CHAPTER 11 LECTURE – MONOPOLY AND MONOPSONY

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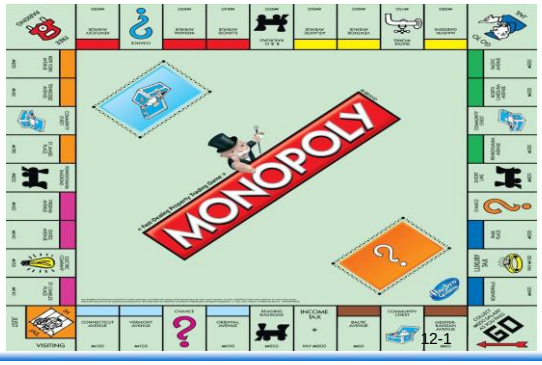

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MONOPOLY

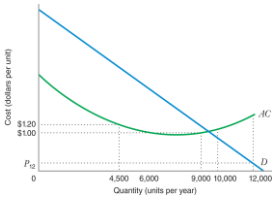
- ***Monopoly:*** **a market structure in which a single seller of a product with no close substitutes serves the entire market.**
  - **A monopoly has significant control over the price it charges.**

Five Sources Of Monopoly

1. **Exclusive Control over Important Inputs**
2. **Economies of Scale**
3. **Patents**
4. **Network Economies**
5. **Government Licenses or Franchises**

Give examples

Natural Monopoly



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PROFIT MAXIMIZATION AND REVENUE OR THE MONOPOLIST

- **The monopolist's goal is to maximize economic profit.**
  - **In the short run this means to choose the level of output for which the difference between total revenue and short-run total cost is greatest.**
- **As price falls, total revenue for the monopolist does not rise linearly with output.**
  - **Instead, it reaches a maximum value at the quantity corresponding to the midpoint of the demand curve after which it again begins to fall.**
  - **Total revenue reaches its maximum value when the price elasticity of demand is unity.**

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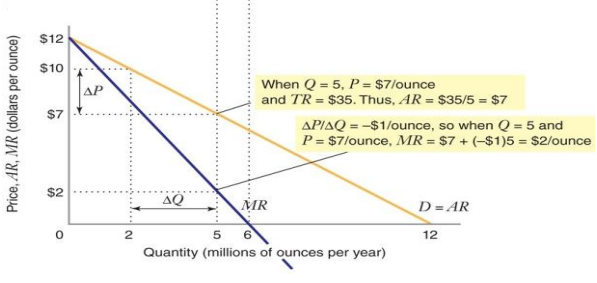
THE DEMAND CURVE AND CORRESPONDING MARGINAL REVENUE CURVE

$$P = a - bQ \text{ then } TR = aQ - bQ^2 \quad MR = \frac{dTR}{dQ} = a - 2bQ$$



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PROFIT MAXIMIZATION

The goal of the firm is to find the level of output (Q) which maximizes profit (π)

Max π(Q) = PQ – TC(Q)

F.O.C. π = TR – TC

$$\frac{d\Pi}{dQ} = \underbrace{P + Q\frac{dP}{dQ}}_{MR} - \underbrace{\frac{dTC}{dQ}}_{MC} = 0 \qquad MR - MC = 0 \text{ or } MR = MC$$

S.O.C. $\frac{d^2\pi}{dQ^2} = \frac{dMR}{dQ} - \frac{dMC}{dQ} < 0$

$$If\ \frac{dMC}{dQ} > 0\ and\ \frac{dMR}{dQ} < 0\ \ suff.$$

$$If\ \frac{dMC}{dQ} < 0, \left|\frac{dMR}{dQ}\right| must\ be > \left|\frac{dMC}{dQ}\right|$$

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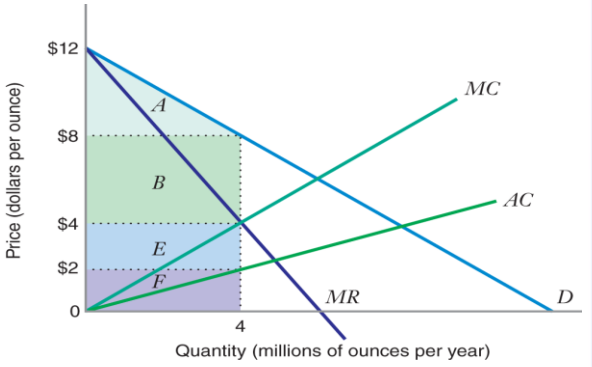
THE PROFIT-MAXIMIZING PRICE AND QUANTITY FOR A MONOPOLIST



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CALCULATING MONOPOLY OUTPUT

- **Suppose that the market for cell phones has a linear demand curve of the form**

$$Q = 2,000 - 20P$$

or

$$P = 100 - \frac{1}{20}Q$$

- **The total costs of the cell phone producer are given by**

$$TC = C(Q) = 0.05Q^2 + 10,000$$

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CALCULATING MONOPOLY OUTPUT

- **To maximize profits, the monopolist chooses the output for which *MR = MC***
- **We need to find total revenue**

$$TR = P * Q = 100Q - \frac{Q^2}{20}$$

- **Therefore, marginal revenue is**

$$MR = \frac{dTR}{dQ} = 100 - \frac{Q}{10}$$

while marginal cost is

$$MC = \frac{dTC}{dQ} = 0.1Q$$

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CALCULATING MONOPOLY OUTPUT

- Thus, ***MR = MC*** where

$$100 - \frac{Q}{10} = 0.1Q$$

$Q^* = 500$ $P^* = 75$

- At the profit-maximizing output,

$$TC = C(Q) = (0.05)(500)^2 + 10,000 = 22500$$

$$AC = \frac{TC}{Q} = \frac{22500}{500} = 45$$

$$\pi = (P - AC)Q = (75 - 45)500 = 15000$$

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A MONOPOLIST HAS NO SUPPLY CURVE

- The monopolist is a price maker.
  - When demand shifts rightward elasticity at a given price may either increase or decrease, and vice-versa.
    - So there can be no unique correspondence between the price a monopolist charges and the amount she chooses to produce.
- Monopoly has a ***supply rule***, which is to equate marginal revenue and marginal cost.

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THE PROFIT-MAXIMIZING MONOPOLIST

- If a monopolist's goal is to maximize profits, she will never produce an output level on the inelastic portion of her demand curve.
- The profit-maximizing level of output must lie on the elastic portion of the demand curve.
- ***Shutdown condition for a monopolist***: he or she should cease production whenever average revenue is less than average variable cost at every level of output.

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MARGINAL COST AND PRICE ELASTICITY OF DEMAND: THE INVERSE ELASTICITY PRICING RULE

We define marginal revenue as:

$$MR = \frac{dTR}{dQ} = P(1 + \frac{1}{E_{Q,P}})$$

Monopolist maximizes profit by producing where MR=MC or:

$$MC = P(1 + \frac{1}{E_{Q,P}})$$

Rearranging yields:

$$\frac{P - MC}{P} = -\frac{1}{E_{Q,P}}$$

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MARGINAL COST AND PRICE ELASTICITY OF DEMAND: THE INVERSE ELASTICITY PRICING RULE

$$\frac{P - MC}{P} = -\frac{1}{E_{Q,P}}$$

- The left-hand side of equation is the monopolist's optimal markup of price over marginal cost, expressed as a percentage of the price.
- The right-hand side is the negative of the inverse of the price elasticity of demand.
- For this reason, equation is called the inverse elasticity pricing rule (IEPR).
- The IEPR states that the difference between the profit-maximizing price, and marginal cost, expressed as a percentage of price, is equal to minus the inverse of the price elasticity of demand.
- The more price elastic the monopolist's demand, the smaller will be the optimal markup. inverse elasticity pricing rule (IEPR)

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SAMPLE PROBLEM

Assume that a monopolist sells a product with a total cost function $TC = 1{,}200 + 0.5Q^2$ and a corresponding marginal cost function $MC = Q$. The market demand curve is given by the equation $P = 300 - Q$.

a) Find the profit-maximizing output and price for this monopolist. Is the monopolist profitable?

If demand is given by P=300-Q, then TR = 300Q $-Q^2$.Thus, MR=300-2Q. To find the optimum output set MR=MC.

$$300 - 2Q = Q \quad or \quad Q = 100.$$

At Q=100 price will be P=300-100=200. At this price and quantity total revenue will be TR=200(100)=20,000 and total cost will be TC=1200+.5(100)^2=6,200. Therefore, the firm will earn a profit of π=TR-TC=13,800.

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SAMPLE PROBLEM CONTINUED

b) Calculate the price elasticity of demand at the monopolist's profit-maximizing price. Also calculate the marginal cost at the monopolist's profit-maximizing output. Verify that the IEPR holds.

b) The price elasticity at the profit-maximizing price is

$$E_{Q,P} = \frac{dQ}{dP}\frac{P}{Q}$$

With the demand curve Q=300-P, dQ/dP=-1. Therefore, at the profit-maximizing price and quantity.

$$E_{Q,P} = -1\frac{200}{100} = -2$$

The marginal cost at the profit-maximizing output is MC = Q = 100.

The inverse elasticity pricing rule states that at the profit-maximizing price is

$$\frac{P - MC}{P} = -\frac{1}{E_{Q,P}}$$

In this case we have

$$\frac{200 - 100}{200} = -\frac{1}{-2} \quad or \quad \frac{1}{2} = \frac{1}{2}$$

IEPR HOLDS

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QUANTIFYING MARKET POWER: THE LERNER INDEX

- When a firm faces a downward-sloping demand curve, either because it is a monopolist or it produces a differentiated product, the firm will have some control over the market price it sets.
- For a monopoly, the ability to set the market price is constrained by competition from substitute products.
- In the case of differentiated products, a firm's direct competitors constrain its pricing freedom.
- When a firm can exercise some degree of control over its price in the market, we say that it has market power.
- Thus, monopolists or producers of differentiated products will, in general, charge prices that exceed marginal cost.
- A natural measure of market power is the percentage markup of price over marginal cost, or the LERNER INDEX

$$\text{LERNER INDEX} = \frac{P - MC}{P}$$

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