# Economics 101A (Lecture 19)

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#### 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:

$$\max_{y} \left( a - by \right) y - cy$$

• Solution:

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

 $\quad \text{and} \quad$ 

$$p^*(a, b, c) = a - b \frac{a - c}{2b} = \frac{a + c}{2}$$

- S.O.C.
- Figure

- Comparative statics:
  - Change in marginal cost  $\boldsymbol{c}$

– Shift in demand curve  $\boldsymbol{a}$ 

- 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-byconsumer
- 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  $\varepsilon$  small):
  - 100 photocopies for \$100- $\varepsilon$
  - 1,000 photocopies for \$500- $\varepsilon$

• 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:

 $\max_{y_A,y_B} p_A\left(y_A\right) y_A + p_B\left(y_B\right) y_B - c\left(y_A + y_B\right)$ 

• 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:

$$\max_{y_i} p\left(y_i + y_{-i}\right) y_i - c\left(y_i\right)$$
 where  $y_{-i} = \sum_{j \neq i} y_j.$ 

• First order condition with respect to  $y_i$ :

$$p'_{Y}(y_{i}+y_{-i})y_{i}+p-c'_{Y}(y_{i})=0.$$

- Problem: what is the value of  $y_{-i}$ ?
  - simultaneous determination?
  - can firms -i observe  $y_i$ ?
- Need to study strategic interaction

## **5** Next Lecture

- Game theory
- Back to oligopoly:
  - Cournot
  - Bertrand