Production and Cost

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Production

- What is the process of production?
- What are the inputs of production?
- What is a Production Function?
- Example of the Production function

$$
\begin{aligned}
Q &= A + \alpha L + \beta K \\
Q &= min\Big[L, K\Big] \\
Q &= AL^{\alpha} K^{\beta} \\
Q &= A\Big[\theta L^{\alpha} + (1-\theta) K^{\alpha}\Big]^{\frac{1}{\alpha}}
\end{aligned}
$$

Production Function

Text

- Difference between technical and economic efficiency
- What are the fixed factor and the variable factors of production. variable factors can be changed in short period of time eg. labour
- What is the concept of the short run and the long run in economics. in short run fixed cost is sunk cost while in long turn fixed cost
- What is a short run and long run production function.
  - Variable proportion Production Function. Text
  - Fixed Proportion Production Function.
- Diagram of the Production function

Different Measure of Productivity

- Average Product of Labor
- Marginal Product of Labor
- Relationship between Average Product of labor and marginal Product of labor
  - When the Marginal Product is more than the average product the average is rising and when the marginal product is less than the average product the average product is falling.
- What happens to the production function if the fixed factor increases. What is technological progress.

Stages of Production

- Stages of Production
  - Stage 1
    $MP_L > AP_L > 0,\ MP_L > 0$
  - Stage 2
    $AP_L > MP_L > 0,\ MP_L > 0$
  - Stage 3
    $MP_L > AP_L > 0,\ MP_L < 0$
- Law of Diminishing Marginal Productivity

Long Run Production Function

- $Q = f(L, K)$
- Return to Scale
  - Division of Labor and Specialization in Production
  - Managerial Difficulties (Inventory Control)
- Related by different concept "Return to Scope"

Cost Function

- Opportunity Cost in terms of the Production
- Resources are two types
  - **Market Supplied Resources**
    - Resource owned by others which are purchased, hired, rented or leased by the firms.
  - **Owner Supplied Resources**
    - Resource that are supplied by the owner.
- Business incurs opportunity cost for both categories of resources used. The total economic cost of the resources used in the production is the sum of the opportunity cost of the market supplied resources and the owner supplied resources.
- Economic Cost=Opportunity Cost of Resources

Cost Function

- Opportunity Cost of the market-supplied resources is out of the pocket monetary payment made by the owner of the resources. The monetary payments made for market supplied inputs are known as the **explicit cost**.
- Opportunity Cost of the owner-supplied resources is the best returns the owner of the firms could have received has they taken their resources to market instead of using it themselves. The non-monetary opportunity cist of using firm's own resources is called **Implicit cost**.

Economic Profit

- Economic Cost = Explicit Cost + Implicit Cost
- Economic Profit = Total Revenue - (Explicit Cost + Implicit Cost)
- Economic Profit = (Total Revenue - Explicit Cost) - Implicit Cost
- Economic Profit = Accounting Profit - Implicit Cost

Firm's Cost in Short Run

- Cost = Fixed Cost + Variable Cost
- Fixed Cost: Cost incurred towards hiring the fixed factor and it do not changes with short-run.
- Variable Cost: Cost incurred towards hiring the Variable factor and it do not changes with short-run.

$$C(L, K) = rK + wL$$
$$C(L; \overline{K}) = r\overline{K} + wL$$

Fixed Cost and Sunk Cost

- *Fixed Cost* is the cost that a business incurs while doing the production. If the production stops the cost can be recuperated.
- *Sunk Cost* is the cost that a business loses while doing the business.
- **Example**
  - Suppose a manager of the a coal company rents a railcar for Rs.10,000. The terms of the lease states that if the manager returns the railcar by one month he will be repaid Rs. 4000 and none will be paid after one month.
  - What is the amount of Fixed Cost and What is the amount of sunk cost?

before 1 month sunk cost:6000
after 1 month sunk cost:10000

Relationship between AVC, MC with AP, MP

- Average Cost

$$\begin{aligned} C &= \underline{r\overline{K}} + \underline{wL} \quad \text{=fixed cost+variable cost} \\ \frac{C}{Q} &= r\frac{\overline{K}}{Q} + w\frac{L}{Q} \\ AC &= r\frac{1}{AP_K} + w\frac{1}{AP_L} \end{aligned}$$

- Marginal Cost

$$\begin{aligned} C &= r\overline{K} + wL \\ \frac{\partial C}{\partial Q} &= +w\frac{\partial L}{\partial Q} \\ MC &= r\frac{1}{MP_L} \end{aligned}$$

Cost Curves

- Show that when the Average cost is minimum the average cost is equal to the marginal cost
- Plot the area of total revenue, total variable cost ,total fixed cost and thus the total profit