### Announcements

**Thank you for bearing with the noisy air vent today**

Please check web site for updated links

Warning: you are responsible for all material covered in lecture. Some items may not appear in slides, but are presented verbally or via overheads.

It is likely that outlines will be posted before lecture for most lectures. We received PPT text figures from the publisher just before the semester started. This is why sometimes slides are readyonly very close to lecture.

## Imperfect Competition

## Or, Departures from Perfect Competition

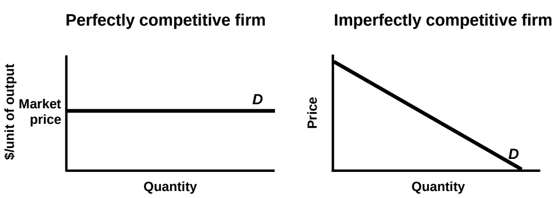
### Questions We Can Answer

Why do stores at airports get away with charging such high prices?

Are patients better off when pharmaceutical companies are protected by patent laws that keep new drug prices temporarily high?

### Key Difference Between Perfectly and Imperfectly Competitive Firms:

### Demand Curve Facing Firm




### Types of Imperfect Competition

Monopoly
- one firm , ie one seller
- no close substitute

Oligopoly
- handful of firms
- similar product
- (eg. GM , Ford in US auto industry)

Monopolistic Competition
- many sellers
- imperfect subsitutes
- (eg. customers with brand loyalty, cereals)

### Reasons or Sources of Monopoly Power

Monopoly has market power

Market power: ability to set price (above MC)

Sources: Unique input
- eg. access to mineral quarry

Patent or Copyright
- eg. new drug or music CD

Government license
- eg. airport concession stands

Economies of Scale (Natural Monopoly)
- eg. public utilities (electricity, natural gas, water)

### Example: High Prices at Airports

Airport Authority grants license to sell to single seller: eg Early 90s Host Marriot Corporation at SFO

Airport can earn high rental charges on retail space (Here airport captures some of monopoly profits)

Example of Price Premiums:

Bottled water $1.69 at airport ($0.49 in town)
Snapple $2.25 at airport ($0.99 in town)
Life Savers $0.85 at airport ($0.59 in town)

### Example: Smith Kline Patent on Ulcer Drug

Prior to ulcer drug Tagamet, ulcer patients went in for surgery 155,000 per year in 70s dropped to 16,000 in 90s. Saving from reduced surgery about $3B per year.

<u>Benefit of Drug:</u>

While patent in place: price 75 cents per dose and 1.3 M doses bought & sold. CS = $0.44 M

After 17 yrs, patent removed: price fell to MC = 7.5 cents per dose and 2.61 M doses bought & sold. CS = $1.76M

### Smith Kline Patent on Ulcer Drug

Patent: Allows drug manufacturers to recover high fixed cost of R&D , testing , winning FDA approval etc

Benefit to consumers measured by CS.

### Example: Natural Monopoly
### (eg Public Utility, Electricity Generation)

Transmission lines involve high fixed costs
Makes sense for one set to be installed.

Once installed, AC declines, low for large output

Or, consider that Demand in region of AC where AC declining

Review: AC declining means MC < AC

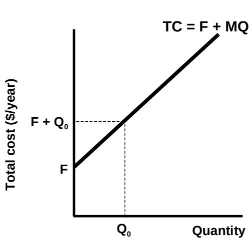
### Example: Natural Monopoly
### (New High Tech Products)

<u>F&B Focus:</u> New high tech products

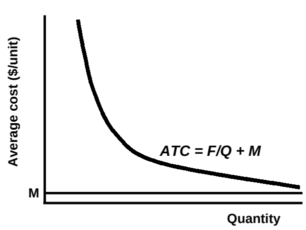
computer chips
computer/video games
software

High fixed cost (R&D), low MC

### Economies of Scale: Declining ATC, ATC > MC

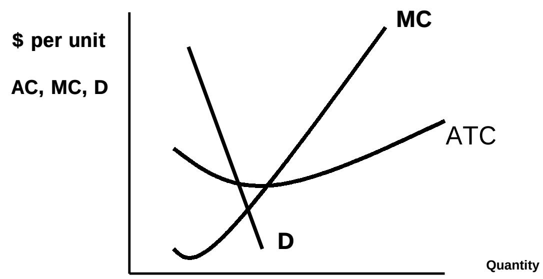



(Special Form of TC)




ATC Falls
ATC > MC Everywhere

### Economies of Scale: Declining ATC, ATC > MC
### For General AC, MC




**Demand Occurs in Region where AC declining**

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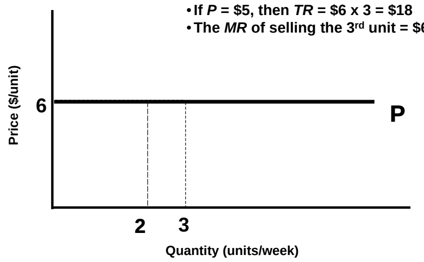
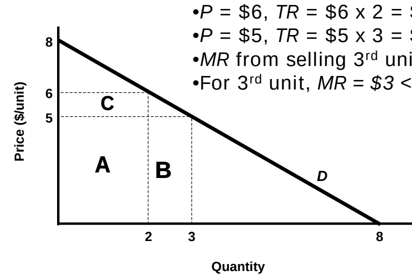
### PC firms "MB" from sale of additional unit
### MR = P

- If $P$ = \$6, then $TR$ = \$6 x 2 = \$12
- If $P$ = \$5, then $TR$ = \$6 x 3 = \$18
- The $MR$ of selling the 3rd unit = \$6 = P



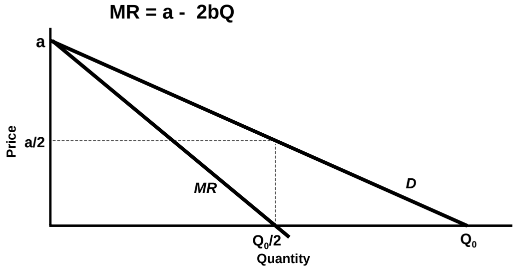

### Monopolist's MB from sale of additional unit
### MR < P

- $P$ = \$6, $TR$ = \$6 x 2 = \$12
- $P$ = \$5, $TR$ = \$5 x 3 = \$15
- $MR$ from selling 3rd unit = \$3
- For 3rd unit, $MR$ = \$3 < $P$ = \$5



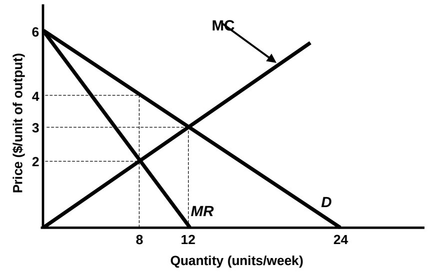

<u>Extra:</u> MR = P +△p/△Q x Q, MR = B - C = 5 - C

### MR: Straight Line Demand Curve
P = a - bQ
MR = a - 2bQ




**Vertical intercept MR = *a***
**Horizontal intercept MR = *$Q_0$ / 2***

### Monopoly: Profit- Maximizing Output Level
### MR = MC , Qm=8



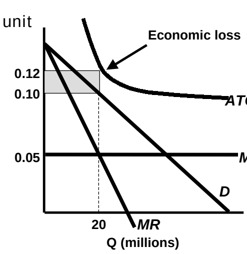

<u>Note</u>: At P=MC=3, MC > MR , not profit max

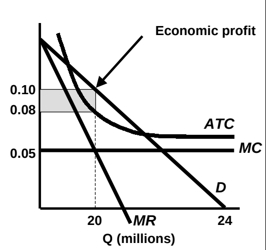
### Profits for Monopoly: Compare P & ATC

P < ATC

P > ATC

$/unit



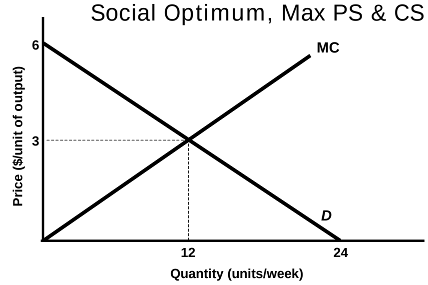




Demand Low

Demand High

### Monopoly: Output Low, WTP > MC

WTP = P = MC, at 12 units
Social Optimum, Max PS & CS



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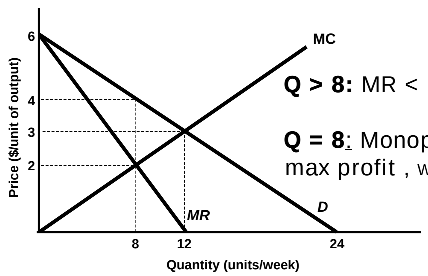
Lecture 5, July 7, 2003

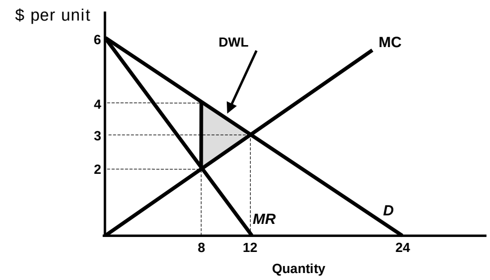
### Monopoly: Output Low, WTP > MC




**Q > 8:** MR < MC

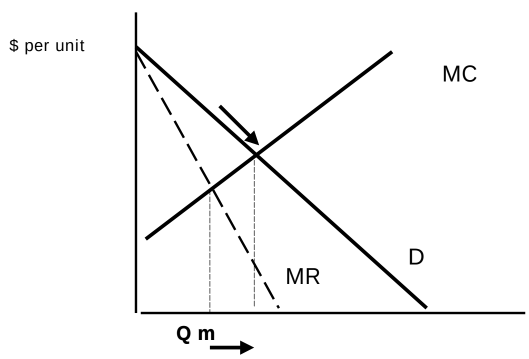
**Q = 8**: Monopoly max profit , WTP > MC

### Monopoly: Output Low, WTP > MC

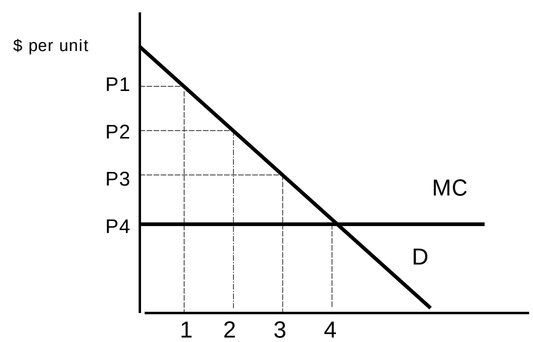



DWL= surplus that goes to no one

### Price Discriminating Monopolist Extracts Surplus




### Perfect Price Discriminating Monopolist Extracts All Surplus




### Imperfect Price Discrimination

Divide consumers into groups based on reservation price, WTP

Determine price sensitivity from hurdle consumer willing to cross:

- wait for DVD, video, broadcast of movie
- clip coupon
- wait for paperback edition

Works if sales between groups can be prevented

## Summary: Monopoly

Monopoly arises when good has no close substitute

Source: unique input, patent, copyright, license, economies of scale

Monopoly power: Patent gives incentive for R&D
Economies of scale means one firm better than many. Lower ATC.

Monopoly output less than social optimum

Monopoly will increase Qm w/ price discrimination

**More Imperfect Competition**

**Questions We Can Answer**

Why are cartel arrangements hard to maintain?

Why are economic sanctions hard to enforce?

**Everyday Questions We Can Answer**

Why do people shout at parties?

Why does everyone stand at a concert, when everyone would be better off if all were seated?

## Non-cooperative Behavior Between Firms

Each firm acts in his best interest not knowing what other firm will actually do.

Violation of PC Assumption: few sellers, strategic behavior

Game Theory: tool to model such situations

## Game: Basics

Players: firms (for our purposes)

Strategies: Actions each player can take, given behavior of other player

Dominant Strategy: Action that is best no matter other player's strategy

Payoffs: Reward for action taken (profit etc)

Assume: Each player knows complete payoff matrix

## Equilibrium of Game

Nash Equilibrium:

Each player plays a best response given other player's strategy

Equilibrium Outcome: Actions actually played in equilibrium

**Example: One Player w/ Dominant Strategy**

| | | American's Choice | |
|---|---|---|---|
| | | Raise ad spending | Leave ad spending the same |
| United's Choice | Raise ad spending | American gets $4,000<br>United gets $3,000 | American gets $3,000<br>United gets $8,000 |
| | Leave ad spending the same | American * gets $5,000<br>United gets $4,000 * | American gets $2,000<br>United gets $5,000 |

"Using Arrows" Equilibrium = *

## Example: One Player w/ Dominant Strategy

American's Choice +

| United's Choice # | Raise ad spending | Leave ad spending the same |
|---|---|---|
| Raise ad spending | American + gets $4,000; United gets $3,000 | American gets $3,000; United gets $8,000 # |
| Leave ad spending the same | American + gets $5,000; United gets $4,000 # | American gets $2,000; United gets $5,000 |

"Using Symbols"

## Example: Both Players w/ Dominant Strategy

American's Choice

| United's Choice | Raise ad spending | Leave ad spending the same |
|---|---|---|
| Raise ad spending | American gets $2,000; United gets $3,000 | American * gets $3,000; United gets $4,000 * |
| Leave ad spending the same | American gets $3,000; United gets $2,000 | American gets $4,000; United gets $3,000 |

## Prisoner's Dilemma: Classic Case

Jasper's Choice

| Horace's Choice | Confess | Remain silent |
|---|---|---|
| Confess | Jasper gets 5 years*; Horace gets 5 years* | Jasper gets 20 years; Horace gets 0 years |
| Remain silent | Jasper gets 0 years; Horace gets 20 years | Jasper gets 1 years; Horace gets 1 years |

"Social Optimum" = "Joint Optimum" = (silent,silent)

## Prisoner's Dilemma?

GAME 1

Chrysler's Choice

| GM's Choice | Don't Invest | Invest |
|---|---|---|
| Don't Invest | 10 for Chrysler; 10 for GM | 12 for Chrysler; 4 for GM |
| Invest | 4 for Chrysler; 12 for GM | 5 for Chrysler*; 5 for GM* |

## Prisoner's Dilemma?

GAME 2

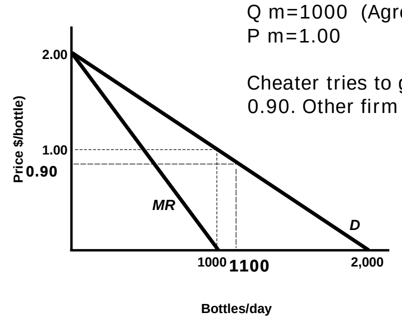
Chrysler's Choice

| GM's Choice | Don't Invest | Invest |
|---|---|---|
| Don't Invest | 12 for Chrysler; 4 for GM | 5 for Chrysler; 5 for GM |
| Invest | 10 for Chrysler*; 10 for GM* | 4 for Chrysler; 12for GM |

## Cartel Agreement: Jointly Behave as Monopoly Incentive to Cheat

Q m=1000 (Agree : 500 each)
P m=1.00

Cheater tries to get all sales at 0.90. Other firm retaliates



## Prisoner's Dilemma Application: Cartel Agreement

Mountain Spring's Choice

| Aquapure's Choice | Charge $1 | Charge $0.90 |
| --- | --- | --- |
| Charge $1 | $500/day for Mountain Spring<br>$500/day for Aquapure | $990/day for Mountain Spring<br>$0/day for Aquapure |
| Charge $0.90 | $0/day for Mountain Spring<br>$990/day for Aquapure | $495/day for Mount Spring *<br>$495/day for Aquapure * |

## Summary: Oligopoly

Oligopolistic market has few firms that behave as rivals. Will engage in strategic advertising or pricing behavior to gain profit advantage.

Game theory is a tool we can use to study such non-cooperative behavior

Prisoner's Dilemma is a type of game that fits many situations. Rational actions by individual lead to outcomes that are pareto inferior to dominated strategy.

## Asymmetric Information

**Questions We Can Answer**

Why are cars in the used car market of low quality? What will happen to prices in such markets?

Why do insurer's offer a menu of deductibles?

## Asymmetric Information

Violation of PC market assumption of perfect information.

Can happen in many ways:

1. Imperfect information on good's characteristic

(eg. Lemons Model)

2. Imperfect information on buyer's characteristic (AS)

3. Imperfect information on buyer's action (MH)

## Lemons Model (Buyer)

1) does not know quality of good being sold by a seller

2) knows proportion of bad quality goods.

3) has reservation price (WTP) for good and bad cars

4) calculates average price or expected value

5) buys car if average (going) price > sale price

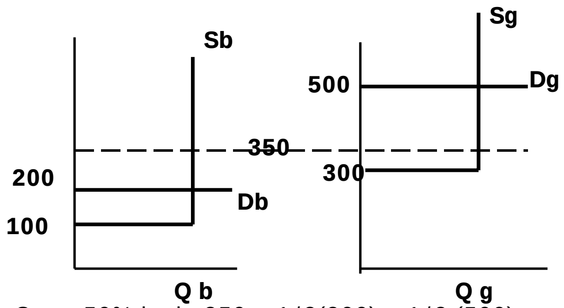
## Lemons Model (Seller)

1) knows quality of his good

2) has reservation price (WTA) for his good

3) sells if price he gets > reservation price

## Lemons Model ( Buyer & Seller)




Spse: 50% bad , 350 = 1/2(200) + 1/2 (500)

## Adverse Selection

Seller knows proportion of high and low risk. If seller (insurer) offers an average price that is attractive only to high risk, market unravels

One Remedy: offer deductible menu. High risks self select by taking low deductible at higher price (premium) Low risks take high deductible.

## Summary: Asymmetric Information

Lemons Model predicts that when buyers don't know quality of good on market, prices reflect an average valuation so that sellers of good quality will not be willing to place these goods on market. Average quality of goods and prices spiral downward.

Adverse Selection in the insurance market leads insurers to offer a menu of deductible/price contracts. Low risks self-select by buying high deductible -low price contracts