Economic Analysis of Technological Processes

Lecture 5

Monopoly-Monopoly Behavior-Factor Market-Oligopoly

Lecture 5: Monopoly

Market environment:
One company
Setting price or quantity

$r(y) = p(y)y$ denote the revenue function

profit-maximization:

$$\max_y \; r(y) - c(y)$$

$$MR = MC$$

$$\frac{\Delta r}{\Delta y} = \frac{\Delta c}{\Delta y}$$

$$\Delta r = p\Delta y + y\Delta p$$

$$\frac{\Delta r}{\Delta y} = p + \frac{\Delta p}{\Delta y}y$$

Lecture 5: Monopoly

$$MR(y) = p(y)\left[1 + \frac{1}{\epsilon(y)}\right]$$

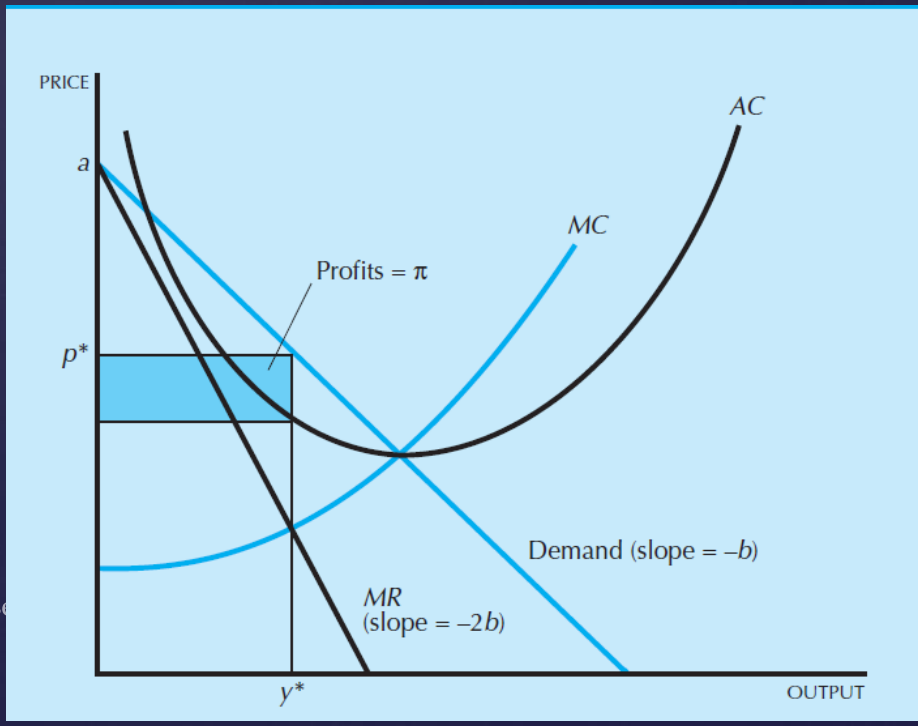
$$p(y)\left[1 + \frac{1}{\epsilon(y)}\right] = MC(y)$$

$$p(y)\left[1 - \frac{1}{|\epsilon(y)|}\right] = MC(y)$$

$$p(y) = a - by$$

$$r(y) = p(y)y = ay - by^2$$

$$MR(y) = a - 2by$$



Lecture 5: Monopoly

Markup Pricing

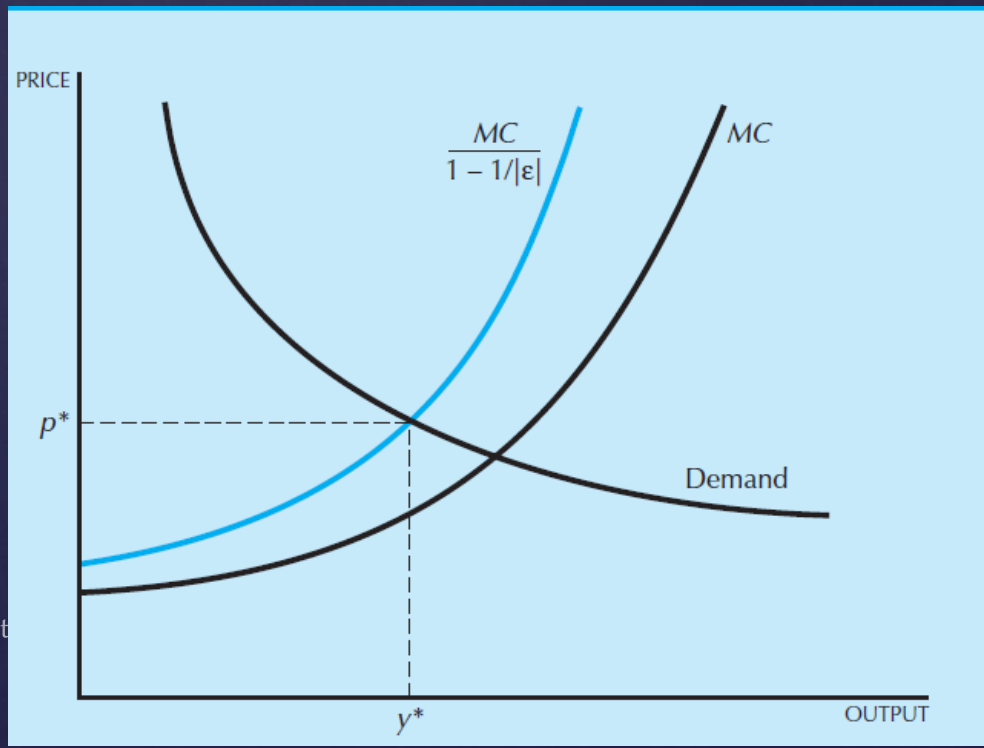
$$p(y) = \frac{MC(y^*)}{1 - 1/|\epsilon(y)|}$$

markup

$$\frac{1}{1 - 1/|\epsilon(y)|}$$

$|\varepsilon| > 1$

Constant $p = MC/(1 - 1/|\varepsilon|)$



Lecture 5: Monopoly

Impact of Tax

MC+t

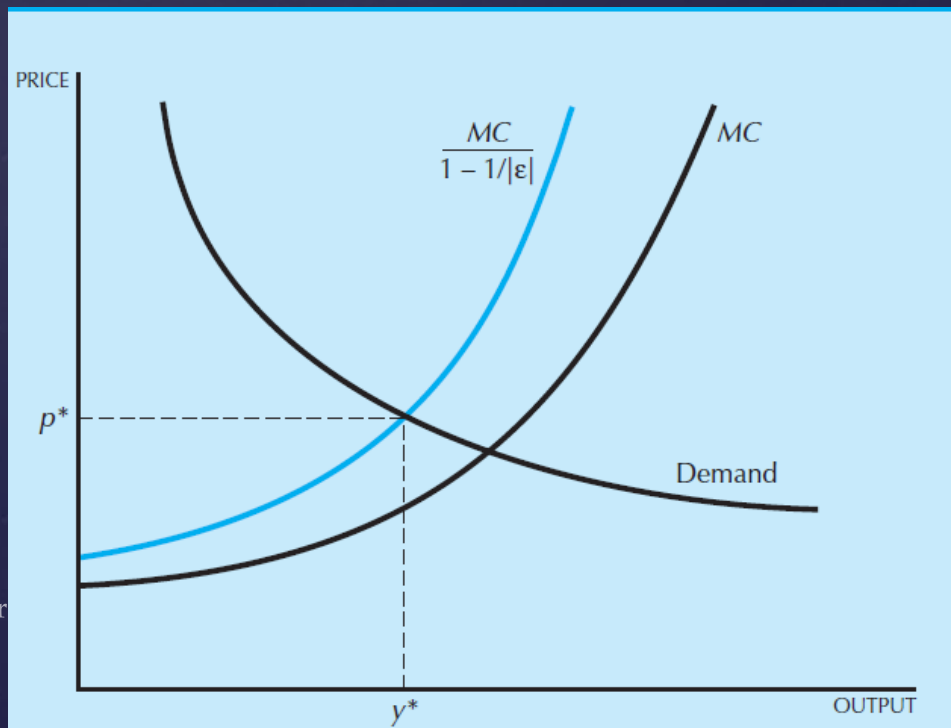
$a - 2by = c + t$

$$y = \frac{a - c - t}{2b}$$

$$\frac{\Delta y}{\Delta t} = -\frac{1}{2b}$$

demand curve $p(y) = a - by$

$$\frac{\Delta p}{\Delta t} = -b \times -\frac{1}{2b} = \frac{1}{2}$$



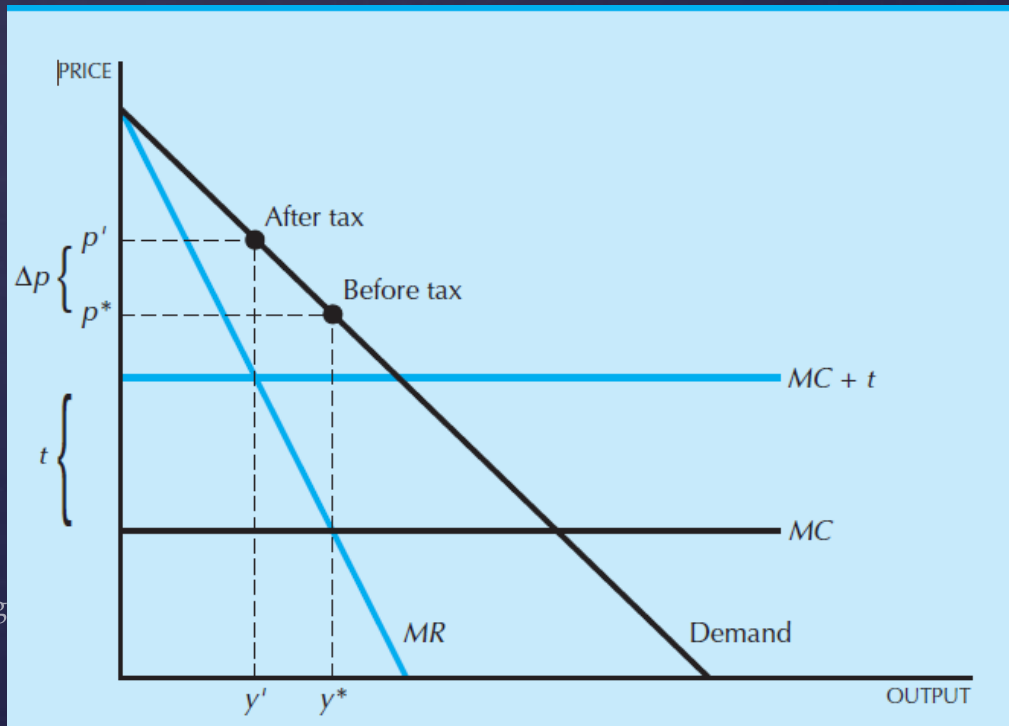
Lecture 5: Monopoly

$$p = \frac{c + t}{1 - 1/|\epsilon|}$$

$$\frac{\Delta p}{\Delta t} = \frac{1}{1 - 1/|\epsilon|}$$

profits tax

$$\max_y \ (1 - \tau)[p(y)y - c(y)]$$



Lecture 5: Monopoly

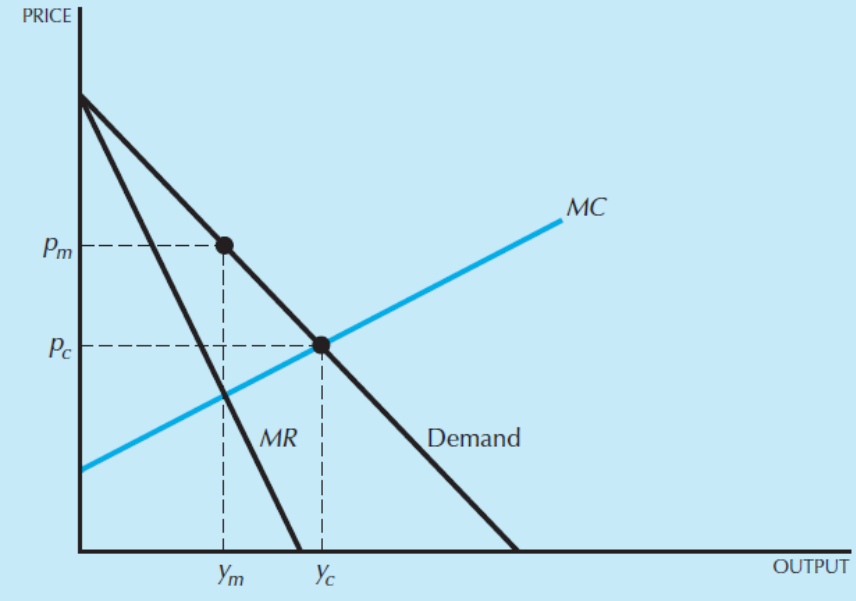
Inefficiency

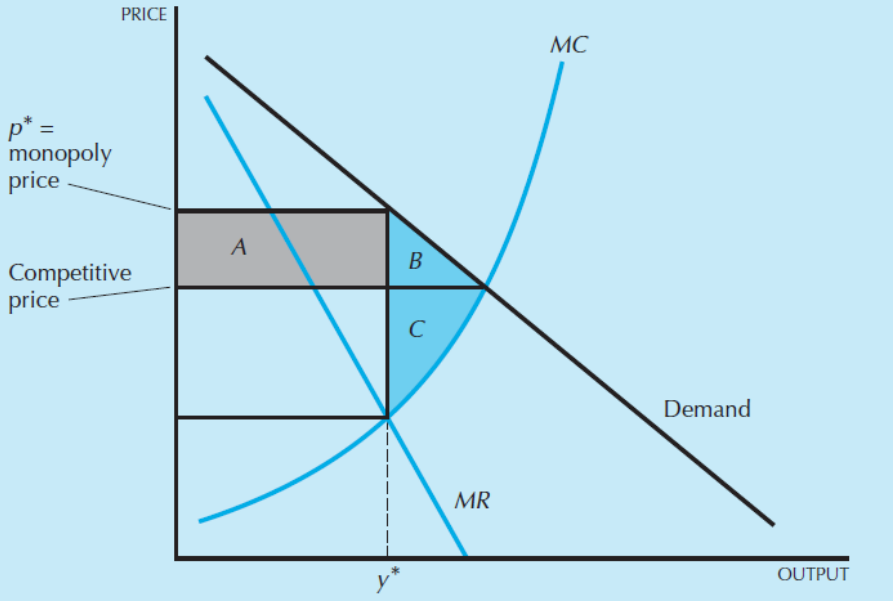
relative welfare of consumers and the owners of firms

Pareto efficiency

Deadweight Loss of Monopoly- measure the total loss

Cost of the monopoly





Lecture 5: Monopoly

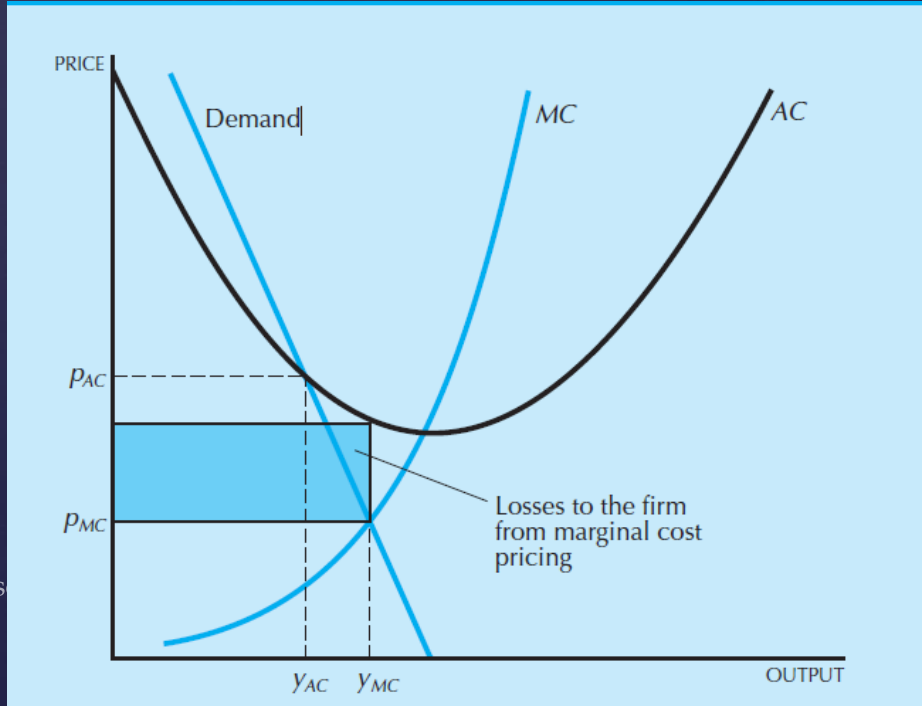
Natural Monopoly

public utilities: large fixed costs and small variables

regulated or operated by governments

what the true costs of the firm are?

lump-sum subsidy



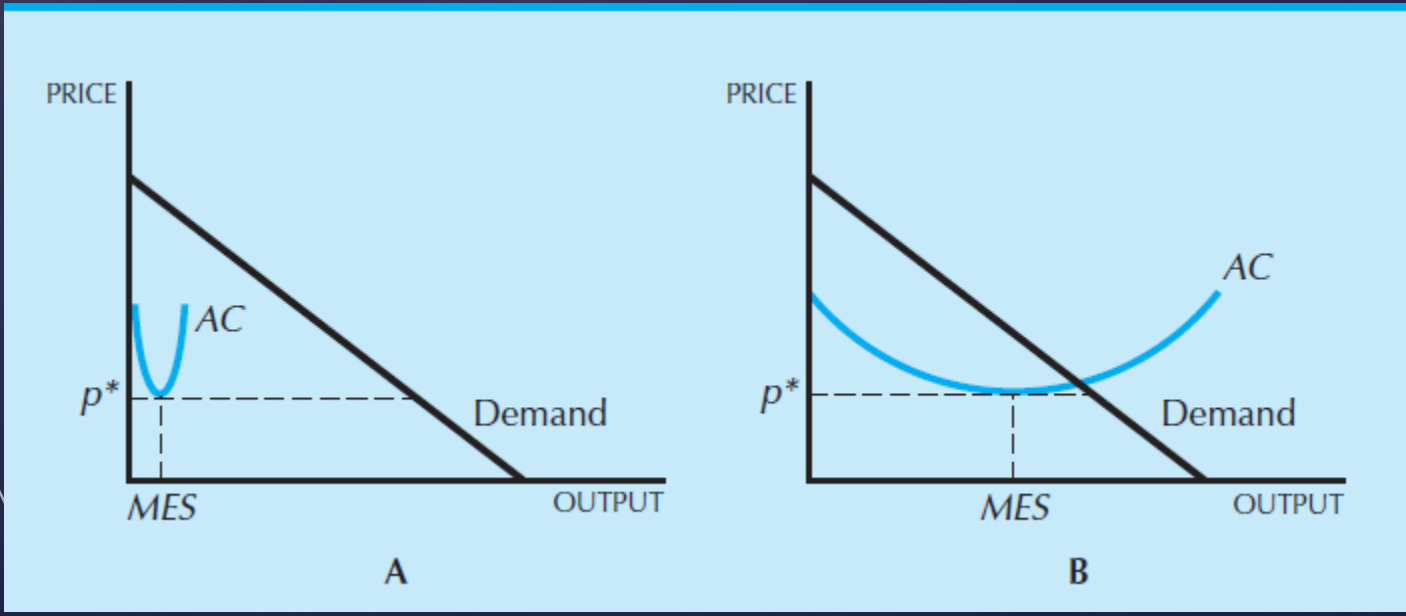
Lecture 5: Monopoly

What Causes Monopolies?

size of the minimum efficient scale (MES)

Collusion

Cartel



Lecture 5: Monopoly behaviour

some degree of monopoly power

more complicated pricing and marketing strategies

Price Discrimination

sell different units of output at different prices

First-degree: different prices from person to person

= perfect price discrimination

Second-degree : prices differ across the units of the good, but not across people= bulk discount

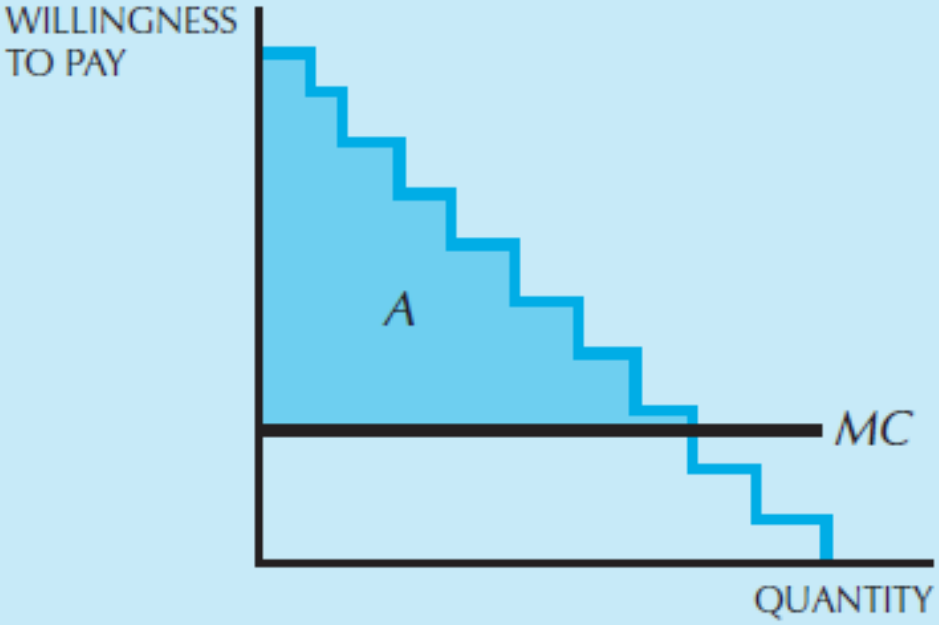
Third-degree: to different people for different prices e.g. Senior tickets

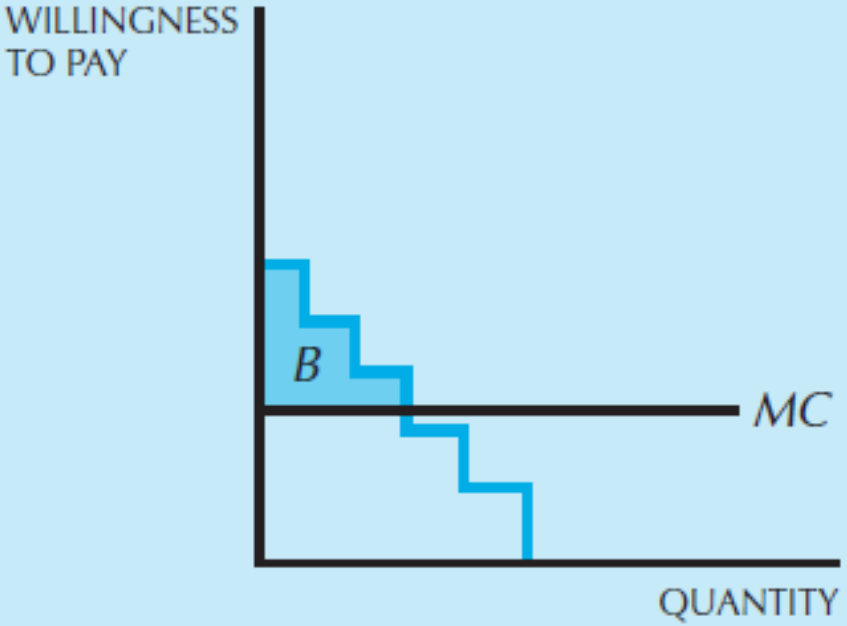
Lecture 5: Monopoly behaviour

First-Degree Price Discrimination

producer's surplus

automobile sales or in antique markets

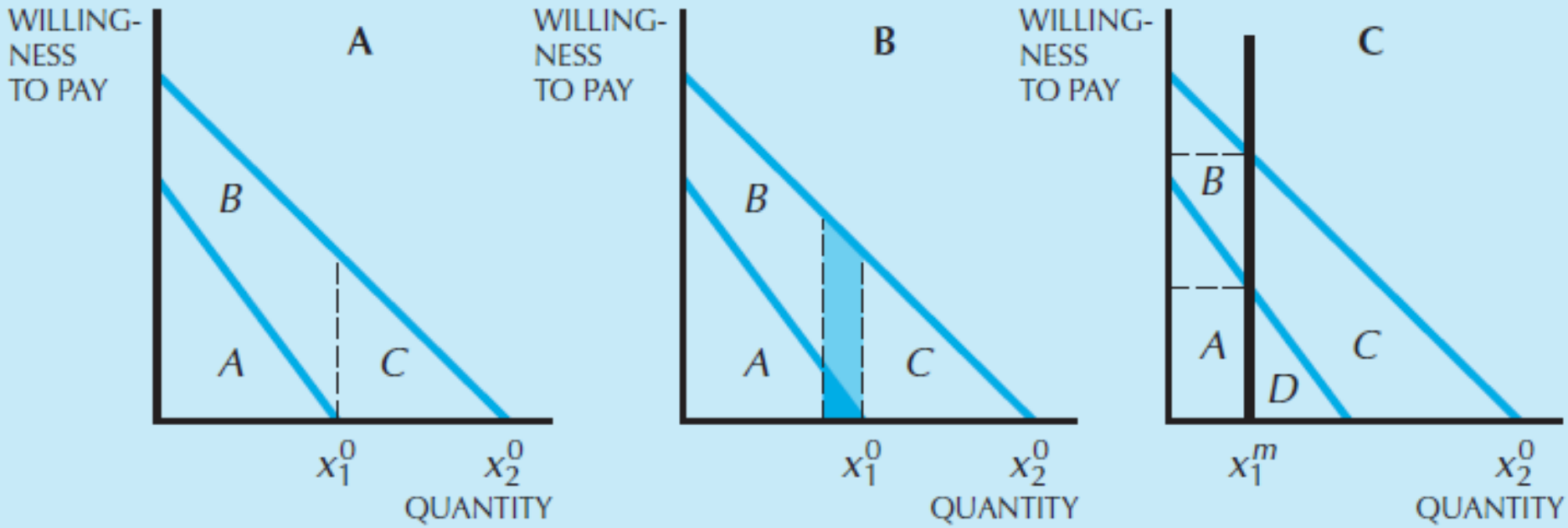




Lecture 5: Monopoly behaviour

Second-Degree Price Discrimination

Nonlinear pricing: public utilities, how much is bought



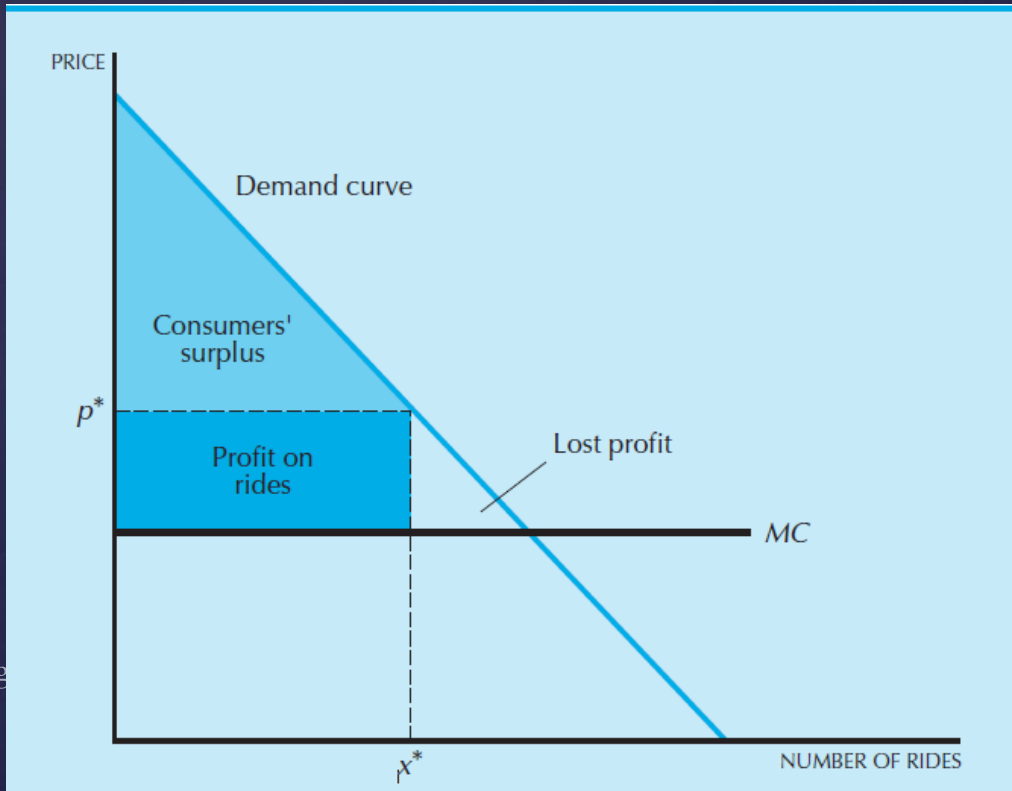
Lecture 5: Monopoly behaviour

Third-Degree Price Discrimination

student discounts at the movies, or senior citizens' discounts

Bundling: software suite

Two-Part Tariffs: amusement park

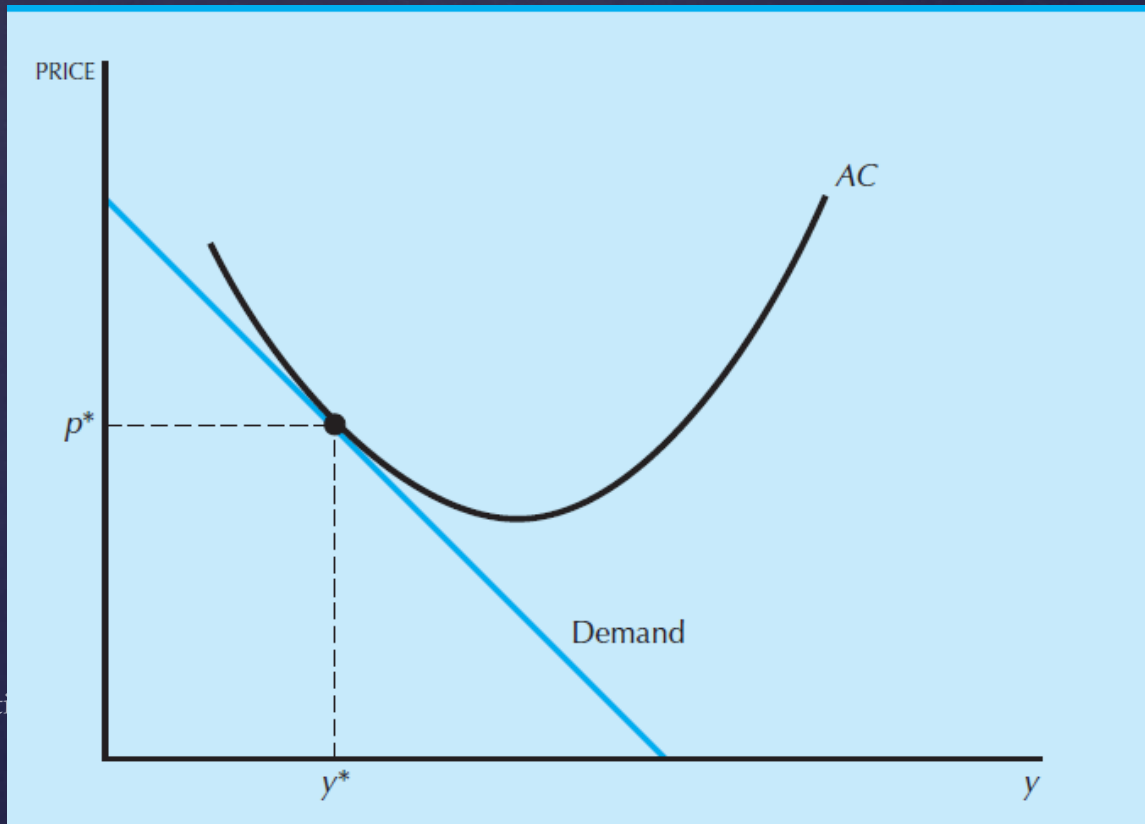


Lecture 5: Monopoly behaviour

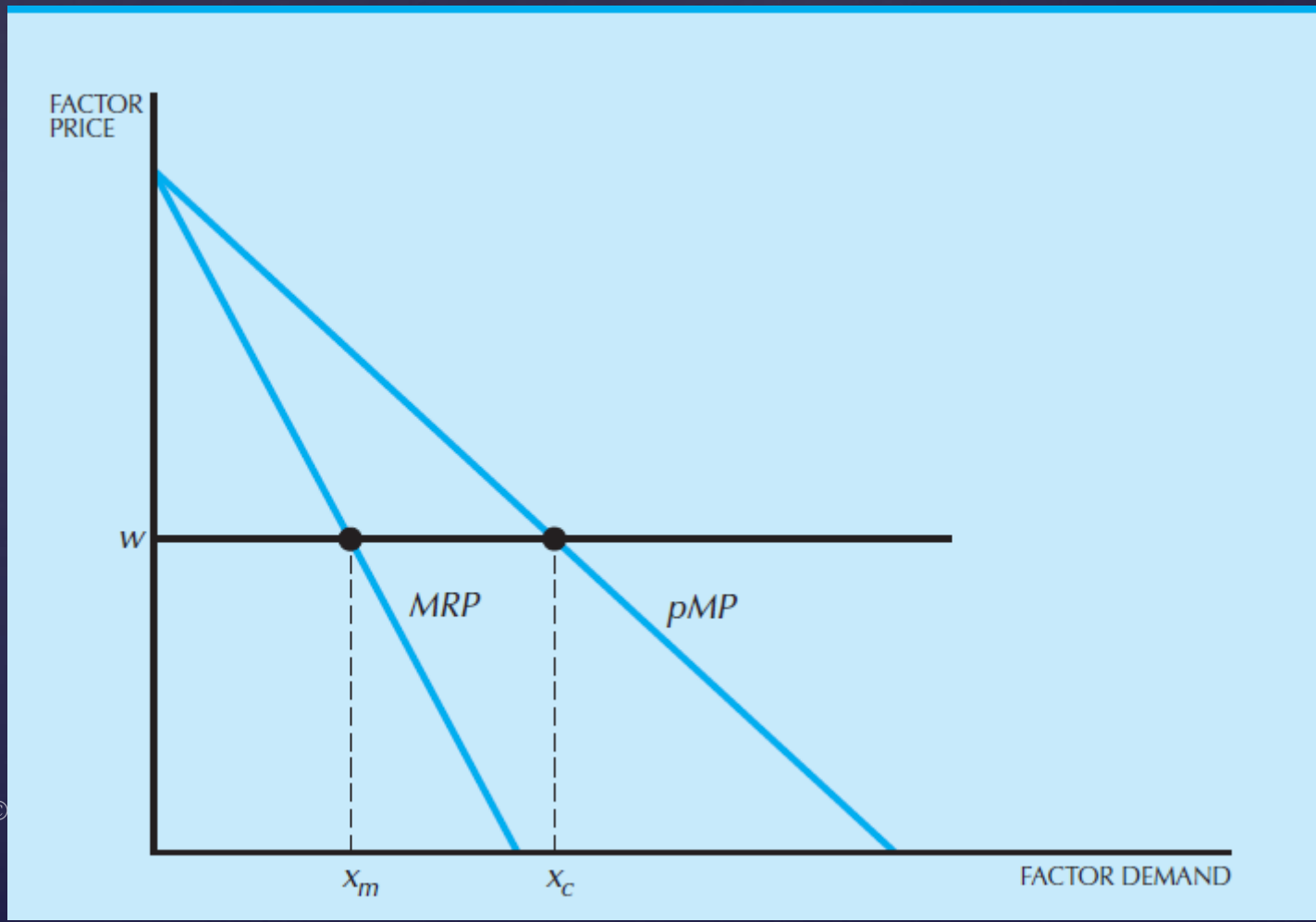
Monopolistic Competition (soft drink market)

product differentiation

Competition in location



Lecture 5: Factor Market



Some parts used from ©

Lecture 5: Factor Market

Monopsony: single buyer

Output to be sold in a competitive market

Single input function $y = f(x)$

price maker

$$\max_x \; pf(x) - w(x)x$$

$$\Delta c = w\Delta x + x\Delta w$$

$$\frac{\Delta c}{\Delta x} = MC_x = w + \frac{\Delta w}{\Delta x}x$$

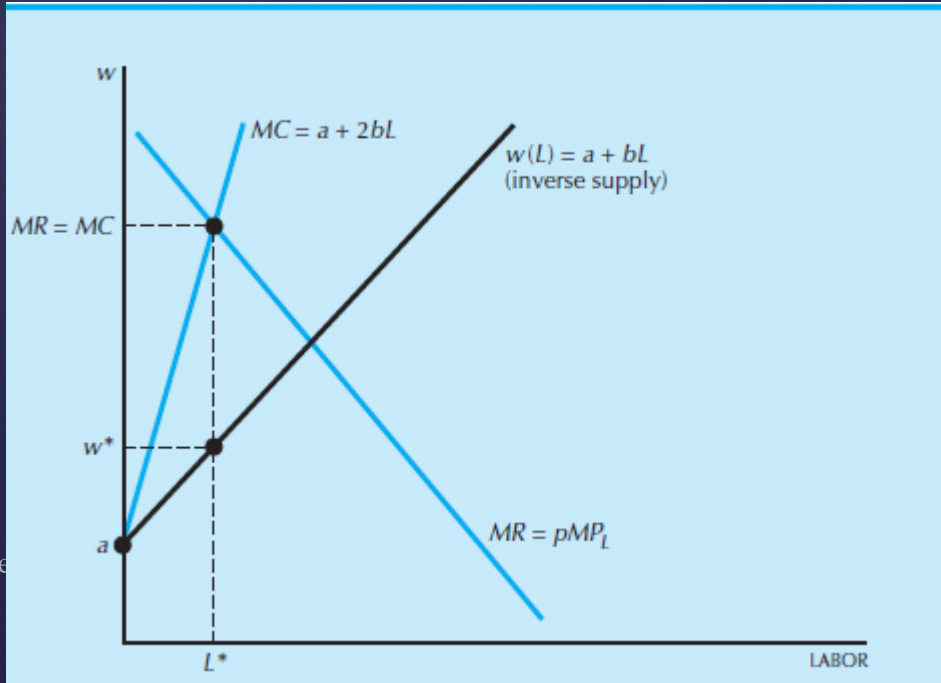
$$MC_x = w\left[1 + \frac{x}{w}\frac{\Delta w}{\Delta x}\right] \qquad = w\left[1 + \frac{1}{\eta}\right]$$

Lecture 5: Factor Market

Monopsony: single buyer

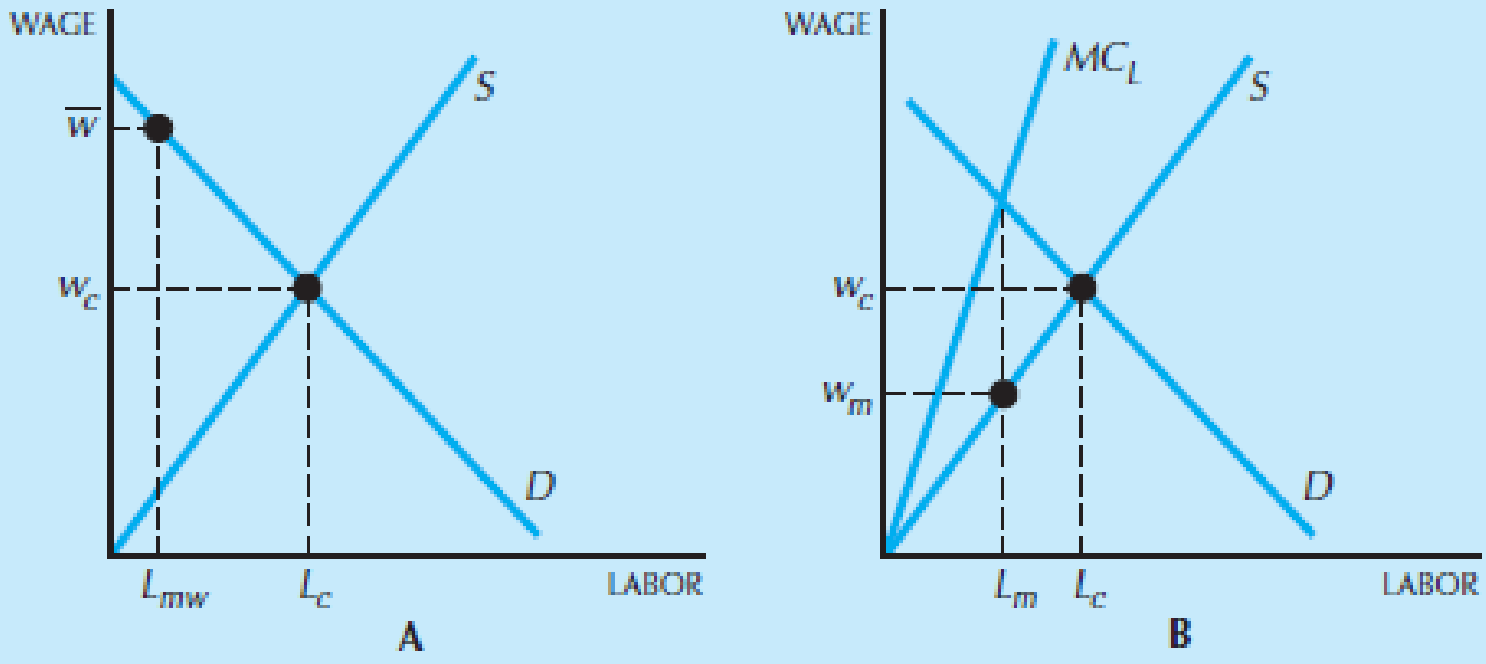
inverse supply curve: $w(x) = a + bx$

$$C(x) = w(x)x = ax + bx^2 \qquad MC_x(x) = a + 2bx$$



Lecture 5: Factor Market

Minimum wage



Some parts

Lecture 5: Oligopoly

Number of competitors in the market, but not so many

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negligible effect on price

strategic interactions in an industry with a small number of firms.

Duopoly, identical product

sequential game: leader and follower in price/quantity

simultaneous game: not considering the other's decisions

to **collude: cooperative game**

Lecture 5: Oligopoly

Pricing Matching (Tires):

a vendor that offers a low-price guarantee takes away much of its competitors' motivation for cutting prices

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Quantity Leadership= Stackelberg model:

dominant firm, or a natural leader: IBM

Output: $Y = y_1 + y_2$

The Follower's Problem: $\max_{y_2} \; p(y_1 + y_2)y_2 - c_2(y_2)$

$$MR_2 = p(y_1 + y_2) + \frac{\Delta p}{\Delta y_2} y_2 = MC_2$$

Lecture 5: Oligopoly

Reaction function: $y_2 = f_2(y_1)$

Linear demand, inverse function: $p(y_1+y_2) = a-b(y_1+y_2)$

0 cost, profit function: $\pi_2(y_1, y_2) = [a - b(y_1 + y_2)]y_2$

isoprofit lines $ay_2 - by_1y_2 - by_2^2 = \overline{\pi}_2$

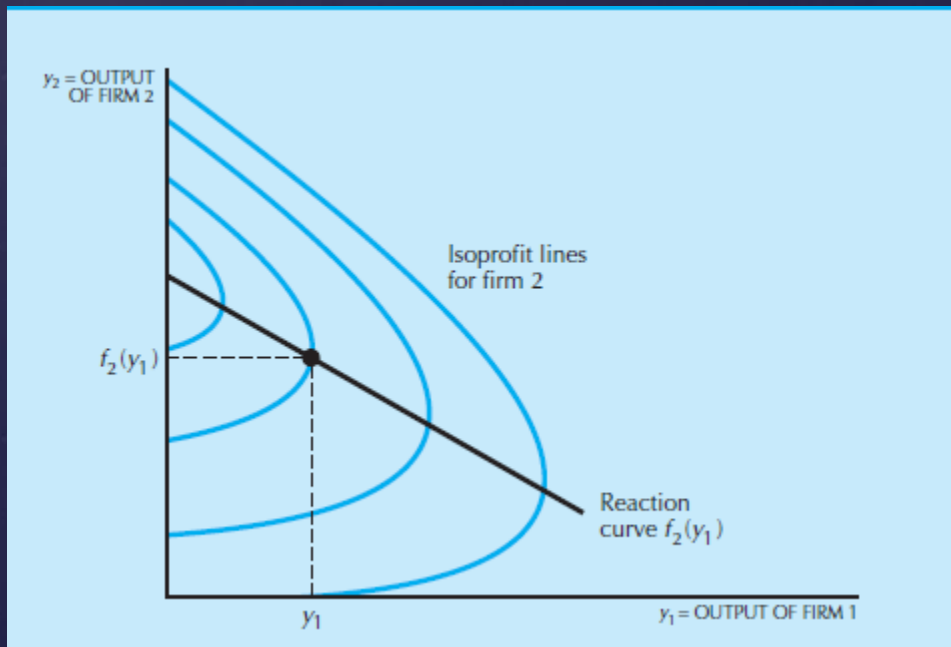
$$MR_2(y_1, y_2) = a - by_1 - 2by_2$$

MR=MC and MC=0

$$a - by_1 - 2by_2 = 0$$

Reaction curve, company 2:

$$y_2 = \frac{a - by_1}{2b}$$



Lecture 5: Oligopoly

The Leader's Problem:

$$\max_{y_1} p(y_1 + y_2)y_1 - c_1(y_1)$$

$$y_2 = f_2(y_1)$$

$$\max_{y_1} p[y_1 + f_2(y_1)]y_1 - c_1(y_1)$$

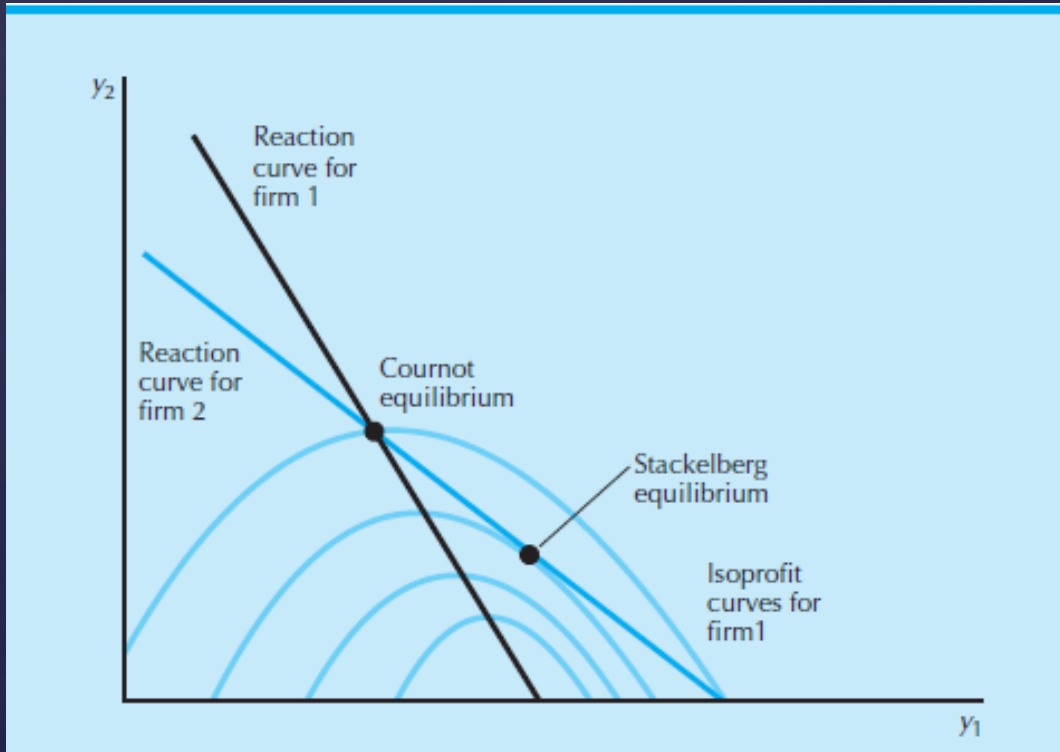
$$f_2(y_1) = y_2 = \frac{a - by_1}{2b}$$

$$\pi_1(y_1, y_2) = p(y_1 + y_2)y_1 = ay_1 - by_1^2 - by_1y_2$$

$$\pi_1(y_1, y_2) = \frac{a}{2}y_1 - \frac{b}{2}y_1^2$$

$$MR = \frac{a}{2} - by_1$$

$$y_1^* = \frac{a}{2b} \qquad y_2^* = \frac{a - by_1^*}{2b} = \frac{a}{4b}$$



Lecture 5: Oligopoly

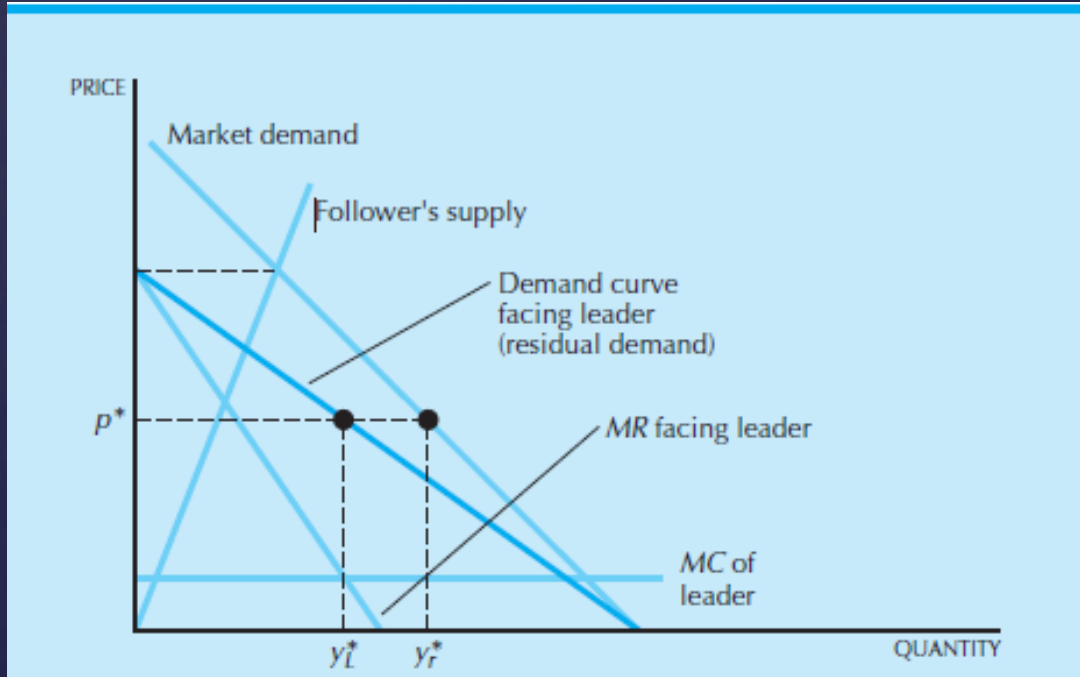
Price Leadership:

Follower's behaviour:

$$\max_{y_2} \; py_2 - c_2(y_2)$$

residual demand curve

$$\pi_1(p) = (p-c)[D(p) - S(p)] = (p-c)R(p)$$



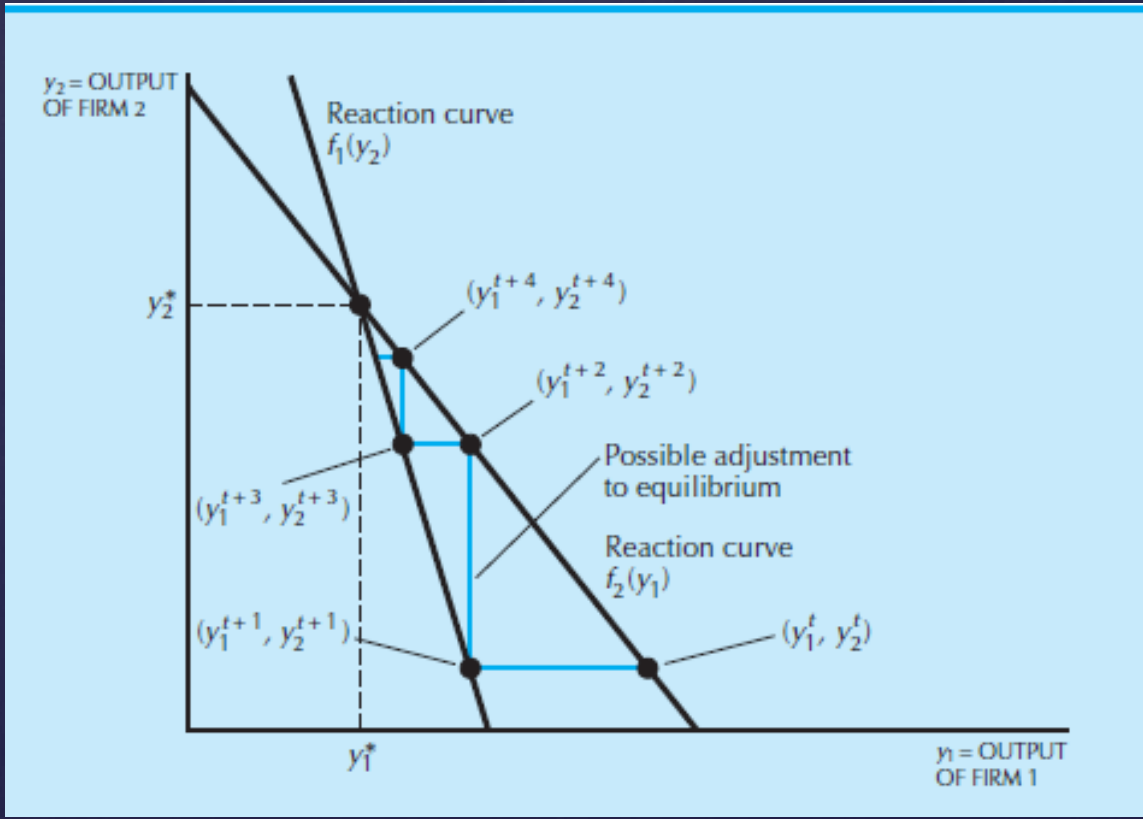
Lecture 5: Oligopoly

Comparing Price Leadership and Quantity Leadership

Simultaneous Quantity Setting= Cournot model

stable equilibrium

Many firms in Cournot equilibrium



Lecture 5: Oligopoly

Collusion

Cartel

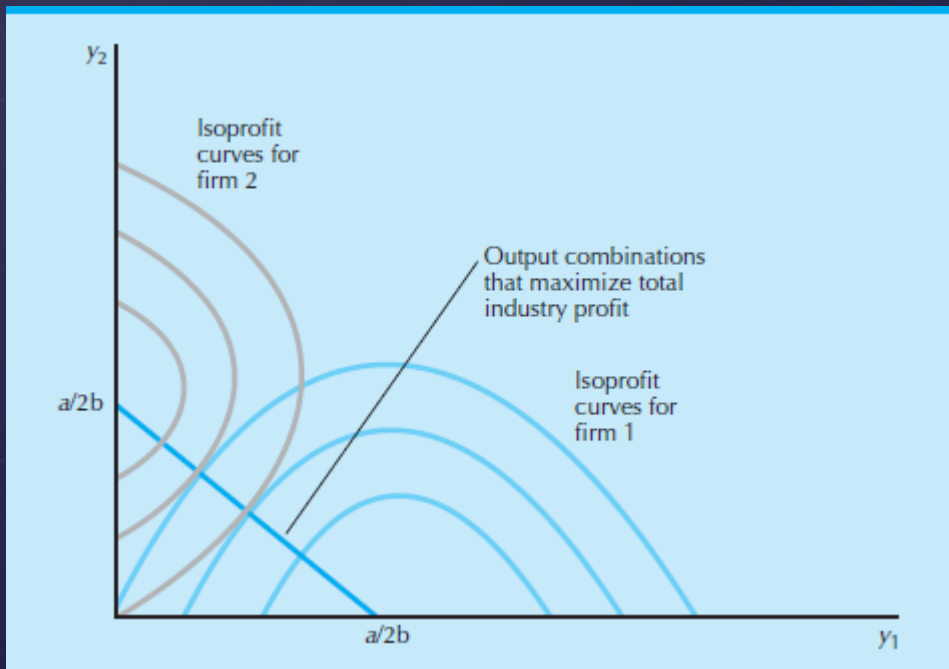
firms act together to restrict output so as not to "spoil" the market

detect and punish cheating

$$\pi(y_1, y_2) = [a - b(y_1 + y_2)](y_1 + y_2) = a(y_1 + y_2) - b(y_1 + y_2)^2$$

$$a - 2b(y_1^* + y_2^*) = 0$$

$$y_1^* + y_2^* = \frac{a}{2b}$$



Lecture 5: Oligopoly

Punishment Strategies and the size of them

$$\text{Present value of cartel behavior} = \pi_m + \frac{\pi_m}{r}$$

$$\text{Present value of cheating} = \pi_d + \frac{\pi_c}{r}$$

$$\pi_m + \frac{\pi_m}{r} > \pi_d + \frac{\pi_c}{r}$$

$$r < \frac{\pi_m - \pi_c}{\pi_d - \pi_m}$$