Pricing Decisions and Market Structures

Module 1, Chapter 5

Lesson: Market Structures

Objectives:

- ❑ Link market characteristics with real-world leagues
- ❑ Distinguish between market characteristics and how that impacts the outcome
- ❑ Calculate optimal prices, quantity, and profits from various markets

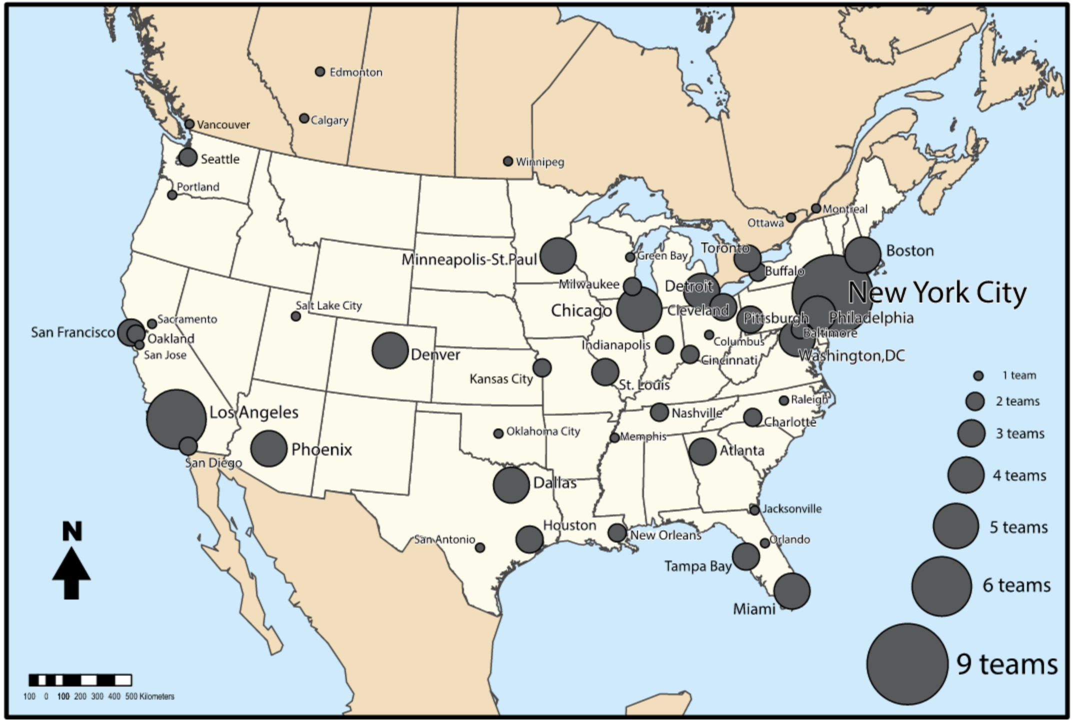
Lesson Direction

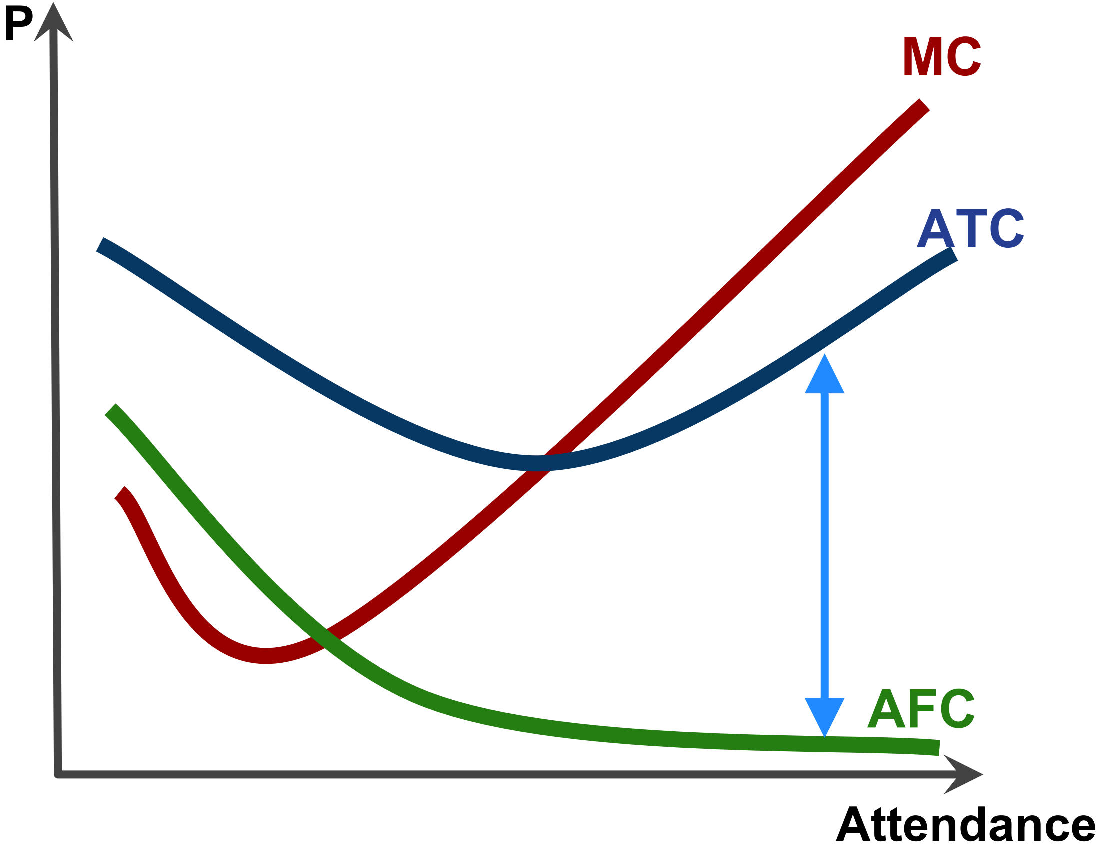
Scarcity

Rationing

Competition

Number of NFL, NBA, MLB and NHL Sports Teams by City, 2012





Marginal Cost (MC)

The cost of the next person

Average Total Cost (ATC)

The “full” average cost of the next person

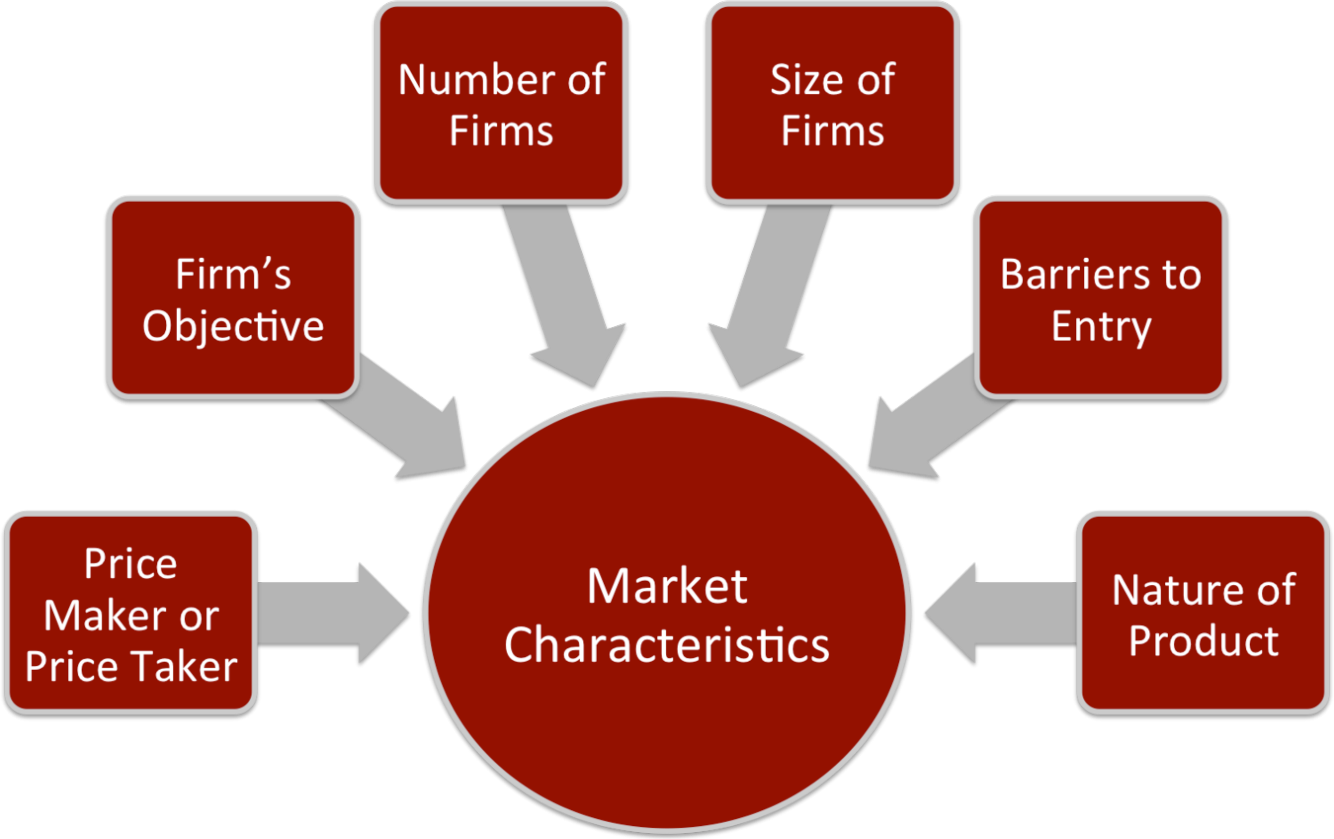
Average Fixed Cost (ATC)

*The portion of fixed cost paid by **each** person*

Average Variable Cost (AVC)

*The portion of variable cost paid by **each** person*

The Average Cost Curves



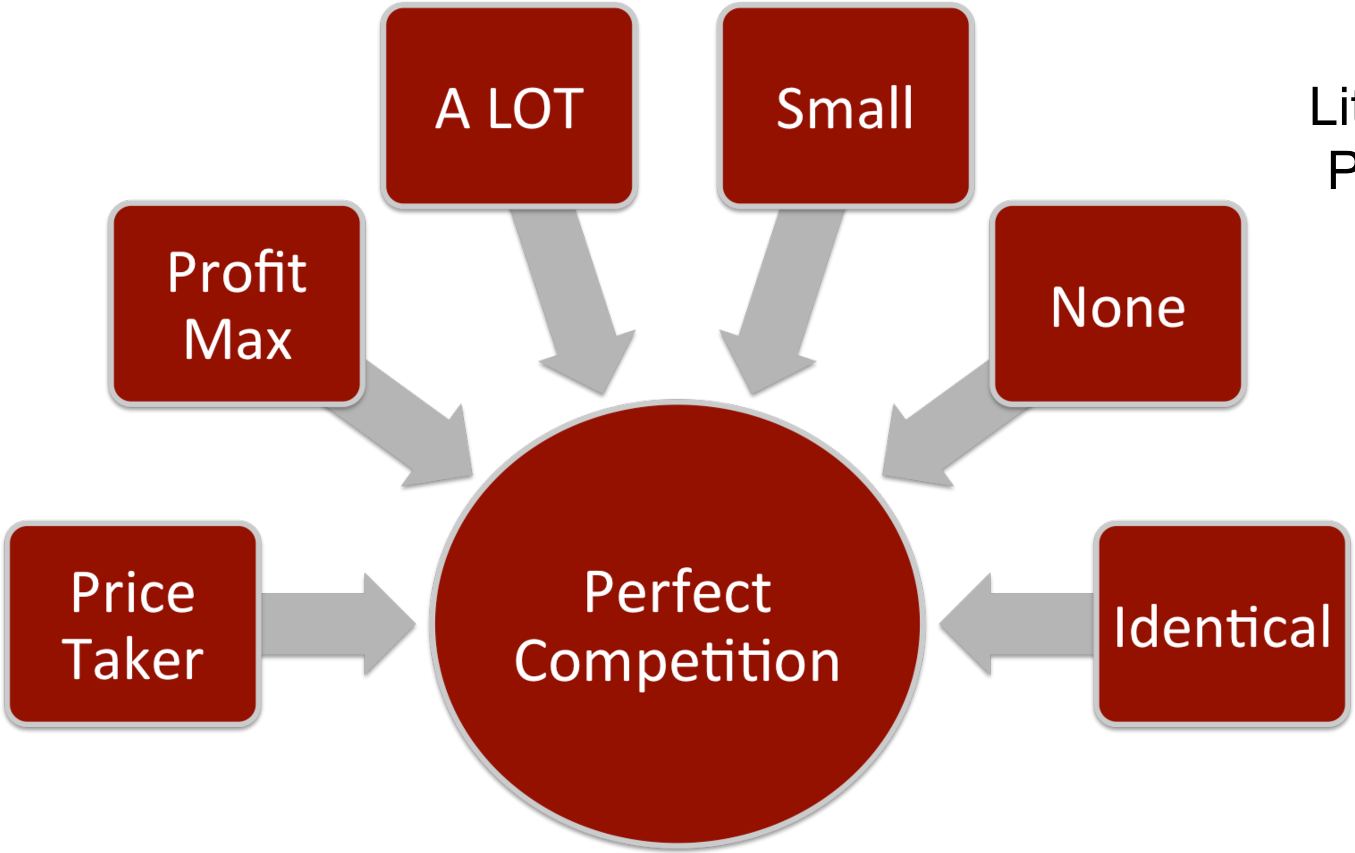
Additional Help

Tables comparing market structures and outcomes

YouTube lesson comparing market structures

A different market structure simulation with candy

Understanding Market Characteristics



Examples?

Little League Baseball

Pop Warner Football

What About:

NCAA Basketball

European Soccer

(-players are widely and openly traded in the market,

-player characteristics are well known and observed,

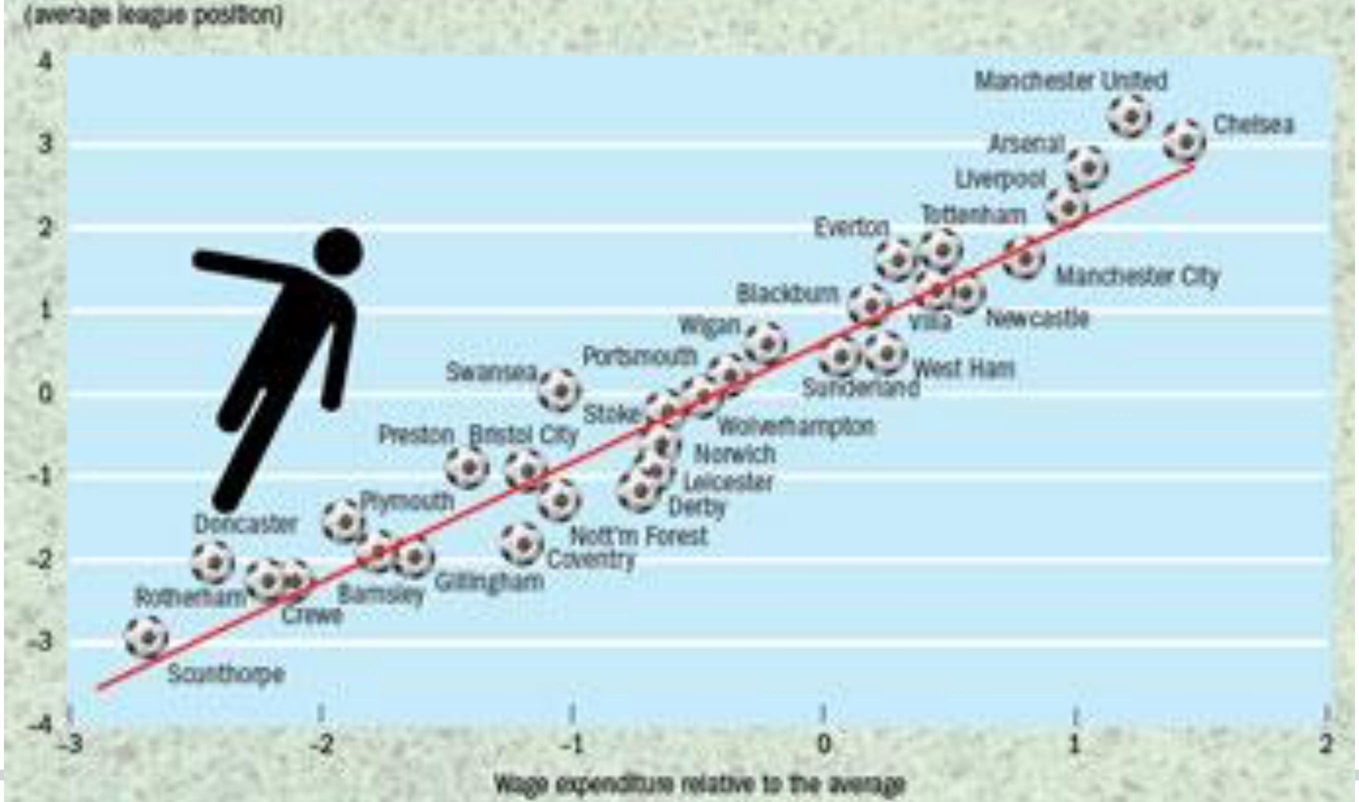
-better players tend to win more games,

-teams that win generate more income.

Perfect Competition in Sports

You get what you pay for

Soccer teams that are paid higher wages tend to win more games.



Source: Companies House website (http://www.companieshouse.gov.uk).

Note: The chart includes data on wage spending for a sample of clubs in the top two divisions of English soccer (Premier League and Championship) between 2003 and 2012. Data are based on the clubs' financial accounts.

Perfect Competition

A perfectly competitive firm is a price taker. Demand curve for 1 firm is a horizontal line, and coincides with the Marginal Revenue curve (P = D = MR).

A perfectly competitive firm maximizes profit where price equals marginal cost:

$$P = MC$$

Perfect Competition

Perfectly competitive firms can make positive profit only in the short run, but not in the long run.

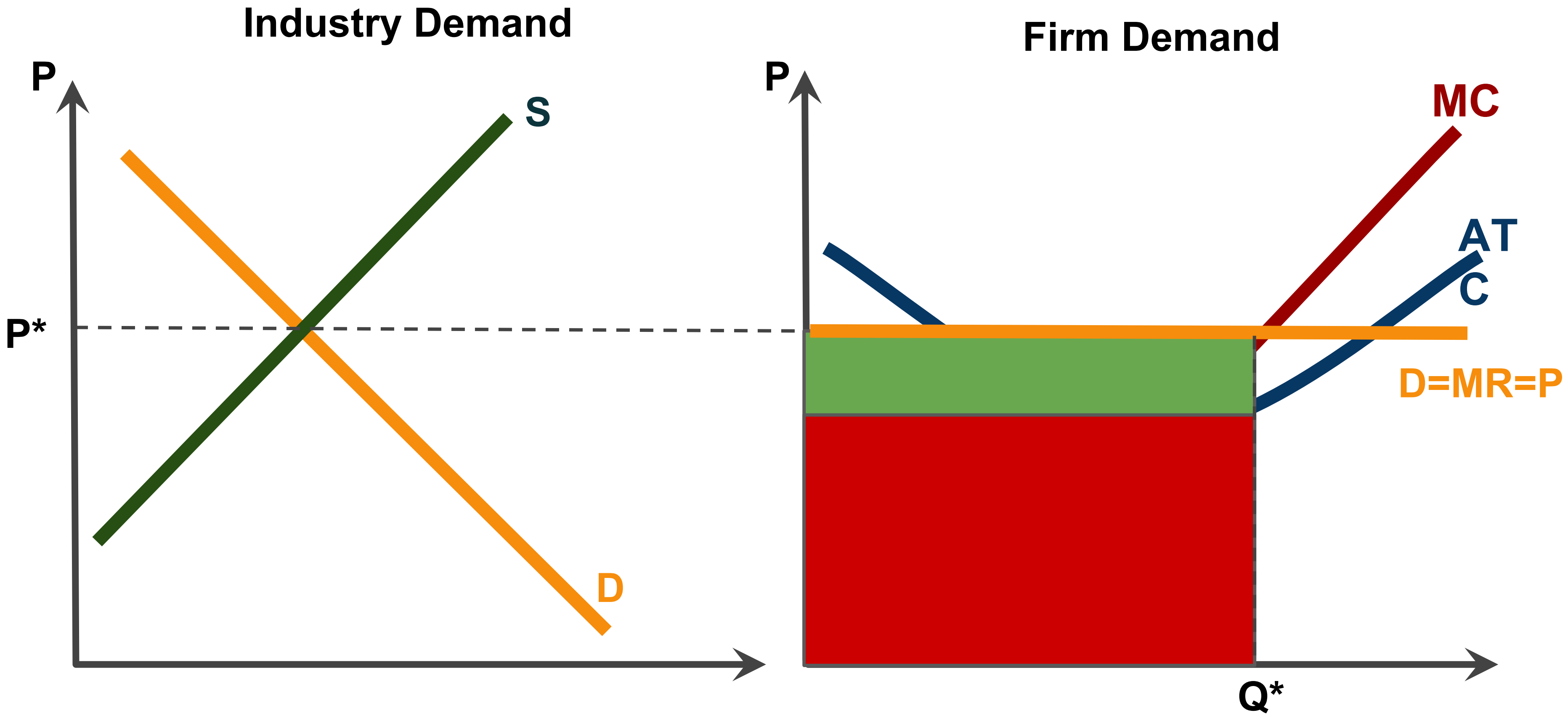
In the short run, firms cannot enter or exit the market (fixed inputs).

In the long run: because there are no barriers to entry, whenever firms make profit, more firms enter the market. Thus supply of the good increases, and equilibrium price falls. Price falls to the point where

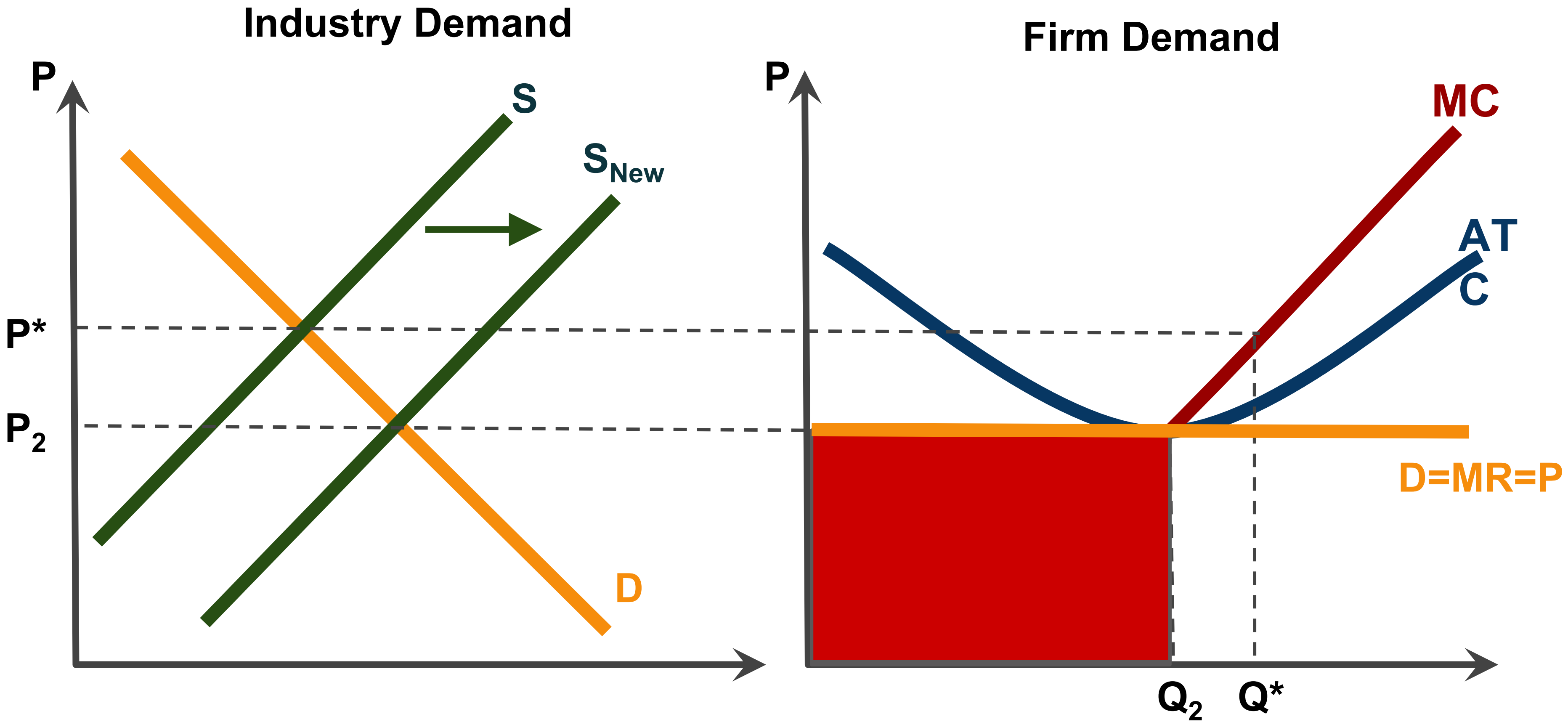
$$P = MC = ATC$$

Thus at equilibrium perfectly competitive firms make zero economic profit.

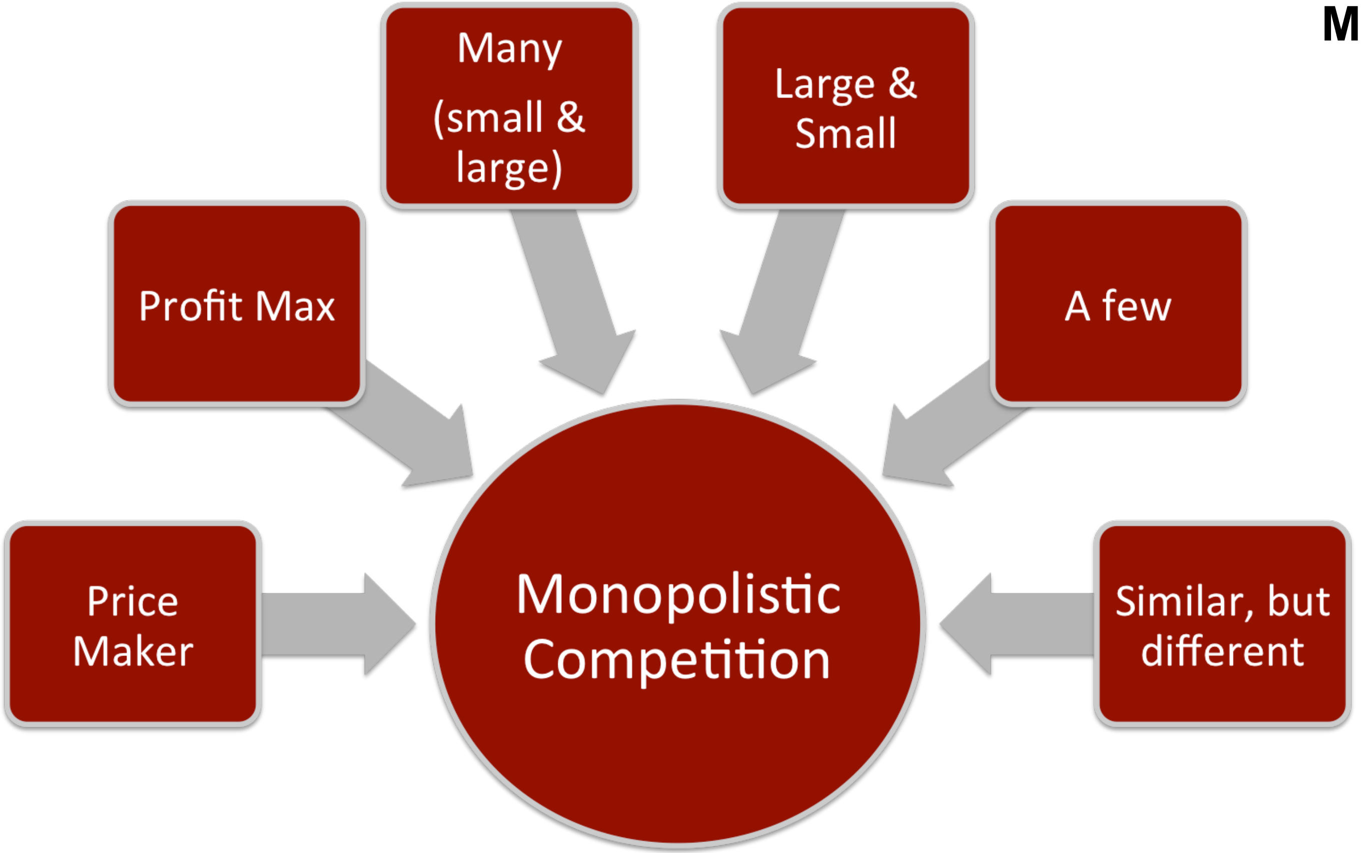
This is demonstrated on the next slide.



Perfect Competition & Possible Profits (for now…)



Perfect Competition & Possible Profits (for now…)



Markets w/ All 4 Major Sports Team
(+ *MLS*)

Boston, MA
Chicago, IL
Dallas, TX
Denver, CO
Detroit, MI
Miami, FL
Minneapolis, MN
New York, NY
Philadelphia, PA
Phoenix, AZ
San Francisco, CA
Washington, DC

Monopolistic Competition in Sports?

Monopoly

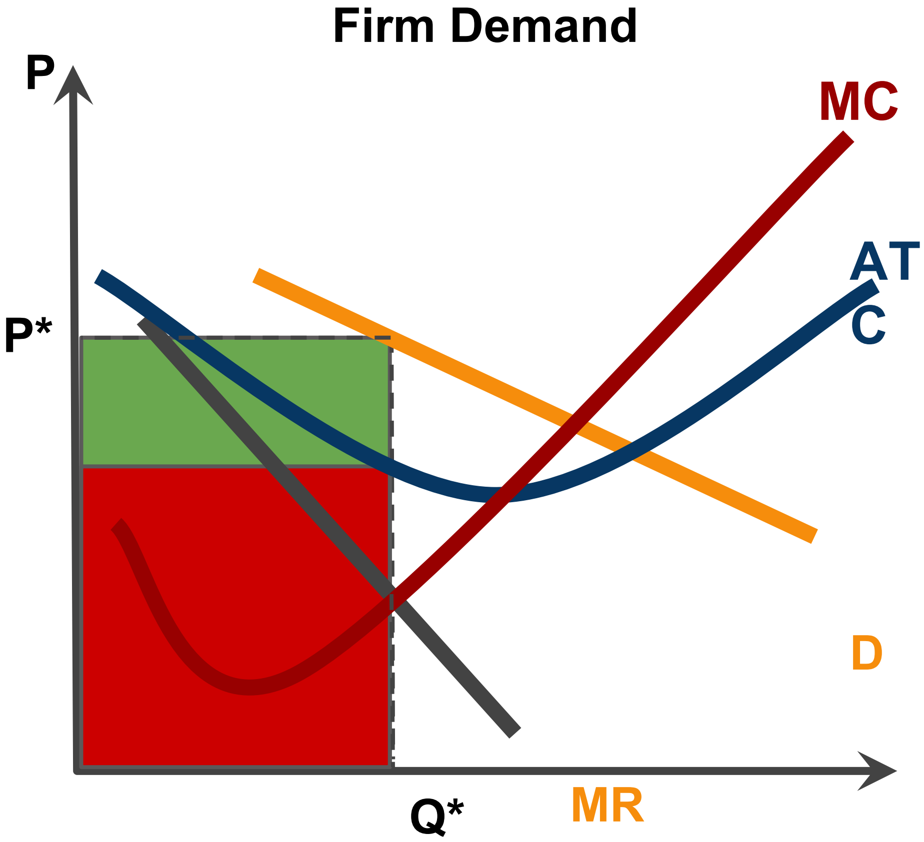
A monopolistic firm is a price setter. Demand curve for 1 firm is a downward-sloping line, which does NOT coincide with the Marginal Revenue curve.

The slope of the Demand Curve is twice the slope of Marginal Revenue Curve. For example, if the demand is given by $P = a - bQ$, then MR is given by $MR = a – 2bQ$

A monopolist maximizes profit where:

$$MR = MC$$

Because there are barriers to entry, other firms cannot enter the market. Thus the monopolist can make profit in the long run.

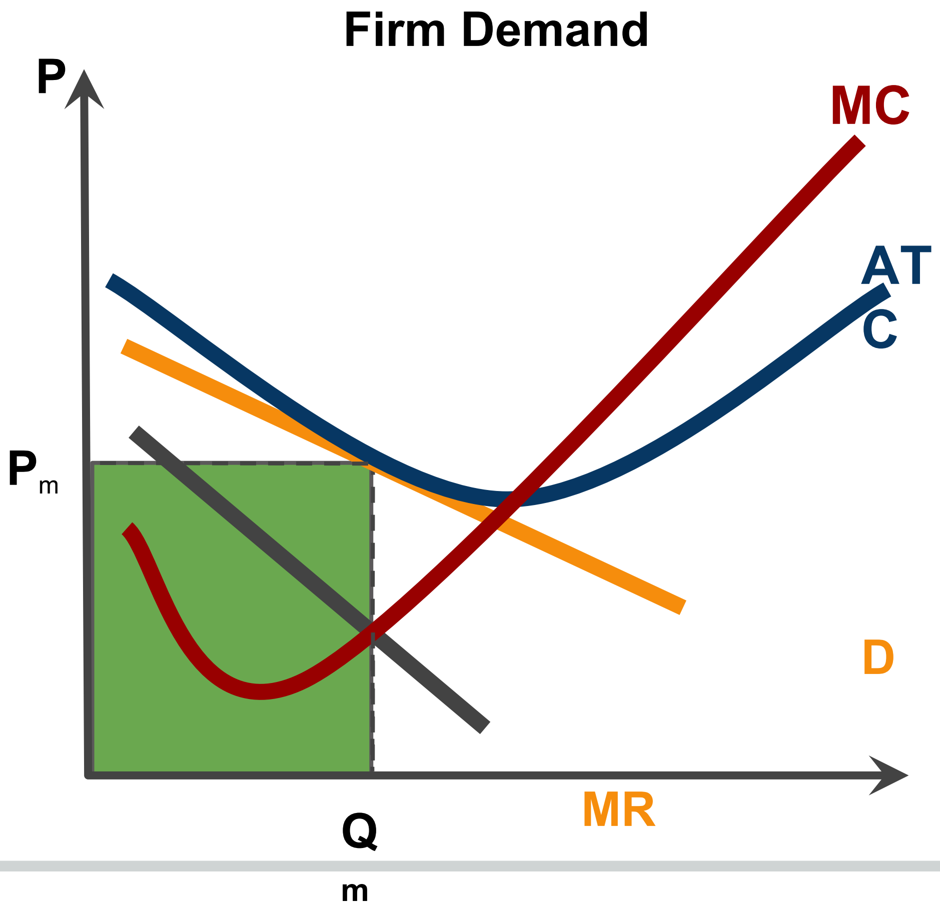


Profit Maximizing Condition:
MR = *MC*

Demand curve is a little flatter: more substitutes

Long-run outcome:
Zero Profit

A Monopoly in a Graph



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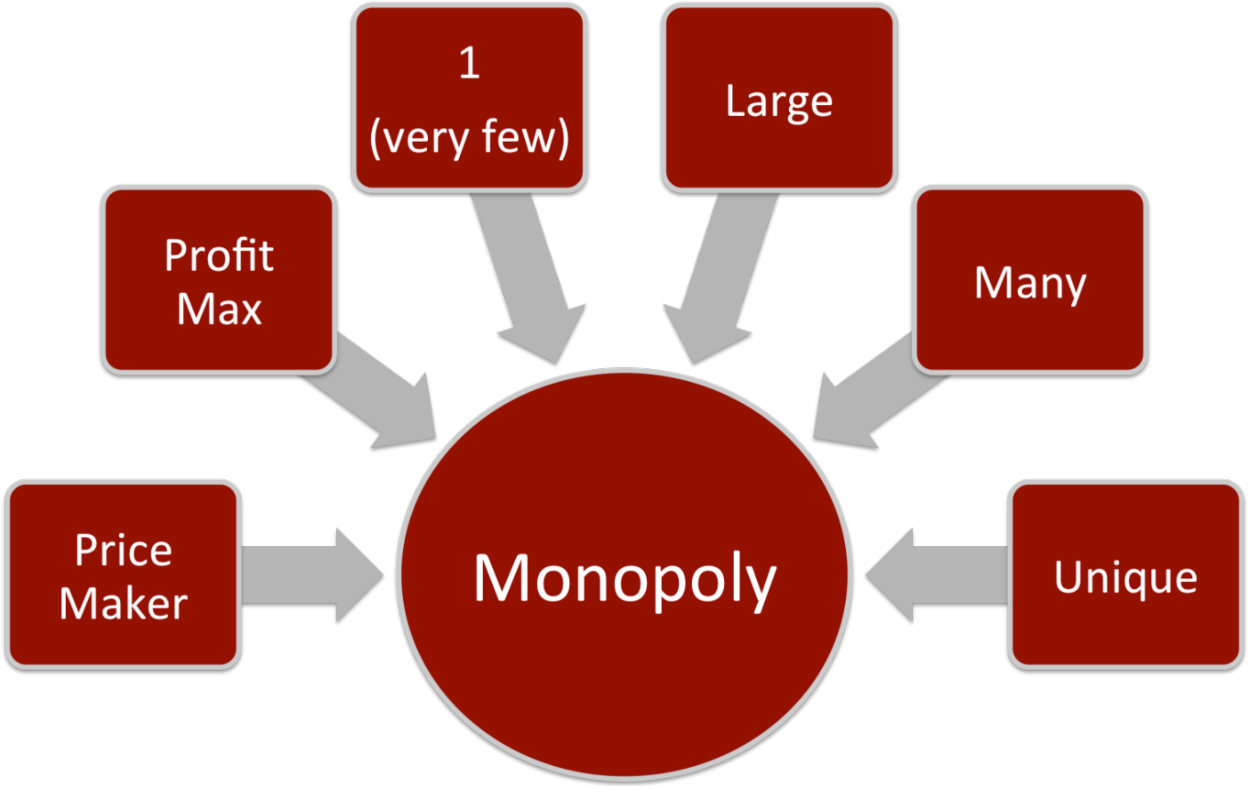
A Monopoly in a Graph

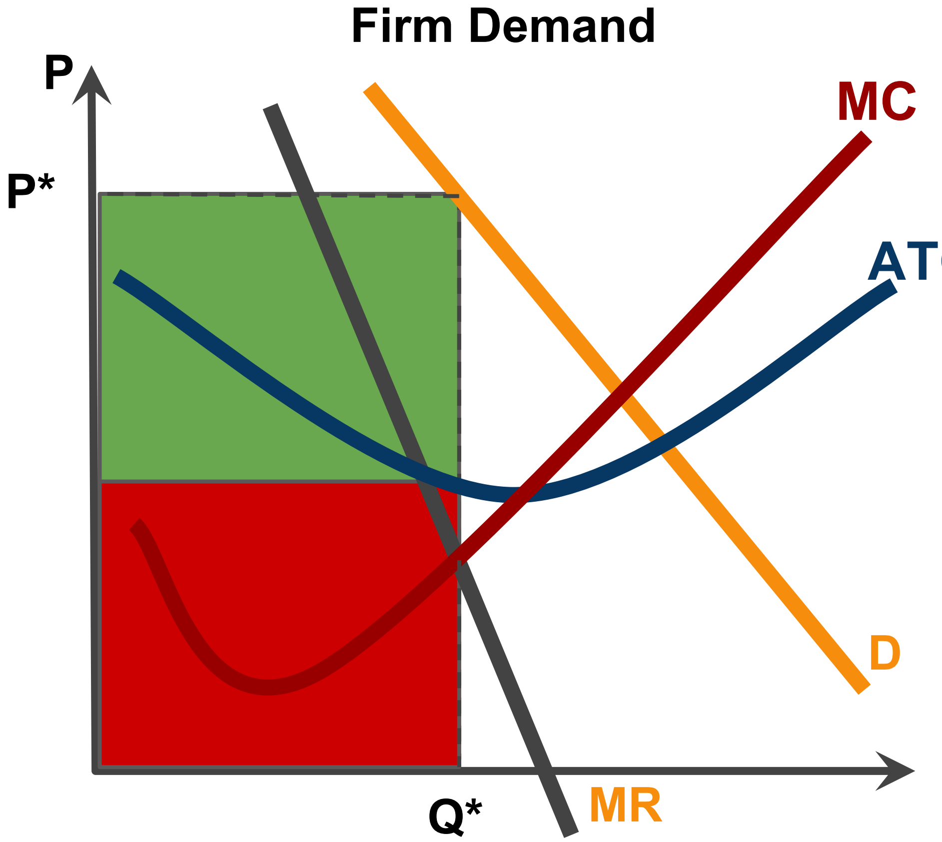


Markets w/ Only 1 Major Sports Team

Green Bay, WI
Jacksonville, FL
Memphis, TN
Oklahoma City, OK
Orlando, FL
Raleigh, NC
Sacramento, CA
San Antonio, TX

Leagues are a monopoly

Monopolies in Sports?



Profit Maximizing Condition:

MR = *MC*

Note*:*
Sometimes profit max cannot be reached. For example, if the stadium capacity is lower than the profit-maximizing number of seats. Then select the maximum Q that is possible.

A Monopoly in a Graph

Example 1

A monopolist faces the following inverse-demand equation:

$P = 300 - 1/2Q$

Total costs for the firm are:

$4000 + 45Q$

Find:

1) Functions for Total Revenue, Marginal Revenue, Total Cost, Marginal Cost
2) Suppose the firm is perfectly competitive. Find its profit maximizing (optimal) price (P*), quantity (Q*), and Profit.
3) Suppose the firm is a monopolist. Find its profit maximizing (optimal) price (P*), quantity (Q*), and Profit.
4) Find consumer surplus for a competitive firm and for a monopolist. Which consumer surplus is higher?

A <u>perfectly competitive firm</u> faces the following inverse-demand equation:

$P = 300 - 1/2Q$

Total costs for the firm are: TC = 4000 + 45Q

Total Revenue

$TR = PxQ$

$= (300 - ½Q) \times Q$

$= 300Q - ½Q^2$

Marginal Revenue

$MR = 300 - Q$

Total Cost

$TC = 4000 + 45Q$

Marginal Cost

$MC = 45$

Profit Maximizing Rule:

Price = MC

$300 – 1/2Q = 45$

$\boxed{510 = Q^*}$

$P = 300 - ½(510)$

$\boxed{P^* = \$45}$

$TR = (510 \times 45)$

$= \$22,950$

$TC = 4000+(45 \times 510)$

$= \$26,950$

Profit = TR - TC

$\boxed{\text{Profit} = -\$4,000 \quad \text{(loss)}}$

Outcome Under a Perfect Competition

A <u>monopolist</u> faces the following inverse-demand equation:

$P = 300 - 1/2Q$

Total costs for the firm are:

$TC = 4000 + 45Q$

$TR = P \times Q$
$= (300 - \frac{1}{2}Q) \times Q$
$= 300Q - \frac{1}{2}Q^2$
$MR = 300 - Q$

$TC = 4000 + 45Q$
$MC = 45$

Profit Maximizing Rule:
MR = MC

$300 - Q = 45$
$\boxed{255 = Q}$

$P = 300 - \frac{1}{2}(255)$
$\boxed{P = \$172.50}$

Rev = (255 x 172.50)
Rev = $43,987.50

Costs = 4000+(45 x 255)
Costs = $15,475

Profit = Revenue - Costs
$\boxed{\text{Profit} = \$28{,}512.50}$

Outcome Under a Monopoly

Compare the profits:

A perfectly competitive firm's profit = -$4,000 (loss)
A monopolist's profit = $28,512.50 (profit)

Profit is typically higher for a monopolist compared to a perfectly competitive firm

Compare the Outcomes

Compare the Consumer Surplus:

Consumer Surplus – area below the demand curve, above the price. Calculated as (height * base) / 2

Consumer Surplus in a perfectly competitive firm:

$$CS_{competition} = \frac{(300-45)\cdot(510-0)}{2} = \$65,025$$

Consumer Surplus in a monopoly:

$$CS_{monopoly} = \frac{(300-172.50)\cdot(255-0)}{2} = \$16,256.25$$

Consumer Surplus (consumer satisfaction with the price) is higher under perfect competition.

Compare the Outcomes

We found that Q* = 510.What if the facility contains only 500 seats?
Answer: In that case, profit max cannot be reached. So we select the maximum number of seats available (500) and find the price and profit at that Q

Q = 500

P = 300 - ½(500)
$\boxed{P = \$50}$

TR = (50x 500)
= $25,000

TC = 4000+(45 x 500)
= $26,500

Profit = Revenue - Costs
$\boxed{\text{Profit} = -\$1{,}500}$

Outcome Under a Monopoly If Stadium/ Facility Capacity is lower than Q*

Example 2: Try it yourself!

A monopolist faces the following inverse-demand equation:

$$P = 100 - 2Q$$

Total costs for the firm are:

$$TC = 10Q^2$$

Find:

1) Functions for Total Revenue, Marginal Revenue, Total Cost, Marginal Cost
2) Suppose the firm is perfectly competitive. Find its profit maximizing (optimal) price (P*), quantity (Q*), and Profit.
3) Suppose the firm is a monopolist. Find its profit maximizing (optimal) price (P*), quantity (Q*), and Profit.
4) Find consumer surplus for a competitive firm and for a monopolist. Which consumer surplus is higher?

A monopolist faces the following inverse-demand equation:

$P = 100 - 2Q$

Total costs for the firm are:

$TC = 10Q^2$

$TR = PxQ$
$= (100 - 2Q) \times Q$
$= 100Q - 2Q^2$
$MR = 100 - 4Q$

$TC = 10Q^2$
$MC = 20Q$

Profit Maximizing Rule:
$P = MC$

$100 - 2Q = 20Q$
$\boxed{4.54 = Q^*}$

$P = 100 - 2(4.54)$
$\boxed{P^* = \$90.92}$

$TR = (90.92 \times 4.54)$
$= \$412.78$

$TC = 10(4.54^2)$
$= \$206.12$

$Profit = TR - TC$
$\boxed{Profit = \$206.67}$

Outcome Under a Perfect Competition

A monopolist faces the following inverse-demand equation:

$$P = 100 - 2Q$$

Total costs for the firm are:

$$TC = 10Q^2$$

$TR = PxQ$
$= (100 - 2Q) \times Q$
$= 100Q - 2Q^2$
$MR = 100 - 4Q$

$TC = 10Q^2$
$MC = 20Q$

Profit Maximizing Rule:
MR = MC

$100 - 4Q = 20Q$
$\boxed{4.16 = Q^*}$

$P = 100 - 2(4.16)$
$\boxed{P^* = \$91.68}$

TR = (91.68 x 4.16)
= $381.39

TC = $10(4.16^2)$
= $1,173.06

Profit = TR - TC
$\boxed{\text{Profit} = \$208.33}$

Outcome Under a Monopoly

Compare the profits:

A perfectly competitive firm's profit = $206.67 (profit)
A monopolist's profit = $208.33 (profit)

Profit is typically higher for a monopolist compared to a perfectly competitive firm

Compare the Outcomes

Compare the Consumer Surplus:

Consumer Surplus – area below the demand curve, above the price. Calculated as (height * base) / 2

Consumer Surplus in a perfectly competitive firm:

$$CS_{competition} = \frac{(100 - 90.92) \cdot (4.54 - 0)}{2} = \$20.6$$

Consumer Surplus in a monopoly:

$$CS_{monopoly} = \frac{(100 - 91.68) \cdot (4{,}16 - 0)}{2} = \$17.3$$

Consumer Surplus (consumer satisfaction with the price) is higher under perfect competition.

Compare the Outcomes

Price Discrimination

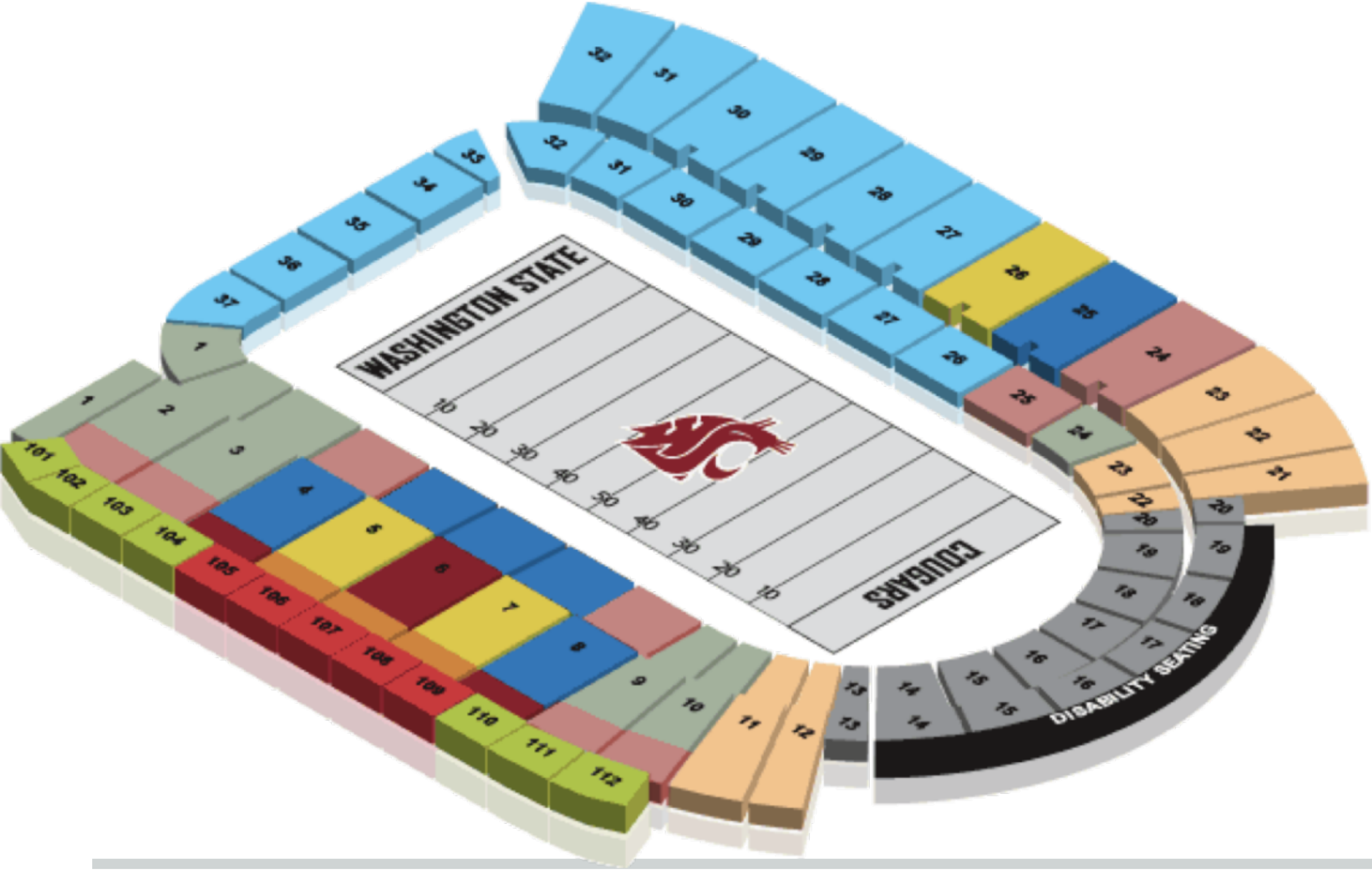
Consumers have different own-price elasticities of demand. For example, a student's demand for game tickets is more price-elastic (sensitive to price) than that of a Boeing employee. A monopolist knows that, and is willing to maximize profits by charging a different price to different groups of consumers.

In its narrow sense, **price discrimination** is when a seller charges different prices to different buyers for the same product.

So what is price discrimination?

2013

SEASON TICKET REQUIREMENTS



Ticket Price	CAF Membership	TOTAL
$300	$1,700	$2,000
$300	$1,400	$1,700
$200	$1,150	$1,350
$200	$550	$750
$200	$400	$600
$200	$200	$400
$200	$50	$250
$200	$0	$200
$175	$0	$175
$500*	$0	$500
Single Game Tickets		
Students		

*Price reflects four tickets

Price Discrimination or Not?

Price Discrimination

Two conditions for successful price discrimination:

1) Seller must be able to identify two groups of consumers with different own-price elasticity of demand

2) Seller must be able to prevent arbitrage
Arbitrage – the practice of buying in the low-price market and reselling in the higher-price market. This is also called "**Ticket scalping**" – reselling a product over its stated "face value"

www.wsucougars.com/tickets/wast-student-tickets.html

What is a Sports Pass?

2012-13 Sports Pass (undergraduate student): $129
2012-13 Sports Pass (graduate student): $175

The Student Sports Pass is an ACADEMIC YEAR pass which allows admittance to all regular season home events in Football, Women's Volleyball, Men's Basketball, Women's Basketball, and Baseball from August through May, based on student section seating availability. In other words, a sports pass does not guarantee admission into an event since there are times when the student section reaches capacity. The Sports Pass is embedded into the magnetic stripe on your student ID card once it is purchased, and you swipe your ID card at the Student Entrance to gain admission to home events. The Sports Pass also includes "home" WSU Football games at CenturyLink Field in Seattle and any "home" Men's Basketball games at Spokane Arena or at Key Arena in Seattle. Tickets for these home games at venues outside of Pullman usually require ticket pickup in advance of game day. Your sports pass also does not include admittance to any NCAA or Pac-12 championship events. For any further questions about your Student Sports Pass, contact the WSU Athletic Ticket Office at 509-335-9626. The approximate value if all student tickets were purchased separately is greater than $450.

Definitely Price Discrimination

Seahawks to Limit Ticket Sales for NFC Championship Game to Certain States

By Kyle Newport

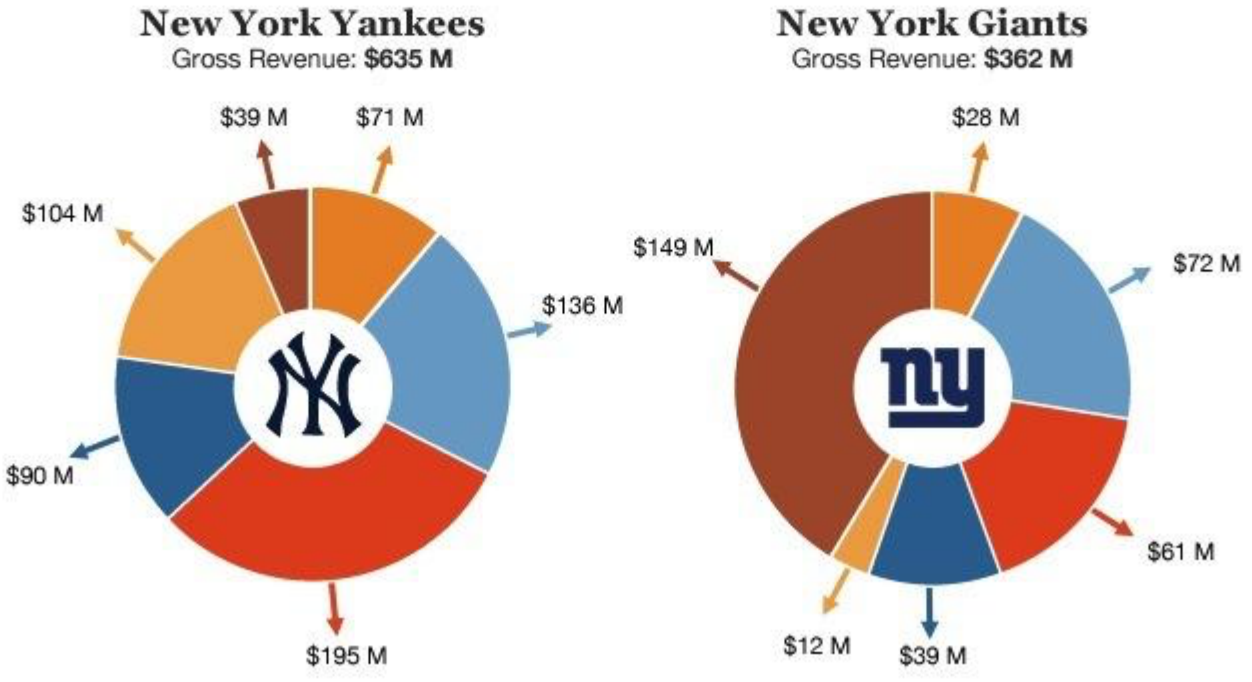
f 21.2K | 1.1K | 22.4K SHARES

Is this price discrimination?

Clippers Explain Dynamic and Variable Pricing

Northwestern Introduces “Purple Pricing” using a Dutch Auction

New York Rangers (NHL) and New York Knicks (NBA)



Stadium
Amenities
Premium Seating
General Seating
Sponsorships
Local Media
National Media

Where Does Revenue Come From?

Other Pricing Strategies

- **Peak Load Pricing**
    - Whenever a sports team or a golf course practice price discrimination, it has to do with simultaneous demands
    - Peak load pricing deals with sequential demands: e.g. higher demand for golf in the summer. Peak load pricing puts higher price during period of higher demand.
- **Season Tickets and Bundling**
    - Bundling – when a seller combines two/more separate goods in one for a single price
    - Example 1: In the NFL a season ticket holder must pay for preseason games to get the regular season game tickets. In MLB, to get good seats, one must buy tickets to all home games.
    - Example 2: A golfer pays a fee for a round of golf + a golf cart fee

Other Pricing Strategies

- **Two-Part Pricing**
  - a seller charges a price plus a membership fee / access fee / annual dues.
- **Pricing Complements**
  - A sports team sells complementary goods: a ticket, parking, food, drinks, programs, etc.
  - To maximize profit, the team must carefully price the ticket and the food.
  - 2008 – due to the recession affecting attendance, MLB teams started offering bargains on concessions (“Five for Five Dollars” at San Diego Padres games, “Dollar Dog Nights” at The Pittsburgh Pirates games)

Two-Part Pricing

Two-part pricing – a seller charges a price plus a membership fee / access fee / annual dues.

This is done to extract as much value as possible from the consumer. With two-part pricing, a monopolist charges a very low price where P = MC. However, the monopolist will also charge a membership fee that will equal the size of the consumer surplus.

Examples of two-part pricing: membership fees in athletic clubs, gold club memberships

Example 3.1: No Two-Part Pricing

A monopolist golf club knows that all the members are facing the following <u>identical</u> demand equation:

$$P = 80 - Q$$

Total costs for the firm are:

$$TC = 10Q$$

Find:

1) Functions for Total Revenue, Marginal Revenue, Total Cost, Marginal Cost
2) Profit-maximizing Price (P*), Quantity (Q*) and Profit* without two-part pricing
3) Suppose the monopolist will pursue a two-part pricing strategy. It will charge annual dues (membership fees) in addition to the regular price ("greens fee"). Find the monopolist's Profit-maximizing Price (P*), Quantity (Q*) and Profit* with two-part pricing

Identical demand functions:

$P = 80 - Q$

Total costs for the monopolistic firm are:

$TC = 10Q$

TR and MC	Profit Maximizing Rule	Profit
$TR = PxQ$ $= (80 - Q) \times Q$ $= 80Q - Q^2$ $MR = 80 - 2Q$ $TC = 10Q$ $MC = 10$	Profit Maximizing Rule: *MR = MC* $80 – 2Q = 10$ $\boxed{35 = Q^*}$ $P = 80 - 30$ $\boxed{P^* = \$45}$	$TR = (45 \times 35)$ $= \$1,575$ $TC = 10 \times 35$ $= \$350$ **Profit <u>without</u> two-part pricing:** Profit = TR - TC $\boxed{\text{Profit} = \$1,225}$

Outcome Under Identical Demand Functions, No Two-Part Pricing

Example 3.2: Two-Part Pricing

A monopolist golf club knows that all the members are facing the following <u>identical</u> demand equation:

$P = 80 - Q$

Total costs for the firm are:

$TC = 10Q$

Suppose the monopolist will pursue a two-part pricing strategy. It will charge annual dues (membership fees) in addition to the regular price ("greens fee").

Find the monopolist's Profit-maximizing Price (P*), Quantity (Q*) and Profit* with two-part pricing

Identical demand functions:

$P = 80 - Q$

Total costs for the monopolistic firm are:

TC =10Q

To extract the most profit out of the members, the golf club will charge:
- Price = MC
- Annual dues = Consumer surplus

P = MC

80 – Q = 10

$\boxed{70 = Q^*}$

P = 80 - 70

$\boxed{P^* = \$10}$

Consumer Surplus:

$$\boxed{CS = \frac{(80 - 10)(70 - 0)}{2}}$$

$$= \$2450$$

TR = (10 x 70)
= $700

TC = 10 x 70
= $700

Profit = TR - TC + dues

$\boxed{\text{Profit} = 0 + 2450 = 2450}$

Outcome Under Identical Demand Functions, With Two-Part Pricing

Example 4: Two-Part Pricing

A monopolist golf club knows that all the members are facing the following <u>non-identical</u> demand equations:

One group of consumers (juniors) has the demand function:

$$P = 80 - Q_1$$

Second group of consumers (adults) has the demand function:

$$P = 100 - Q_2$$

Total costs for the firm are:

$$TC = 10Q$$

Using the Two-Part Pricing Approach, find:

Profit-maximizing Price (P*), Quantity (Q*), and maximum Profit, provided that the golf club can charge different membership fees to the two groups of consumers.

Identical demand functions:

$P_1 = 80 – Q_1$ $P_2 = 100 - Q_2$

Total costs for the monopolistic firm are:

TC =10Q

The monopolist golf club will charge:

- Price = MC
- Annual dues = Consumer surplus (different for each group)

Group 1:

$P_1 = MC$

$80 – Q_1 = 10$

$\boxed{70 = Q_1^*}$

$P = 80 - 70$

$\boxed{P^* = \$10}$

Group 2:

$P_2 = MC$

$100 – Q_2 = 10$

$\boxed{90 = Q_2^*}$

$P = 100 - 90$

$\boxed{P^* = \$10}$

Outcome Under Non-Identical Demand Functions

Identical demand functions:

$P_1 = 80 - Q_1$ $P_2 = 100 - Q_2$

Total costs for the monopolistic firm are:

TC =10Q

The monopolist golf club will charge:

- Price = MC
- Annual dues = Consumer surplus (different for each group)

Group 1:
Membership fees =

$$CS = \frac{(80 - 10)(70 - 0)}{2} = \$2450$$

TR = PxQ=10x70=$700
TC = 10xQ =10x70=$700
Profit1 = TR – TC + fees
= $2,450

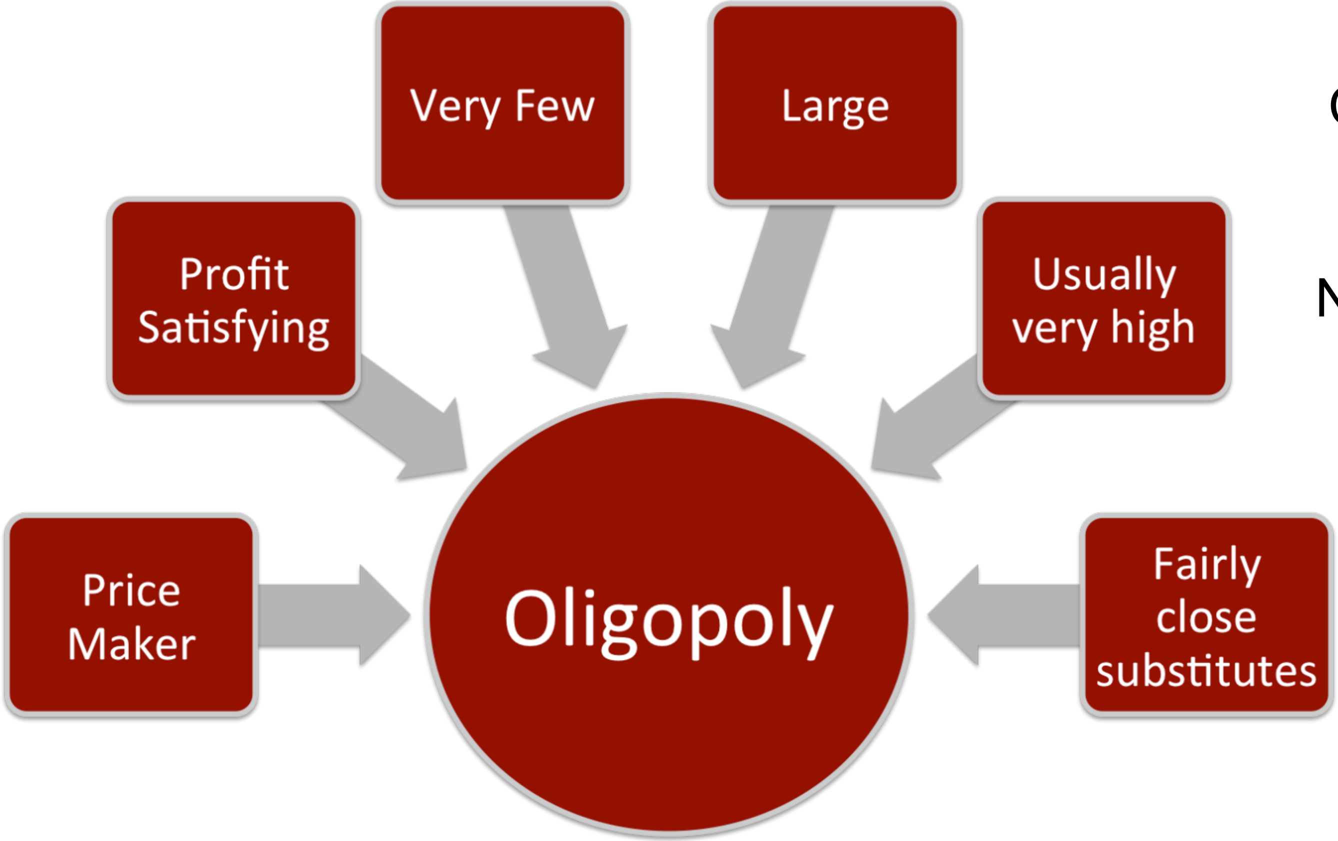
Group 2:
Membership fees =

$$CS = \frac{(100 - 10)(90 - 0)}{2} = \$4050$$

TR = PxQ=10x90=$900
TC = 10xQ =10x90=$900
Profit1 = TR – TC + fees
= $4,050

Total Profit = Profit 1 + Profit 2 = $2,450 + $4,050 = $ 6,500

Outcome Under Non-Identical Demand Functions



Examples

Chicago Cubs/White Sox

New York Jets/Giants

New York Yankees/Mets

San Francisco/Oakland

Oligopolies in Sports?

	q_1 low	q_1 high
q_2 low		
q_2 high		

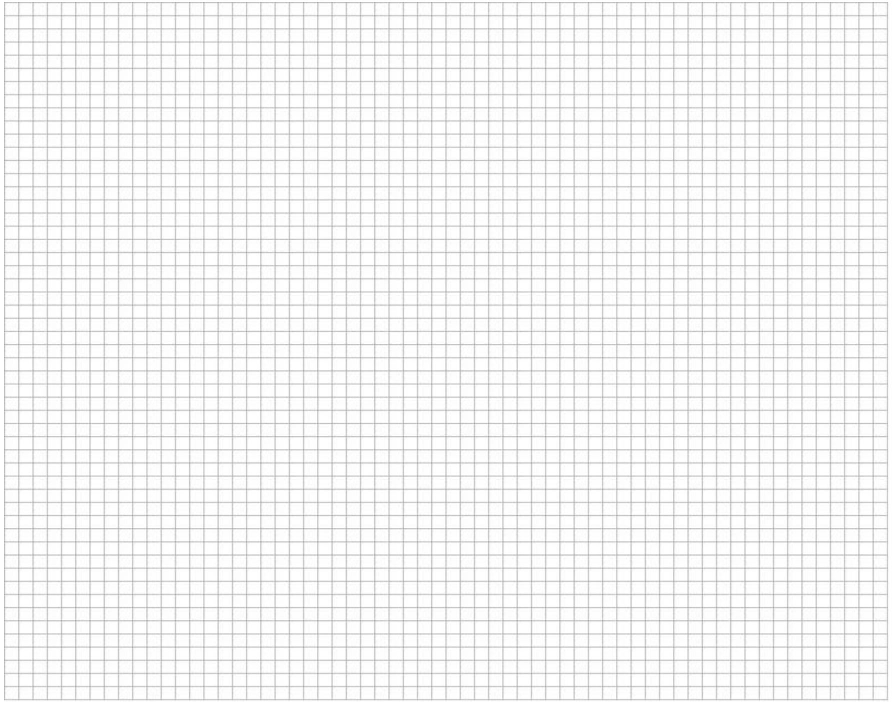
What happens to our reduced form game?

Reduced form game with FIVE choices:

What happens to our reduced form game?

Reduced form game with TEN choices:

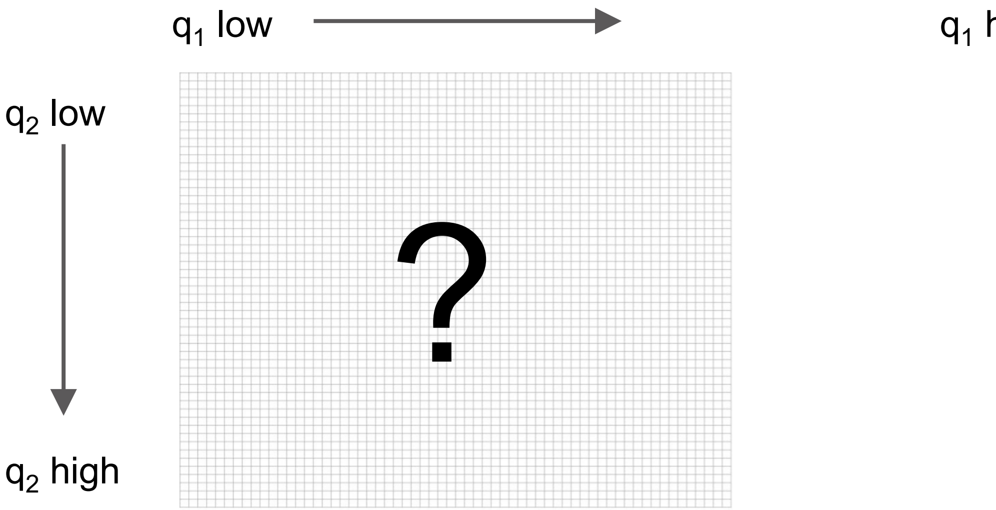
With even more options, we have more and more decisions and reactions we need to consider.



We need a better way to find our best choice than by checking each option individually!

What can we do instead?

- Firms compete by choosing how much to sell (choosing the quantity of output they produce)
- The firms know each other's costs, so they can predict behavior.
- Firms want to maximize profit GIVEN what the other firm will do.



Cournot Duopoly Problem

What do I do if I have an equation like

$$P = q_1^2 + 2q_1q_2 + 3$$

And need to know what the derivative of P with respect to q_1?

Treat "q_2" as a constant, and then use the rules we talked about in class. :)

Identical firms face the following inverse-demand equation:

$P = 300 - \frac{1}{2}Q$

Total costs for each firm is:

$TC = 4000 + 45q_{1,2}$

Two firms means:

$Q = q_1 + q_2$

Find Rev, Costs, Profits for each firm

Solve one firm at a time!

$Rev_1 = P \times q_1$

$Rev_1 = (300 - \frac{1}{2}Q) \times q_1$

$Rev_1 = (300 - \frac{1}{2}(q_1 + q_2)) \times q_1$

$Rev_1 = (300 - \frac{1}{2}q_1 - \frac{1}{2}q_2) \times q_1$

$Rev_1 = 300q_1 - \frac{1}{2}q_1^2 - \frac{1}{2}q_1q_2$

$MR_1 = 300 - q_1 - \frac{1}{2}q_2$

$TC = 4000 + 45q_1$

$MC = 45$

Profit Maximization Rule:

$MR = MC$

$300 - q_1 - \frac{1}{2}q_2 = 45$

$q_1 = 255 - \frac{1}{2}q_2$

Outcome Under a Duopoly

Identical firms face the following inverse-demand equation:

$P = 300 - \frac{1}{2}Q$

Total costs for each firm is:

$TC = 4000 + 45q_{1,2}$

Two firms means:

$Q = q_1 + q_2$

Find Rev, Costs, Profits for each firm

Solve one firm at a time!

What we know:

$q_1 = 255 - \frac{1}{2}q_2$

Because firms are identical:

$q_2 = 255 - \frac{1}{2}q_1$

Two equations, two unknowns:

$q_1 = 255 - \frac{1}{2}(255 - \frac{1}{2}q_1)$

$q_1 = 255 - 255/2 + \frac{1}{4}q_1$

$q_1 = 255 - 255/2 + \frac{1}{4}q_1$

$\frac{3}{4}q_1 = 255/2$

$q_1 = 170 = q_2$

Again, identical firms

Total Supply:

$Q = q_1 + q_2 = 340$

$P = 300 - \frac{1}{2}(340) = 130$

Outcome Under a Duopoly (Part 2)

Identical firms face the following inverse-demand equation:

$P = 300 - \frac{1}{2}Q$

Total costs for each firm is:

$TC = 4000 + 45q_{1,2}$

Two firms means:

$Q = q_1 + q_2$

Find Rev, Costs, Profits for each firm

Solve one firm at a time!

Total Supply:

$Q = q_1 + q_2 = 340$

$P = 300 - \frac{1}{2}(340) = 130$

Profit for Firm 1:

Rev = 170 x 130 = 22,100

TC = 4000 + (45x170) = 11,650

Profit = 22,100 - 11,650

Profit = $10,450 EACH

Assumptions:

1. No collusion
2. Simultaneous decisions
3. Identical firms

Let them collude?

Outcome Under a Duopoly (Part 2)

Colluding firms face the following inverse-demand equation:

$P = 300 - \frac{1}{2}Q$

Total costs for each firm is:

$TC = 4000 + 45q_{1,2}$

Collusion means they act like a **monopoly.** Why? **Each Firm:** $P = \$172.50$ $q = 127.50$ $\boxed{\pi = \$12,256.25}$	**A Cheating Firm!** $q_1 = 127.50$ $q_2 = 255 - \frac{1}{2} q_1$ $q_2 = 191.25$ $P_{New} = 300 - \frac{1}{2}(127.50+191.25)$ $P_{New} = 300 - 159.375$ $P_{New} = \$140.625$ Produce more, prices goes down!	$Rev_2 = 191 \times \$140.625$ $Rev_2 = \$26,894.53$ $TC_2=4000+(45x191.25)$ $TC_2 = \$12,606.25$ $\pi_2 = 26,894.53- 12606.25$ $\boxed{\pi_2 = \$14,288.28}$

Why Collusion Doesn't Last