Outline

1. Profit Maximization: Monopoly

2. Price Discrimination

3. Oligopoly?
1 Profit Maximization: Monopoly

- Nicholson, Ch. 11, pp. 358-365 (Ch. 9, pp. 248–255, 9th)

- Nicholson, Ch. 14, pp. 491-499 (Ch. 13, pp. 385–393, 9th)

- **Perfect competition.** Firms small

- **Monopoly.** One, large firm. Firm sets price $p$ to maximize profits.

- What does it mean to set prices?

- Firm chooses $p$, demand given by $y = D(p)$

- (OR: firm sets quantity $y$. Price $p(y) = D^{-1}(y)$)
• Write maximization with respect to $y$

• Firm maximizes profits, that is, revenue minus costs:

$$\max_y p(y) y - c(y)$$

• Notice $p(y) = D^{-1}(y)$

• First order condition:

$$p'(y) y + p(y) - c'_y(y) = 0$$

or

$$\frac{p(y) - c'_y(y)}{p} = -p'(y) \frac{y}{p} = -\frac{1}{\varepsilon_{y,p}}$$

• Compare with f.o.c. in perfect competition

• Check s.o.c.
• Elasticity of demand determines markup:
  – very elastic demand → low mark-up
  – relatively inelastic demand → higher mark-up

• Graphically, $y^*$ is where marginal revenue \( (p'(y)y + p(y)) \) equals marginal cost \( (c'_y(y)) \)

• Find \( p \) on demand function
Example.

Linear inverse demand function $p = a - by$

Linear costs: $C(y) = cy$, with $c > 0$

Maximization:
$$\max_y (a - by) y - cy$$

Solution:
$$y^*(a, b, c) = \frac{a - c}{2b}$$

and
$$p^*(a, b, c) = a - b \frac{a - c}{2b} = \frac{a + c}{2}$$
• s.o.c.

• Figure

• Comparative statics:
  
  – Change in marginal cost $c$
  
  – Shift in demand curve $a$
• Monopoly profits

• Case 1. High profits

• Case 2. No profits
• Welfare consequences of monopoly
  – Too little production
  – Too high prices

• Graphical analysis
2 Price Discrimination

• Nicholson, Ch. 14, pp. 503-509 (Ch. 13, pp. 397–404, 9th)

• Restriction of contract space:
  – So far, one price for all consumers. But:
  – Can sell at different prices to differing consumers (first degree or perfect price discrimination).

  – Self-selection: Prices as function of quantity purchased, equal across people (second degree price discrimination).

  – Segmented markets: equal per-unit prices across units (third degree price discrimination).
2.1 Perfect price discrimination

- Monopolist decides price and quantity consumer-by-consumer

- What does it charge? Graphically,

- Welfare:
  - gain in efficiency;
  - all the surplus goes to firm
2.2 Self-selection

- Perfect price discrimination not legal

- Cannot charge different prices for same quantity to A and B

- Partial Solution:
  - offer different quantities of goods at different prices;
  - allow consumers to choose quantity desired
• Examples (very important!):

  – bundling of goods (xeroxing machines and toner);

  – quantity discounts

  – two-part tariffs (cell phones)
- Example:

- Consumer A has value $1 for up to 100 photocopies per month

- Consumer B has value $.50 for up to 1,000 photocopies per month

- Firm maximizes profits by selling (for $\varepsilon$ small):
  - 100 photocopies for $100-\varepsilon$
  - 1,000 photocopies for $500-\varepsilon$

- Problem if resale!
2.3 Segmented markets

- Firm now separates markets

- Within market, charges constant per-unit price

- Example:
  - cost function \( TC(y) = cy \).
  - Market A: inverse demand function \( p_A(y) \) or
  - Market B: inverse function \( p_B(y) \)
• Profit maximization problem:

\[\max_{y_A, y_B} p_A(y_A)y_A + p_B(y_B)y_B - c(y_A + y_B)\]

• First order conditions:

• Elasticity interpretation

• Firm charges more to markets with lower elasticity
• Examples:

  – student discounts

  – prices of goods across countries:
    * airlines (US and Europe)
    * books (US and UK)
    * cars (Europe)
    * drugs (US vs. Canada vs. Africa)

• As markets integrate (Internet), less possible to do the latter.
3 Oligopoly?

• Extremes:
  – Perfect competition
  – Monopoly

• Oligopoly if there are $n$ (two, five...) firms

• Examples:
  – soft drinks: Coke, Pepsi;
  – cellular phones: Sprint, AT&T, Cingular,...
  – car dealers
• Firm $i$ maximizes:

$$\max_{y_i} p (y_i + y_{-i}) y_i - c(y_i)$$

where $y_{-i} = \sum_{j \neq i} y_j$.

• First order condition with respect to $y_i$:

$$p_Y^i (y_i + y_{-i}) y_i + p - c'_y (y_i) = 0.$$ 

• Problem: what is the value of $y_{-i}$?

  – simultaneous determination?

  – can firms $-i$ observe $y_i$?

• Need to study strategic interaction
4 Next Lecture

• Game theory

• Back to oligopoly:
  
  – Cournot

  – Bertrand