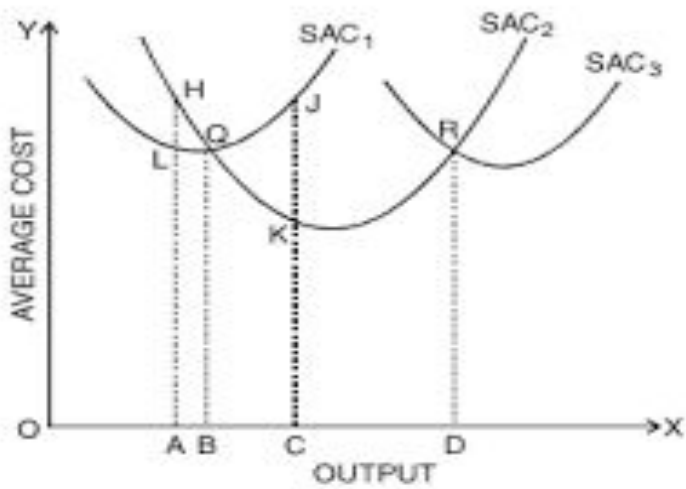
Figure shows the U shaped SAC curve. At OQ_1 output, AC is Q_1E_1 . Cost declines as production increases. At Q output, average cost at E is the lowest, indicating maximum output at minimum cost. Increase in production beyond Q leads to an increase in average cost.



LONG RUN AVERAGE COST CURVE

- Long run is the time that is required by a firm to be able to vary all the inputs. Thus, long run can differ from firm to firm.
- The long run is often referred to as the planning horizon because the firm can build the plant that minimizes the cost of producing any anticipated level of output. Once the plant is built, the firm operates in the short run. Thus, the firm plans for the long run and operates in the short run.
- In the long run, a firm can have alternative plant sizes. For a certain level of output, a plant of a particular size will be most suited.
- Corresponding to each level of output there will be an average cost curve. Hence, the long run is a series of alternative short run average cost curves, associated with different plants, out of which a choice has to be made by the firm for its actual operation.
- This is explained with the following diagram.





- In the diagram it is assumed that there are three plants of a firm. They are depicted by SAC₁, 2 and 3. Each plant is best suited for a particular level of output. E.g. Output OA can be produced at a lower cost (AL) with the plant SAC₁ than with the plant SAC₂ (AH). The difference between the two costs is HL.
- If the firm wants to produce OB output, it can either produce it with plant SAC₁ or SAC₂. But it is worth operating with SAC₂, because at lowest cost firm can produce larger output. i.e. OC.
- Thus, output larger than OB but lower than OD can be produced with SAC₂ plant.
- For output larger than OD, firm will have to operate with SAC₃ plant.

