Managerial Economics

Production and Cost Analysis

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Production function : Long Run

- No factor of production remains constant in the long run hence, all inputs are variable

- With two variable inputs – for simplicity sake if there are only two inputs in a production function, then in the long run both are variable

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- Since all inputs are variable, firm has the opportunity to select combination of inputs that maximizes returns
- It is possible to produce the same amount of output by using different combinations of inputs – plotted on a graph, there is a downward sloping curve known as '**Isoquant**'
- AnIsoquantis the locus of all technically efficient combinations for producing a given level of output
- Any point below theIsoquantwould yield lesser output than the output on or above the curve

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- Production function-: Q= f(L,K)
- E.g. If a firm can produce 120 kg of output with Rs.40000 of Capital and 6 units oflabourper month , there could be other combinations of input that could produce same amount of output

Capital (Rs.Thousand)	Labour
40	6
28	7
18	8
12	9
8	10

Returns to Scale

- Constant to return to Scale
  - Proportional increase in input yields an equal proportional increase in output
- Decreasing Return to Scale
  - Proportional increase in input yields less than proportional increase in output
- Increasing Returns to Scale
  - Proportional increase in input yields more than proportional increase in output

Costs in the Long Run

- There are no fixed cost functions in the long run and this implies radical changes in the cost structure of the firm
- Long run cost structure is often referred to as ‘Planning Cost Function’ and Long run Average Cost is known as ‘Planning Curve’
- As all costs are variable in the long run, only Average Cost is relevant

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- Long run cost curve consists of many short run cost curves
- In the long run the firm could have the choice to operate with different plant sizes based on cost considerations

Long Run Average Cost

- Long run Average Cost curve is known as ‘ Envelop Curve’ as well as ‘Planning Curve’
- LAC falls whenSMC<SAC
- LAC rises whenSMC>SAC
- LAC is minimum whenSMC=SAC

Long Run Marginal Cost

- Long run marginal cost curve (LMC) joins the points on the short run marginal cost curves that are associated with short run average costs corresponding to each level of output on Long run Average Cost curve (LAC)
- The level of output is optimal when long run and short run marginal and average costs are equal
- LMC < LAC, when LAC is decreasing
- LMC=LAC, when LAC is minimum
- LMC>LAC, when LAC is increasing

Long run Costs and Decision making

- If the short run marginal cost of producing the current output is greater than the long run marginal cost, then the firm should build a larger plant
- If the short run marginal cost of producing the current output is less than the long run marginal cost, then the firm should operate with smaller plant

Costs of a multiproduct firm

- Assumption so far was– the firm produces single product or service
- But costs of multiproduct firms would differ from costs of single product firm
- When firm produces only 2 goods:
  - TC= TFC + VC of product 1+ VC of Product 2

Average Cost for a multiproduct firm

- If two products are produced in fixed proportions, then weighted average cost can be calculated
- ACw(Q)= F+C1(X1Q)+C2(X2Q)
  - Where X1 and X2 are proportions in which product 1 and 2 are produced and Q is the total output

Revenue and Output

Total Revenue (TR)

- The total amount of money received by a firm from goods sold (or services provided) during a certain time period.

TR=Q*P, where Q is the quantity sold and P is the price per unit.

Average Revenue (AR)

- Revenue earned per unit of output sold.

AR=TR/Q =P

Marginal Revenue (MR)

- Revenue a firm gains in producing one additional unit of a commodity.
- Calculated by determining the difference between the total revenues produced before and after a unit increase in production.

$MR_Q = TR_Q - TR_{Q-1}$; or

MR=

$$\frac{dTR}{dQ}$$

Break Even Analysis

- Examines the relation between total revenue, total costs and total profits of a firm at different levels of output. .
- **Breakeven point**is the point where total cost just equals the total revenue, in other words it is the*no profit no loss point*.

Approaches to break even analysis:

- **Algebraic Method**
  - If P be the price of a good, Q the quantity produced' the breakeven output is where total revenue equals total cost (Q*).

Total Revenue= P.Q

Total Cost= TFC+TVC = TFC+AVC.Q

P.Q*=TFC+AVC.Q*

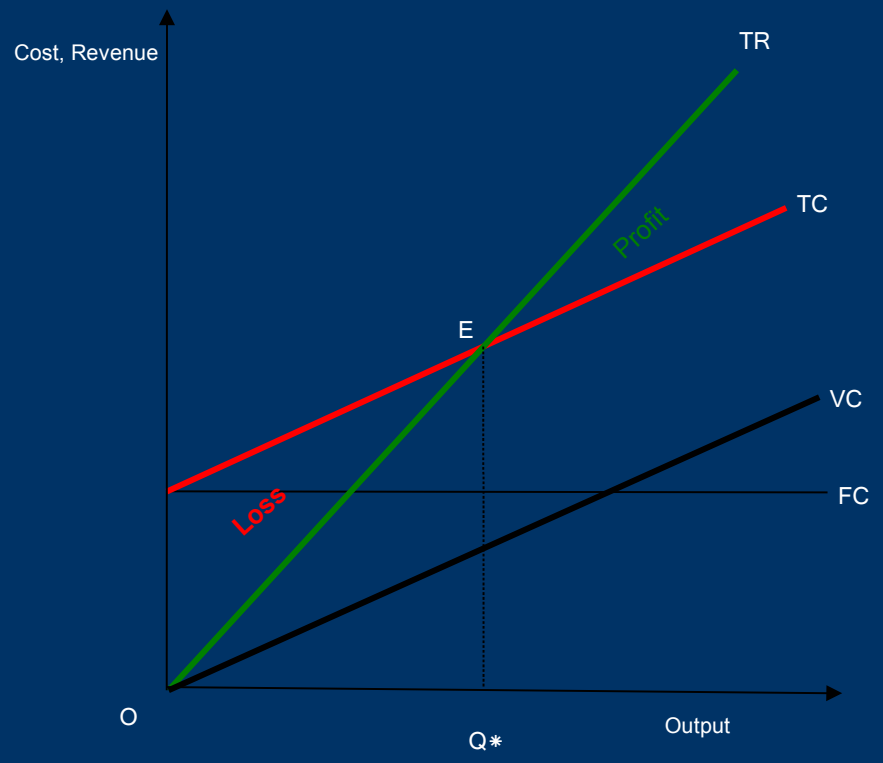
(P-AVC)Q*=TFC

Q*=

$$\frac{TFC}{P - AVC}$$

Break Even Analysis

Graphical Method



- Plot cost and revenue on the Y axis and output on the X axis.
- TC is a straight line because AVC is assumed to be constant
- Total revenue is proportional to output and the TR is a straight line through the origin.
- Point of intersection of TR and TC (E) is the Break Even point, i.e. no profit no loss at output Q*
  - Prior to E is loss zone
  - After E is the profit zone.
- Shows the profit (or loss) resulting from each level of sales by the firm.

Economies of Scale

- Economies of scale refers to the efficiencies associated with larger scale operations
- Internal economies (which occur to the firm due to large size of operations);
  - e.g. Division of labour/ specialization, Financial economies, better managerial functions.
- External economies (which occur due to expansion of the*industry*, and the firm also benefits).
  - Technological advancement, development of infrastructure pool of skilled workers

Diseconomies of Scale

The disadvantages of large scale production that can lead to increasing average costs

- Problems of management
- Maintaining effective communication
- Co-ordinating activities – often across the globe!
- De-motivation and alienation of staff
- Divorce of ownership and control