Outline

1. Market Equilibrium in The Long-Run II
2. Profit Maximization: Monopoly
3. Price Discrimination
4. Oligopoly?
1 Market Equilibrium in the Long-Run

- Special cases:

- Constant cost industry

- Cost function of each company does not depend on number of firms
• **Increasing cost industry**

• Cost function of each company increasing in no. of firms

• Ex.: congestion in labor markets
• Decreasing cost industry

• Cost function of each company decreasing in no. of firms

• Ex.: set up office to promote exports
2 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 $\rightarrow$ low mark-up
  – relatively inelastic demand $\rightarrow$ 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
3 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).
3.1 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
3.2 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 $ small):
  
  – 100 photocopies for $100-$
  
  – 1,000 photocopies for $500-$

• Problem if resale!
3.3 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.
4 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 $y_i$:

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

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

  – simultaneous determination?

  – can firms $-i$ observe $y_i$?

• Need to study strategic interaction
5 Next Lecture

- Game theory

- Back to oligopoly:
  - Cournot
  - Bertrand