Friday, October 12 Quiz: Solutions

To understand the behavior of firms, you must keep several “pieces of the puzzle” and their relationships straight. Memorizing the “pieces of the puzzle” and their relationships is not enough. Instead, you must UNDERSTAND the rationale underlying each relationship. Consequently, pay particular attention to the repetitive use of the word “Explain.”

Profit Maximization

What two “pieces of the puzzle” do we need to determine if a firm is maximizing its profit?

Marginal Revenue Marginal Cost

- When can a firm increase its profit by producing more? Explain.
  
  Marginal Revenue > Marginal Cost
  
  When marginal revenue is greater than marginal cost, a one unit increase in production increases total revenue by less than total cost; thereby increasing profit.

- When can a firm increase its profit by producing less? Explain.
  
  Marginal Revenue < Marginal Cost
  
  When marginal revenue is less than marginal cost, a one unit decrease in production decreases total revenue by less than total cost; thereby increasing profit.

- When is a firm maximizing its profit? Explain.
  
  Marginal Revenue = Marginal Cost

Market Structure

When we are told that an industry is perfectly competitive or a monopoly, what two “pieces of the puzzle” are being provided?

Marginal Revenue Price

- If a monopoly, how are these two “pieces of the puzzle” related? Explain.
  
  Marginal Revenue < Price
  
  Marginal revenue equals the change in the individual firm’s total revenue resulting from a one unit change in production. When a monopoly firm sells an additional unit of output two opposing forces are at work:
  
  o (Additional) Output Effect: The additional unit of output tends to increase total revenue by an amount equal to the price.
  
  o (Lower) Price Effect: To sell the additional unit of output, however, the monopoly firm must lower the price which means less revenue from the sale of all the other units of output.
  
  As a consequence of the (lower) price effect, marginal revenue is less than the price.

- If perfectly competitive, how are these two “pieces of the puzzle” related? Explain.
  
  Marginal Revenue = Price
  
  A perfectly competitive industry is composed of a large number of small firms; hence, an individual firm produces only a miniscule fraction of the industry’s total output. Consequently, the (lower) price effect which depends on the quantity the firm produces will be very, very small – so small that we can ignore it. Consequently, only the (additional) output effect is relevant; therefore, marginal revenue equals the price.
**Long Run and Short Run**

- What differentiates the long run from the short run?

  *In the short run, a firm has some fixed commitments (leases, etc.); these costs are not affected by how much output the firm produces. The costs associated with these fixed commitments are called fixed costs.*

**Long Run**

- Why is the sign of a firm’s profit important in the long run? Explain.

  Profit equals the difference between the income the firm owner earns when operating the firm with the income owner would earn by working for someone else. Therefore, the sign of profit tells us what happens to the industry in the long run. If profit

  - is negative, firms exit.
  - is positive, firms enter.
  - equals 0, a long run equilibrium exists.

- What two “pieces of the puzzle” do we need to determine the sign of a firm’s profit?

  \[
  \text{Average Total Cost} \quad \text{Price} \quad \text{Explain.}
  \]

  \[
  \text{Profits} = \frac{\text{Total Revenues}}{\text{Total Costs}} = \frac{\text{TR}}{\text{TC}}
  \]

  \[
  \text{TR} = P \times q \quad \text{ATC} = \frac{\text{TC}}{q}
  \]

  \[
  \text{ATC} \times q = \text{TC}
  \]

  Factoring out q.

  \[
  = (P - \text{ATC}) \times q
  \]

  \[
  \begin{align*}
  P < \text{ATC} & \quad \text{Profits} < 0 \\
  P = \text{ATC} & \quad \text{Profits} = 0 \\
  P > \text{ATC} & \quad \text{Profits} > 0
  \end{align*}
  \]

  - When will a firm’s profit be negative? What will occur in the long run? Explain.

    Price < Average Total Cost: Exit occurs in the long run because the owner of a firm in the industry can earn more income elsewhere than by continuing to operate his/her firm in the industry.

  - When will a firm’s profit be positive? What will occur in the long run? Explain.

    Price > Average Total Cost: Entry occurs in the long run because entrepreneurs can earn more income in this industry than elsewhere.

  - When will a firm’s profit be zero? What will occur in the long run? Explain.

    Price = Average Total Cost: Neither entry nor exit occurs. A long run equilibrium exists.
Marginal Cost and Average Total Cost Curves
• What is the shape of a firm’s marginal cost curve? Explain.
   A firm’s marginal cost curve is upward sloping as a consequence of diminishing marginal product of labor.

• How are a firm’s marginal cost curve and average total cost curve related? Explain.
   The marginal cost curve intersects the average total cost curve at minimum average total cost. When marginal is less than average, the average must fall. When marginal is greater than average, the average must rise.

Firm’s Individual Supply Curve (in the short run)
• What series of hypothetical questions does a firm’s individual supply curve answer?
   How much output would the firm produce if the price of the product were $_____ per unit, given that everything else relevant to the supply of the product remains the same?

• What two “pieces of the puzzle” do we need to construct a firm’s individual supply curve?
   Marginal Cost Average Variable Cost Explain.

An individual firm’s supply curve is its marginal cost curve as long as price exceeds average variable cost. When the price falls below average variable cost, the firm shuts down in the short run and produces nothing.

Market Supply Curve
• What series of hypothetical questions does a market supply curve answer?
   How much output would firms produce if the price of the product were $_____ per unit, given that everything else relevant to the supply of the product remains the same?

• Where does the market supply curve come from? Explain.
   The market supply curve is the horizontal sum of each firm’s individual supply curve.