

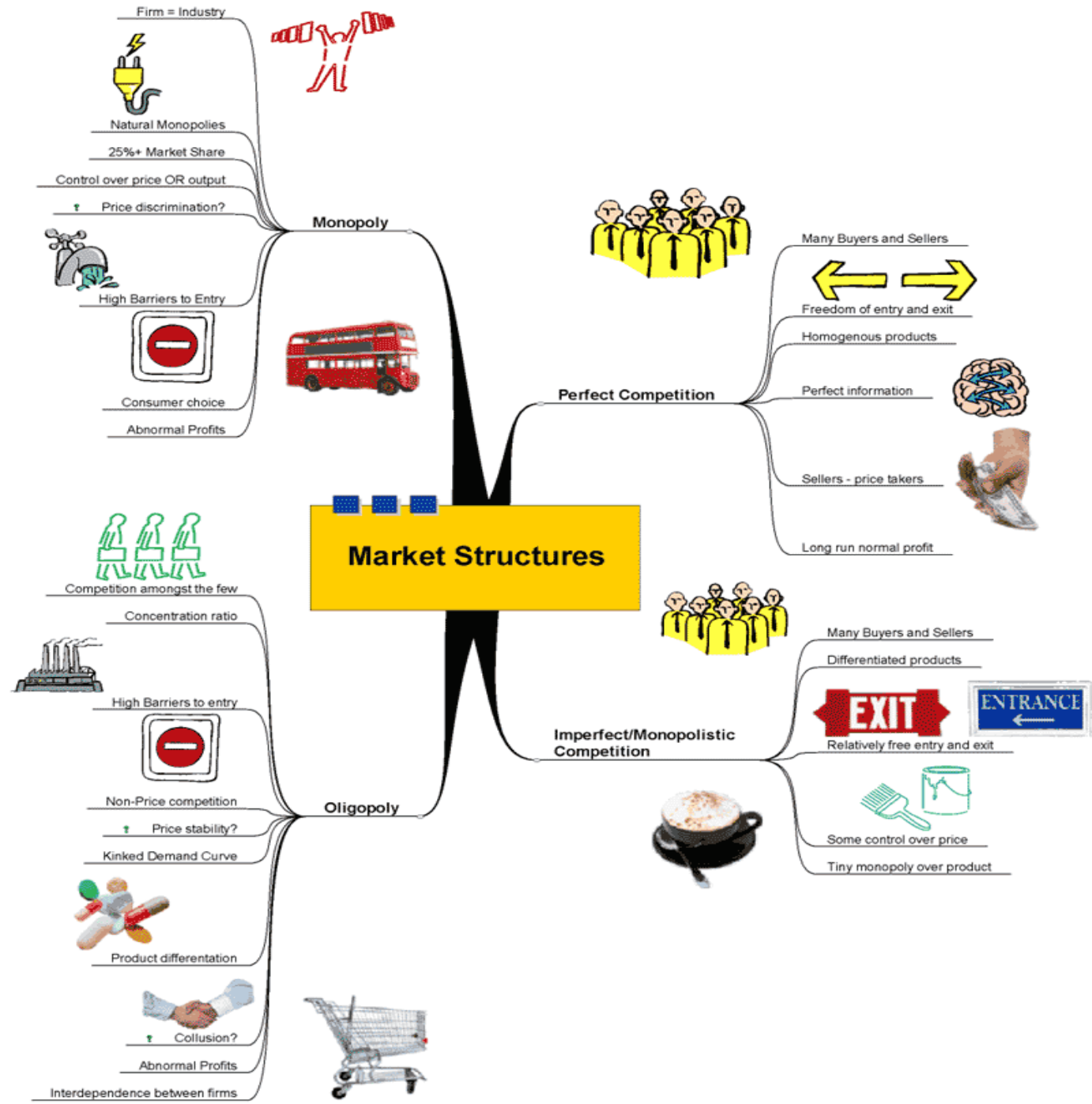
ECO 610: Lecture 8

**Monopoly and Pricing with  
Market Power**

# Monopoly and Pricing with Market Power: Outline

- Goal: understanding the exercise of market power in monopoly markets
- Definition of monopoly and examples
- Short-run profit maximization of a monopolist
- Monopoly power—long run economic profits and the importance of entry barriers
- Monopolistic competition: Monopoly? Competition? Elements of both?
- Pricing with market power: inverse-elasticity rule and types of price discrimination

# A taxonomy of market structures







Standard Oil Company  
(1911)



Standard Oil of New Jersey



Standard Oil of New York



Standard Oil of California



Standard Oil of Kentucky



Standard Oil of Indiana



Standard Oil of Ohio



The Ohio Oil Company



Exxon (renamed in 1973)



Mobil (renamed in 1963)

Began Using Chevron Name in 1930

Acquired by Chevron in 1960



Amaco (renamed in 1925)

Acquired by BP  
(1998)

Acquired by BP (1987)



Marathon Oil (renamed in 1930)



ExxonMobile  
(merged in 1999)



Chevron



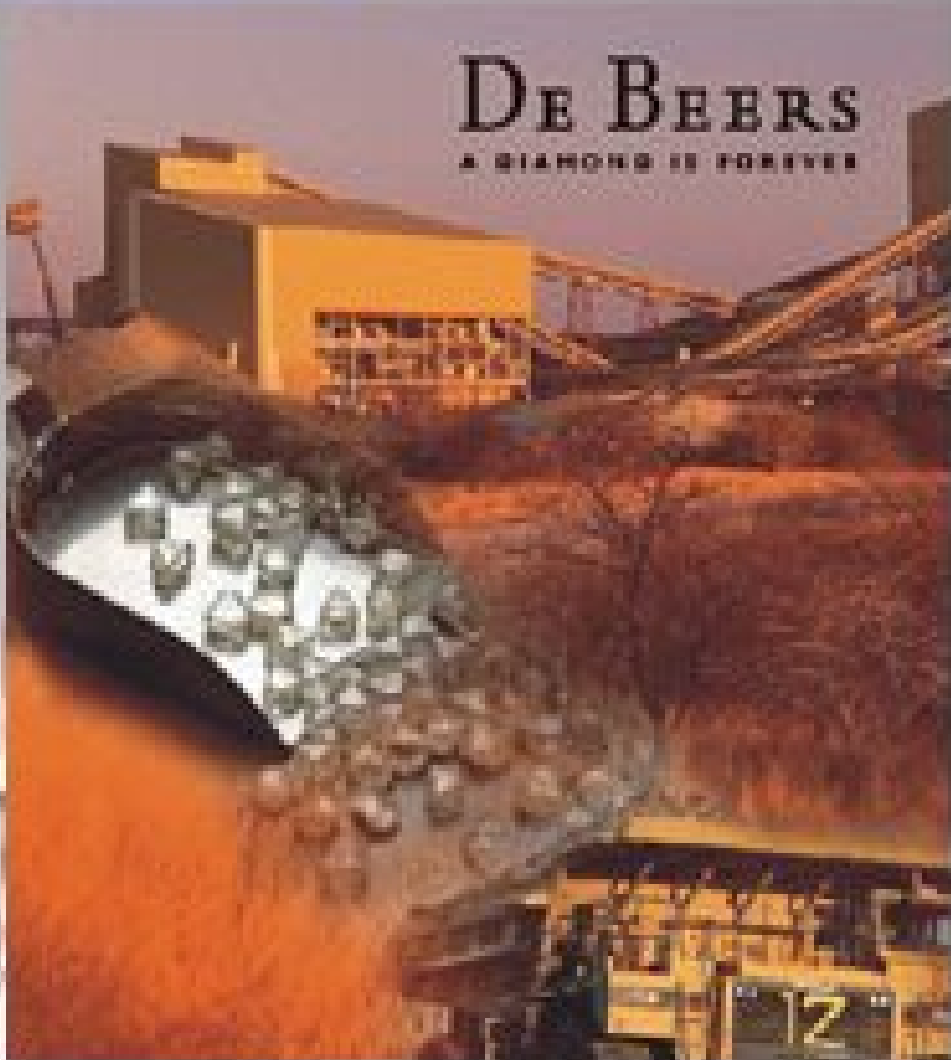
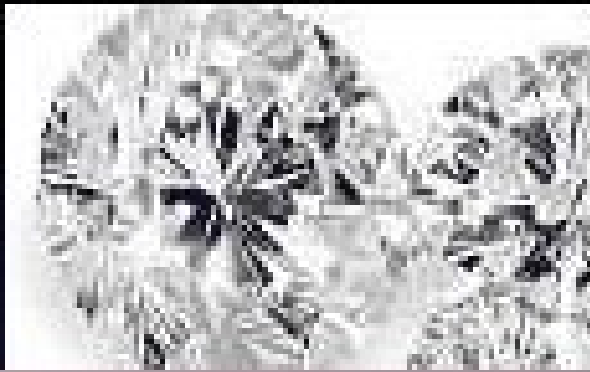
BP



Marathon Petroleum  
(spun-off from Marathon Oil  
in 2011)

# DE BEERS

A DIAMOND IS FOREVER



## DE BEERS

A DIAMOND IS FOREVER



“for which there are no close substitutes”???

- Cable TV monopoly? <https://www.windstream.com/KineticLaunch/>
- Google’s market dominance? <https://www.bing.com/>
- Eyeglasses? Sunglasses?  
<http://www.forbes.com/sites/anaswanson/2014/09/10/meet-the-four-eyed-eight-tentacled-monopoly-that-is-making-your-glasses-so-expensive/#477d90214dc8>
- Mickey Mouse? <https://disneyworld.disney.go.com/>
- Cancer treatment? <https://www.ibrance.com/>
- The Parthenon?





# Demand curve facing a monopolist

- Supply side of a competitive market: many small independent firms
- Supply side of a monopoly market: one firm
- Demand curve facing a competitive firm: perfectly elastic at the market price
- Demand curve facing a monopolist: Market demand, since the supply side of the market consists of one firm—the monopolist
- [refer to diagram on board—demand for Parthenon visits]
- Result is that in order to sell more of the product a monopoly must reduce its price, so it is a **price searcher**—it must determine which price and output combination maximize profit.

# ➤ What output will maximize profit in the short run for the only miniature golf course in town?

- First decision: produce  $Q = 0$  or produce  $Q > 0$  in the short run?
- What does producing  $Q = 0$  in the short run [i.e. shut down] look like?
- How to decide whether to shut down or produce a positive output?
- $\pi = TR - TC = TR - TVC - TFC$
- If  $Q = 0$ , then  $TR = 0$  and  $TVC = 0$ , so  $\pi = -TFC$ ; i.e. your losses equal your fixed costs
- If  $Q > 0$ , then  $\pi = TR - TVC - TFC$
- So, if  $[TR - TVC] > 0$ , you are better off producing  $Q > 0$ . If  $TR < TVC$ , you are better off shutting down in the short run.
- Alternatively, if  $TR/Q < TVC/Q$ , i.e. **if  $P < AVC$ , then shut down in the short run.**



- If  $P > AVC$ , what output will maximize profit in the short run for the only miniature golf course in town?
- If  $P > \min AVC$  such that producing a  $Q > 0$  is optimal, what  $Q$  will maximize profit for the monopolist in the short run?
  - Expand output as long as producing and selling another unit adds more to total revenue than it does to total cost.
  - In other words, expand output up to point where  $MR = MC$ .
  - [Refer to diagram drawn on board for monopolist, with  $AVC$  and  $MC$  diagrams included.]
  - What is marginal revenue for a monopolist?  $MR = \Delta TR / \Delta Q$ .
  - As the firm expands output, does it have to lower price to sell more output? Yes, since the market demand curve is the firm's demand curve.

# Short-run profit maximization by a monopoly

Price	Quantity Demanded	Total Revenue	Marginal Revenue	Total Cost	Marginal Cost	Profit
500	0	0		0		0
499	1	499	499	100	100	399
498	2	996	497	200	100	796
497	3	1491	495	300	100	1191
496	4	1984	493	400	100	1584
302	198	59796	105	19800	100	39996
301	199	59899	103	19900	100	39999
<b>300</b>	<b>200</b>	60000	<b>101</b>	20000	<b>100</b>	<b>40000</b>
299	201	60099	<b>99</b>	20100	100	39999
298	202	60196	97	20200	100	39996
3	497	1491	-493	49700	100	-48209
2	498	996	-495	49800	100	-48804
1	499	499	-497	49900	100	-49401
0	500	0	-499	50000	100	-50000

# Associated diagrams for monopoly

- Figure #1 (drawn on board): Demand, marginal revenue, marginal cost, profit-maximizing price and output, profit.
- Figure #2 (drawn on board): Total revenue, total cost, profit.

Figure 1: Demand, Marginal Revenue, Marginal Cost

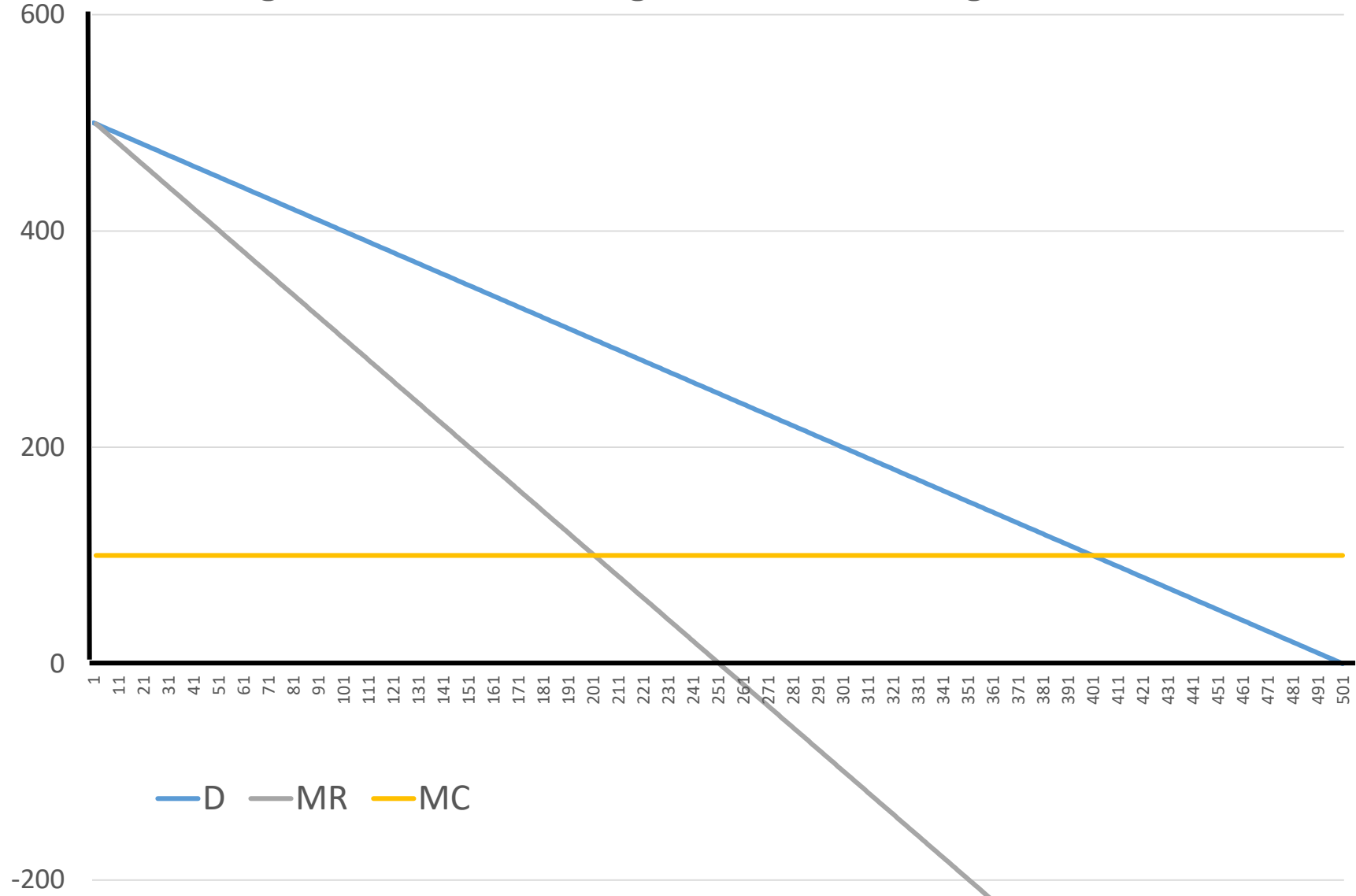
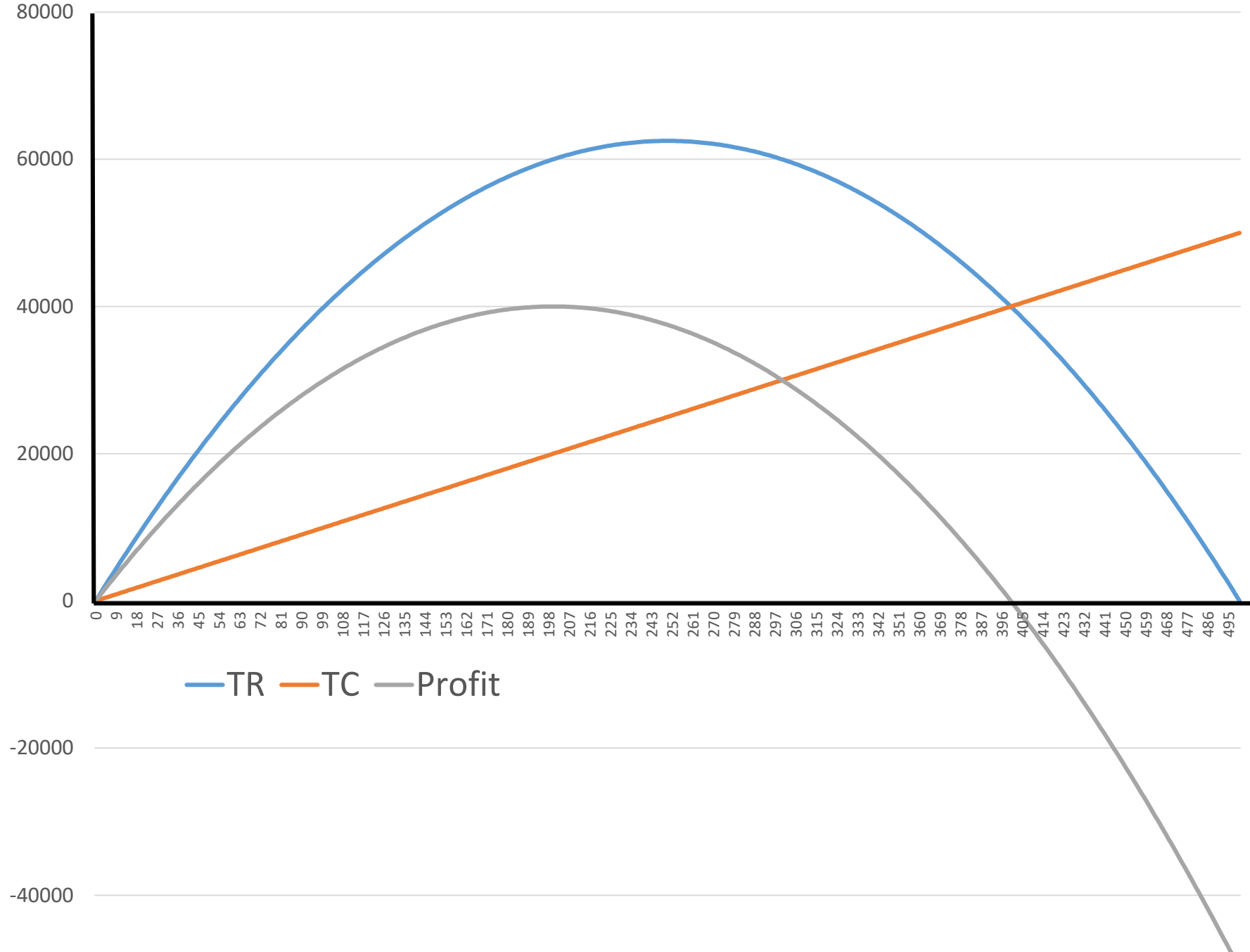
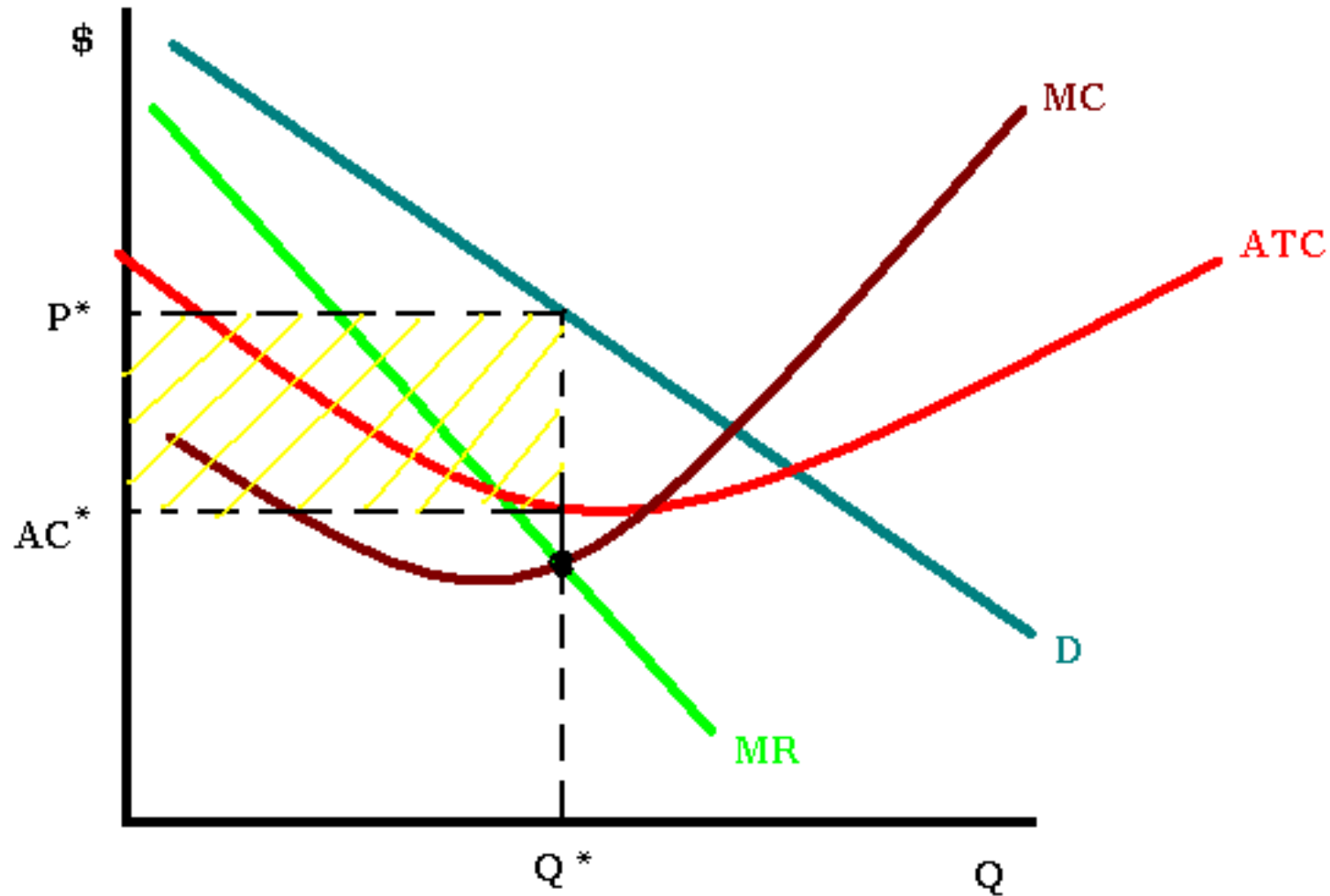


Figure 2: Total Revenue, Total Cost, Profit





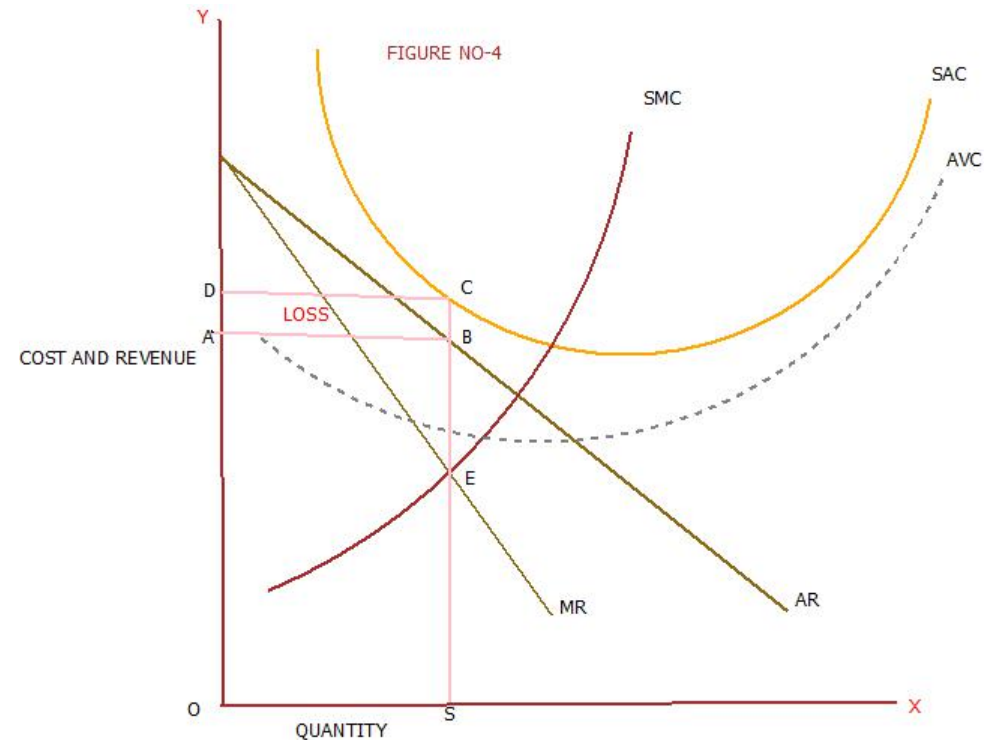
More generally, a monopolist earning positive short-run economic profits:



# Long-run adjustments in monopoly markets

In the short run, a monopolist may make positive, zero, or negative economic profits.

What sort of adjustments do you expect to occur over time if the monopolist is suffering short-run economic losses? Enjoying short-run economic profits?



# Barriers to Entry and Monopoly Power

- In a competitive market, when existing sellers are earning an above-normal return, we predict that new firms will enter the market and compete away those profits.
- If a monopolist is earning short-run economic profits, will entry occur and the monopolist's profits disappear?
- Not if there are significant barriers to entry.
- **Monopoly Power:** the ability of a firm to earn positive long-run economic profits
- Only if there are barriers to entry can a firm expect to earn an above-normal return that persists over time.

# Sources of entry barriers

- Ownership of an essential resource or raw material
  - Examples? Parthenon. DeBeers.
- Economies of scale
  - Examples? Railroad. Ice-skating rinks in Lexington.
- Legal barriers
  - Examples? Patented drugs. Local moving companies in Lexington.
- Strategic entry deterring behavior by incumbent firms
  - More on this when we study oligopoly and game theory.

# Monopolistic Competition

- How would you characterize MacDonal'd's and its signature product, the Big Mac?



- Monopoly? Perfectly competitive? A blend of the two?
- MacDonal'd's has a monopoly on Big Macs. But there are many substitutes for Big Macs, so MacDonal'd's monopoly is a bit different from DeBeers.

# Characteristics of monopolistic competition

- Many small independent sellers
- Many small independent buyers
- Differentiated product
- Insignificant entry barriers
- Examples? <http://www.lexingtonburgerweek.com/#!burgers/cfvg>



# Short-run profit maximization by a monopolistically competitive firm

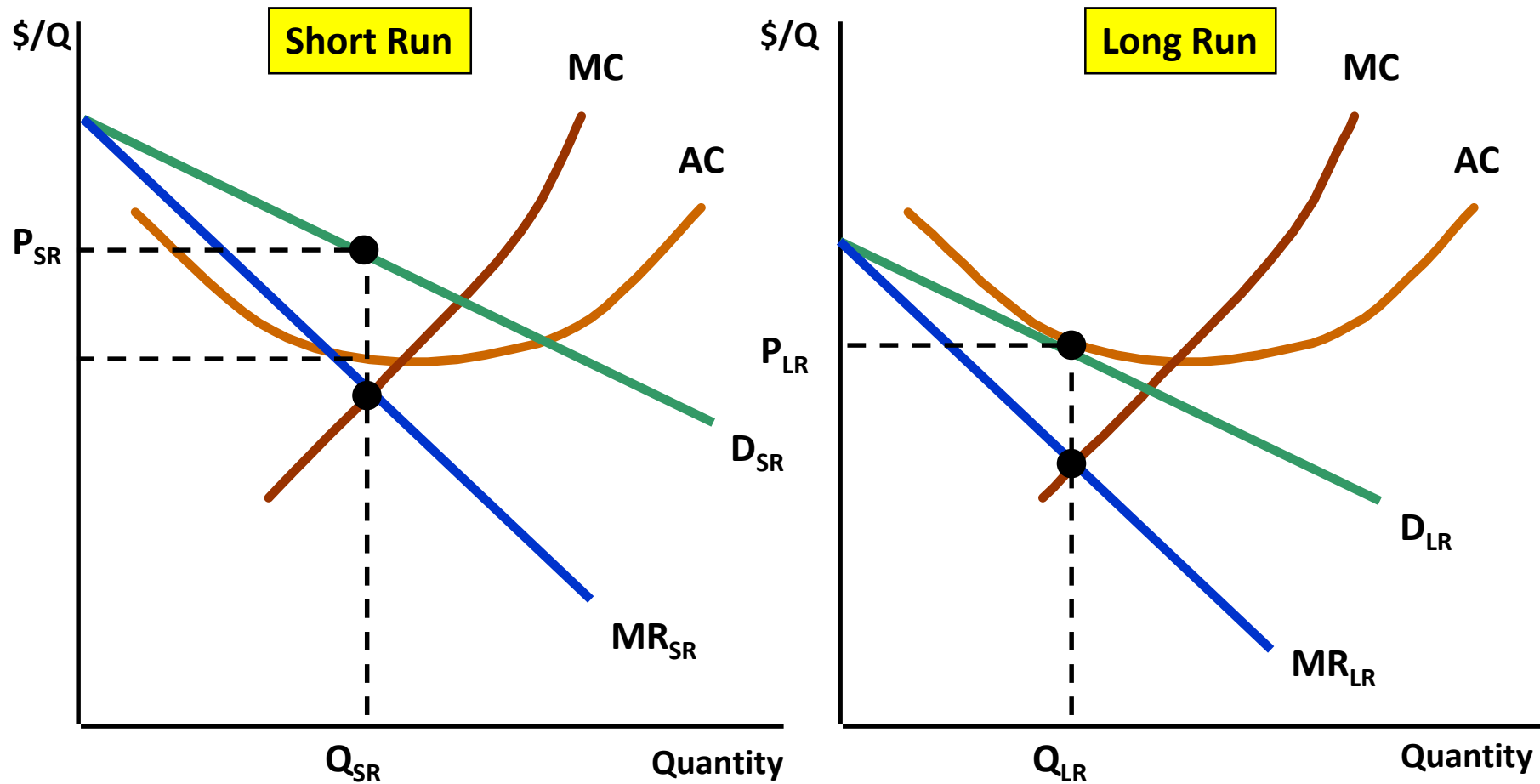
- Firm's demand curve is downward sloping, because other attributes of the product besides price matter to consumers.
- Firm must lower price to sell more of the product.
- Customer responsiveness to changes in price (own price elasticity of demand) depends on "closeness" of substitutes.
- Shut down decision?
- How much to produce? What price to charge?
- Short-run economic profits? Losses?
- [refer to diagram drawn on board]

# Long-run adjustments in a monopolistically competitive market

- Suppose firms in the industry are earning positive economic profits.
- What changes do you predict, given enough time for firms to adjust?
  - Entry of new competitors.
- How will that affect existing producers?
  - Fewer customers. Incumbent producers will see their demand curves shift inward.
- Where does it end? When is the market in long-run equilibrium?
  - Zero economic profits. When enough new competitors have entered the market such that sellers are earning a normal return, there is no incentive for additional entry.



# A Monopolistically Competitive Firm in the Short and Long Run



# Pricing with Market Power

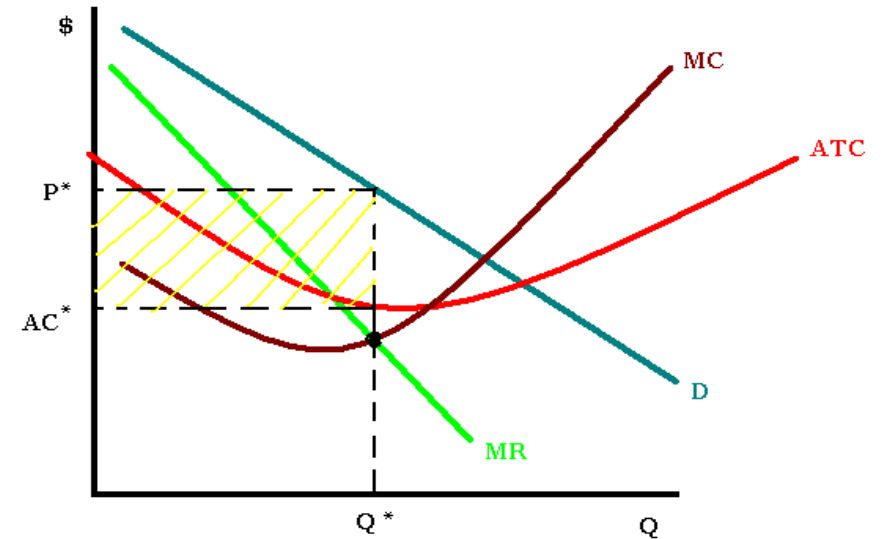
- Market Power refers to the ability of a firm to set its own price, as opposed to firms that are price takers and take market price as given.
- Challenge for a firm with market power: how to set price so as to extract maximum surplus from its customers.
- The simplest pricing strategy is to charge all customers the same uniform price per unit.
- Under certain circumstances, firms can increase their profits by adopting more complex pricing strategies.

# The inverse-elasticity pricing rule

- A monopolist maximizes profit by choosing output where  $MR=MC$  and setting price according to the market demand curve.

- It can be shown that this price and output combination can be expressed as follows:

$$P^* = MC/[1 - (1/\epsilon_{X,P_X})] , \quad \text{or} \quad \frac{P - MC}{P} = \frac{1}{\epsilon_{X,P_X}}$$



Logic of Inverse Elasticity Rule:  $\frac{P - MC}{P} = \frac{1}{\epsilon_{X, P_X}}$

- The IER suggests that in order to maximize profit, a monopolist should set price such that the markup of price over marginal cost is inversely related to own-price elasticity of demand.
- Optimal gouging: the less elastic is demand, the bigger or smaller the markup of price over marginal cost???
- Examples? Airline pricing policies? Student and senior citizen discounts? Industrial parts?

<http://ezproxy.uky.edu/login?url=http://search.proquest.com/docview/399036795?accountid=11836>

**From:** Vishnu Sivagnanalingam [<mailto:vishnus11@gmail.com>]

**Sent:** Thursday, September 17, 2009 12:01 PM

**To:** Scott, Frank

**Subject:** Personal Experience with Parker Hannifin for Friday's class

Dr. Scott,

Sorry I won't be able to be there on Friday for class as we discussed. As promised, here are some thoughts I had on Parker Hannifin based on my experiences with them.

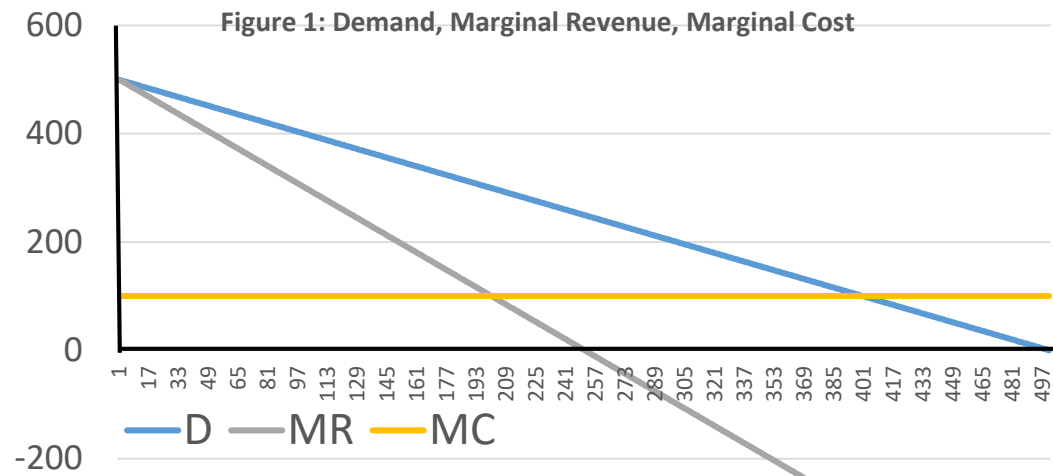
Prior to beginning the MBA program at UK, I worked as a developmental engineer at Cummins Inc. in Indiana. Our plants used many seals from Parker Hannifin. A notable experience from my work as an engineer that relates to this article:

Because the prices on seals and such were raised, especially when Parker realized it was the only manufacturer of such seals - e.g. speciality seals, such as those that have to resist high temperatures on the exhaust manifold - we (Cummins) wanted to source some of the seals from elsewhere to reduce costs.

Sometimes we were successful in finding lower cost providers (usually companies outside the United States), but more often than not, we accepted the price increase. Simply put, we had had no previous problems with their seals and didn't want to invest the R&D into validating a new seal from a different manufacturer. So Parker's strategy of raising prices for unique seals WAS effective in many of their contracts with us (Cummins).

# Potential for higher profit

- A monopolist setting a uniform price for all customers may be able to earn positive long-run economic profits, if barriers to entry protect it from new competitors.
- Under certain circumstances the monopolist may be able to employ more complex pricing strategies that allow it to increase its profits.
- Simple example: backyard roller coaster. Demand curve for typical customer:
  - Uniform pricing strategy:
  - $P^* = \$3$ ,  $Q = 2$ ,  $\pi = \$4$



# Creative pricing strategies?

- Does a uniform price extract the maximum consumer's surplus available in this market? i.e. can you come up with a more complex pricing strategy that increases your profits?
- [Refer to diagram drawn on board]
- How do King's Island, Disney World, Kentucky Kingdom, and other amusement parks price their product?
- Two-part pricing. Set a price per ride and charge an admission fee as well.
- How should you set the price per ride? Admission fee?

# Price Discrimination

Price Discrimination occurs when a firm charges:

- 1) Different prices to different customers for the same good
- 2) Different prices to the same customer for successive units of the good
- 3) The same price to different customers for different (in terms of cost) goods

Examples?

- <http://ezproxy.uky.edu/login?url=http://search.proquest.com/docview/1030070943/138B00F13ED129D5D44/87?accountid=11836>
- <http://search.proquest.com.ezproxy.uky.edu/docview/1640656018/282BDA0784EC4495PQ/60?accountid=11836>
- <http://ezproxy.uky.edu/login?url=http://search.proquest.com/docview/1416012158/13FC4793A95703AF36B/87?accountid=11836>



# Necessary conditions for price discrimination

The following conditions are necessary in order for a firm to be able to price discriminate:

- The firm must face a downward-sloping demand curve, i.e. it must have market power.
- The firm must have the ability to identify and sort customers according to their willingness to pay.
- The firm must be able to prevent arbitrage, i.e. resale of the commodity.

How do airlines sort customers into WTP categories? Why doesn't the university bookstore charge out-of-state students higher prices for their textbooks than in-state students?

# First-degree price discrimination

- First-degree price discrimination is perfect price discrimination. The seller extracts all surplus from consumers.
- First-degree price discrimination can be accomplished by walking down the demand curve—individually negotiating with each customer and charging the highest price they will pay.
- [Dry Ridge Toyota example, diagram drawn on board]
- It can also be accomplished with a two-part price—an entry fee plus a price per unit, where the entry fee is set so as to extract all surplus.
- [amusement park example, diagram drawn on board]

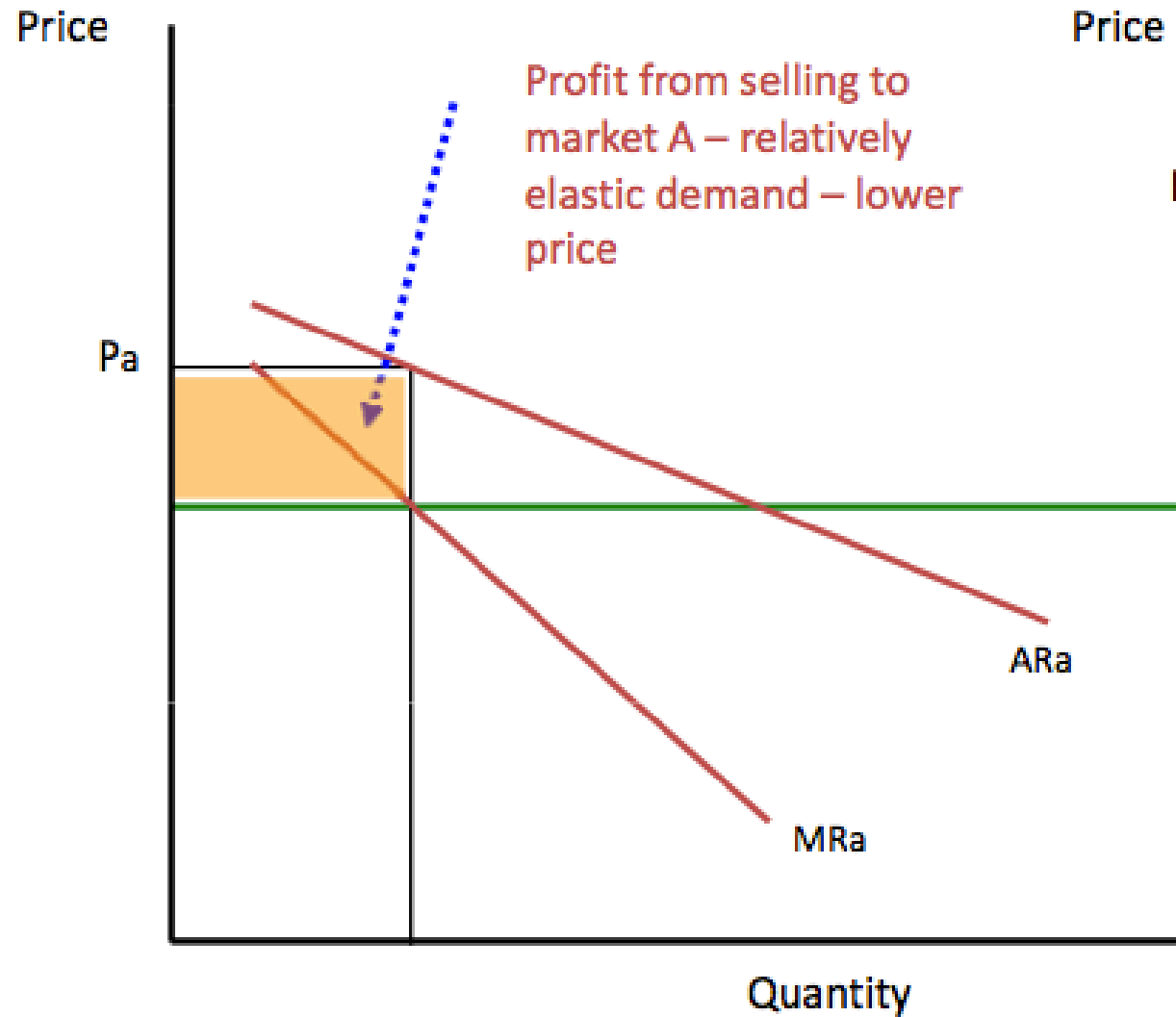
# Second-degree price discrimination

- Second-degree price discrimination involves the use of self-selecting quantity discounts.
- Example: suppose you operate a cell-phone company and face two categories of customers. [illustrated on the board]
- Simple pricing strategy: charge 7¢ per minute to one and all. Type 1 and type 2 customers will choose 120 minutes each and  $TR = \$16.80$
- Can you increase your revenues by changing your pricing strategy?
- More complex pricing strategy: offer self-selecting quantity discount whereby Plan A has 100 minutes per month for \$10 and Plan B has 300 minutes per month for \$15. With these options, type 1 customers will choose Plan A and type 2 customers will choose Plan B. Total revenue will be \$25.

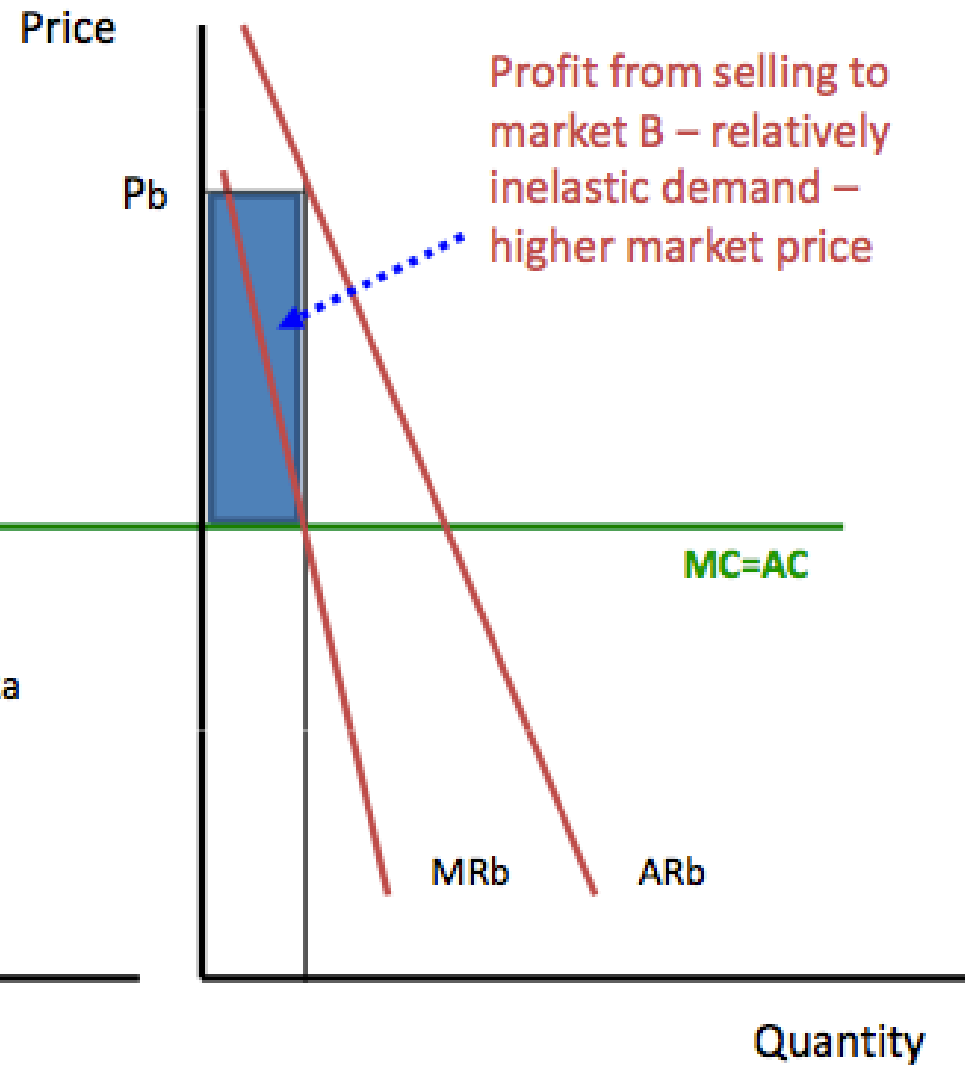
# Third-degree price discrimination

- Third-degree price discrimination involves market segmentation, whereby the firm is able to set different prices in each market segment. Inverse-elasticity pricing rule is the order of the day.
- Example: airline pricing. Suppose you have two types of travelers, leisure and business. Business travelers are relatively unresponsive to changes in price, while leisure travelers are relatively responsive to changes in price. [illustrated on board]
- How to set price for each type of customer? Choose  $Q$  and  $P$  such that  $MR = MC$  in each market segment.
- Challenge: How to identify and sort customers?

### Market A



### Market B



# Commodity Bundling



- Suppose that a firm sells multiple products, and that different customers have different reservation prices for each good.
- Example: Toyota sells Camrys, which can be equipped with moon roofs, or backup cameras, or neither, or both. <http://www.cars.com/toyota/camry/2016/standard-equipment/>
- Different pricing strategies:
  - Pure components strategy: offer a la carte prices for each separate item.
  - Pure bundling strategy: bundle the two items and charge one price for the bundle. <https://www.youtube.com/watch?v=hdIXrF34Bz0>
  - Mixed bundling strategy: offer and price the two items separately, and also offer and price them together as a bundle.
- Bundling can be more profitable if it allows the firm to sort customers into groups with different reservation price characteristics and hence to extract consumer's surplus. For a deeper analysis, see <https://www.youtube.com/watch?v=8mw5RLzWNnE>

# Other pricing issues: multiple products that are related in demand

- Demand Interrelationships: suppose a firm produces two products, A and B, that are related in demand but unrelated in cost.

$$\pi = TR_A(Q_A, Q_B) + TR_B(Q_A, Q_B) - TC_A(Q_A) - TC_B(Q_B)$$

- Suppose A and B are unrelated, how to set price?
  - No differently than two separate single-product monopolists would.
- Suppose A and B are substitutes, how to set price?
  - Set prices higher than if A and B were unrelated (cannibalization).
- Suppose A and B are complements, how to set price?
  - Set prices lower than if A and B were unrelated.

