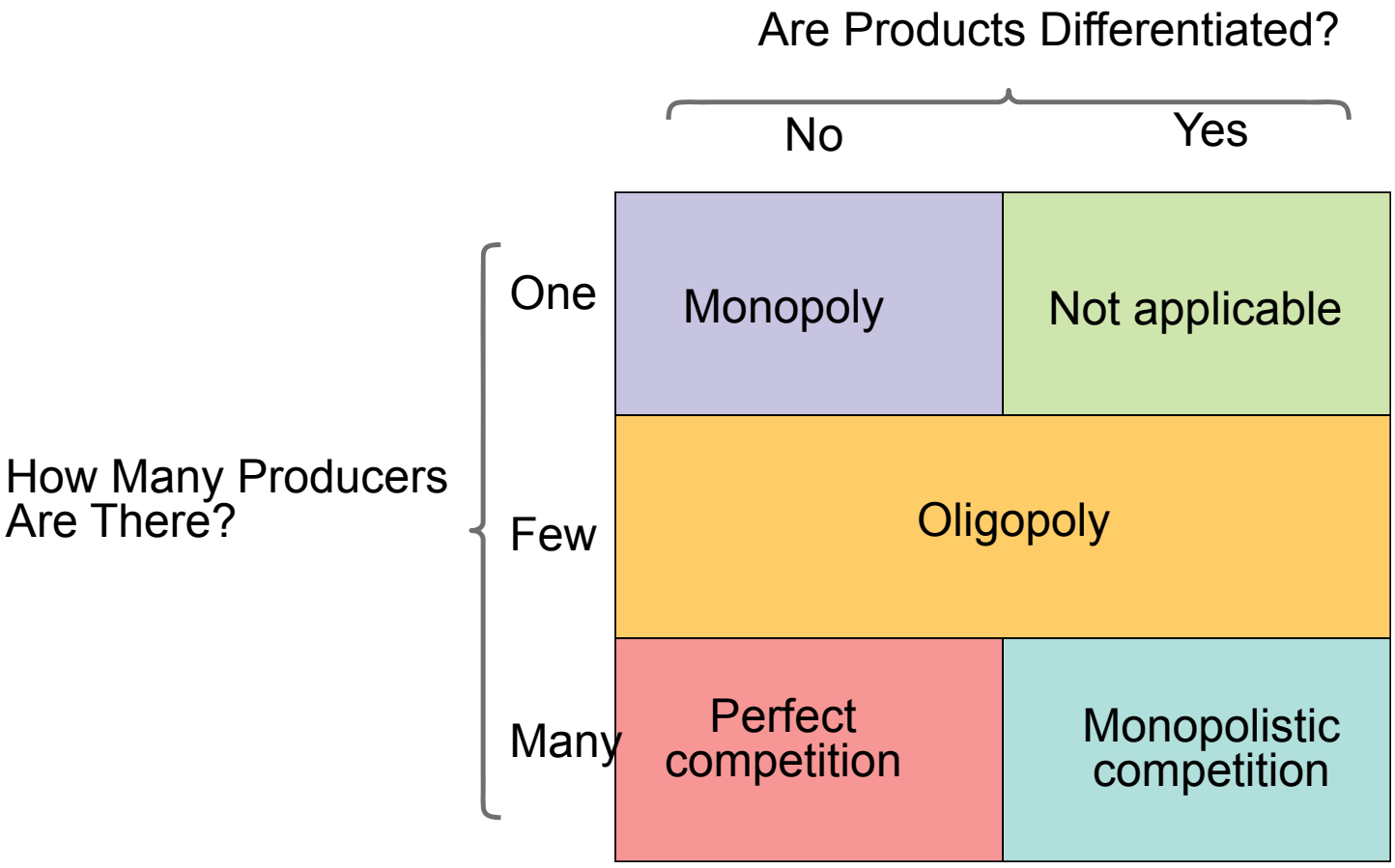
April 29th 2025

Monopoly

EE211

Types of Market Structure



- Why do monopolies arise?
- The Significance of monopoly, where a single monopolist is the only producer of a good
- Why is MR < P for a monopolist?
- How a monopolist determines its profit-maximizing output and price ?
- How do monopolies affect society's well-being?
- The difference between monopoly and perfect competition, and the effects of that difference on society's welfare
- How policy makers address the problems posed by monopoly
- What is price discrimination? (price customization)

The Meaning of Monopoly

A **monopolist** is a firm that is the only producer of a good that has no close substitutes. An industry controlled by a monopolist is known as a **monopoly.** *e.g. De Beers*

The ability of a monopolist to raise its price above the competitive level by reducing output is known as **market power.**

Why Do Monopolies Exist?

- A ***monopolist*** has *market power* and as a result will charge higher prices and produce less output than a competitive industry. This generates profit for the monopolist in the short run and long run.

- Profits will not persist in the long run unless there is a **barrier to entry**. This can take the form of
  - Control of natural resources or inputs
  - Increasing returns to scale
  - Technological superiority
  - Government-created barriers including patents and copyrights.

Why Monopolies Arise

- Monopoly
  - A firm that is the sole seller of a product without close substitutes
  - Has market power: price maker
    - The ability to influence the market price of the product it sells
  - Arise due to barriers to entry
    - Other firms cannot enter the market to compete with it

Barriers to Entry – 1

1. Monopoly resources
   - A single firm owns a key resource required for production.
     - Single water provider in town
     - DeBeers diamond company - owns most of the world's diamond mines
   - Relatively rare in practice

"Rather than a monopoly, we like to consider ourselves 'the only game in town.'"

Barriers to Entry – 2

2. Government regulation
   - Government-created monopolies
   - The government gives a single firm the exclusive right to produce the good.
     - Patents for new pharmaceutical drugs
     - Copyright laws
     - Lead to higher prices and higher profits (than under competition)
     - Also encourage some desirable behavior (provides incentives for creative activity)

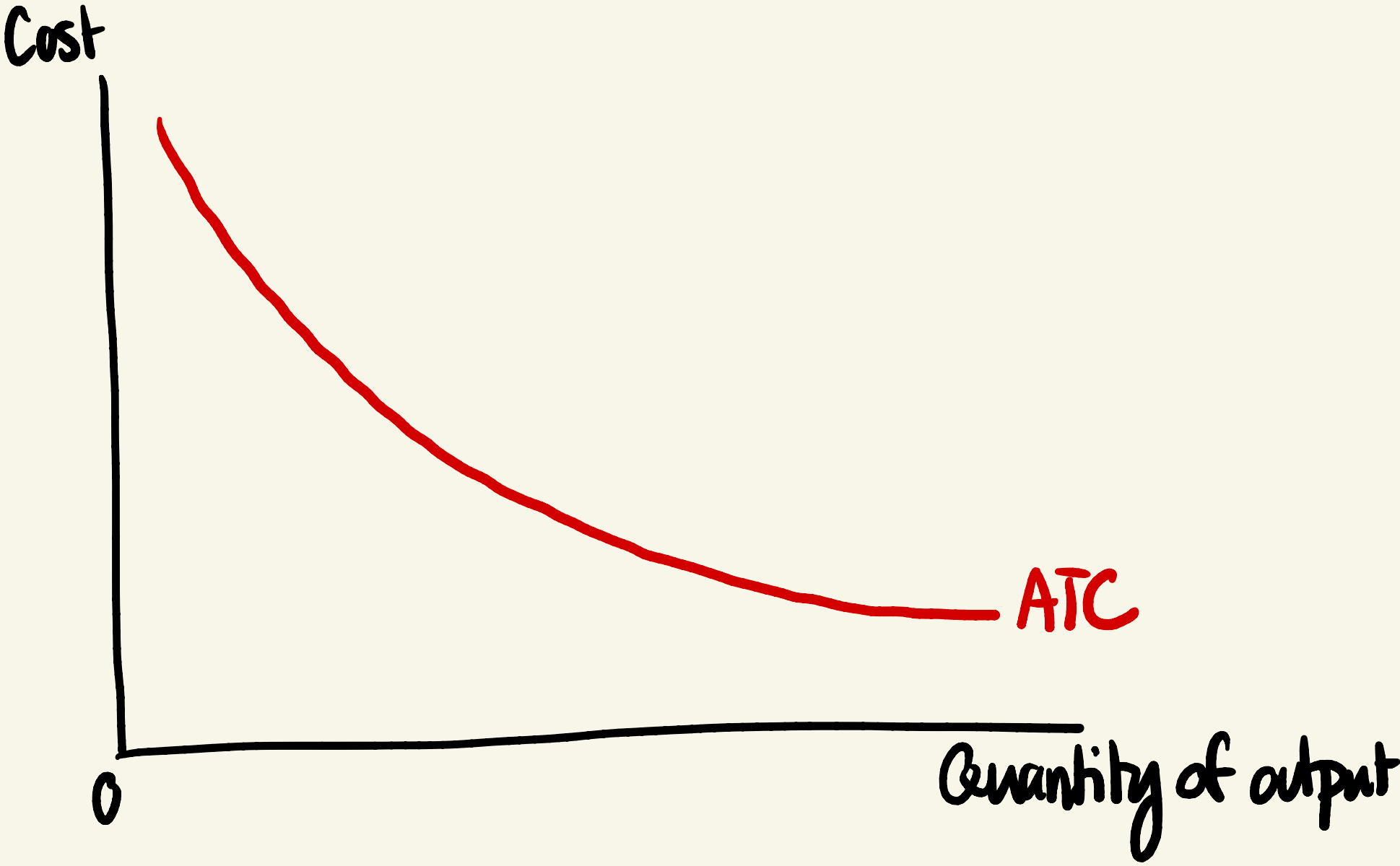
Barriers to Entry – 3

3. The production process: natural monopoly
   - A single firm can produce the entire market Q at lower cost than could several firms
   - Arises when there are economies of scale over the relevant range of output
   - Distribution of water, electricity, etc.
   - Club goods (excludable, not rival in consumption)

E.g. The bridge is excludable because a toll collector can prevent someone from using it.

The bridge is not rival in consumption because one person's use of the bridge does not hinder others' use of it.

There is a large fixed cost of building the bridge but a negligible marginal cost of additional users, so the average total cost (the total cost divided by the number of trips) declines as the number of trips rises, making the bridge a natural monopoly.


Cost
ATC
0
Quantity of output

Economies of Scale as a Cause of Monopoly

When a firm's ATC curve continually declines, the firm has what is called a natural monopoly

In this case, when production is divided among more firms, each firm produces less, and ATC rises.

As a result, a single firm can produce any given amount at the lowest cost.

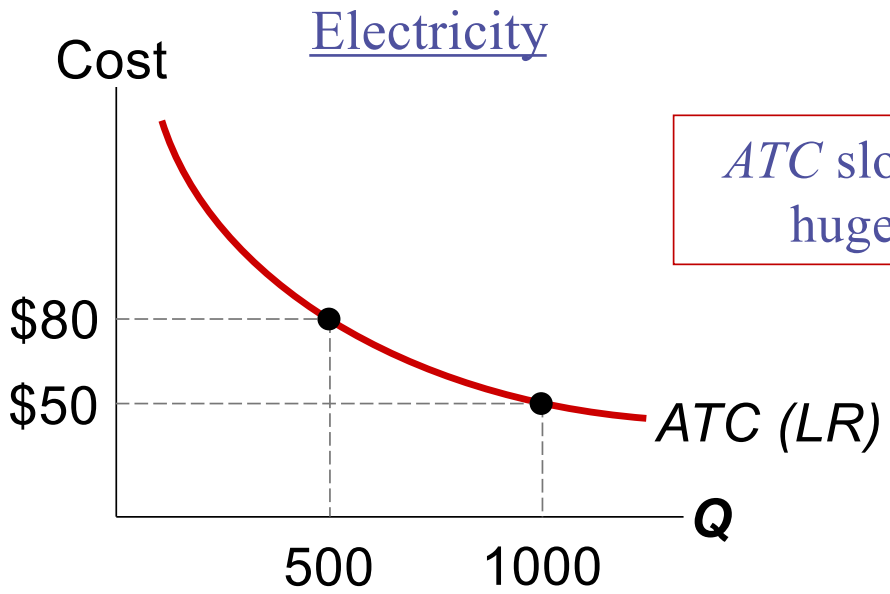
Economies of Scale and Natural Monopoly

- A **natural monopoly** exists when increasing returns to scale provide a large cost advantage to a single firm that produces all of an industry's output.
- It arises when increasing returns to scale provide a large cost advantage to having all of an industry's output produced by a single firm.
- Under such circumstances, average total cost is declining over the output range relevant for the industry.
- This creates a barrier to entry because an established monopolist has lower average total cost than any smaller firm.

EXAMPLE 1: Natural Monopoly

You live in a small town where 1,000 homes need electricity.

- ***ATC*** is lower if one firm services all 1,000 homes than if two firms each service 500 homes.



ATC slopes downward due to huge *FC* and small *MC*

How a Monopolist Maximizes Profit

- The price-taking firm's optimal output rule is to produce the output level at which the marginal cost of the last unit produced is equal to the market price.

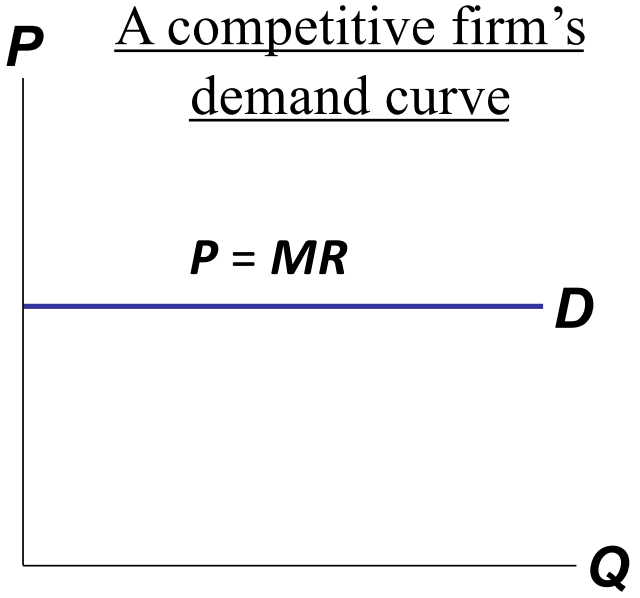
- A monopolist, in contrast, is the sole supplier of its good. So its demand curve is simply the market demand curve, which is downward sloping.

- This downward slope creates a "wedge" between the price of the good and the marginal revenue of the good—the change in revenue generated by producing one more unit.

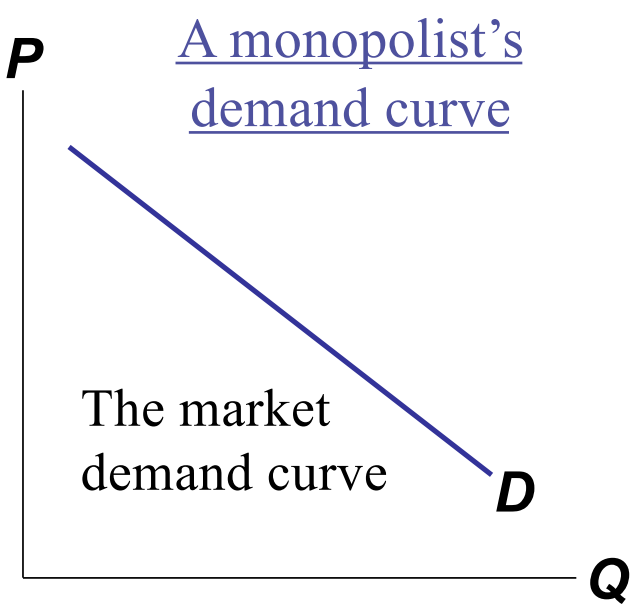
Monopoly versus Competition

- **Competitive firm**
  - Price taker
  - Small, one of many
  - Faces individual demand at ***P***: perfectly elastic demand
- **Monopoly firm**
  - Price maker, market power
  - Faces the entire market demand: downward sloping demand

Demand Curves: Competitive Firm vs. Monopoly

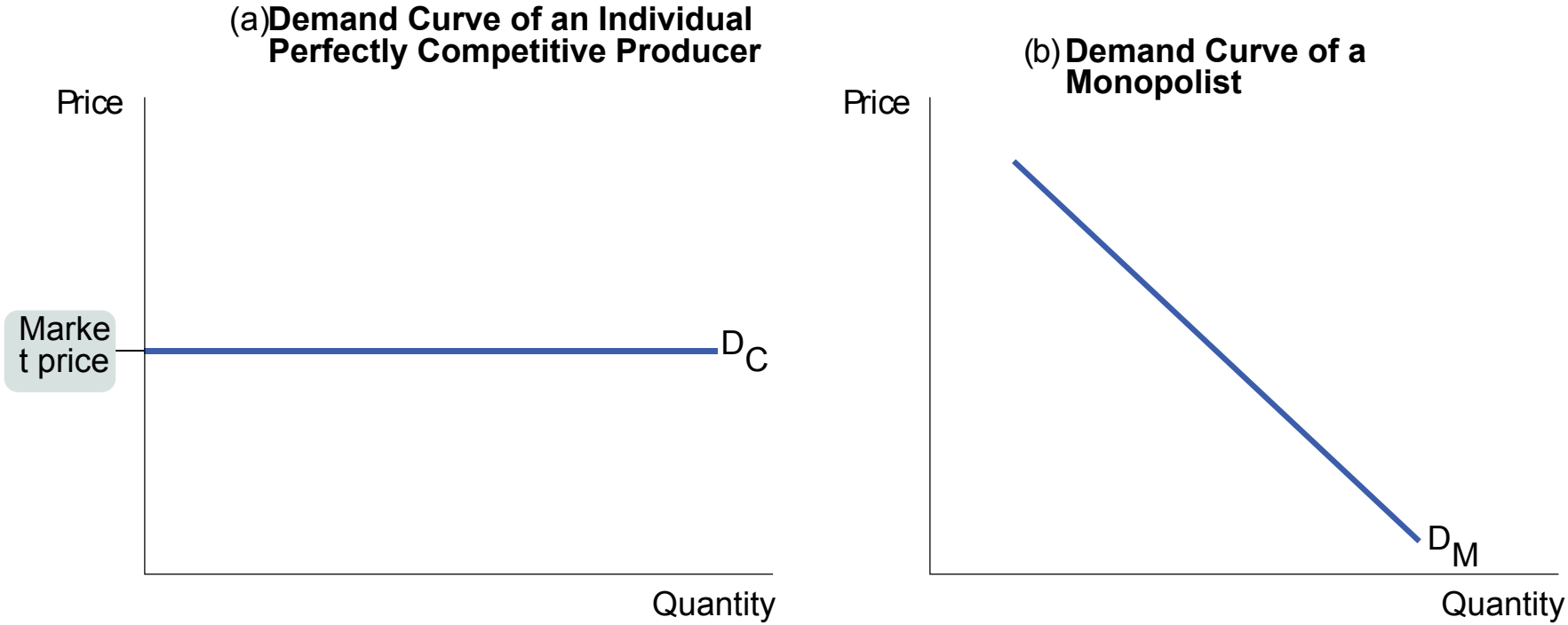


The firm can increase ***Q*** without lowering ***P***, so ***MR*** = ***P*** for the competitive firm.



To sell a larger ***Q***, the firm must reduce ***P***. Thus, ***MR*** ≠ ***P***.

Comparing the Demand Curves



An individual perfectly competitive firm cannot affect the market price of the good → it faces a horizontal demand curve *DC ,* as shown in panel (a).

A monopolist, on the other hand, can affect the price (sole supplier in the industry) → its demand curve is the market demand curve, *DM,* as shown in panel (b). To sell more output it must lower the price; by reducing output it raises the price.

Active Learning 1: JJ's Hairdo Revenue

Jayla and Jaden own the only hair salon in town, "JJ's hairdo."

The table shows the market demand for haircuts.

- Fill in the missing spaces of the table.
- What is the relation between ***P*** and ***AR***?
- Between ***P*** and ***MR***?

Q	*P*	*TR*	*AR*	*MR*
0	$60			
1	55			
2	50			
3	45			
4	40			
5	35			
6	30			
7	25			
8	20			
9	15			
10	10			

$TR = P \times Q$

$AR = \frac{TR}{Q}$

$MR = \frac{\Delta TR}{\Delta Q}$

Active Learning 1: Answers

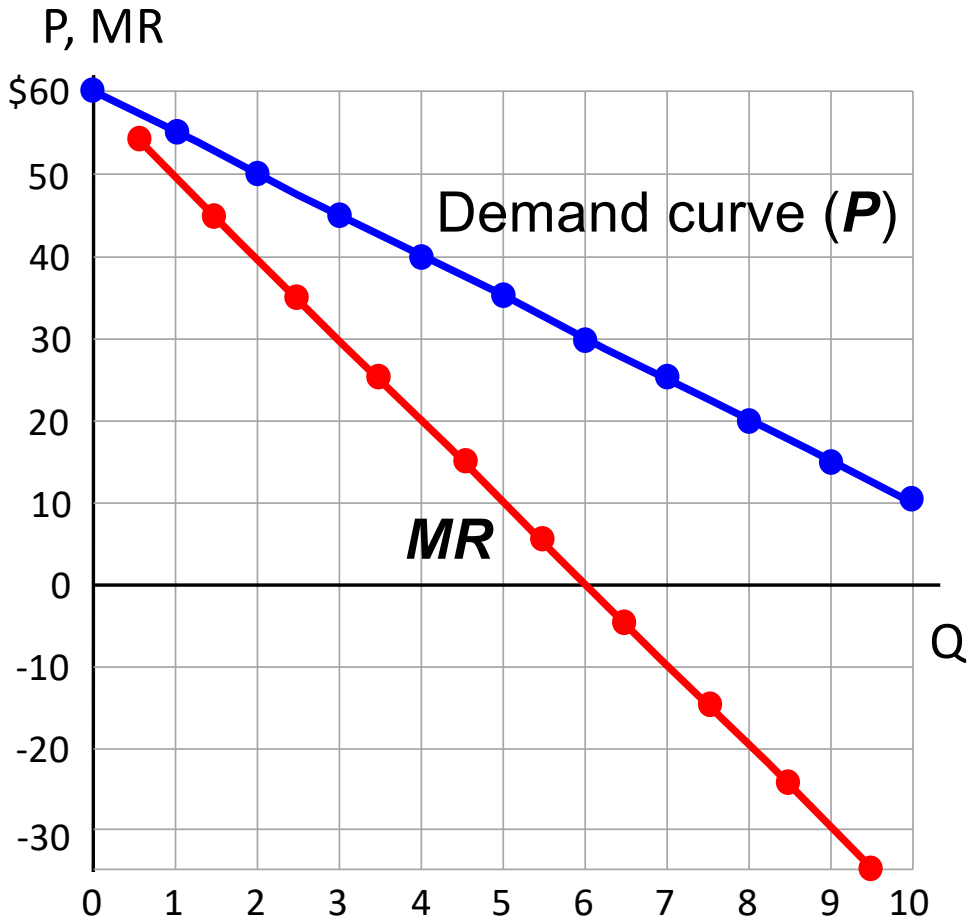
- ***P*** = ***AR***, same as for a competitive firm.

- ***MR*** < P, whereas ***MR*** = ***P*** for a competitive firm.

Q	*P*	*TR*	*AR*	*MR*
0	$60	$0	n/a	
1	55	55	55	55
2	50	100	50	45
3	45	135	45	35
4	40	160	40	25
5	35	175	35	15
6	30	180	30	5
7	25	175	25	-5
8	20	160	20	-15
9	15	135	15	-25
10	10	100	10	-35

EXAMPLE 2: JJ's MR and Demand Curves

Q	*P*	*MR*
0	$60	
		55
1	55	
		45
2	50	
		35
3	45	
		25
4	40	
		15
5	35	
		5
6	30	
		-5
7	25	
		-15
8	20	
		-25
9	15	
		-35
10	10	



A Monopoly's Revenue

- Increasing ***Q*** has two effects on revenue:
  - Output effect: higher output raises revenue
  - Price effect: lower price reduces revenue
- Marginal revenue, ***MR < P***
  - To sell a larger ***Q***, the monopolist must reduce the price on all the units it sells
  - Is negative if price effect > output effect
    - e.g., when JJ's increases ***Q*** from 6 to 7

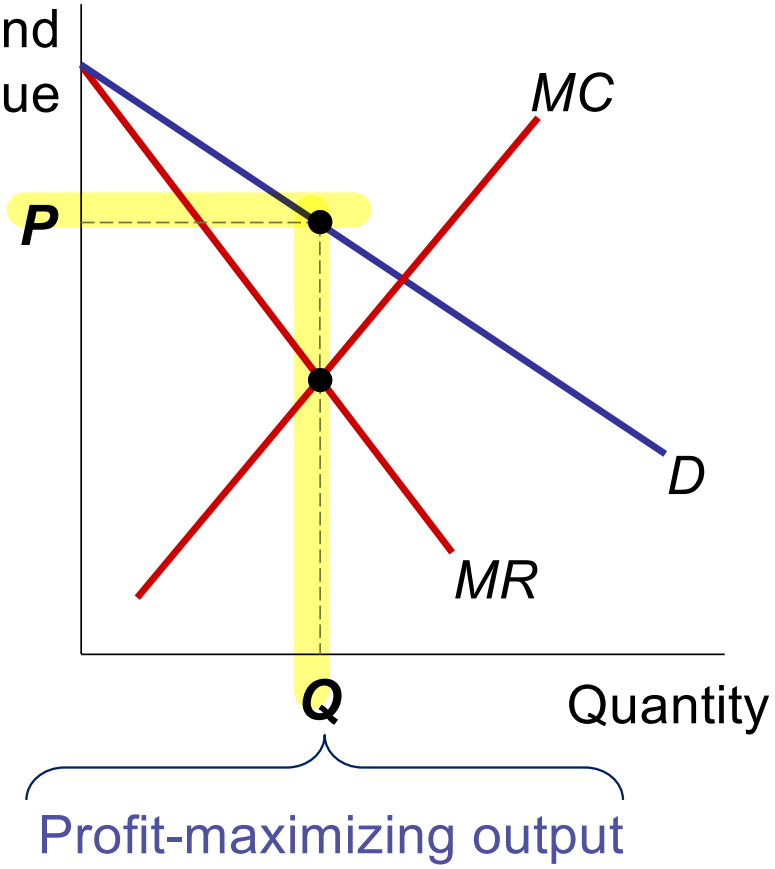
Monopoly Profit Maximization

- Produce ***Q*** where ***MR = MC***
  - Sets the highest price consumers are willing to pay for that quantity
  - Finds this price on the ***D*** curve
  - ***P > MR = MC***
  - If ***P > ATC***, the monopoly earns a profit

Profit-Maximization for a Monopoly

At this ***Q***, find ***P*** on the demand curve.

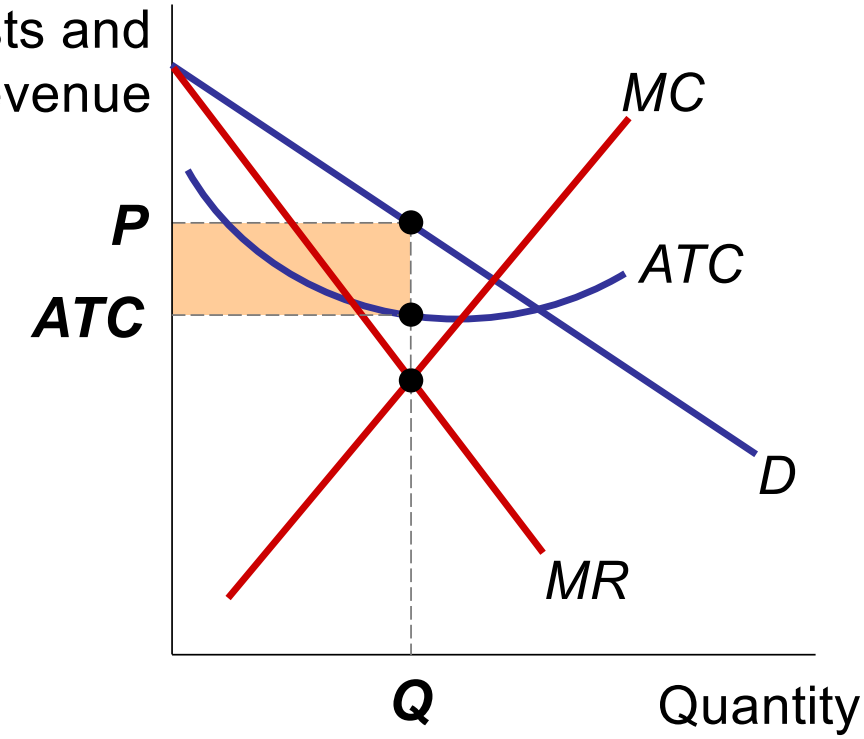
The profit-maximizing ***Q*** is where ***MR*** = ***MC***.



The Monopoly's Profit

As with a competitive firm, the monopolist's profit equals

$$(P - ATC) \times Q$$



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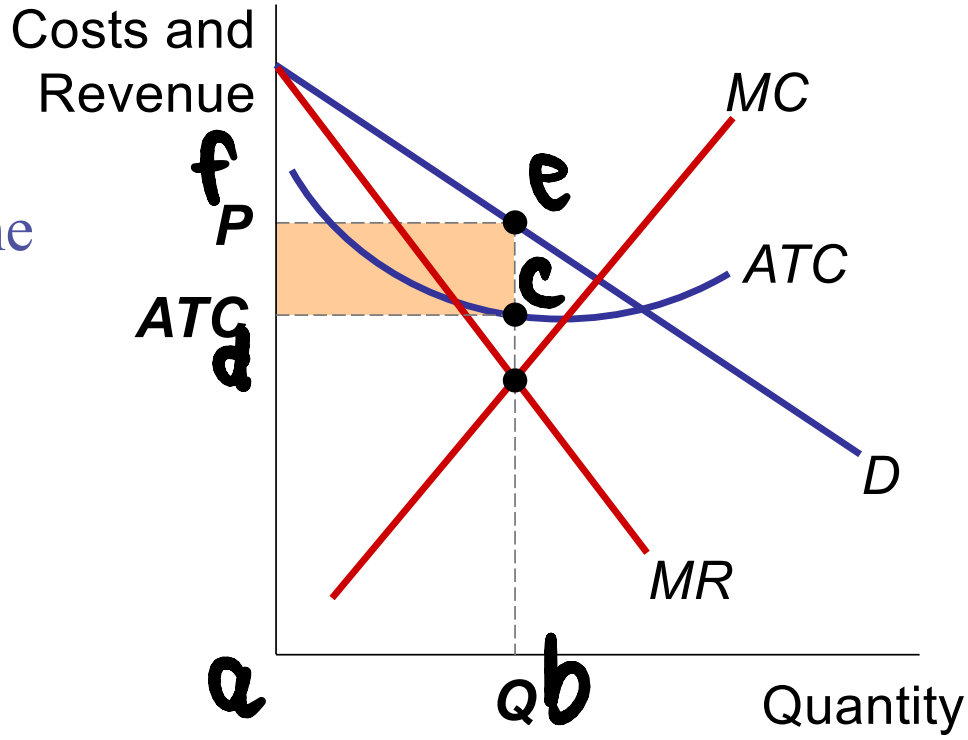
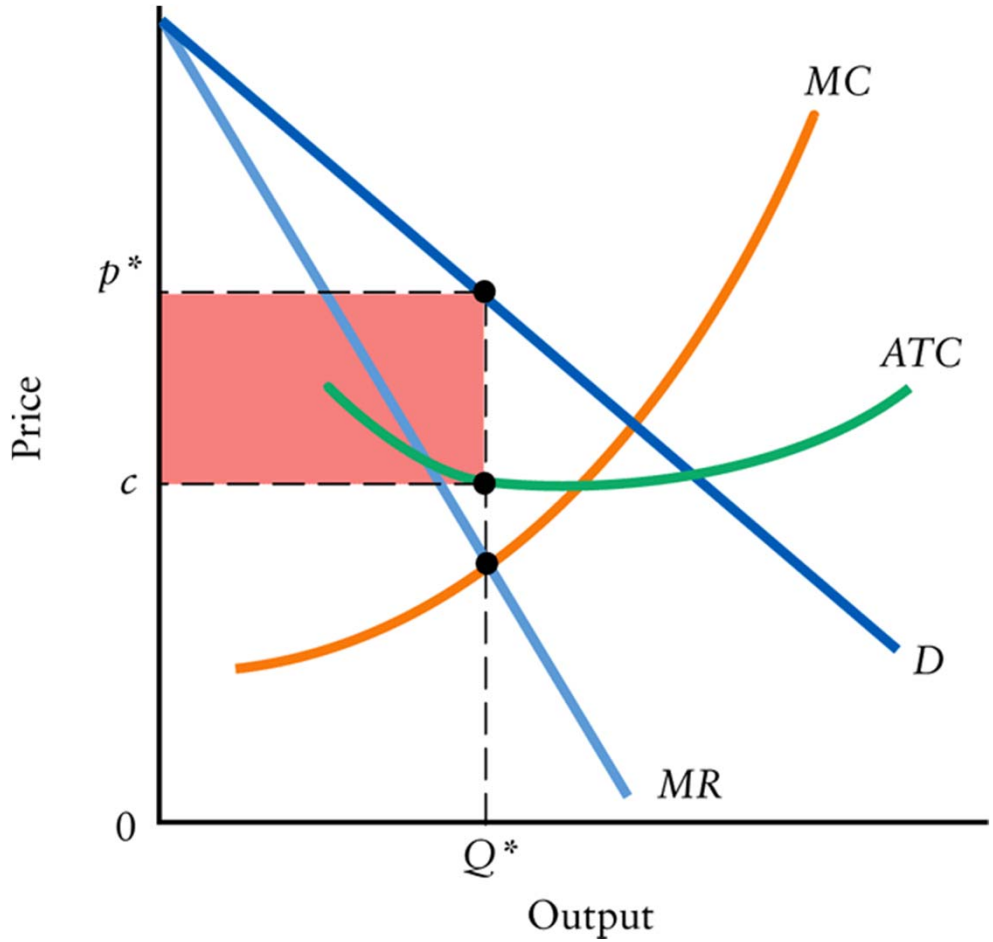


TC = □abcd

TR = □abef

Profit = TR − TC = □dcef

Short-Run Profit Maximization for a Monopolist



Monopolist's Profit-Maximizing Behavior

There is no unique relationship between market price and the quantity of output supplied.

➔ A monopolist does not have a supply curve

The monopolist is the only producer in an industry.

➔ A monopolist is the industry.

Competition and Monopoly Compared

Unlike a competitive firm, the monopolist does not have a supply curve because it chooses its price.

The monopolist is the industry, so that its profit-maximizing conditions is the equilibrium of the industry.

In a perfectly competitive industry price equals MC. But a monopolist produces at a lower level of output, with price exceeding MC.

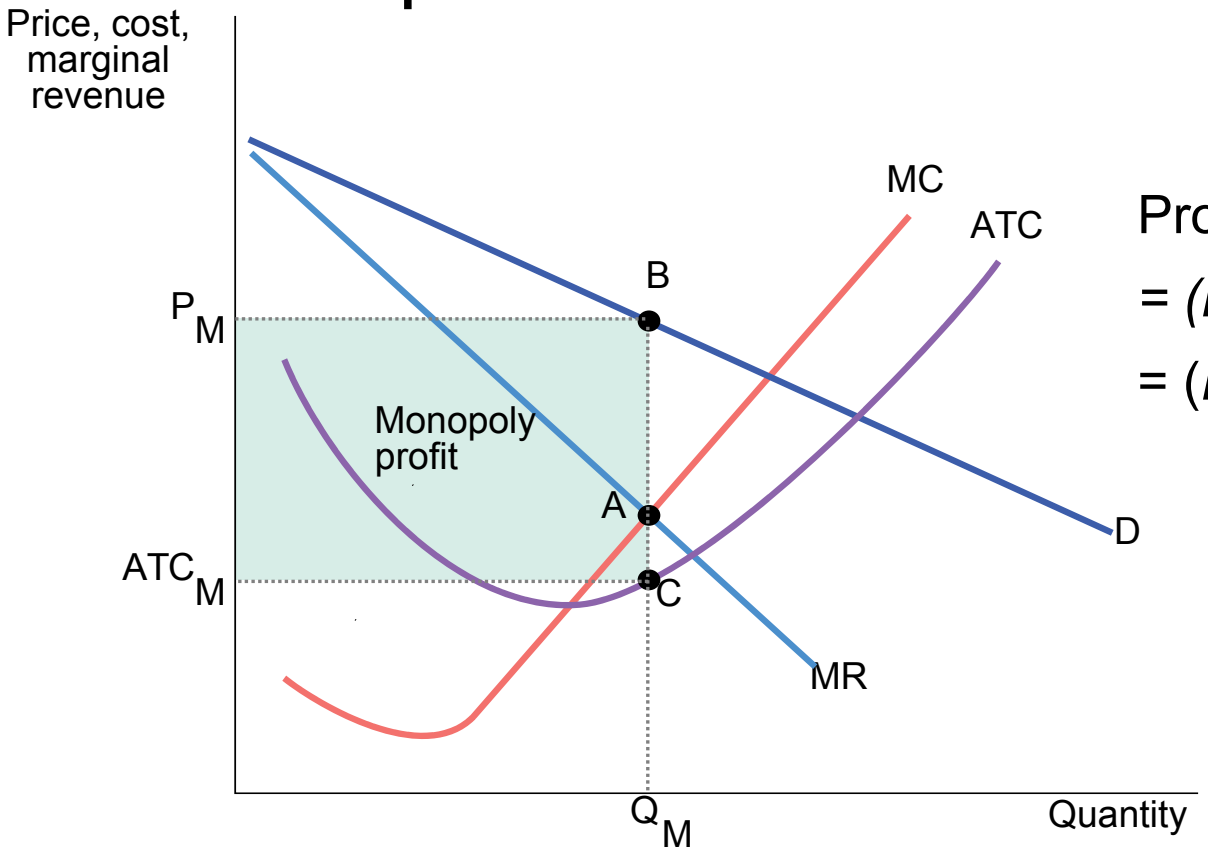
Monopoly versus Perfect Competition

- *P = MC at the perfectly competitive firm's profit-maximizing quantity of output*
- *P > MR = MC at the monopolist's profit-maximizing quantity of output*

Compared with a competitive industry, a monopolist does the following:

- Produces a smaller quantity: *QM* < QC
- Charges a higher price: *PM* > PC
- Earns a profit

The Monopolist's Profit



Profit = $TR - TC$

$= (P_M \times Q_M) - (ATC_M \times Q_M)$

$= (P_M - ATC_M) \times Q_M$

In this case, the MC curve is upward sloping and the ATC curve is U-shaped. The monopolist maximizes profit by producing the level of output at which *MR* = *MC*, given by point *A*, generating quantity Q_M. It finds its monopoly price, P_M , from the point on the demand curve directly above point *A*, point *B* here. The average total cost of Q_M is shown by point *C*. Profit is given by the area of the shaded rectangle.

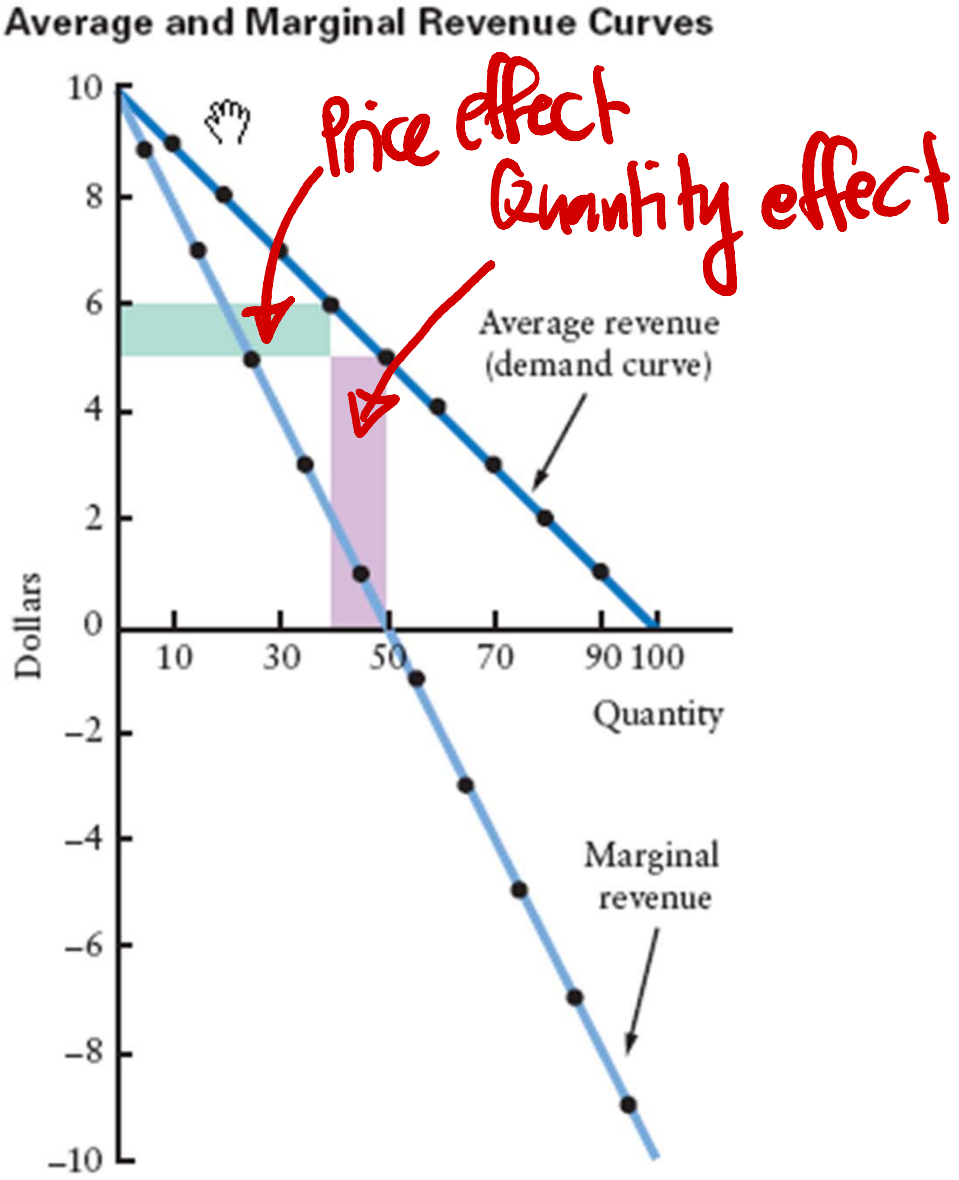
A Monopoly Does Not Have a S Curve

- A competitive firm takes ***P*** as given
  - Has a supply curve that shows how its ***Q*** depends on ***P***
- A monopoly firm is a "price-maker"
  - ***Q*** does not depend on ***P***
  - ***Q*** and ***P*** are jointly determined by ***MC***, ***MR***, and the demand curve
  - Hence, no supply curve for monopoly.

A Monopolist's Average and Marginal Revenue

Computing Average and Marginal Revenue

(1) Price (average revenue)	(2) Quantity Sold Q	(3) Total Revenue ($p \times Q$)	(4) Change in Total Revenue (ΔTR)	(5) Marginal Revenue ($\Delta TR/\Delta Q$)
10	0	0		
9	10	90	90	9
8	20	160	70	7
7	30	210	50	5
6	40	240	30	3
5	50	250	10	1
4	60	240	−10	−1
3	70	210	−30	−3
2	80	160	−50	−5
1	90	90	−70	−7
0	100	0	−90	−9



* An increase in monopolist has two opposing effects on revenue :

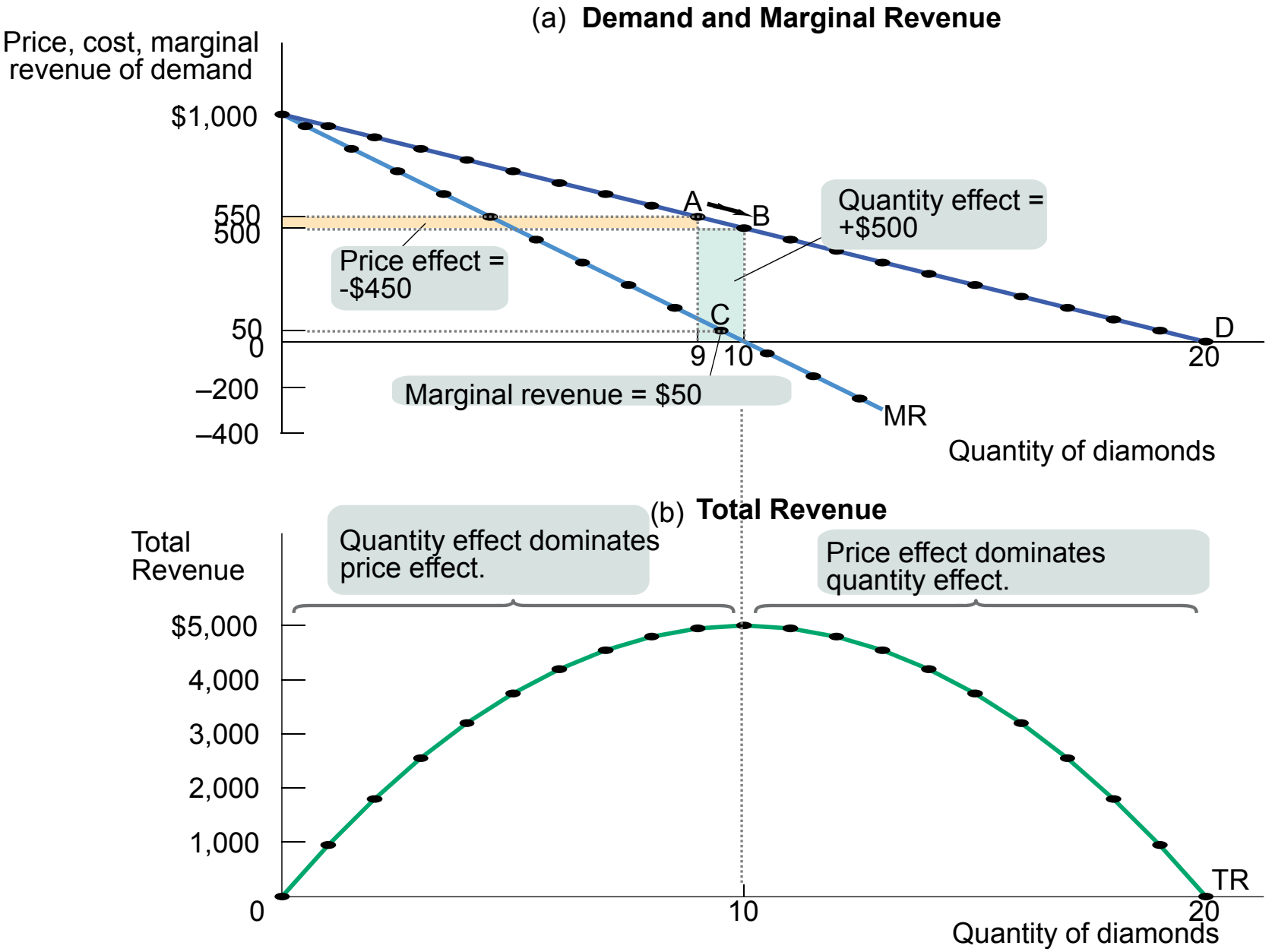
How a Monopolist Maximizes Profit

- An increase in production by a monopolist has two opposing effects on revenue:
- *A **quantity effect***. One more unit is sold, increasing total revenue by the price at which the unit is sold.
- *A **price effect***. In order to sell the last unit, the monopolist must cut the market price on *all* units sold. This decreases total revenue.
- The quantity effect and the price effect are illustrated by the two shaded areas in panel (a) of the following figure based on the numbers on the table accompanying it.

A Monopolist's Demand, TR, and MR Curves

Demand, Total Revenue, and Marginal Revenue for the De Beers Monopoly

Price of diamond P	Quantity of diamonds Q	Total revenue $TR = P \times Q$	Marginal revenue $MR = \Delta TR/\Delta Q$
$1,000	0	$0	
			$950
950	1	950	
			850
900	2	1,800	
			750
850	3	2,550	
			650
800	4	3,200	
			550
750	5	3,750	
			450
700	6	4,200	
			350
650	7	4,550	
			250
600	8	4,800	
			150
550	9	4,950	
			50
500	10	5,000	
			−50
450	11	4,950	
			−150
400	12	4,800	
			−250
350	13	4,550	
			−350
300	14	4,200	
			−450
250	15	3,750	
			−550
200	16	3,200	
			−650
150	17	2,550	
			−750
100	18	1,800	
			−850
50	19	950	
			−950
0	20	0	


(a) Demand and Marginal Revenue
Price, cost, marginal revenue of demand
$1,000
550
500
50
0
–200
–400
A
B
C
D
MR
Quantity effect = +$500
Price effect = -$450
Marginal revenue = $50
9
10
20
Quantity of diamonds
(b) Total Revenue
Total Revenue
Quantity effect dominates price effect.
Price effect dominates quantity effect.
$5,000
4,000
3,000
2,000
1,000
0
TR
10
20
Quantity of diamonds

Monopolist's Demand Curve and Marginal Revenue

- Due to the price effect of an increase in output, the marginal revenue curve of a firm with market power always lies below its demand curve. So a profit-maximizing monopolist chooses the output level at which marginal cost is equal to marginal revenue—*not* to price.

- As a result, the monopolist produces less and sells its output at a higher price than a perfectly competitive industry would. It earns a profit in the short run and the long run.

Monopolist's Demand Curve and Marginal Revenue

- To emphasize how the quantity and price effects offset each other for a firm with market power, notice the hill-shaped total revenue curve:

- This reflects the fact that *at low levels of output, the quantity effect is stronger than the price effect:* as the monopolist sells more, it has to lower the price on only very few units, so the price effect is small.

- As output rises beyond 10 diamonds, total revenue actually falls. This reflects the fact that *at high levels of output, the price effect is stronger than the quantity effect:* as the monopolist sells more, it now has to lower the price on many units of output, making the price effect very large.

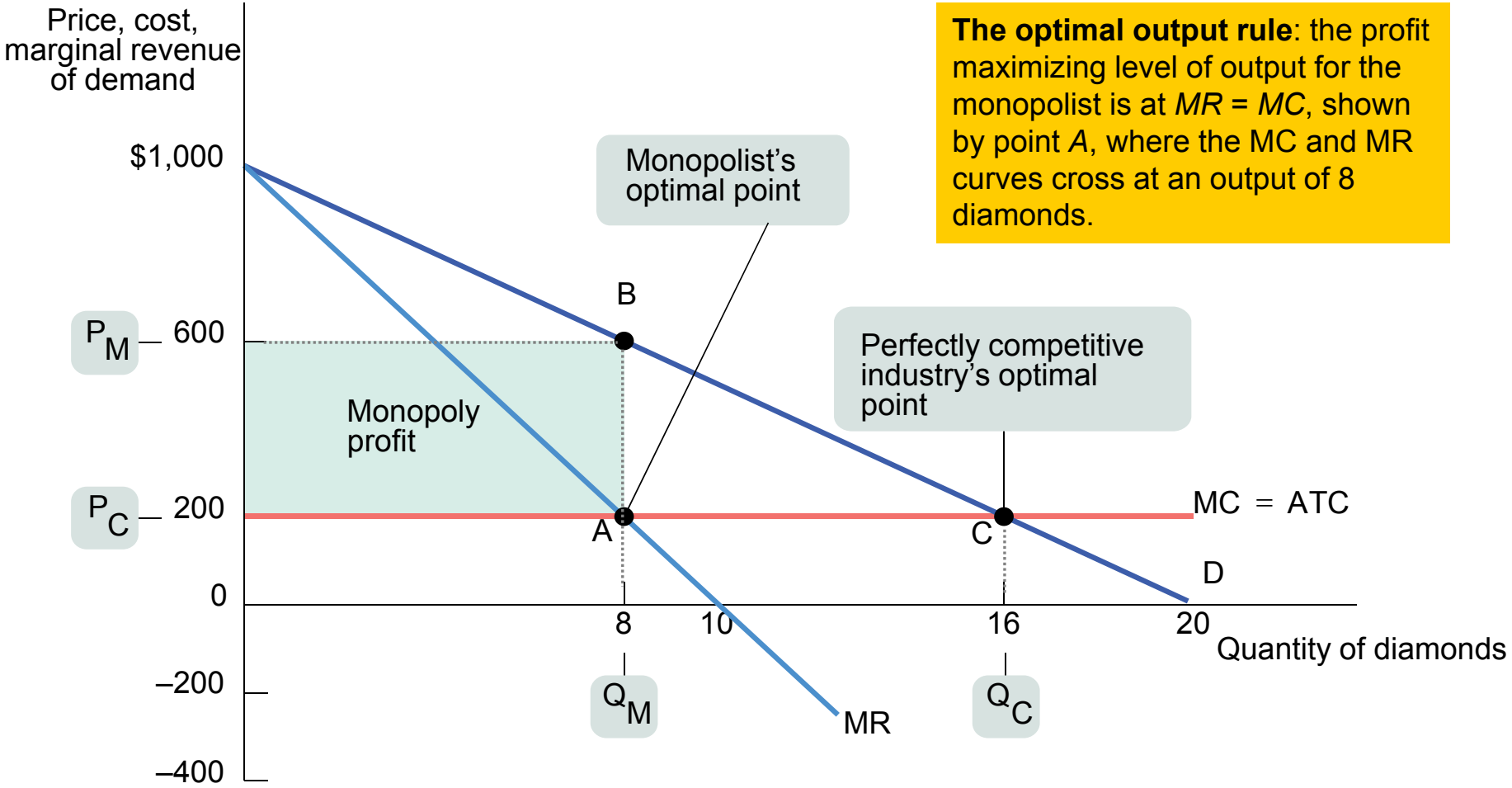
Monopolist's Profit-Maximizing Output and Price

- To maximize profit, the monopolist compares marginal cost with marginal revenue.

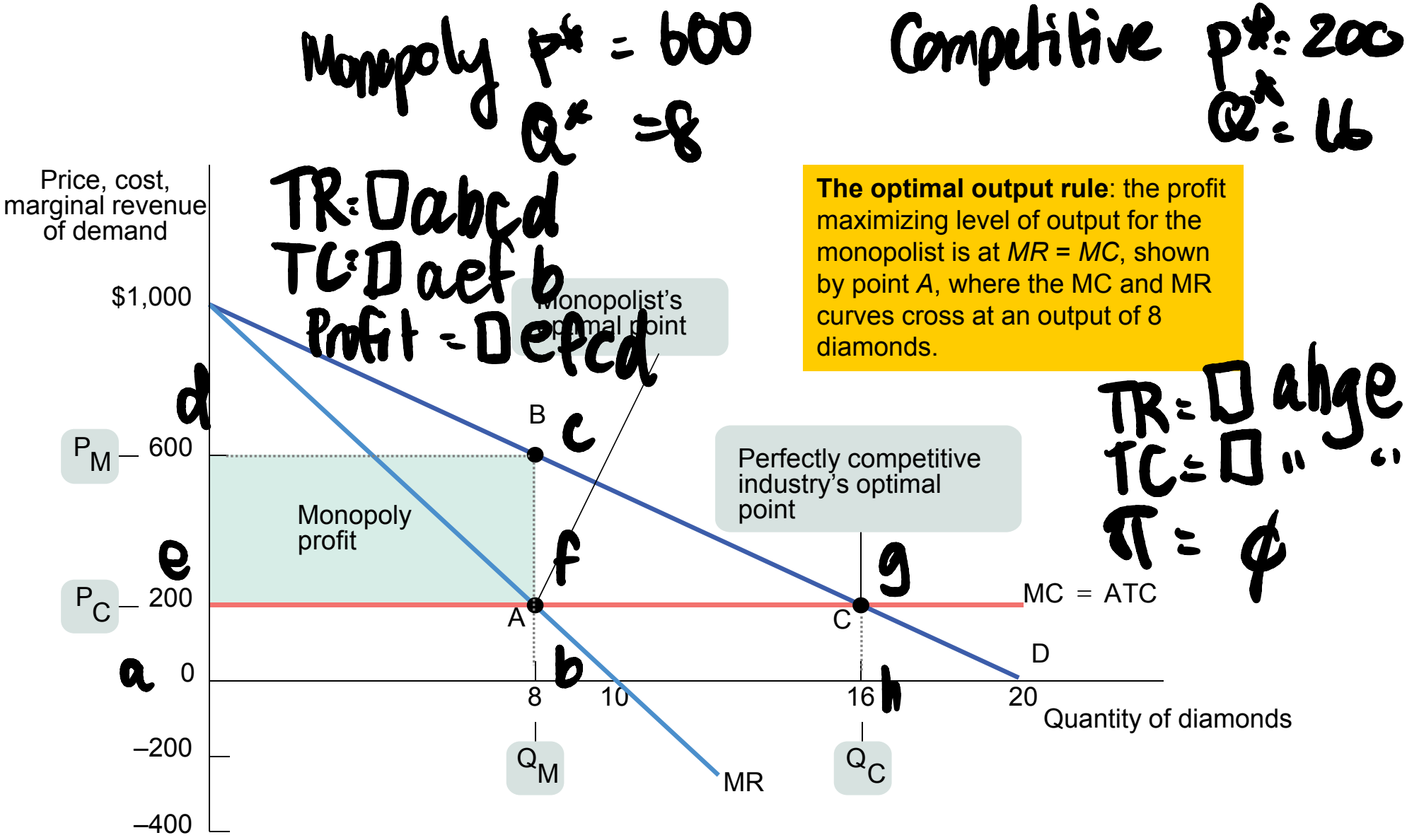
- If marginal revenue exceeds marginal cost, De Beers increases profit by producing more; if marginal revenue is less than marginal cost, De Beers increases profit by producing less. So the monopolist maximizes its profit by using the optimal output rule:

- At the monopolist's profit-maximizing quantity of output,

$$MR = MC$$



The price De Beers can charge per diamond is found by going to the point on the demand curve directly above point *A*, (point *B* here) —a price of $600 per diamond. It makes a profit of $400 × 8 = $3,200.



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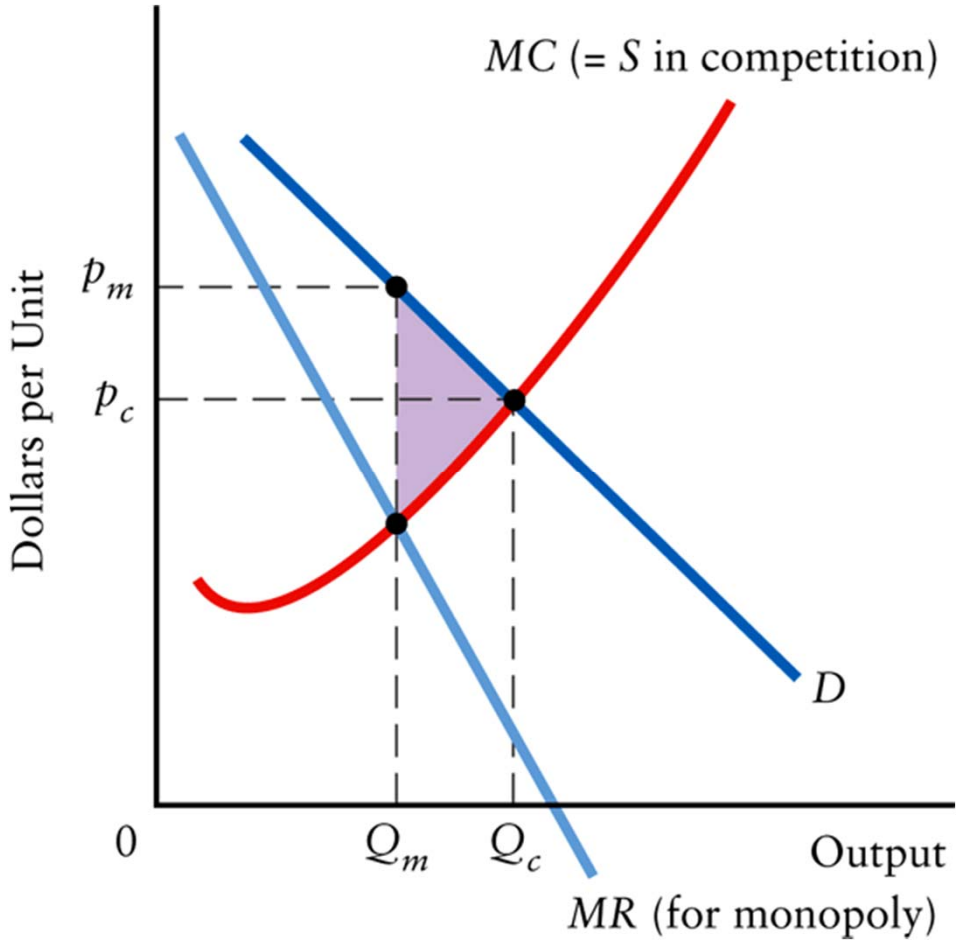
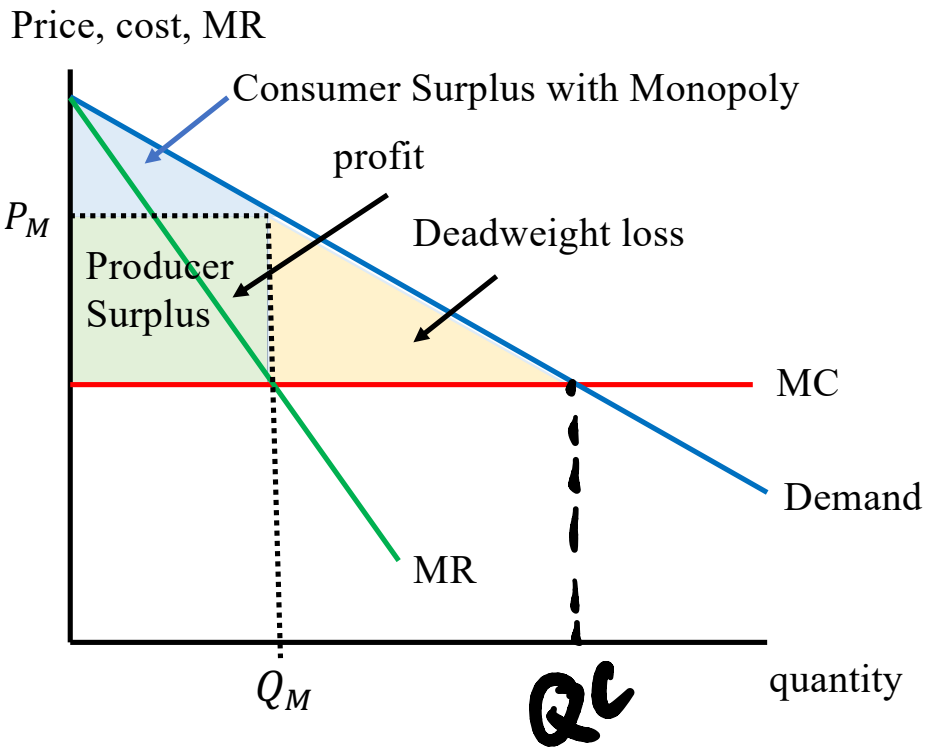
Monopoly and Public Policy

- By reducing output and raising price above marginal cost, a monopolist captures some of the consumer surplus as profit and causes deadweight loss. To avoid deadweight loss, government policy attempts to prevent monopoly behavior.
- When monopolies are “created” rather than natural, governments should act to prevent them from forming and break up existing ones.
- The government policies used to prevent or eliminate monopolies are known as *antitrust policy*.

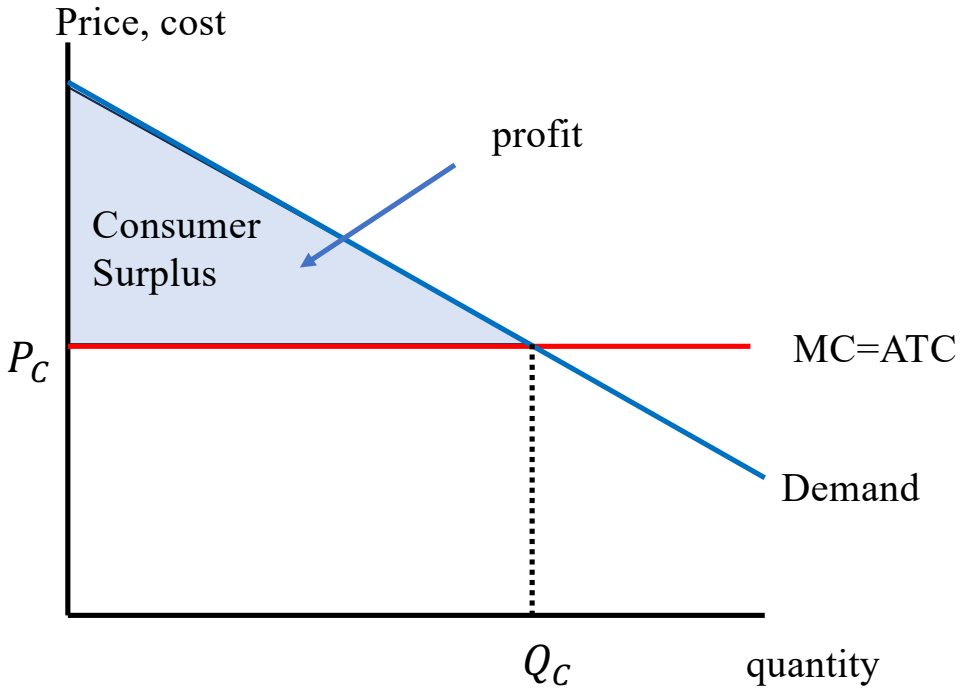
The Inefficiency of Monopoly



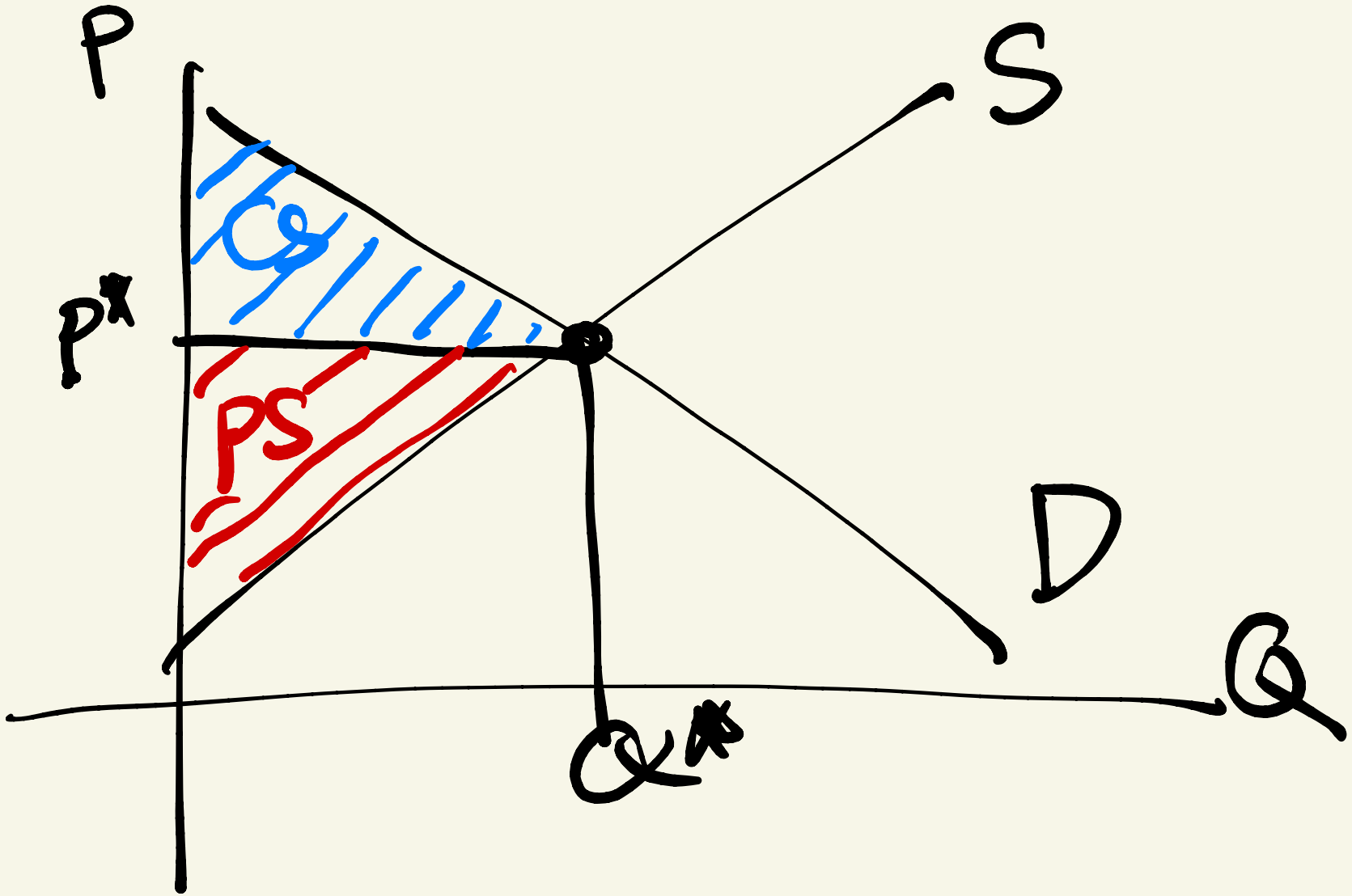
Monopoly Causes Inefficiency



(a) Total surplus with Monopoly



(b) Total surplus with Perfect competition


P
S
P*
CS
PS
D
Q
Q*

Panel (a) depicts the industry under monopoly: the monopolist decreases output to Q_M and charges P_M. Total surplus in this market equals the sum of producer surplus (profit) and consumer surplus. Total surplus falls: the deadweight loss represents the value of mutually beneficial transactions that do not occur because of monopoly behavior.

Preventing Monopoly

Dealing with Natural Monopoly

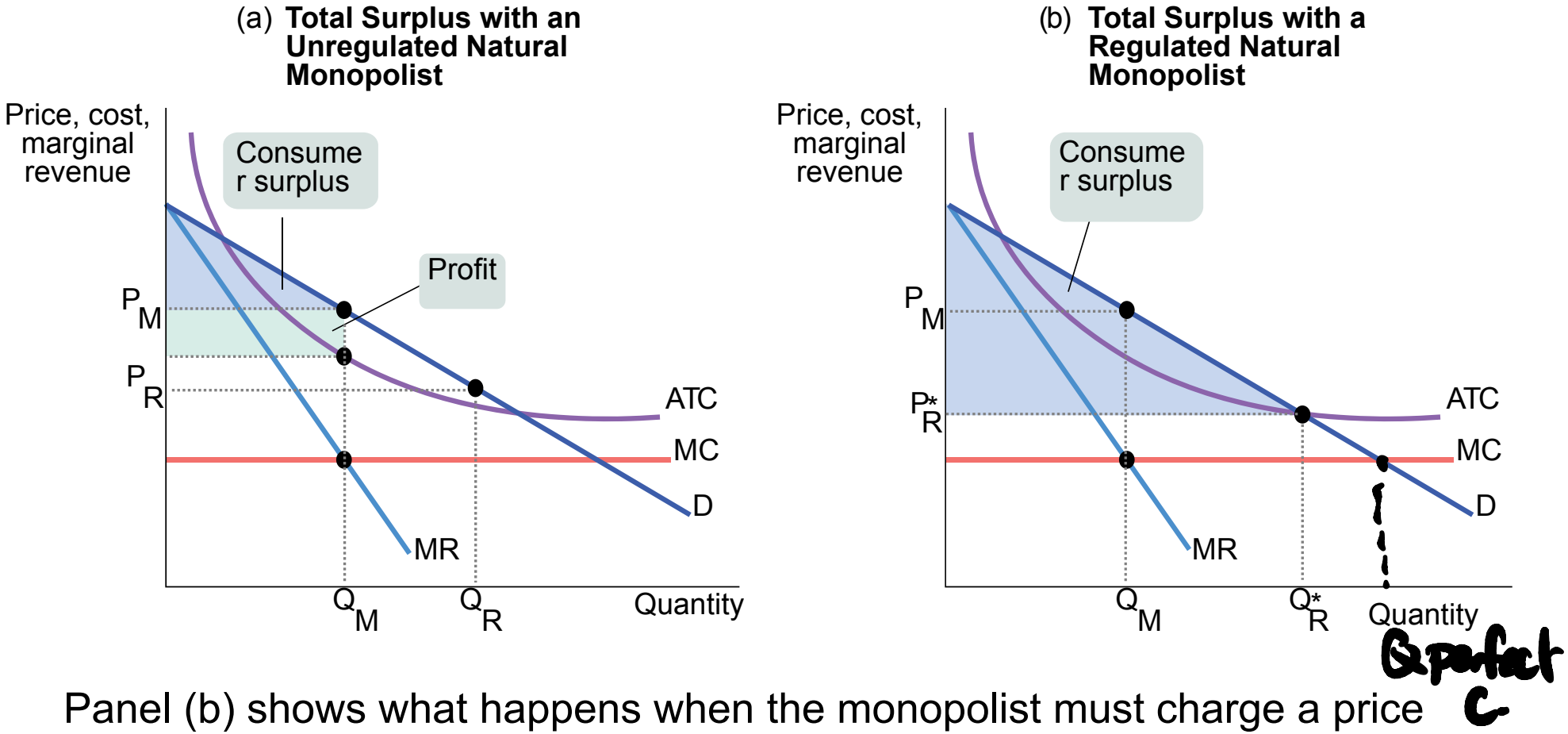
- Breaking up a monopoly that isn't natural is clearly a good idea, but it's not so clear whether a natural monopoly, one in which large producers have lower average total costs than small producers, should be broken up, because this would raise average total cost.

- Yet even in the case of a natural monopoly, a profit-maximizing monopolist acts in a way that causes inefficiency—it charges consumers a price that is higher than marginal cost, and therefore prevents some potentially beneficial transactions.

Dealing with Natural Monopoly

- What can public policy do about this? There are two common answers…
- One answer is *public ownership*, but publicly owned companies are often poorly run.
- In public ownership of a monopoly, the good is supplied by the government or by a firm owned by the government
- A common response in the United States is *price regulation*. A price ceiling imposed on a monopolist does not create shortages as long as it is not set too low.
- There always remains the option of doing nothing; monopoly is a bad thing, but the cure may be worse than the disease.

Unregulated and Regulated Natural Monopoly



Panel (b) shows what happens when the monopolist must charge a price equal to average total cost, the price P_R^*. Output expands to Q_R^*, and consumer surplus is now the entire blue area. The monopolist makes zero profit. This is the greatest consumer surplus possible when the monopolist is allowed to at least break even, making P_R^* the best regulated price.

Entry Barriers and Long-Run Equilibrium

Despite incentives to enter, effective entry barriers allow monopoly profits to persist in the long run.

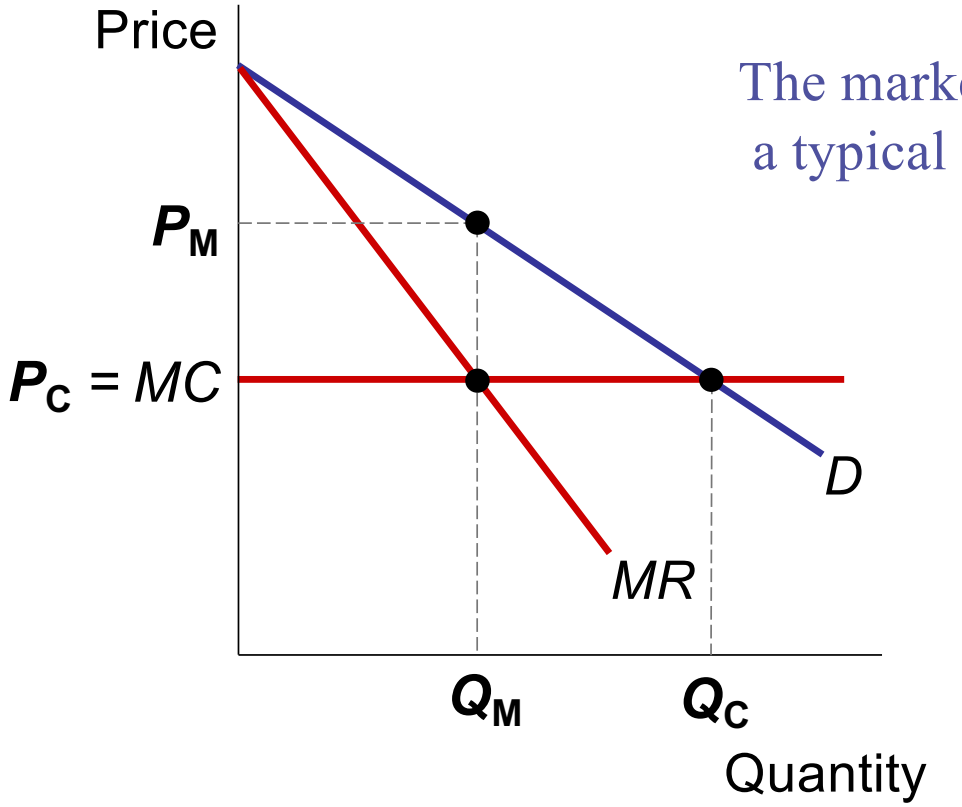
Entry barriers are of two types:

- "natural" – such as economies of scale
- "created" – by advertising campaigns or
  – by government regulation

CASE STUDY: Monopoly vs. Generic Drugs

Patents on new drugs give a temporary monopoly to the seller: P_M, Q_M.

When the patent expires, the market becomes competitive, generics appear: P_C, Q_C.



The Welfare Cost of Monopolies

- Competitive market equilibrium:
  - At $P = MC$ and maximizes total surplus
- Monopoly equilibrium: at $P > MR = MC$
  - The value to buyers of an additional unit (P) exceeds the cost of the resources needed to produce that unit (MC)
  - The monopoly Q is too low – could increase total surplus with a larger Q.
  - Monopoly results in a deadweight loss

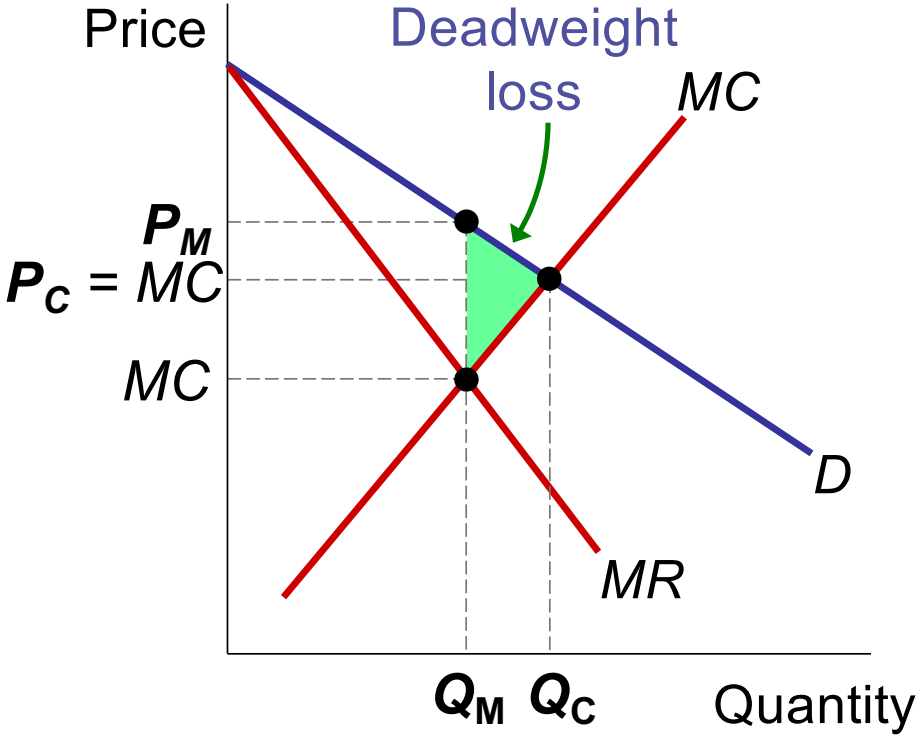
The Deadweight Loss of Monopoly

Competitive equilibrium:

- quantity = Q_C
- $P_C = MC$
- total surplus is maximized

Monopoly equilibrium:

- quantity = Q_M
- $P_M > MC$
- deadweight loss



The Monopoly's Profit: A Social Cost?

- Monopoly profit is not in itself necessarily a problem for society
  - Greater producer surplus for monopoly
  - Smaller consumer surplus
  - Transfer of surplus from consumers to monopoly
- The inefficiency:
  - Monopoly produces $Q <$ efficient quantity
  - Deadweight loss

Price Discrimination

- Price discrimination (price customization):
  - Sell the same good at different prices to different customers
  - A firm can increase profit by charging a higher price to buyers with higher willingness to pay
  - Requires the ability to separate customers according to their willingness to pay
  - Can raise economic welfare

Active Learning 2: At the Movies

You are the manager of the only movie theater in town. The price you charge is \$18 per ticket, and you sell $Q = 1{,}000$ movie tickets each week. Assume that you incur only a fixed cost of \$10,000 in a week.

A. How much profit is the movie theater making?

B. If you are dropping the price to \$5, you will be able to sell $Q = 2{,}500$ movie tickets. Calculate the profit.

C. Suggest a way you can price discriminate when selling movie tickets. Calculate the profit if you price discriminate, with $P_1 =$ \$18 and $P_2 =$ \$5.

Active Learning 2: Answers

A. Single price monopoly $P = \$18$, $Q = 1{,}000$, $TC = \$10{,}000$
   - Total revenue $TR = P \times Q = \$18{,}000$
   - Profit = $TR - TC = \$8{,}000$

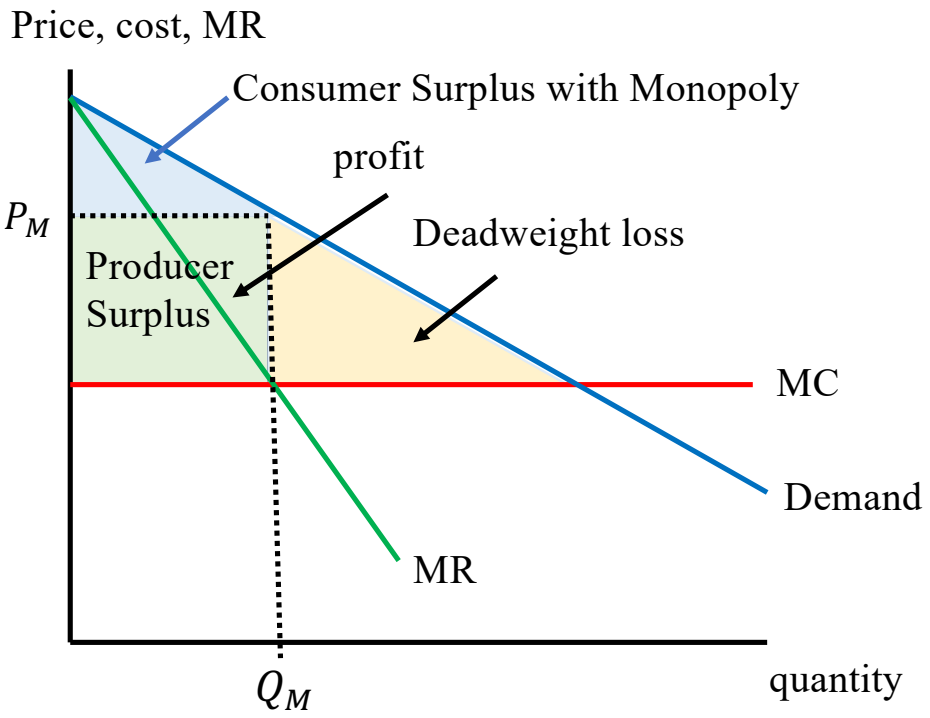
B. Single price monopoly $P = \$5$, $Q = 2{,}500$, $TC = \$10{,}000$
   - Total revenue $TR = P \times Q = \$12{,}500$
   - Profit = $TR - TC = \$2{,}500$

C. Price discrimination: $P_1 = \$18$ and $P_2 = \$5$.
   - Sell $Q = 1{,}000$ at P_1, so $TR_1 = \$18{,}000$
   - Sell $Q = (2{,}500 - 1{,}000)$ at P_2, so $TR_2 = \$7{,}500$
   - Profit = $TR_1 + TR_2 - TC = \$15{,}500$

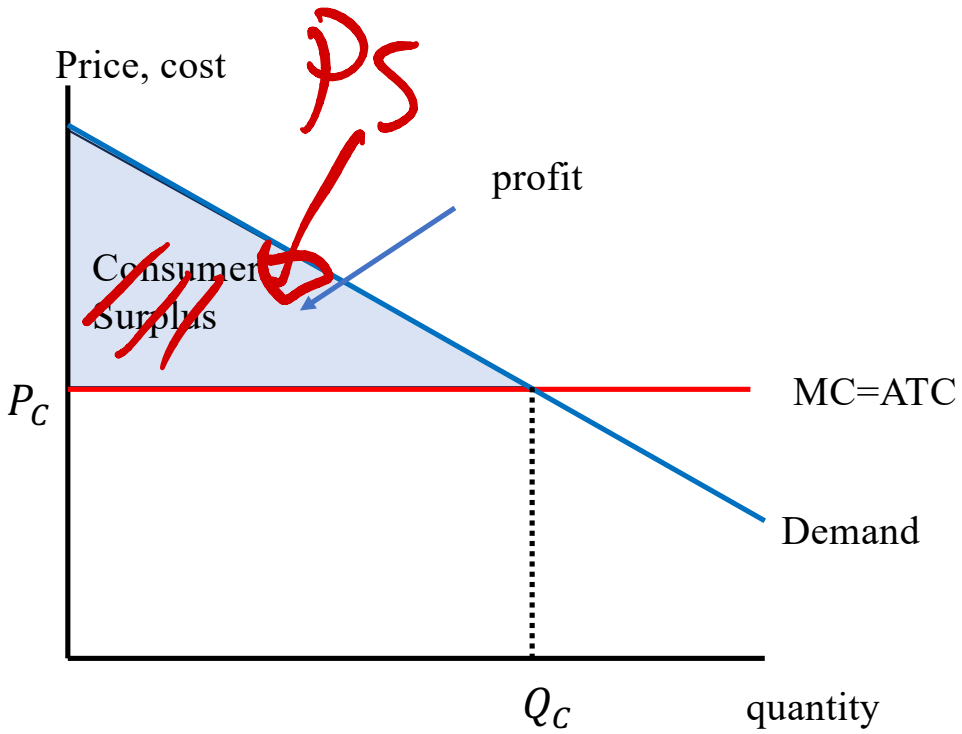
Perfect Price Discrimination

- Perfect price discrimination
  - Charge each customer a different price
    - Exactly his or her willingness to pay
  - Monopoly firm gets the entire surplus (Profit)
  - No deadweight loss

Welfare with and without Price Discrimination



(a) Monopolist with single price



(b) Monopolist with perfect price discrimination

Panel (a) shows a monopoly that charges the same price to all customers. Total surplus in this market equals the sum of producer surplus (profit) and consumer surplus.

Panel (b) shows a monopoly that can price discriminate perfectly. Because consumer surplus equals zero, total surplus now equals the firm's profit.

Comparing these two panels, you can see that perfect price discrimination raises profit, raise total surplus, and lowers consumer surplus

Price Discrimination in the Real World

- Perfect price discrimination
  - Not possible in the real world
    - No firm knows every buyer's ***WTP***
    - Buyers do not reveal it to sellers
- Price discrimination
  - Firms divide customers into groups based on some observable trait that is likely related to willingness to pay (***WTP***), such as age

EXAMPLE 3: Price discrimination – 1

A. Movie tickets
   - Discounts for seniors, students, and people who can attend during weekday afternoons.
   - Lower ***WTP*** than people who pay full price on Friday night

B. Airline prices
   - Discounts for Saturday-night stayovers: business travelers (higher ***WTP***) vs. more price-sensitive leisure travelers

"Would it bother you to hear how little I paid for this flight?"

EXAMPLE 3: Price discrimination – 2

C. Discount opportunities
- Discount coupons; online savings on special days
- Separate customers: willingness to spend the time to seek discounts

D. Financial aid based on family income
- Students from wealthy families: higher willingness to pay
- Charge high tuition and selectively offer financial aid

EXAMPLE 3: Price discrimination – 3

E. Quantity discounts

- A buyer's WTP often declines with additional units, so firms charge less per unit for large quantities than small ones.
- Example: A movie theater charges $7 for a small popcorn and $9 for a large one that's twice as big

Public Policy Toward Monopolies – 1

1. Increasing competition with antitrust laws
   - Sherman Antitrust Act, 1890
   - Clayton Antitrust Act, 1914
   - Prevent mergers
   - Break up companies
   - Prevent companies from coordinating their activities to make markets less competitive

Public Policy Toward Monopolies – 2

2. Regulation
   - Set the monopolists' price (common in case of natural monopolies)… but where?
   - If P is set at MC, but ***MC*** < ***ATC*** at all ***Q***
     - Marginal-cost pricing would result in losses (and exits in the LR)
     - Regulator might subsidize the monopolist or set ***P*** = ***ATC*** for zero economic profit
     - Problem: no incentive to reduce costs

Public Policy Toward Monopolies – 3

3. Public ownership: a government unit can run the monopoly itself
   - If it does a bad job, losers are the customers and taxpayers
   - Public ownership is usually less efficient since there is no profit incentive to minimize costs

Public Policy Toward Monopolies – 4

4. Above all, do no harm
   - Some economists argue that the government should be careful not to make matters worse when dealing with monopoly pricing
   - Determining the proper role of the government in the economy requires judgments about politics as well as economics

The Prevalence of Monopolies

- Pure monopoly – rare in the real world
- Many firms have market power, due to:
  - Selling a unique variety of a product
  - Having a large market share and few significant competitors
- In many such cases, most of the results from this chapter apply, including:
  - Markup of price over marginal cost
  - Deadweight loss

Competition versus Monopoly

	Competition	Monopoly
Similarities		
Goal of firms	Maximize profits	Maximize profits
Rule for maximizing	MR = MC	MR = MC
Can earn economic profits in SR?	Yes	Yes
Differences		
Number of firms	Many	One
Marginal revenue	MR = P	MR < P
Price	P = MC	P > MC
Produces welfare-maximizing level of output?	Yes	No
Entry in the LR?	Yes	No
Can earn economic profits in LR?	No	Yes
Price discrimination possible?	No	Yes

CHAPTER IN A NUTSHELL

- Monopoly: the sole seller in its market.
- Monopoly arises when:
  - A single firm owns a key resource
  - The government gives a firm the exclusive right to produce a good
  - A single firm can supply the entire market at a lower cost than many firms could.
- Monopoly faces a downward-sloping demand curve for its product: MR < P

CHAPTER IN A NUTSHELL

- Monopoly maximizes profit
  - Produce Q where MR = MC, but Q is not efficient
  - For this Q, the price is on the demand curve.
  - So, P > MR = MC
  - Causes deadweight loss
- Price discrimination: charge different prices for the same good based on a buyer's willingness to pay.
  - Can raise economic welfare by getting the good to some consumers who would otherwise not buy it.

CHAPTER IN A NUTSHELL

- Perfect price discrimination
  - No deadweight loss
  - The entire surplus in the market goes to the monopoly producer.
- Policymakers can:
  - Use the antitrust laws to try to make the industry more competitive.
  - Regulate the prices that the monopoly charges.
  - Turn the monopolist into a government-run enterprise.
  - Do nothing at all.

References

- Mankiw, N.G., (2023)
- Krugman, P. and Robin Wells (2008)
- Lipsey, Regan, and Storer (2008)