Lecture 11:
Market Power and Monopoly

November 7, 2023

Course Administration

1. Use Numbers 3 due today
2. Use Numbers 1 and 2 answers posted
3. PS answers posted
4. Final
   - Last year's final posted
   - Review December 8, 7 to 8:30 PM, Bell 107
   - Exam Dec. 13 and 14, 3:30 to 5:20
5. Any questions?

Ripped from the Headlines

Next week – article due by Wednesday midnight

Finder	Presenter
Jared	Trenton

Ripped from the Headlines

Finder	Presenter
Vanea	Tara

Where We Are Going

- Market power
- Market power and marginal revenue
- Market power and profit maximization
- Reaction to market changes
- Welfare
- The role of government
- Use Numbers 3
- Monopolies in the long run

Sources of Market Power

Why Study Market Power?

- Most markets are imperfect to some degree
- Economists believe there is a role for government in easing market imperfections
- Today
  - How does limited competition impact consumption and production?
  - What is government's role in improving competition?

What is Market Power?

- Market power $\equiv$ when a firm has the ability to influence the market price
- Monopoly $\equiv$ market served only by one firm
- Monopolist $\equiv$ sole supplier and price setter of good on the market

Where Does Market Power Come From?

What keeps prices low in competitive markets?

Inhibitions to entry include

1. "Natural" monopolies
2. Switching costs
3. Product Differentiation
4. Absolute Cost Advantages
5. Government barriers to entry

1. Natural Monopolies

- An industry in which average total cost always decreases as Q increases
  - Note that this also implies decreasing marginal cost
- This means that it is efficient for one firm to produce the entire industry output

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- An industry in which average total cost always decreases as Q increases
  - Note that this also implies decreasing marginal cost
- This means that it is efficient for one firm to produce the entire industry output
- And there is a rationale for government to regulate the monopoly

2. Switching Costs and Market Power

- Switching costs $\equiv$ cost to consumer in switching between products – examples?
- Network goods have particularly high switching costs
- Network good $\equiv$ good for which value to consumer increases with number of other consumers of the product

3. Product Differentiation and 4. Cost Advantage

Product differentiation

- Imperfect substitutability across varieties of a product
- Observable if you are willing to pay a little more for a particular variant

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Absolute Cost Advantage

- Firm owns something or has a technology that makes it have lower costs relative to competitors
- Examples?

5. Government Regulation as a Barrier to Entry

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- Remember, over the long run, high profits are a temptation to entry, perhaps in a slightly altered form

5. Government Regulation as a Barrier to Entry

- We've already given examples that limit entry – reprise?
  - patent rights
  - occupational licensing
  - education requirements
- Remember, over the long run, high profits are a temptation to entry, perhaps in a slightly altered form
- Don't conclude that barriers to entry are always bad
- Do compare cost of barriers to benefits

Market Power and Marginal Revenue

Neither Perfect Competition Nor a Monopoly

- We say a firm has market power if it faces a downward sloping demand curve
  - Recollect – what did a demand curve look like to a perfectly competitive firm?

Neither Perfect Competition Nor a Monopoly

- We say a firm has market power if it faces a downward sloping demand curve
  - Recollect – what did a demand curve look like to a perfectly competitive firm?
- Firms in these types of markets face downward-sloping demand curves
  - Oligopoly $\equiv$ an industry with few firms – examples?
  - Monopolistic competition $\equiv$ many firms selling differentiated products
  - Monopoly

Marginal Revenue: Perfect Competition and Not

Perfect Competition

- What is marginal revenue?

Marginal Revenue: Perfect Competition and Not

Perfect Competition

- What is marginal revenue?
- If the firm perceives the demand curve as constant, then $MR = P$

Marginal Revenue: Perfect Competition and Not

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- What is marginal revenue?
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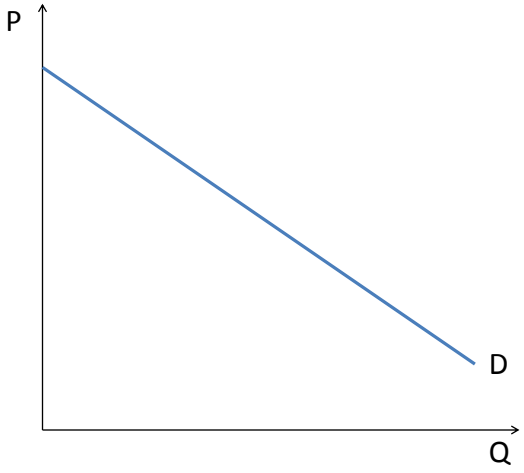
Market Power

- We assume that the firm has to charge the same price for all units of the good
- As before, marginal revenue is the additional revenue from an additional unit of output sold
- However, selling an additional unit of output now requires lowering the price on all units of output

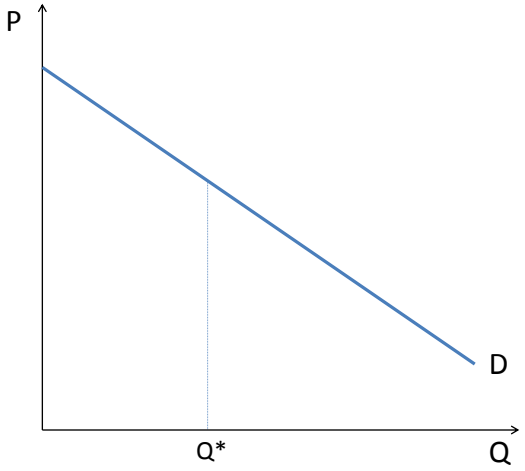
Market Power and Marginal Revenue in Pictures

Demand as Perceived by the Firm



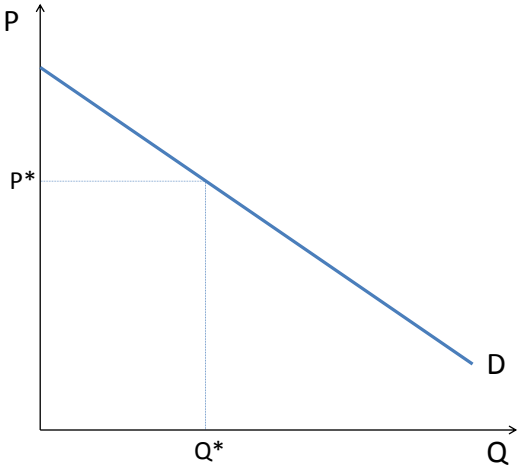
Market Power and Marginal Revenue in Pictures

Can Think of Firm Choosing Either P or Q



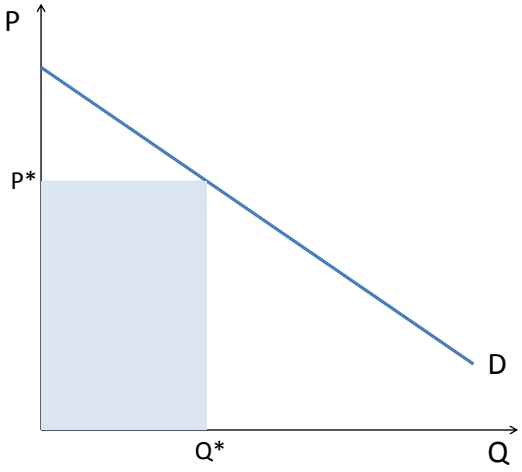
Market Power and Marginal Revenue in Pictures

What is Revenue?



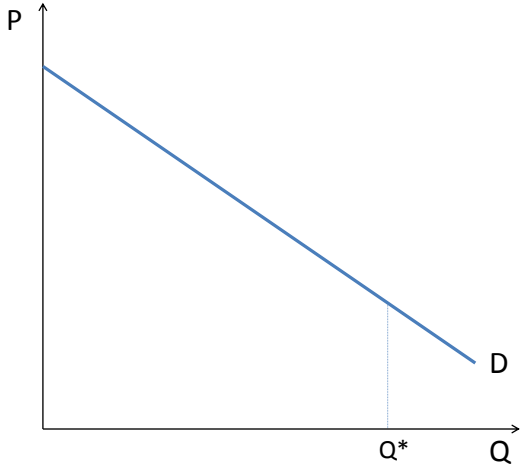
Market Power and Marginal Revenue in Pictures

Revenue



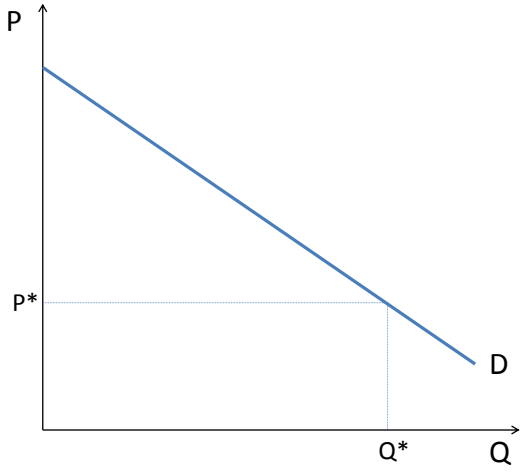
Market Power and Marginal Revenue in Pictures

Choose a Different Q



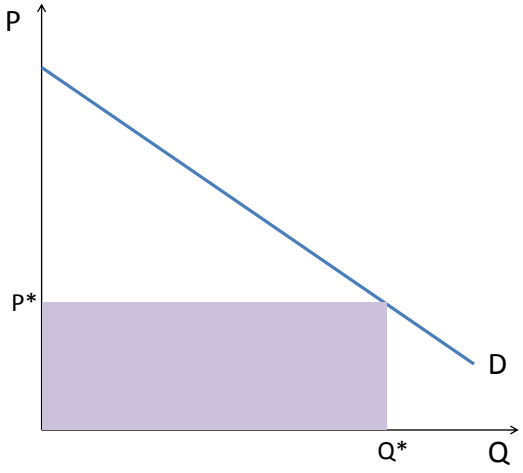
Market Power and Marginal Revenue in Pictures

Yields a Different P



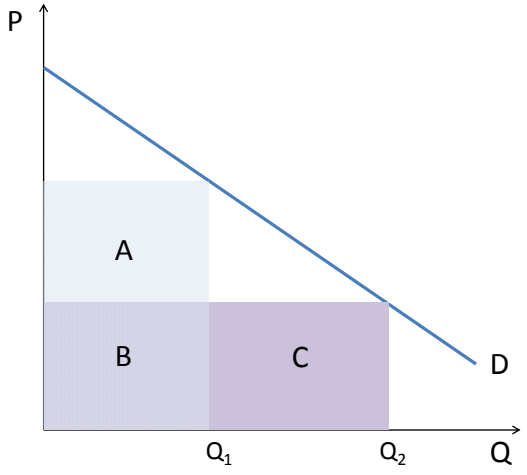
Market Power and Marginal Revenue in Pictures

Different Revenue



Market Power and Marginal Revenue in Pictures

Compare Gains and Losses From Change in Production



Market Power and Marginal Revenue in Algebra

Define

$$MR = P + \frac{\Delta P}{\Delta Q} Q = \left(\frac{\partial TR}{\partial Q} \right)$$

- We know that $\frac{\Delta P}{\Delta Q}$ is the slope of the demand curve, and that's negative
- Thus, MR decreases as Q increases

Market Power and Marginal Revenue in Algebra

For a linear demand curve,

- Consider an inverse demand curve of form $P = a + bQ$ (note similarity to $y = b + mx$)
- We can rewrite MR as

$$\begin{aligned} MR &= P + \frac{\Delta P}{\Delta Q} Q \\ &= (a + bQ) + bQ \\ &= a + 2bQ \end{aligned}$$

Market Power and Marginal Revenue in Algebra

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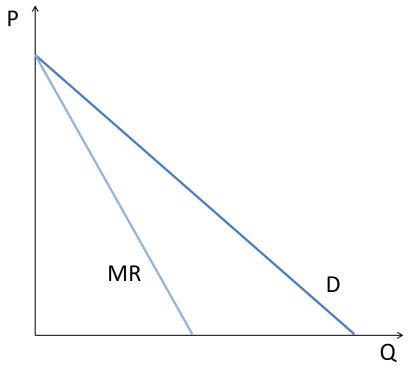
$$\begin{aligned} MR &= P + \frac{\Delta P}{\Delta Q} Q \\ &= (a + bQ) + bQ \\ &= a + 2bQ \end{aligned}$$

- The intercept is the same as the inverse demand curve, but the slope is twice as steep
- Memorize this formula

Note: This is slightly different notation with signs than in the textbook; I find it clearer. Remember that b is negative, so the MR slope will always be negative.

Figure: Demand Curve and Marginal Revenue Curve



When demand is linear, *MR* curve has

- same P intercept
- slope twice as steep
- Q intercept half of the demand curve

Profit Maximization and Market Power

Profit Maximization

What does a competitive firm set equal for profit maximization?

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What does a firm with market power set equal for profit maximization?

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Profit Maximization

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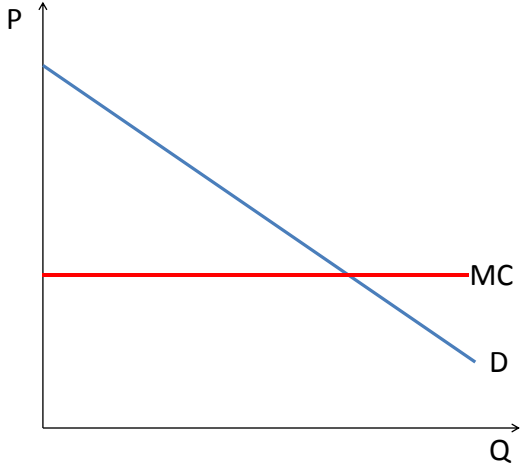
- $MR = MC$, and we know that $MR = P$

What does a firm with market power set equal for profit maximization?

- $MR = MC$
- But MR is more complicated
- And $MR \neq P$ (in general)

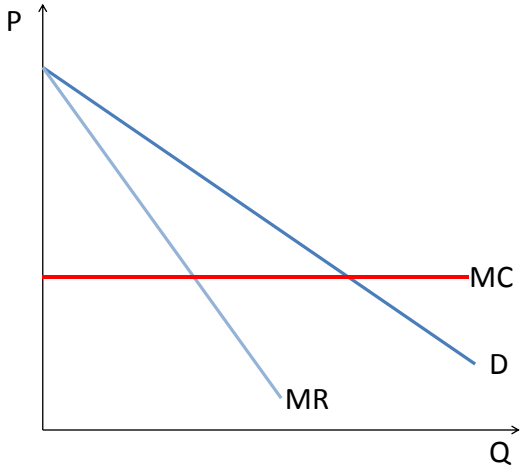
Maximizing π with Market Power: Constant *MC*

Where is *MR*?



Maximizing π with Market Power: Constant *MC*

What is Profit Maximizing *Q*?



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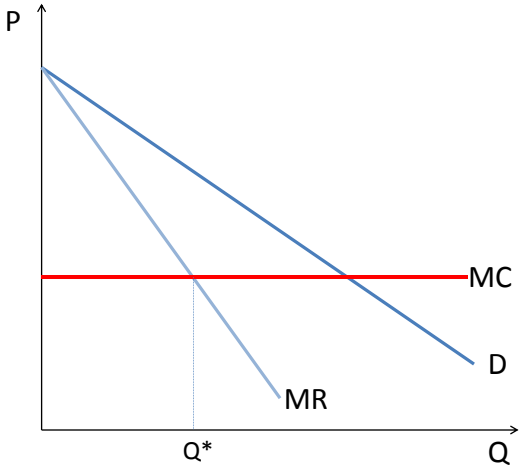
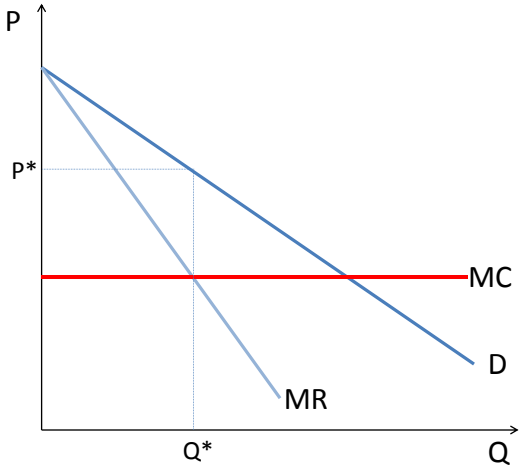


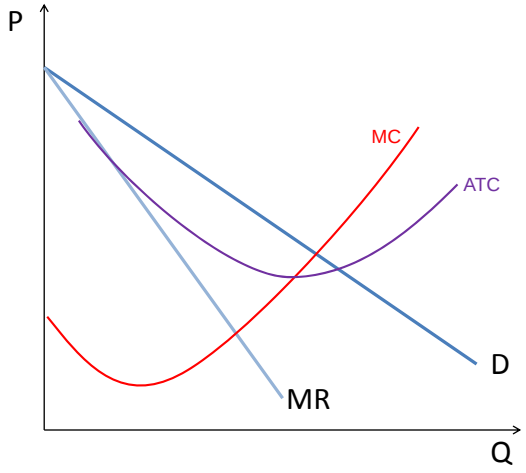
Maximizing π with Market Power: Constant *MC*

Can See Revenues, but Not Costs



Maximizing π with Market Power: Increasing *MC*

Where is Profit Maximizing *Q*?



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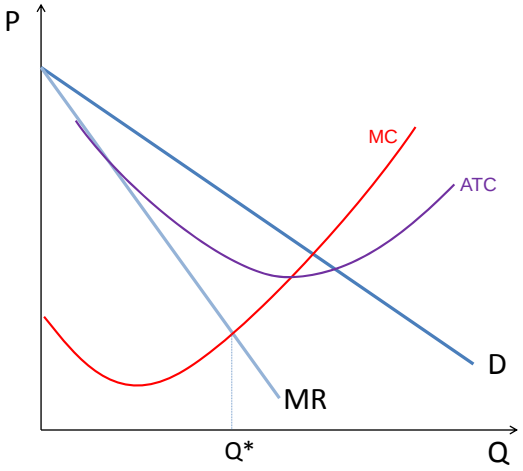
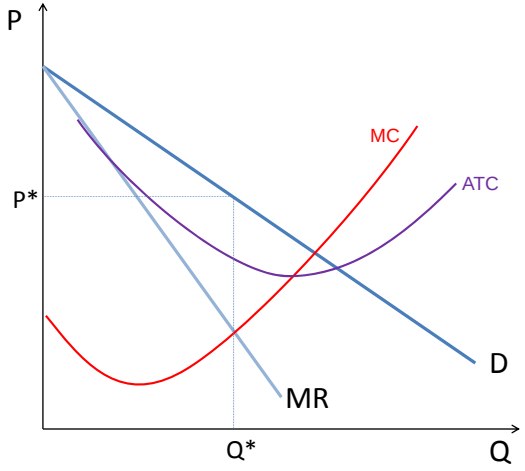


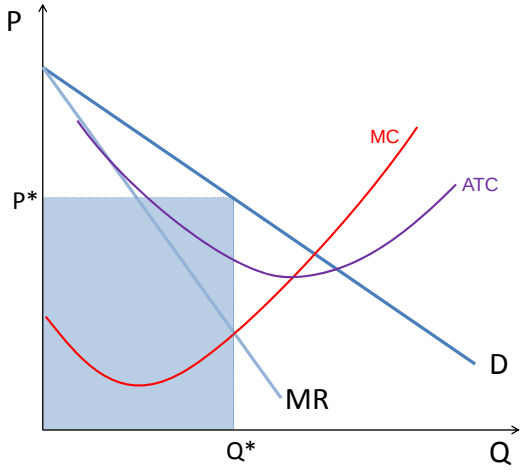
Maximizing π with Market Power: Increasing *MC*

What is Total Revenue?



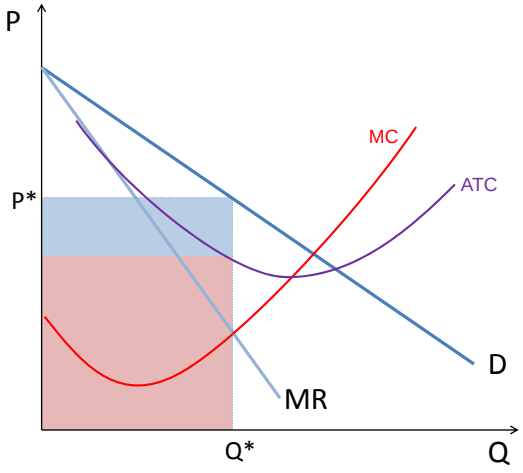
Maximizing π with Market Power: Increasing *MC*

What are Total Costs?



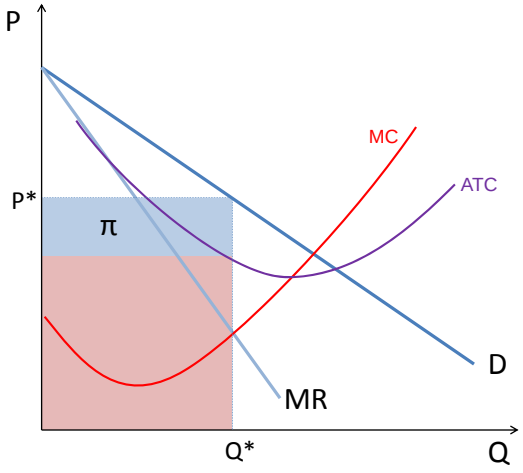
Maximizing π with Market Power: Increasing *MC*

What is Profit?



Maximizing π with Market Power: Increasing *MC*

Market Power Yields Profits!



Profit Maximization with Market Power in Math

Profits are maximized at Q^* such that $MR = MC$. What are Q^* and P^*?
Use these three steps:

1. Find MR
   - If you have a linear demand curve, you can find $MR = a + 2bQ$
   - where b is the slope of the **inverse** demand curve
   - a is the y-intercept
   - Remember that the inverse demand curve is $P = f(Q)$
2. Find profit-maximizing Q by setting $MR = MC$
3. Find profit-maximizing price by putting Q^* in demand curve

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Do not confuse MC curve with true supply curve, which is independent of demand.

Try it Yourself: Roofer Market Power

Suppose the local roofing company has market power and faces the demand curve $Q = 200 - P/10$, where Q is the number of roof jobs, and P is in dollars. The marginal cost for the firm is $MC = 200 + 16Q$.

1. What is marginal revenue?
2. What is the profit maximizing output?
3. Price?

And at home, if we don't have time, you can try...

4. If the firm's demand changes to $Q = 3500/3 - P/12$, what is the new marginal revenue?
5. Profit maximizing output?
6. Price?

In-Class Problem Answer

1. Find marginal revenue
   The problem gives $Q = f(P)$. We need $P = f(Q)$.
   Re-write the demand curve as the inverse demand curve:

$$Q = 200 - P/10$$
$$P/10 = 200 - Q$$
$$P = 2000 - 10Q$$

   Use the formula to find $MR = a - 2bQ = 2000 - 2(10)Q = 2000 - 20Q$.
   (Or calculus way $MR = \frac{\partial PQ}{\partial Q} = \frac{\partial 2000Q - 10Q^2}{\partial Q} = 2000 - 20Q$.)

Problem Cont'd

2. Find profit maximizing Q
   $MR = MC$. We know $MC = 200 + 16Q$. Set $MR = MC$.

$$\begin{aligned} 2000 - 20Q &= 200 + 16Q \\ 1800 &= 36Q \\ Q^* &= 50 \end{aligned}$$

3. Find profit maximizing price
   Plug Q^* into the demand curve. $P^* = 2000 - 10(50) = 2000 - 500 = 1500$.

Answer, cont'd

4. Firm's demand changes, new MR? Find inverse demand curve:

$$Q = 3500/3 - P/12$$
$$P/12 = 3500/3 - Q$$
$$P = 14000 - 12Q$$

$MR = 14000 - 24Q$

5. Firm's demand declines, new Q^*?

$$MR = MC$$
$$14000 - 24Q = 200 + 16Q$$
$$13800 = 40Q$$
$$345 = Q^*$$

End of Answer

6. New profit maximizing price? Plug into new demand curve
   $P^* = 14000 - 12(345) = 14000 - 4140 = 9860$

How a Firm with Market Power Reacts to Market Changes

Three Changes

1. Change in marginal cost
2. Outward shift in demand
3. Rotation of demand curve

Competitive Market and an Increase in *MC*

What happens to the equilibrium price and quantity?

Competitive Market and an Increase in *MC*

What happens to the equilibrium price and quantity?

- Supply curve shifts inward
- If supply is elastic, curve just shifts up
- Price increases
- Equilibrium Q declines

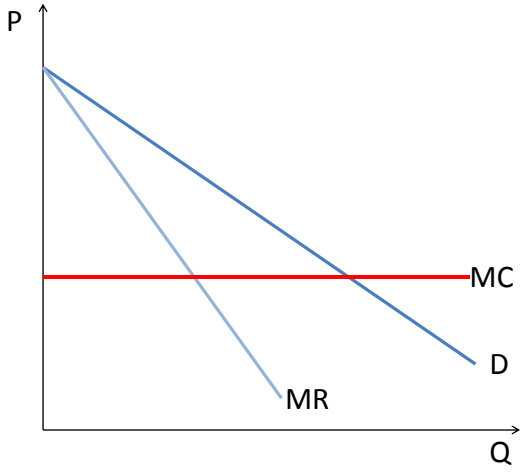
Competitive Market and an Increase in *MC*

What happens to the equilibrium price and quantity?

- Supply curve shifts inward
- If supply is elastic, curve just shifts up
- Price increases
- Equilibrium Q declines
- In the long run, cost increases fully passed along to consumers

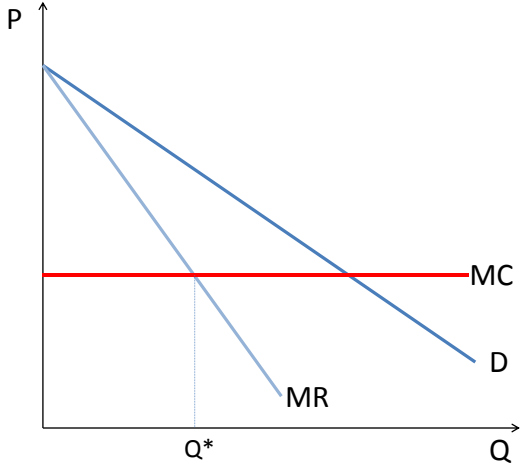
Market Power and an Increase in *MC*

Review: Where is profit maximizing *Q*?



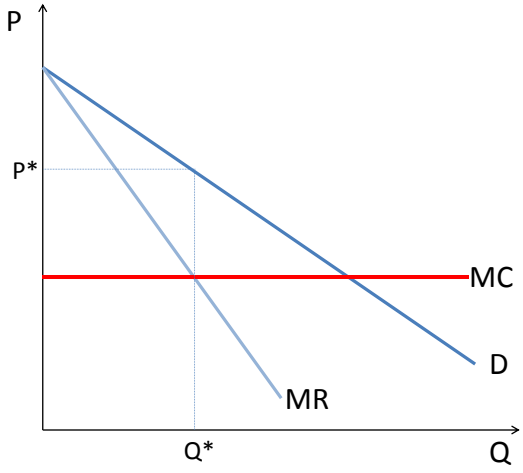
Market Power and an Increase in *MC*

Review: What is Profit Maximizing *P*?



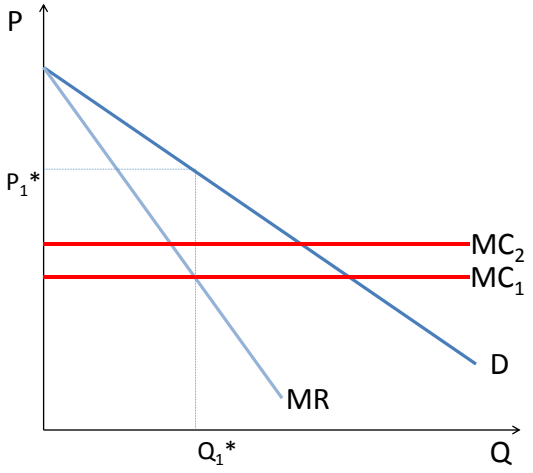
Market Power and an Increase in *MC*

Draw an Increase in *MC*?



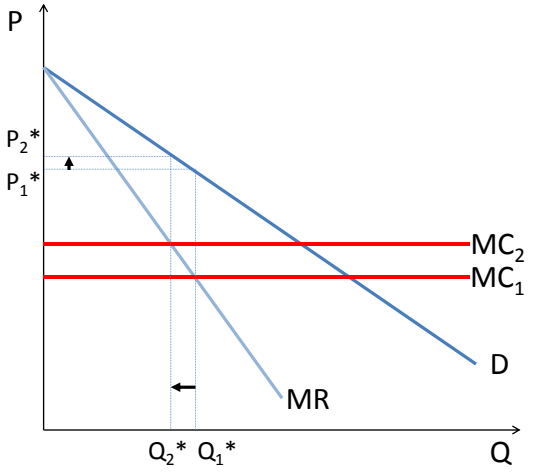
Market Power and an Increase in *MC*

What are New Profit Maximizing *P* and *Q*?



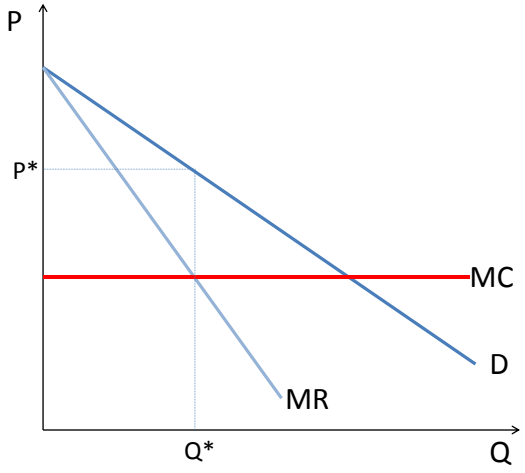
Market Power and an Increase in *MC*

Prices Increase, Quantity Falls



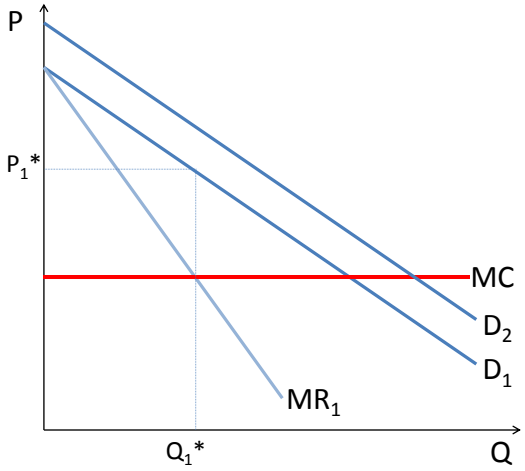
P and Q and Outward Shift in Demand

What Does an Increase in Demand Look Like?



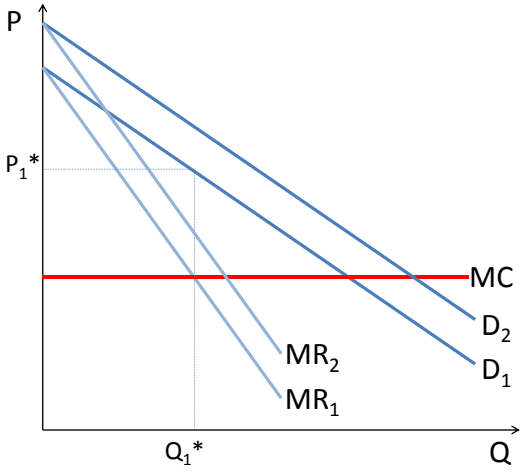
P and Q and Outward Shift in Demand

Where is the New MR?



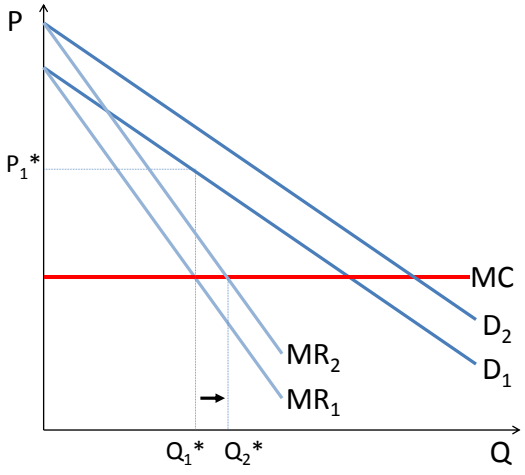
P and Q and Outward Shift in Demand

Where is the New Q?



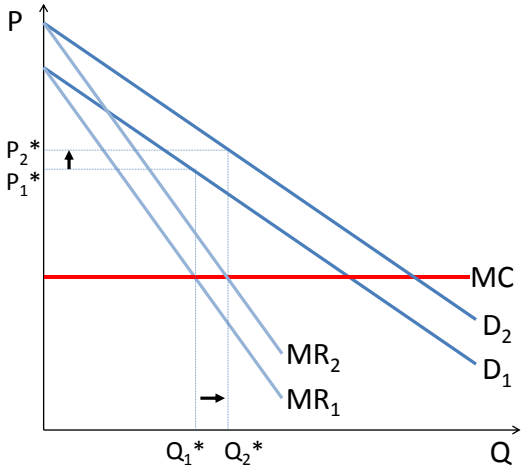
P and Q and Outward Shift in Demand

Where is the New P?



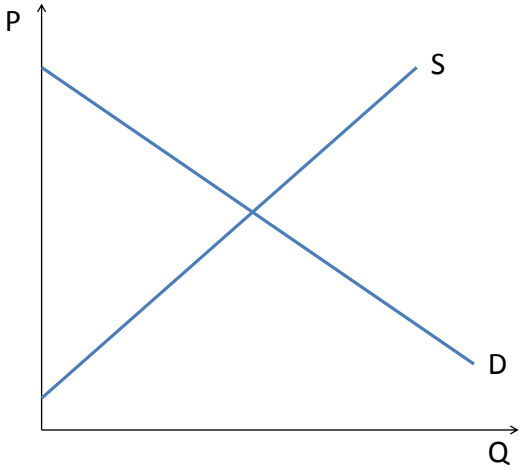
P and Q and Outward Shift in Demand

Q increases, P increases



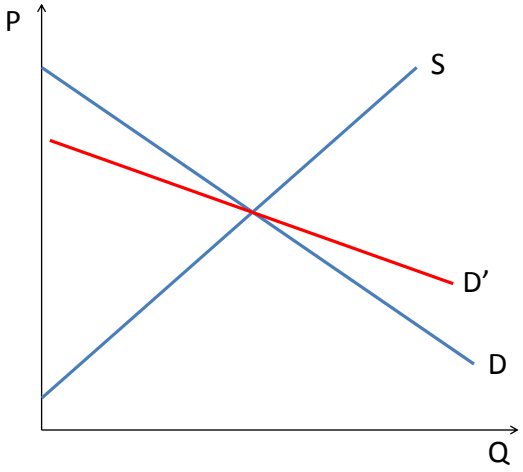
Rotation of the Demand Curve: Perfect Competition

With P Constant, Rotate Demand Curve



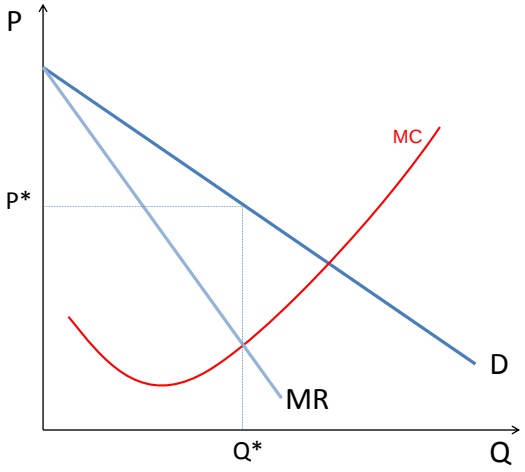
Rotation of the Demand Curve: Perfect Competition

No Response in P or Q



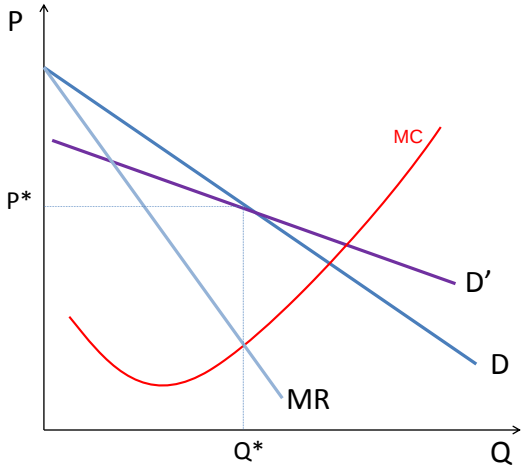
Rotation of the Demand Curve: Market Power

Rotate Demand Curve



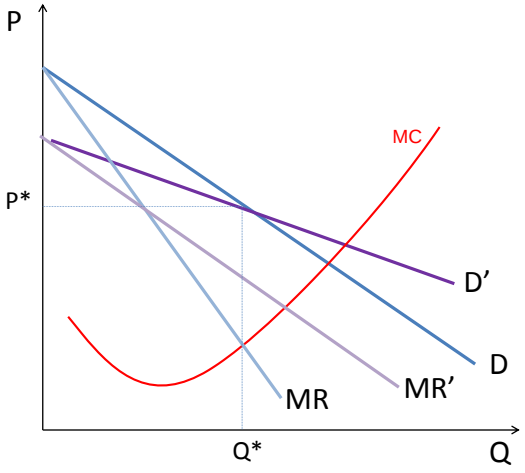
Rotation of the Demand Curve: Market Power

Where is New *MR*?



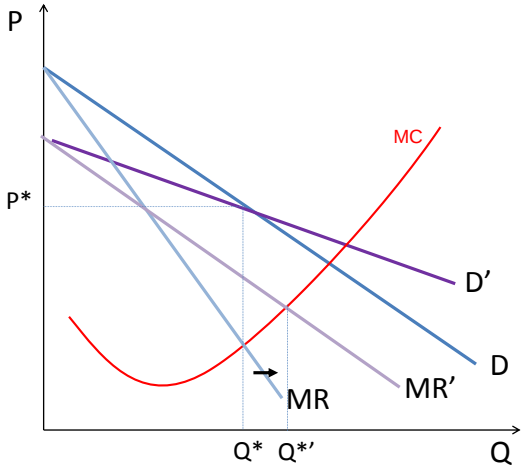
Rotation of the Demand Curve: Market Power

Where is the New Q?



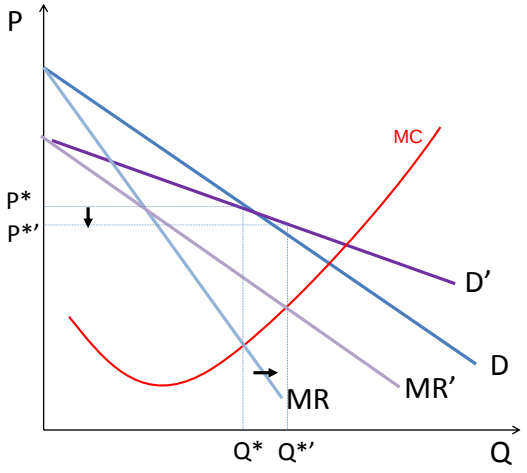
Rotation of the Demand Curve: Market Power

Where is the New P?



Rotation of the Demand Curve: Market Power

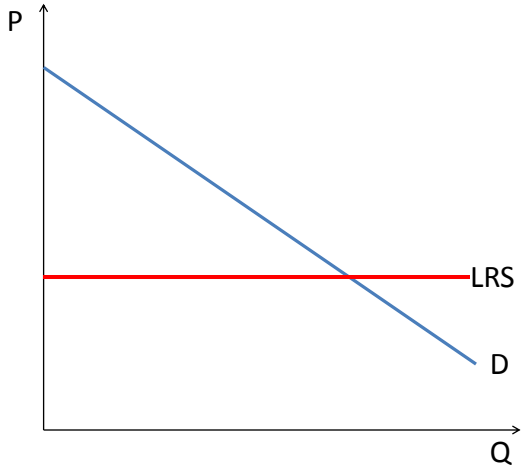
Q increases, P decreases



Winners and Losers from Market Power

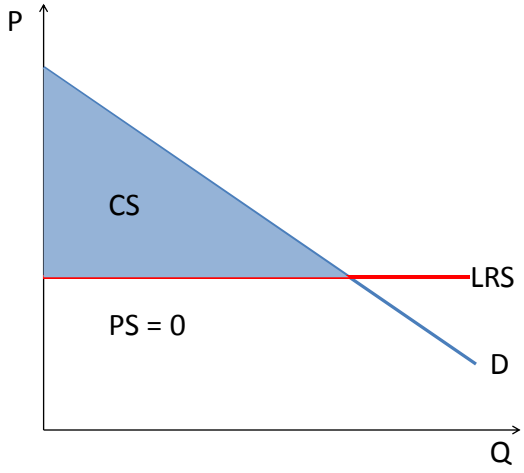
Producer and Consumer Surplus in Perfect Competition

Where are Consumer and Producer Surplus?



Producer and Consumer Surplus in Perfect Competition

It Stinks for Producers, and Is Good for Consumers



No Supply Curve for Firms with Market Power

In a perfectly competitive market

- supply exists independently of demand
- firm supply curve is a subset of the

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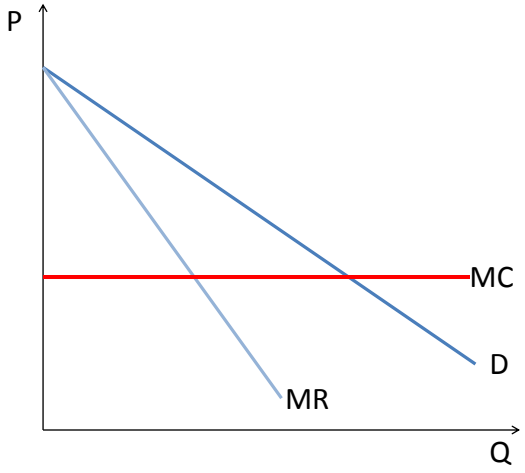
In a world with market power

- profit maximizing P and Q depend on demand
- to calculate producer surplus, rely on marginal cost curve
- this still tells us about the firm's ability to produce more cheaply than it sells

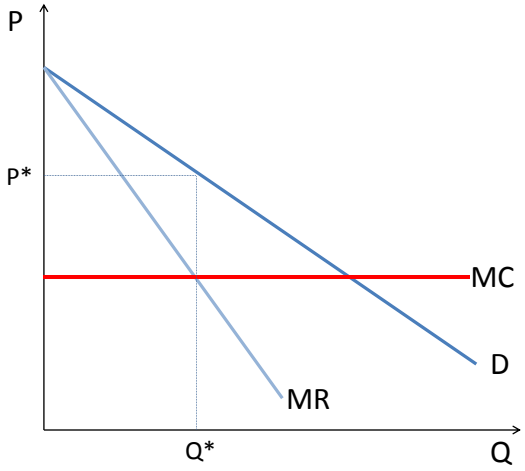
Producer and Consumer Surplus with Market Power

Where is the Profit Maximizing P and Q?



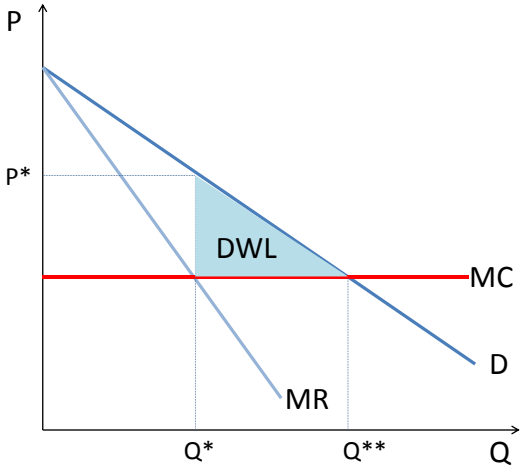
Producer and Consumer Surplus with Market Power

Where are the Trades that Don't Take Place?



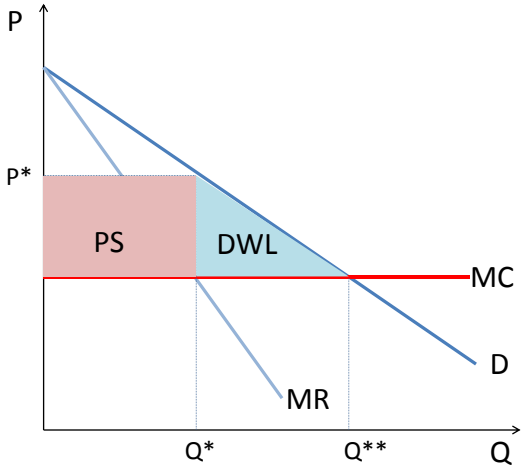
Producer and Consumer Surplus with Market Power

Where is *PS*?



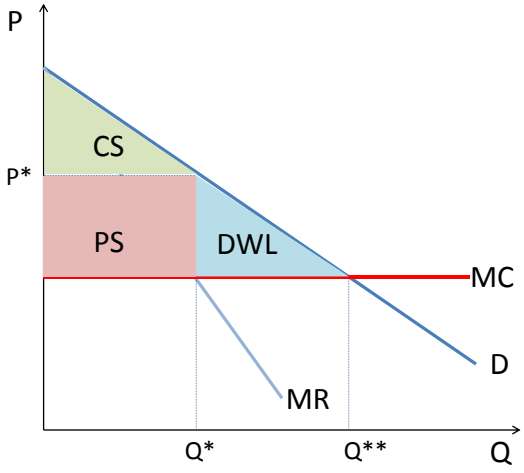
Producer and Consumer Surplus with Market Power

Where is *CS*?



Producer and Consumer Surplus with Market Power

Consumers Worse Off, Producers Better Off



Government's Role
In the Presence of Market Power

A Role for Government

Economists believe that may be a role for government to improve efficiency if the market is not perfectly competitive.

- Direct price regulation
- Antitrust
- Granting monopolies: patents and copyright

Use Numbers 3
Costs

Using Rail Transport to Think About Costs

1. Discuss your commodity examples: prepare 3 to rank and present.
2. Find route with heaviest average load and highest average revenue.
3. Economies of scale in distance? why or why not?
4. Economies of scale in weight? why or why not?

Use Numbers 3: Costs

But Monopolies Never Last Forever: Diamonds

- Two DeBeers brothers find diamonds on their South African farm in 1860s
- Cecil Rhodes, colonizer extraodinaire, purchases almost all diamond mines in South Africa
- "Rhodes was concerned about the break-up of the new monopoly, stating to shareholders in 1896 that the company's 'only risk is the sudden discovery of new mines, which human nature will work recklessly to the detriment of us all'."
- This happened in the early 1900s and this new mine outstrips DeBeers production
- What can they do?

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All quotes from DeBeers Wikipedia page.

The End of the Diamond Monopoly Era

- For most of the 20th century, De Beers keeps a close handle on supply through limitations on sales
- It also
  - buys competitors, or
  - stockpiles diamonds and then sells products similar to competitor products when they exist
- Market share of 90 percent in 1980s
- Market share of 30 percent by 2019
- What happened?

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- Market share of 90 percent in 1980s
- Market share of 30 percent by 2019
- What happened? Competition by
  - American and Canadian producers
  - other gems, via "blood diamonds"

Recap of Today

- Market power
- Market power and marginal revenue
- Market power and profit maximization
- Reaction to market changes
- Welfare
- The role of government
- Use Numbers 3
- Monopolies in the long run

Next Class

- Chapter 10
- LA Times article linked on webpage
- If you have trouble with article paywall, let me know