IV. THE FIRM AND THE MARKETPLACE

A. The Firm's Objective

1. The firm is an institution that organizes production.
   a. The firm hires land, labor, capital and entrepreneurial ability in the factor markets.
   b. The firm combines these factors of production to produce output which it sells in the product markets.

2. The firm can take one of three legal forms:
   a. A sole proprietorship is a firm owned by one person.
   b. A partnership is a firm owned by more than one person who are jointly liable for losses by the firm.
   c. A corporation is a firm managed by one group and owned by another group -- shareholders -- who have limited liability for losses by the firm.

3. The objective of a firm is to maximize economic profits.
   a. Economic profit is defined as total revenue ($TR$) minus total cost ($TC$).
      i. If total revenue ($TR$) exceeds total cost ($TC$) then the firm is earning an economic profit.
      ii. If total revenue ($TR$) is equal to total cost ($TC$) then the firm is breaking even.
      iii. If total revenue ($TR$) is less than total cost ($TC$) then the firm is suffering an economic loss.
b. Total revenue \((TR)\) is defined as price \((P)\) times quantity \((Q)\). The ability of firms to generate total revenue is restricted by the market constraints.

i. A price-taking firm can sell as much or as little of its good or service at the market price.

ii. A price-making firm can raise its price but only by selling less of its good or service.

c. Total revenue \((TC)\) is the total cost of production which is divided between fixed costs \((FC)\) and variable costs \((VC)\). The costs to the firms are referred to as the cost constraints.

i. Fixed costs \((FC)\) are those costs that do not depend upon on the quantity produced.

ii. Variable costs \((VC)\) are those costs that do depend upon the quantity produced.

iii. Marginal cost \((MC)\) is the cost of producing the next unit of output. It depends only upon the variable costs.

d. Rule of Thumb: a firm will sell a good or service so long as the price received \((P)\) is greater than or equal to marginal cost \((MC)\).

4. An example -- mowing Tappan Square

a. Suppose you run a landscape company and are bidding on the contract to mow Tappan Square for Oberlin College.

b. There are three different ways to produce this service:

i. employ 20 workers (labor) and rent 20 pairs of scissors (capital)

ii. employ 5 workers (labor) and rent 5 gas push mowers (capital)

iii. employ 3 workers (labor) and rent 3 electric riding mowers (capital)

iv. employ 2 workers (labor) and rent 2 gas riding mowers (capital)
c. The wage rate for landscape workers is $70 per day and rental rates for a pair of scissors, gas push mower, electric riding mower and gas riding mower are $1, $10, $60 and $100 per day, respectively.

Q: What is the total cost of mowing Tappan Square using each production method?

Q: If the goal of your firm is to maximize employment, which production method would you choose? What would be your bid to Oberlin College?

Q: If the goal of your firm is to be the most environmentally-conscious, which production method would you choose? What would be your bid to Oberlin College?

Q: If the goal of your firm is to maximize economic profits, which production method would you choose? What would be your bid to Oberlin College?

Q: Which bid do you believe Oberlin College would accept? Explain why.
B. The Firm's Costs

1. Yeoman Computer's production function

<table>
<thead>
<tr>
<th>Output ($Q$) (CPUs per day)</th>
<th>Labor ($L$) (hours worked)</th>
<th>Marginal Product of Labor ($MPL$) (CPUs per hour)</th>
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a. The marginal product of labor ($MPL$) is the additional amount of output produced by employing one more unit of labor (variable input) to a given quantity of capital (fixed input).

Q: Calculate the marginal product of labor ($MPL$) for each quantity of output.

Q: What happens to the marginal product of labor ($MPL$) at low quantities of output? What happens to the marginal product of labor ($MPL$) at higher quantities of output?

Q: What does the answer to the above question imply about marginal costs ($MC$)?
2. Yeoman Computer's cost curves

a. Converting the production information into cost information.

<table>
<thead>
<tr>
<th>Output ($Q$) (CPUs per day)</th>
<th>Labor ($L$) (hours worked)</th>
<th>Variable Cost ($VC$) (dollars per day)</th>
<th>Fixed Cost ($FC$) (dollars per day)</th>
<th>Total Cost ($TC$) (dollars per day)</th>
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i. Suppose the wage rate equals $8.00 per hour and the capital cost equals $400 per day.

ii. Variable cost ($VC$) is the total cost of the variable inputs.

iii. Fixed cost ($FC$) is the total cost of the fixed inputs.

iv. Total cost ($TC$) is the total cost of all inputs.

**Q:** Calculate the variable cost ($VC$), fixed cost ($FC$) and total cost ($TC$) for each quantity of output.
b. Yeoman Computer's cost curves

<table>
<thead>
<tr>
<th>Variable cost (VC) (dollars per day)</th>
<th>Total cost (TC) (dollars per day)</th>
<th>Average variable cost (AVC) (dollars per day)</th>
<th>Average total cost (ATC) (dollars per day)</th>
<th>Marginal cost (MC) (dollars per day)</th>
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i. Average variable cost (AVC) is variable cost (VC) divided by output (Q).

ii. Average total cost (ATC) is total cost (TC) divided by output (Q).

iii. Marginal cost (MC) is the change in total cost (TC) divided by the change in output (Q).

Q: Calculate the average variable cost (AVC), average total cost (ATC) and marginal cost (MC) for each quantity of output.
3. Costs and production in the short-run

a. In the short-run the firm can only alter its variable inputs.

Q: Suppose the market price is $300. Indicate on the graph above the profit-maximizing quantity, total revenue and economic profit (or loss) of Yeoman Computer.

Q: Suppose the market price is $200. Indicate on the graph above the profit-maximizing quantity, total revenue and economic profit (or loss) of Yeoman Computer.
C. Price-Takers

1. A competitive market is an industry where many firms produce a similar product.
   a. The prime example is any commodities market. However, industries such as personal computers, fast food and retail gas are also competitive.

2. In a competitive market, a firm sells as much or as little of its good or service at the market price. In other words, a firm takes its price as given.

   \[ Q: \text{Why would a competitive firm not want to sell its product for less? Why would a competitive firm not want to sell its product for more?} \]

3. In the short-run, a price-taking firm must decide the profit-maximizing quantity \( Q^* \) and whether to produce that quantity or shutdown.
   a. Profit-maximizing quantity \( Q^* \) is that amount where the market price \( (P_{mkt}) \) equals the marginal cost \( (MC) \).
   b. A firm will produce in the short-run so long as it can cover its variable costs -- market price \( (P_{mkt}) \) is greater than or equal to average variable cost \( (AVC) \).

4. In a short-run equilibrium, a price-taking firm can be either
   a. earning an economic profit \( (TR > TC) \)
   b. breaking even \( (TR = TC) \)
   c. suffering an economic loss \( (TR < TC) \).
Q: In the above example which range of market prices \(P_{mkt}\) would generate (i) an economic profit, (ii) breakeven point or (iii) an economic loss for Yeoman Computer?

5. In the long-run, a price-taking firm must decide whether or not to remain in the industry.
   
   a. A price-taking firm will remain in the long-run so long as it can cover its total costs -- market price \(P_{mkt}\) is greater than or equal to average total cost \(ATC\).
b. An incumbent firm will exit if suffering an economic loss.

c. A new firm will enter if incumbent firms are earning economic profits.
6. In a long-run equilibrium, a price-taking firm produces at the minimum point of the average total cost curve and breaks even.

![Graph of Yeoman Computer costs]

a. A firm earns no economic profit nor suffers no economic loss -- it breaks even.

b. Resources are used most efficiently since costs per unit are minimized.

7. Example: fall of the PC industry
C. Price-Makers

1. A monopolistic or imperfectly competitive market is an industry where firms produce a differentiated product.
   
a. Examples include cars, sneakers and restaurants.

2. In an imperfectly competitive market, a price-making firm faces a downward sloping demand curve. Therefore, a price-making firm can raise its price but only by selling less of its good or service.

   \[ Q: \text{Why does a price-making firm not lose all of its customers when it raises its price relative to its competitors?} \]

3. In the short-run, a price-making firm must decide the profit-maximizing quantity \( Q^* \) (and price \( P^* \)) and whether to produce that quantity or shutdown.
   
a. Profit-maximizing quantity \( Q^* \) is that amount where the marginal revenue (\( MR \)) equals the marginal cost (\( MC \)).
   
b. A firm will produce in the short-run so long as it can cover its variable costs -- profit-maximizing price (\( P^* \)) is greater than or equal to average variable cost (\( AVC \)).
Q: Find the profit-maximizing quantity $Q^*$ and price $P^*$ for Yeoman Computer. Will Yeoman Computer produce in the short-run?

4. In a short-run equilibrium, a price-making firm can be either
   a. earning an economic profit ($TR > TC$)
   b. breaking even ($TR = TC$)
   c. suffering an economic loss ($TR < TC$).

Q: In the above example what is the short-run equilibrium for Yeoman computer? What could move Yeoman computer to one of the other equilibriums?
5. In the long-run, a price-making firm must decide whether or not to remain in the industry.

a. A price-making firm will remain in the long-run so long as it can cover its total costs -- profit-maximizing price ($P^*$) is greater than or equal to average total cost ($ATC$).

b. An incumbent firm will exit if suffering an economic loss.

c. A new firm will enter if incumbent firms are earning economic profits.
6. In a long-run equilibrium, a price-making firm produces above the minimum point of the average total cost curve and breaks even.

a. A firm earns no economic profit nor suffers no economic loss -- it breaks even.

b. Resources are not used most efficiently since costs of production are higher than the minimum average total cost. There is a deadweight loss imposed on society in that average total costs could be lowered through further production.

Q: Why don't price-making firms increase production further to lower average total costs? What do consumers gain from increased costs in a price-making market?