

**Production and Costs**

Production  
Short-Run Costs

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**Short-Run vs. Long-Run**

- Technically, time does not determine the difference between “short-run” and “long-run”

The **Short Run** is defined by the presence of a factor of production that is fixed in quantity –typically, this is capital (K). In the short-run, firms can only change the amount of non-capital inputs (e.g. Labor)

The **Long Run** is defined by the ability for firms to vary the quantities of all factors of production. The time in which this takes a firm to do so may depend upon the firm as well as the industry.

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**SHORT-RUN PRODUCTION**

- Graphically, we can analyze short-run production

**Total Product (TP) (Q):** describes how output varies in the SR as more of any variable input is used with the fixed input, under current technology

**Marginal Product (MP):** the increase in output from one more unit of an input when the quantity of all other inputs are unchanged

**Average Product (AP):** the total output produced divided by the number of units of the input used

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### Marginal/Average Product

- Formulas for MP and AP
- Since Kapital is fixed in quantity, we are concerned with Marginal and Average products of labor

$$MP_L: \Delta TP / \Delta L$$

$$AP_L: TP/L$$

What do the TP,  $MP_L$  and  $AP_L$  curves look like?

What is the relationship between  $MP_L$  and  $AP_L$ ?

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### Law of Diminishing Marginal Produce

- As a firm uses more a variable input, with a given quantity of fixed inputs, the MP of a variable input eventually diminishes.

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### Short Run Costs

- Short-run costs can be separated according to the nature of the input:

**Fixed Costs (Total Fixed Costs) (TFC):** total cost to all the fixed inputs (Overhead costs) - must be incurred in the short-run even if don't produce anything

**Total Variable Cost (TVC):** total cost to the variable inputs

**Total Cost (TC):** sum of all the costs of all inputs in the production process

$$\text{SO, } TC = TFC + TVC$$

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## Marginal Costs

- However, when firms are choosing to maximize profit, they are more concerned with Marginal Costs – the cost of producing 1 more unit of output.

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

What do we know about the relationship between MC and MP?

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## Average Costs

- Firms are also concerned with Average Costs. In the short-run, there are 3 average costs:

Average Fixed Costs:  $AFC = TFC / Q$

Average Variable Costs:  $AVC = TVC / Q$

Average Costs:  $AC = TC / Q$

**Thus,  $AC = AVC + AFC$**  What do these curves look like?

Why are these curves important?

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## GRAPHICAL ANALYSIS OF SR COST

### Graph 1: TC, TVC, TFC

- 1) Why is TVC upward sloping ?
- 2) Why does TC slope upward ?

### Graph 2: MC, ATC, AFC, AVC

- 1) Why is AFC downward sloping ?
- 2) Why is AVC "U-shaped" ?
- 3) Why is ATC "U-shaped" ?
- 4) Why does MC curve slope upward ?
- 5) Where does the MC curve intersect AVC ? ATC ?

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