



THIRD EDITION

ECONOMICS

and

MICROECONOMICS

Paul Krugman | Robin Wells

Chapter 13

Monopoly

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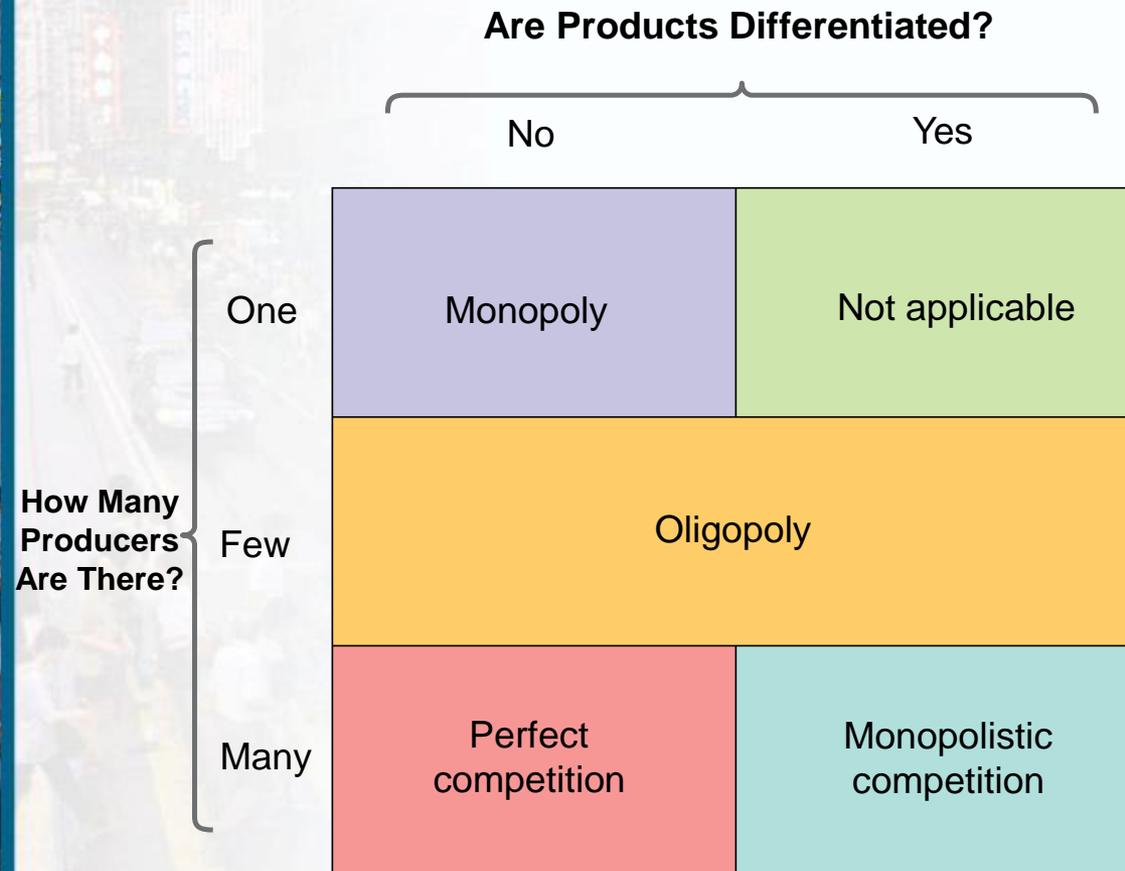
## WHAT YOU WILL LEARN IN THIS CHAPTER

- The significance of monopoly, where a single monopolist is the only producer of a good
- How a monopolist determines its profit-maximizing output and price
- 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 price discrimination is, and why it is so prevalent when producers have market power

# Types of Market Structure

- In order to develop principles and make predictions about markets and how producers will behave in them, economists have developed **four principal models** of market structure:
  - 1) **perfect competition**
  - 2) **monopoly**
  - 3) **oligopoly**
  - 4) **monopolistic competition**

# Types of Market Structure



This system of market structures is based on two dimensions:

1) the number of producers in the market (one, few, or many)

2) whether the goods offered are identical or *differentiated*

Differentiated goods are goods that are different but considered somewhat substitutable by consumers (think Coke versus Pepsi).

# The Meaning of Monopoly

Our first departure from perfect competition...

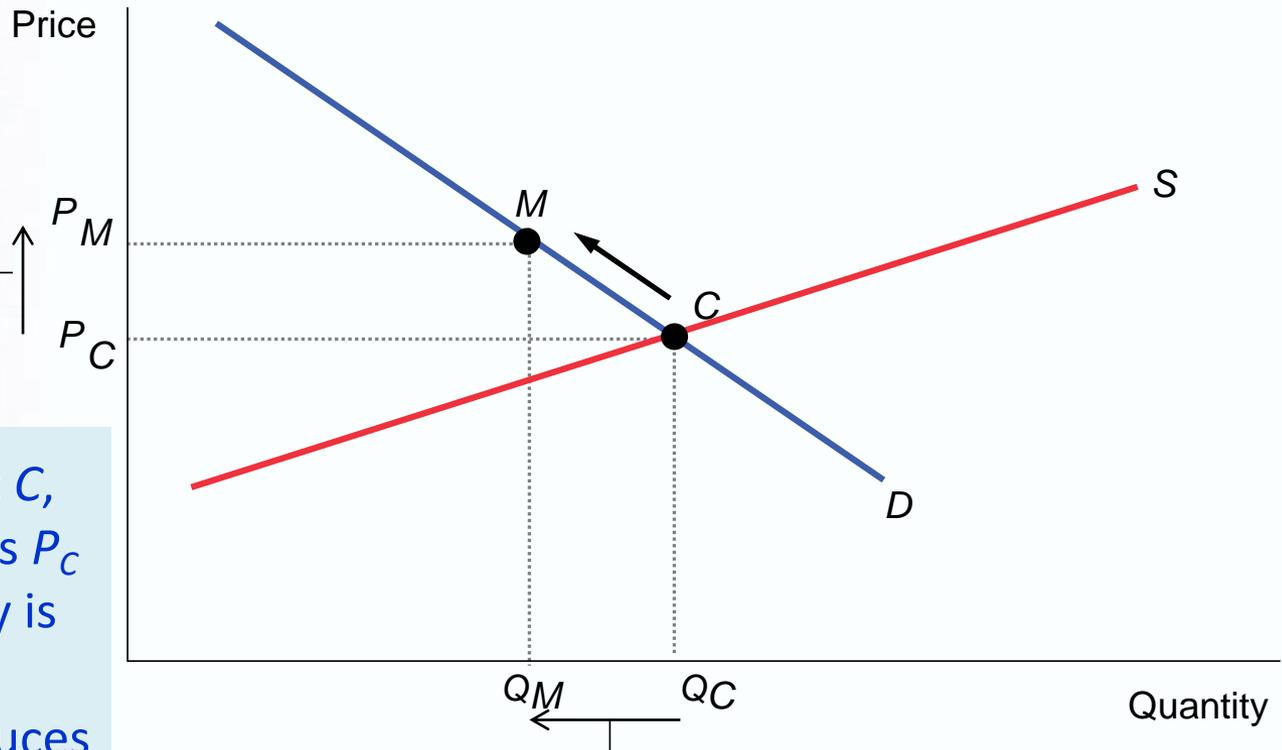
- A **monopolist** is a firm that is the only producer of a good that has no close substitutes. An industry controlled by a monopolist is known as a **monopoly**, e.g. De Beers.
- The ability of a monopolist to raise its price above the competitive level by reducing output is known as **market power**.
- What do monopolists do with this market power? Let's take a look at the following graph.

# What a Monopolist Does

2. ... and raises price.

Equilibrium is at  $C$ , where the price is  $P_C$  and the quantity is  $Q_C$ .

A monopolist reduces the quantity supplied to  $Q_M$ , and moves up the demand curve from  $C$  to  $M$ , raising the price to  $P_M$ .



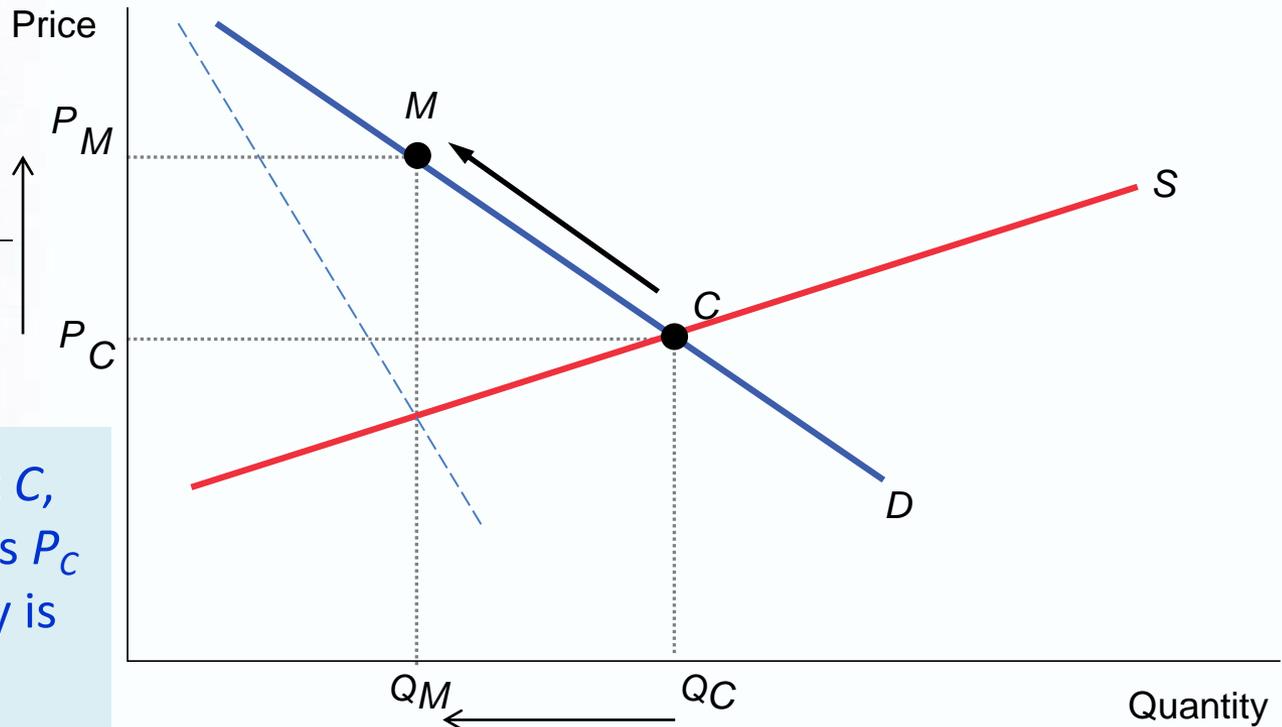
1. Compared with perfect competition, a monopolist reduces output...

# What a Monopolist Does

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1. Compared with perfect competition, a monopolist reduces output...

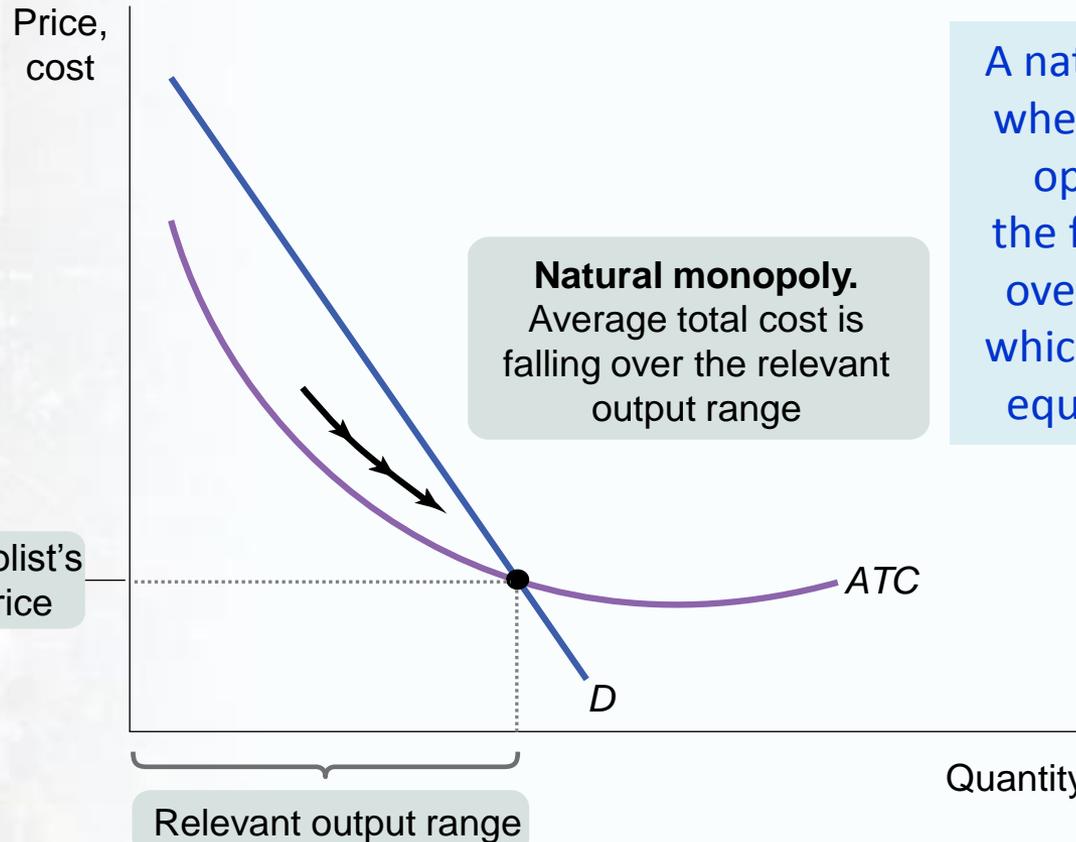
# Why Do Monopolies Exist?

- 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

# 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.

# Increasing Returns to Scale Create Natural Monopoly



A natural monopoly can arise when fixed costs required to operate are very high → the firm's *ATC* curve declines over the range of output at which price is greater than or equal to average total cost.

This gives the firm economies of scale over the entire range of output at which the firm would at least break even in the long run.  
As a result, a given quantity of output is produced more cheaply by one large firm than by two or more smaller firms.

# ECONOMICS IN ACTION

## Newly Emerging Markets: A Diamond Monopolist's Best Friend

- The De Beers Diamond mines in South Africa dwarfed all previous sources, so almost all of the world's diamond production was concentrated in a few square miles.
- De Beers either bought out new producers or entered into agreements with local governments that controlled some of the new mines, effectively making them part of the De Beers monopoly.

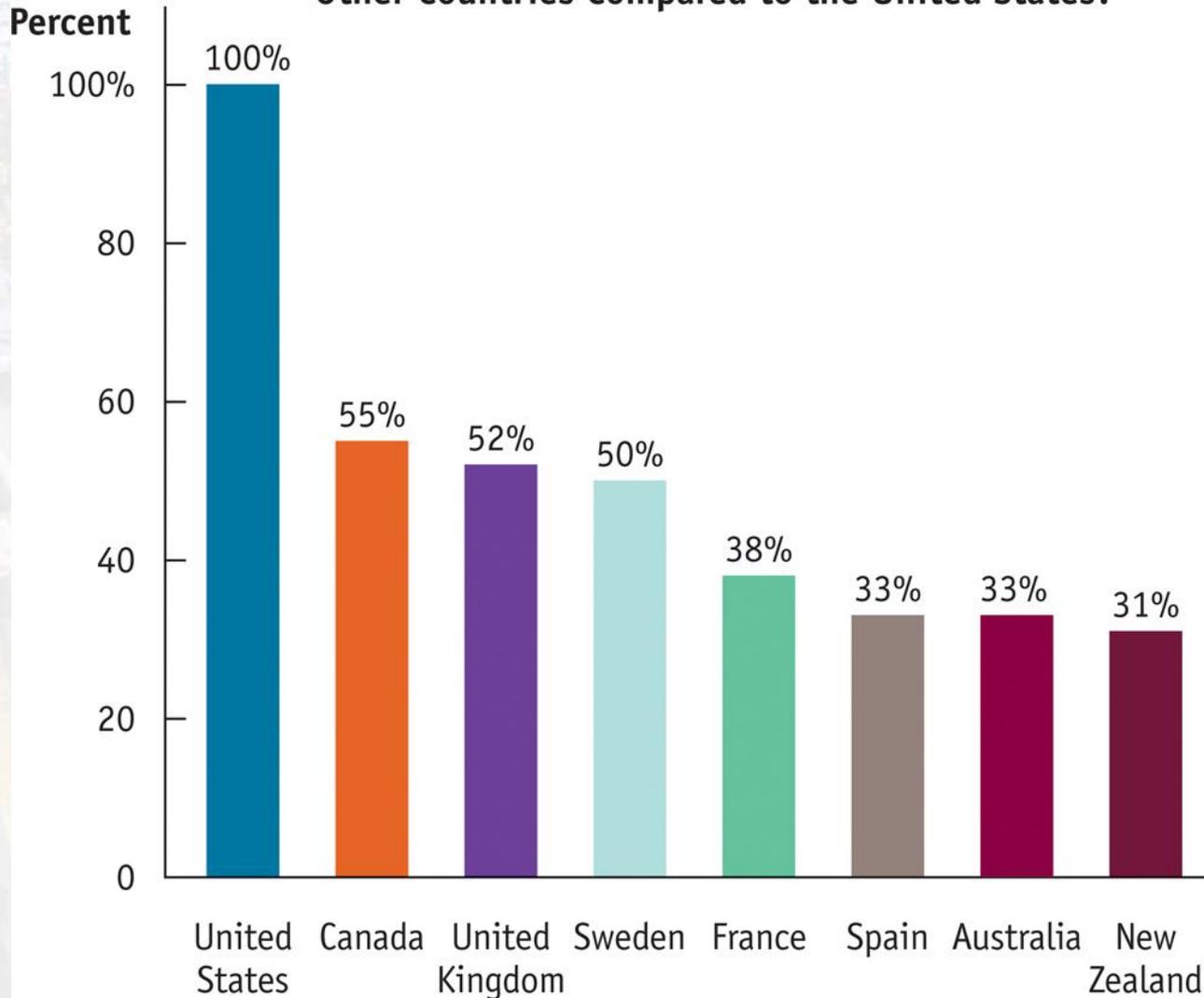
# ECONOMICS IN ACTION

## Newly Emerging Markets: A Diamond Monopolist's Best Friend

- De Beers controlled retail prices and when demand dropped, newly mined stones would be stored rather than sold, restricting retail supply until demand and prices recovered.
- Government regulators have forced De Beers to loosen control of the market and competitors have also entered the industry.
  - However, De Beers being a “near-monopolist” still mines more diamonds than any other single producer.

# GLOBAL COMPARISON: The Price We Pay

How Much Less Expensive Are Drug Prices in Other Countries Compared to the United States?

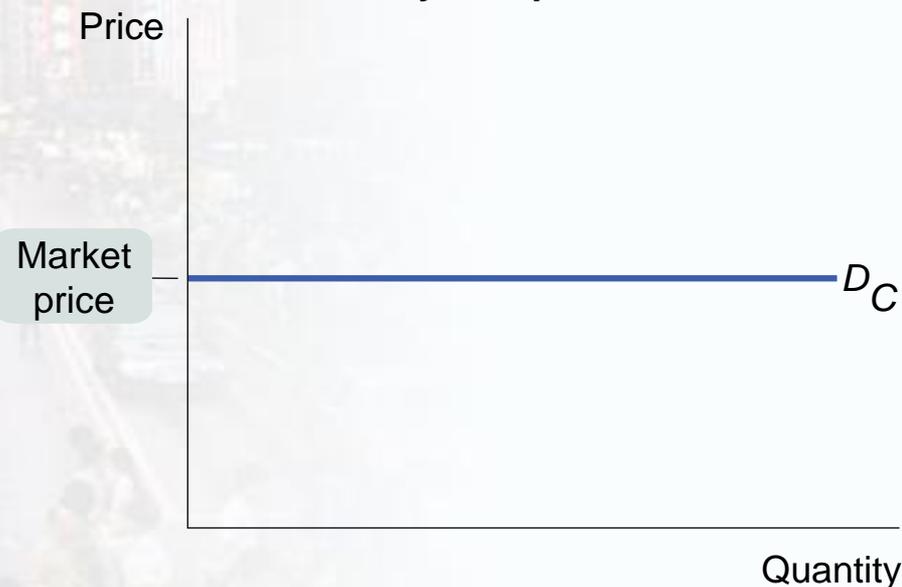


# How a Monopolist Maximizes Profit

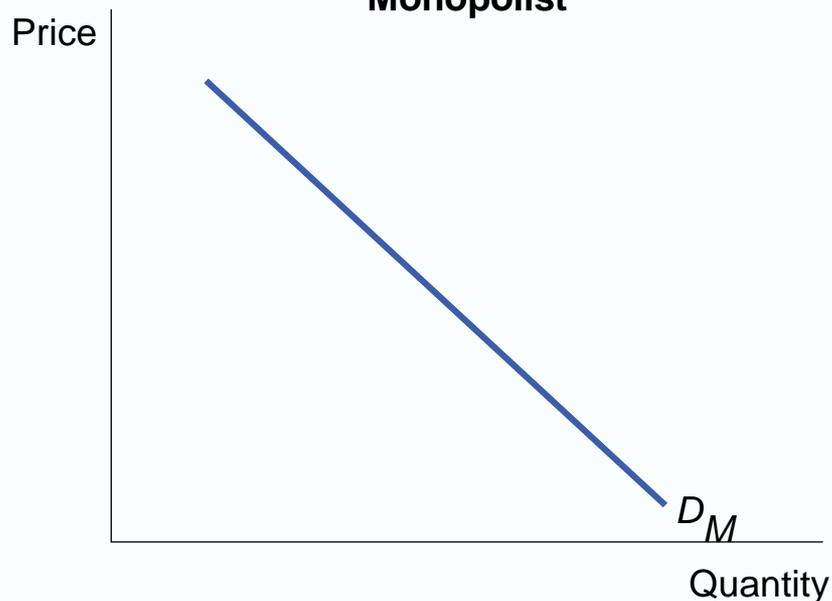
- The price-taking firm's optimal output rule is to produce the output level at which the marginal cost of the last unit produced is equal to the market price.
- A monopolist, in contrast, is the sole supplier of its good. So its demand curve is simply the market demand curve, which is downward sloping.
- 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.

# Comparing Demand Curves

(a) Demand Curve of an Individual Perfectly Competitive Producer



(b) Demand Curve of a Monopolist



An individual perfectly competitive firm cannot affect the market price of the good  
→ it faces a horizontal demand curve  $D_C$  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,  $D_M$ , as shown in panel (b). To sell more output it must lower the price; by reducing output it raises the price.

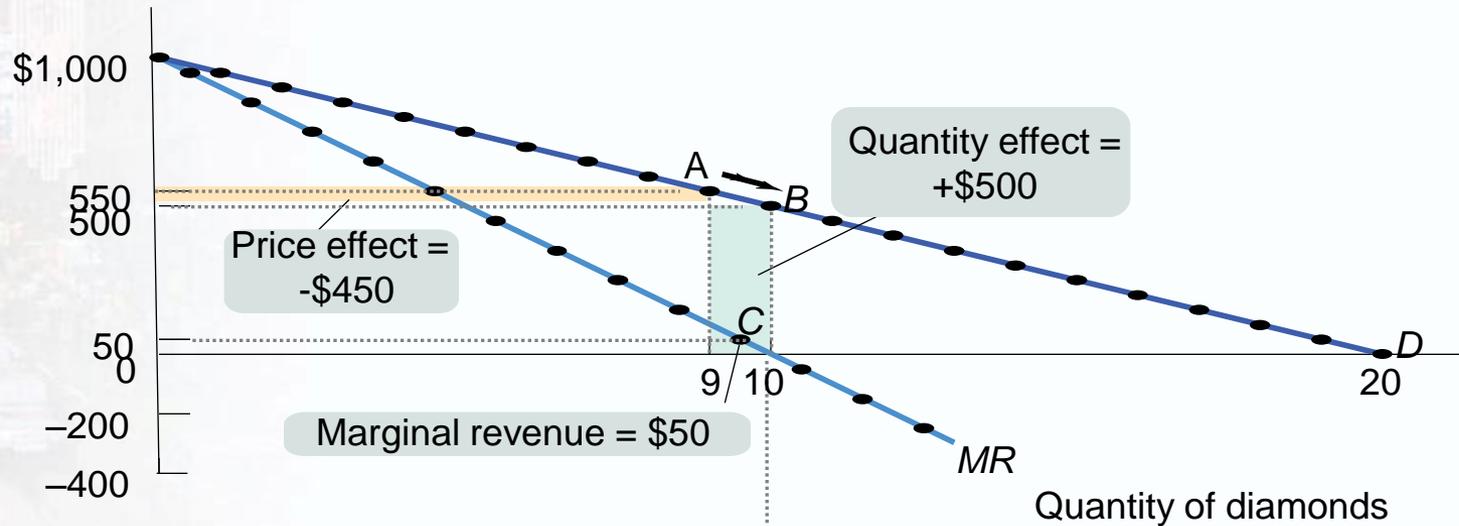
# How a Monopolist Maximizes Profit

- 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 in the table accompanying it.

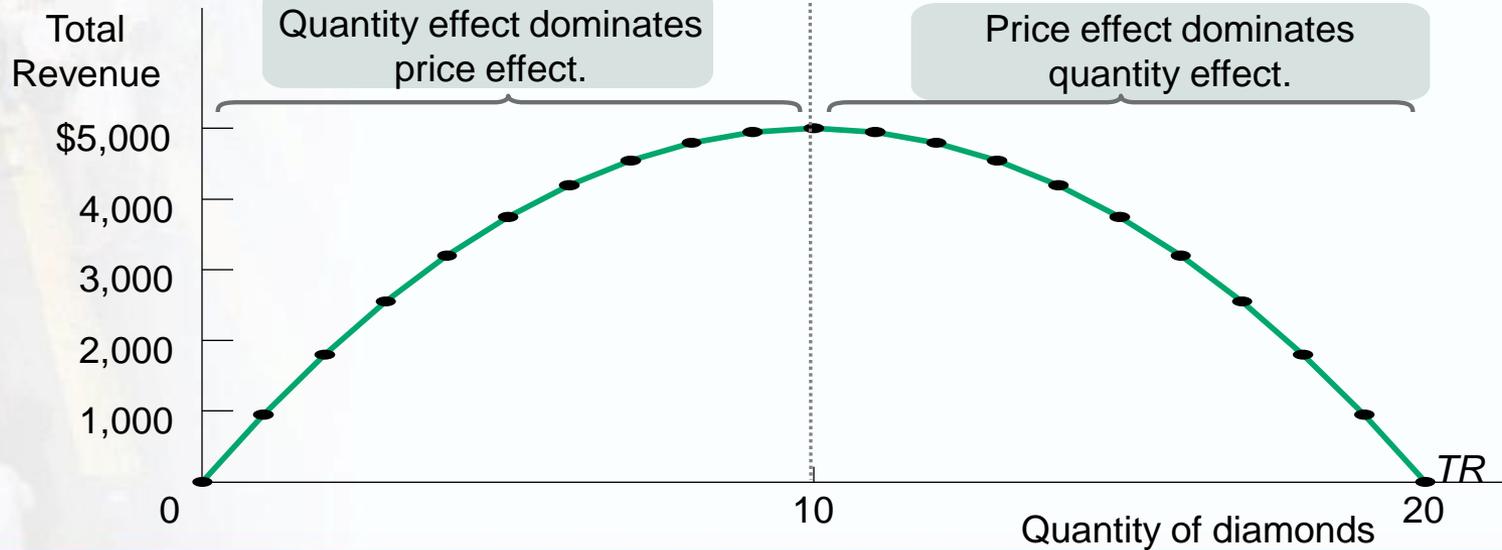
# A Monopolist's Demand, Total Revenue, and Marginal Revenue Curves

Price, cost, marginal revenue of demand

(a) Demand and Marginal Revenue



(b) Total Revenue



## The 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* equal 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.

# The 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.

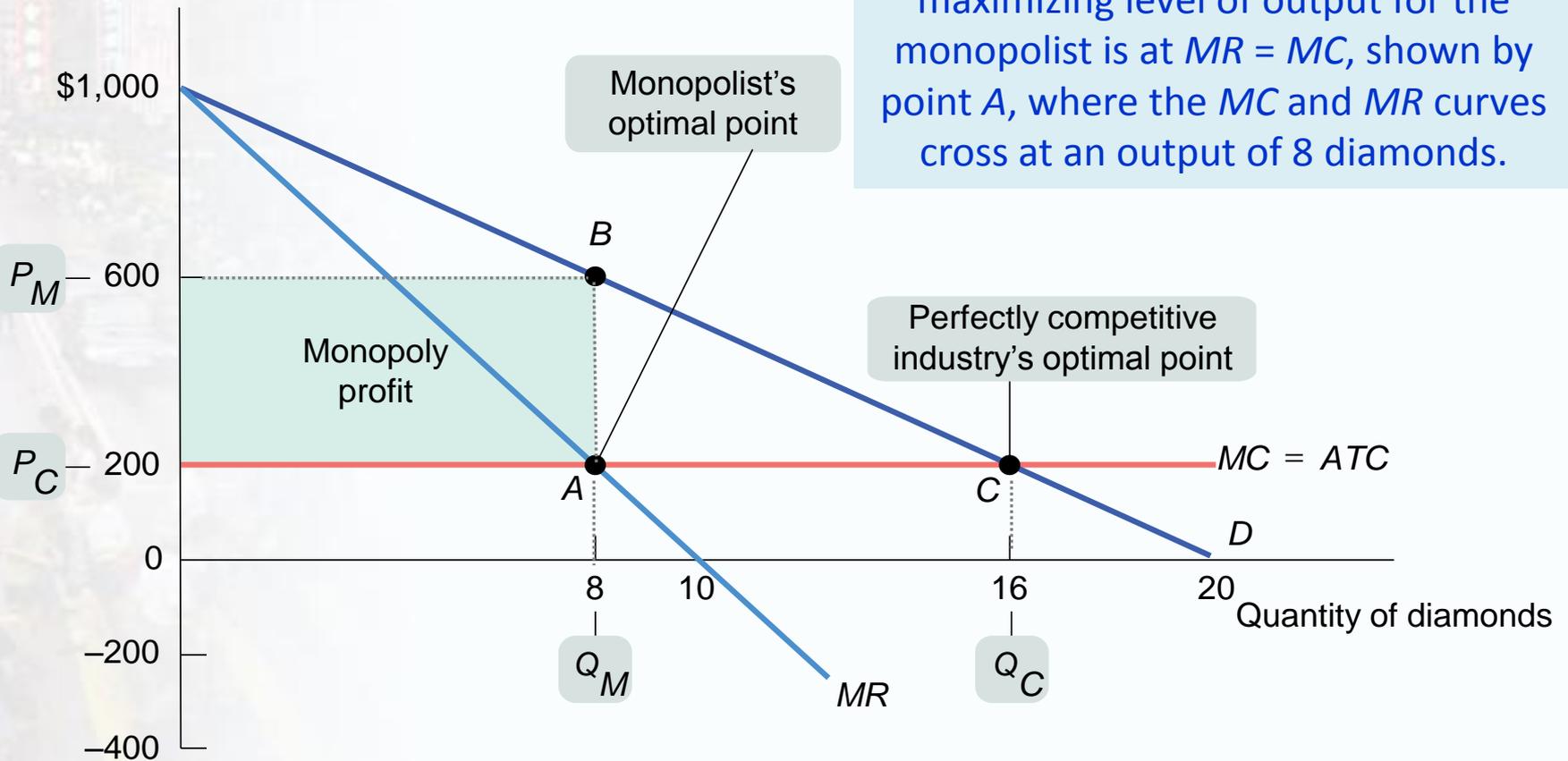
# The Monopolist's Profit-Maximizing Output and Price

- 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:

$$\mathbf{MR = MC}$$

# The Monopolist's Profit-Maximizing Output and Price

Price, cost, marginal revenue of demand



**The optimal output rule:** The profit maximizing level of output for the monopolist is at  $MR = MC$ , shown by point A, where the  $MC$  and  $MR$  curves cross at an output of 8 diamonds.

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  $\$400 \times 8 = \$3,200$ .

# Pitfalls

## Finding the Monopoly Price

- To find the profit-maximizing quantity of output for a monopolist, you look for the point where the marginal revenue curve crosses the marginal cost curve.
  - Point A in the upcoming figure is an example.
- However, it's important not to fall into a common error: imagining that point A also shows the price at which the monopolist sells its output.
  - It doesn't.
  - It shows the marginal revenue received by the monopolist, which we know is less than the price.

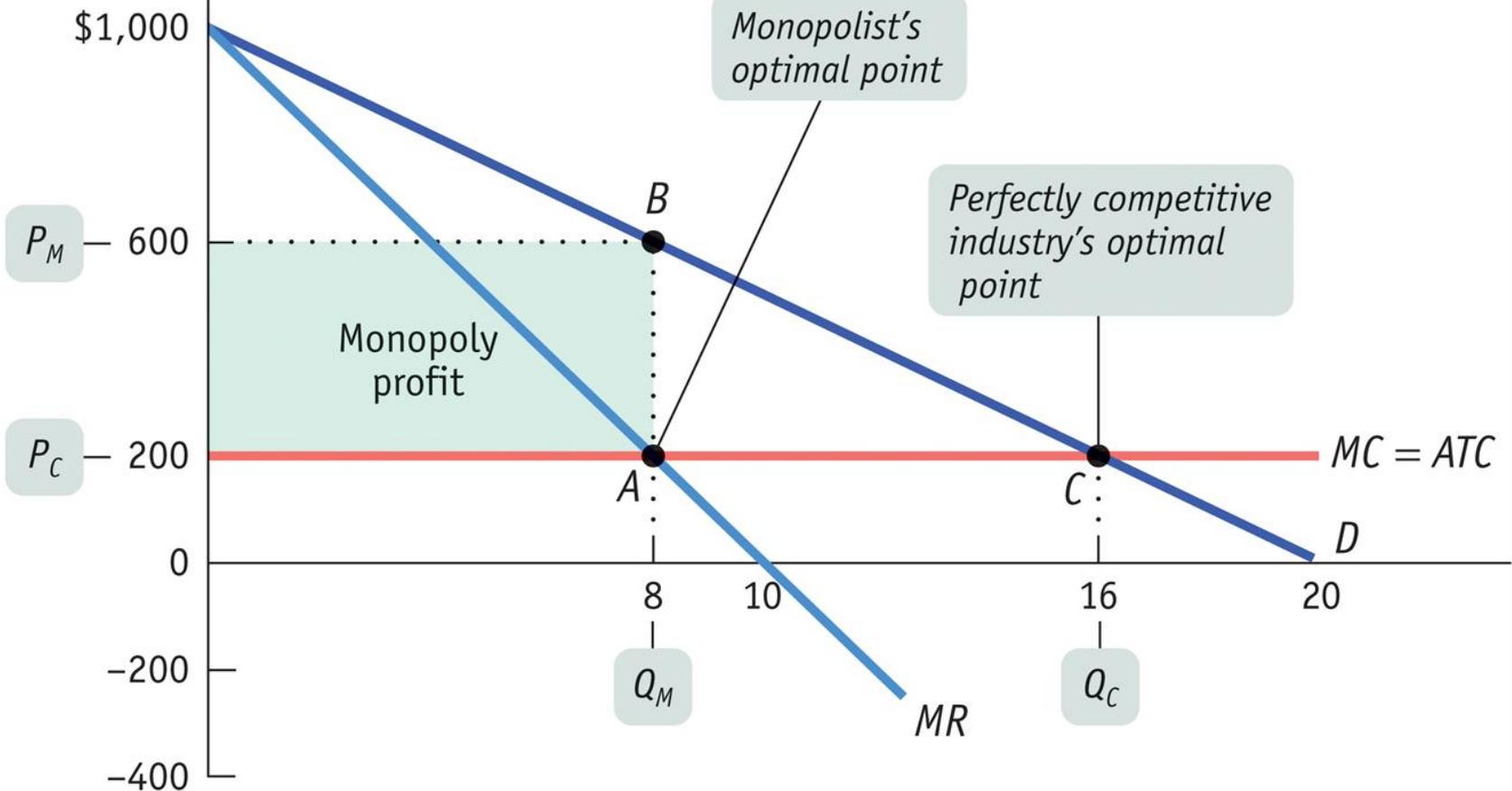
# Pitfalls

## Finding the Monopoly Price

- To find the monopoly price, you have to go up vertically from *A* to the demand curve.
  - There you find the price at which consumers demand the profit-maximizing quantity.
  - So the profit-maximizing price-quantity combination is always a point on the demand curve, like *B* in the following figure.

# ECONOMICS IN ACTION

Price, cost,  
marginal  
revenue of  
diamond



Quantity of diamonds

# Pitfalls

## Is There a Monopoly Supply Curve?

- Given how a monopolist applies its optimal output rule, you might be tempted to ask what this implies for the supply curve of a monopolist.
  - But this is a meaningless question: monopolists don't have supply curves.
- Remember that a supply curve shows the quantity that producers are willing to supply for any given market price.
- A monopolist, however, does not take the price as given; it chooses a profit-maximizing quantity, taking into account its own ability to influence the price.

# FOR INQUIRING MINDS

## Monopoly Behavior and the Price Elasticity of Demand

- A monopolist faces marginal revenue that is less than the market price. But how much lower?
  - The answer depends on price elasticity of demand.
- When a monopolist increases output by one unit, it must reduce the market price in order to sell that unit.
  - If the price elasticity of demand is less than 1, this will actually reduce revenue—that is, marginal revenue will be negative.

# FOR INQUIRING MINDS

## Monopoly Behavior and the Price Elasticity of Demand

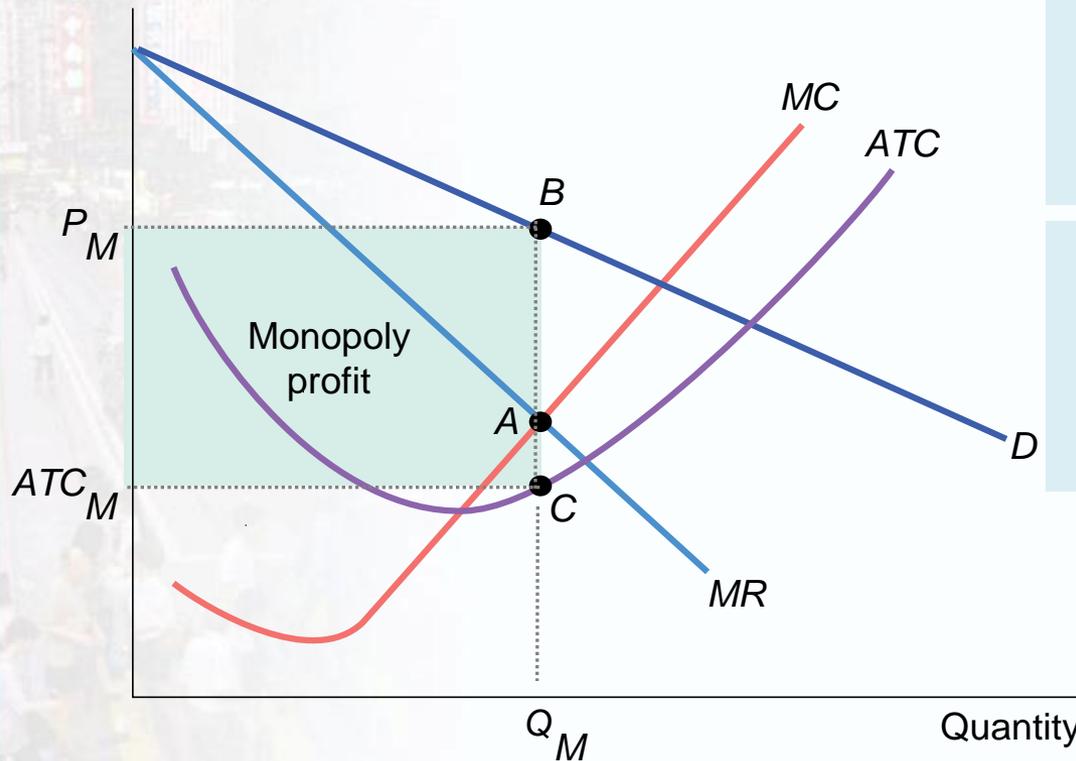
- The monopolist can increase revenue by producing more only if the price elasticity of demand is greater than 1.
  - The higher the elasticity, the closer the additional revenue is to the initial market price.
- A monopolist that faces highly elastic demand will behave almost like a firm in a perfectly competitive industry.

# 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:  $Q_M < Q_C$
  - Charges a higher price:  $P_M > P_C$
  - Earns a profit

# The Monopolist's Profit

Price, cost,  
marginal  
revenue



$$\begin{aligned}\text{Profit} &= TR - TC \\ &= (P_M \times Q_M) - (ATC_M \times Q_M) \\ &= (P_M - ATC_M) \times Q_M\end{aligned}$$

The average total cost of  $Q_M$  is shown by point C. Profit is given by the area of the shaded rectangle.

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.

# ECONOMICS IN ACTION

## SHOCKED BY THE HIGH PRICE OF ELECTRICITY

- Historically, electric utilities were recognized as natural monopolies.
- In the late 1990s, however, there was a move toward deregulation, based on the belief that competition would result in lower retail electricity prices.
- Competition was introduced at two junctures in the channel from power generation to retail customers:
  - 1) distributors would compete to sell electricity to retail customers, and
  - 2) power generators would compete to supply power to the distributors.

# ECONOMICS IN ACTION

## SHOCKED BY THE HIGH PRICE OF ELECTRICITY

- That was the theory, at least.
  - According to one detailed report, 92% of households in states claiming to have retail choice actually cannot choose an alternative supplier of electricity because their wholesale market is still dominated by one power generator.
- What proponents of deregulation failed to realize is that the bulk of power generation still entails large up-front fixed costs.
  - Although many small, gas-fired power generators have been built in the last decade, massive, coal-fired plants are still the cheapest and most plentiful form of electricity generation.

# ECONOMICS IN ACTION

## SHOCKED BY THE HIGH PRICE OF ELECTRICITY

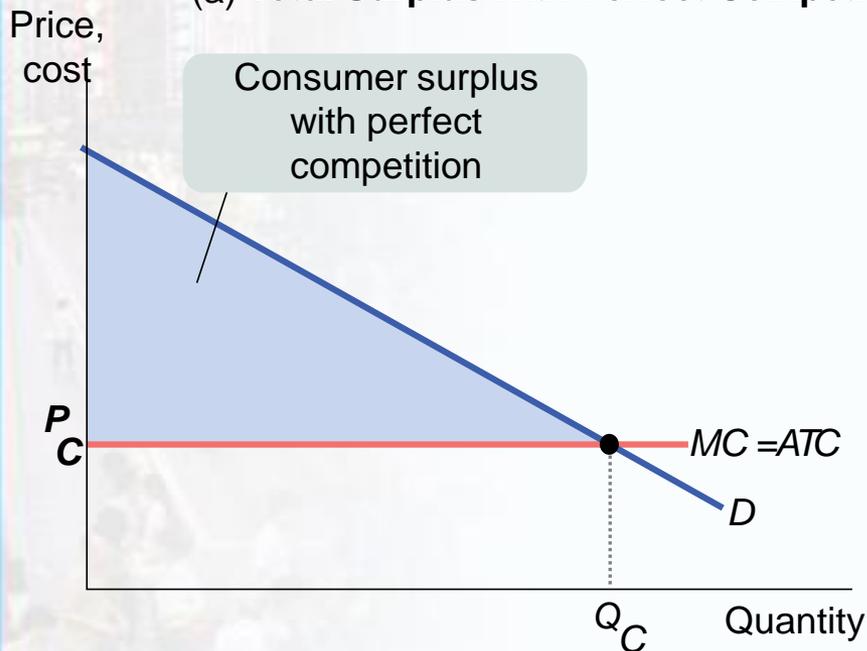
- In addition, deregulation and the lack of genuine competition enabled power generators to engage in market manipulation—intentionally reducing the amount of power they supplied to distributors in order to drive up prices.

# Monopoly and Public Policy

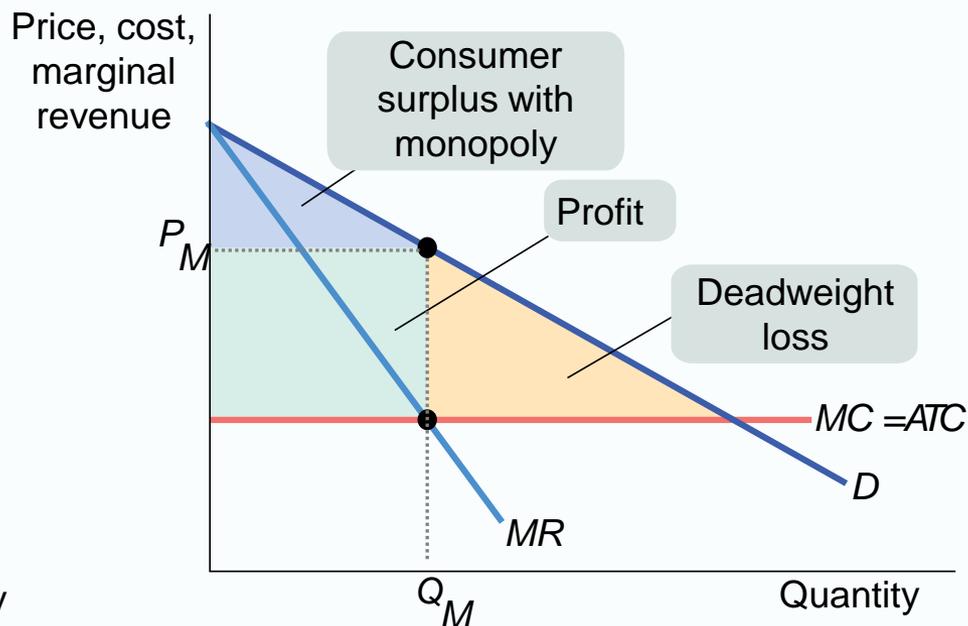
- By reducing output and raising price above marginal cost, a monopolist captures some of the consumer surplus as profit and causes deadweight loss.
  - To avoid deadweight loss, government policy attempts to prevent monopoly behavior.
- When monopolies are “created” rather than natural, governments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

# Monopoly Causes Inefficiency

(a) Total Surplus with Perfect Competition



(b) Total Surplus with Monopoly



Panel (b) depicts the industry under monopoly: the monopolist decreases output to  $Q_M$  and charges  $P_M$ . Consumer surplus (blue triangle) has shrunk because a portion of it has been captured as profit (light blue area).

Total surplus falls: the deadweight loss (orange area) represents the value of mutually beneficial transactions that do not occur because of monopoly behavior.

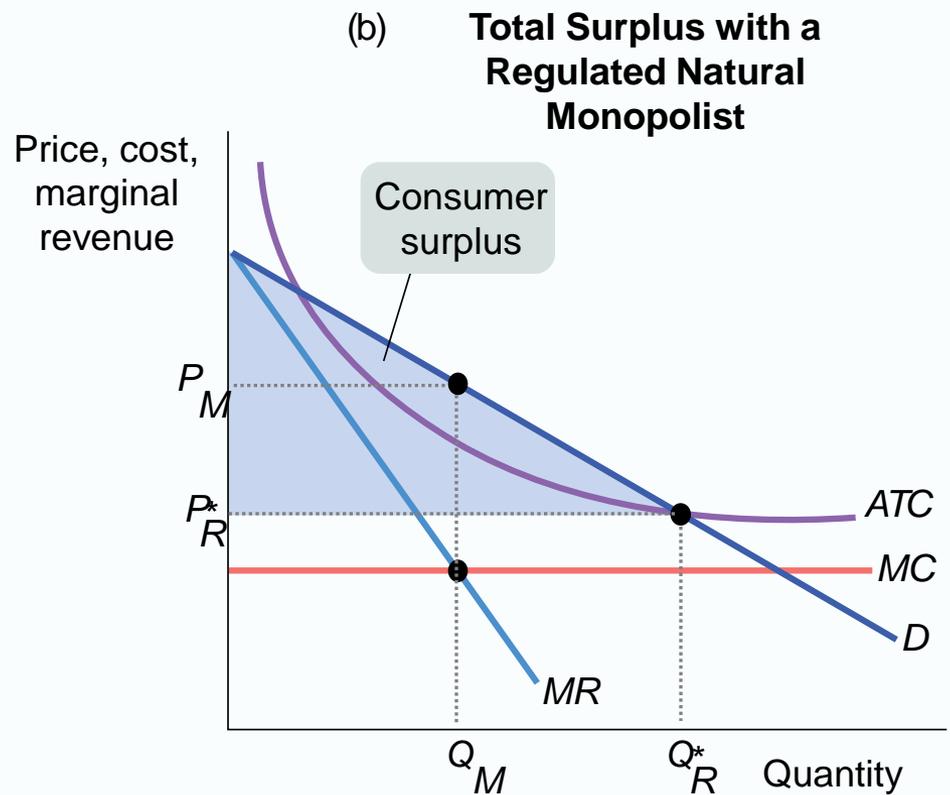
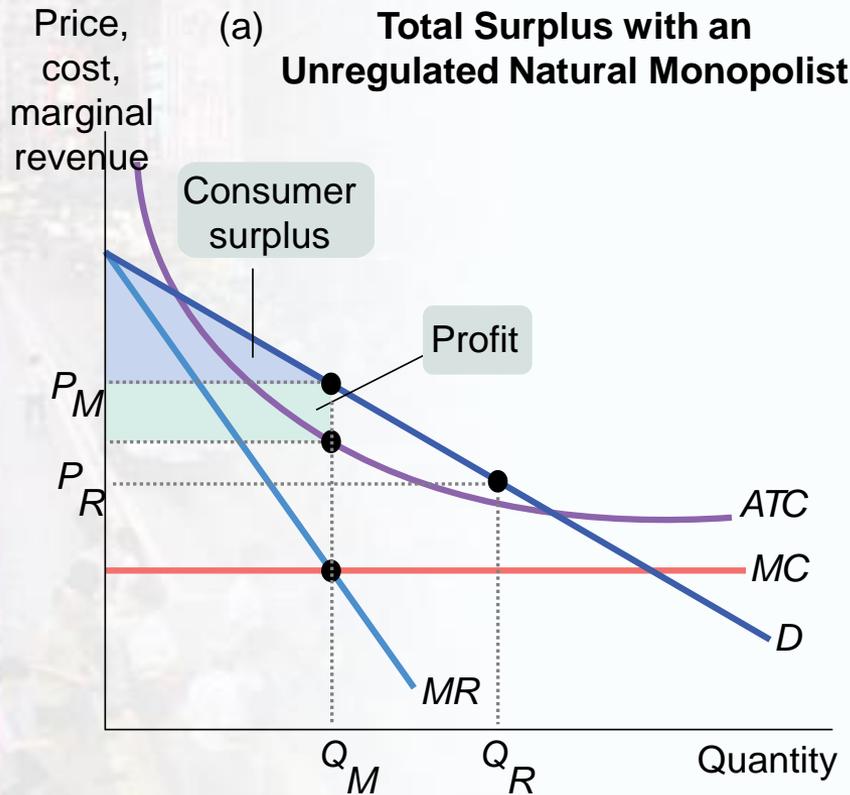
# Preventing Monopoly

- 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 (aside from doing nothing)
  - 1) 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.
  - 2) 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.

# 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.

# ECONOMICS IN ACTION

## CHAINED BY YOUR CABLE

- Until the late 1970s, only rural areas too remote to support local broadcast stations were served by cable.
  - After 1972, new technology and looser rules made it profitable to offer cable service to major metropolitan areas; new networks like HBO and CNN emerged to take advantage of the possibilities.

# ECONOMICS IN ACTION

## CHAINED BY YOUR CABLE

- Until recently, local cable TV was a natural monopoly:
  - At first, cable TV was subject to price regulation but in 1984, Congress passed a law prohibiting most local governments from regulating cable prices.
  - Rates then increased sharply and so local governments had to set limits on cable prices.
  - The cost of “basic” service leveled off.
  - Although cable TV is a monopoly, other players have emerged, such as fiber-optic Internet providers, who caused prices to drop.

# Price Discrimination

- Up to this point we have considered only the case of a **single-price monopolist**, one who charges all consumers the same price.
  - As the term suggests, not all monopolists do this.
- In fact, many (if not most) monopolists find that they can increase their profits by charging different customers different prices for the same good: they engage in **price discrimination**.
  - Example: Airline tickets. If you are willing to buy a nonrefundable ticket a month in advance and stay over a Saturday night, the round trip may cost only \$150, but if you have to go on a business trip tomorrow, and come back the next day, the round trip might cost \$550.

# The Logic of Price Discrimination

- Price discrimination is profitable when consumers differ in their sensitivity to the price.
  - A monopolist would like to charge high prices to consumers willing to pay them without driving away others who are willing to pay less.
- It is profit-maximizing to charge higher prices to low-elasticity consumers and lower prices to high-elasticity consumers.

# Two Types of Airline Customers

Price, cost of ticket

\$550

150  
125

0

2,000

4,000

Quantity of tickets

Profit from sales to business travelers

*B*

Profit from sales to student travelers

*S*

*D*

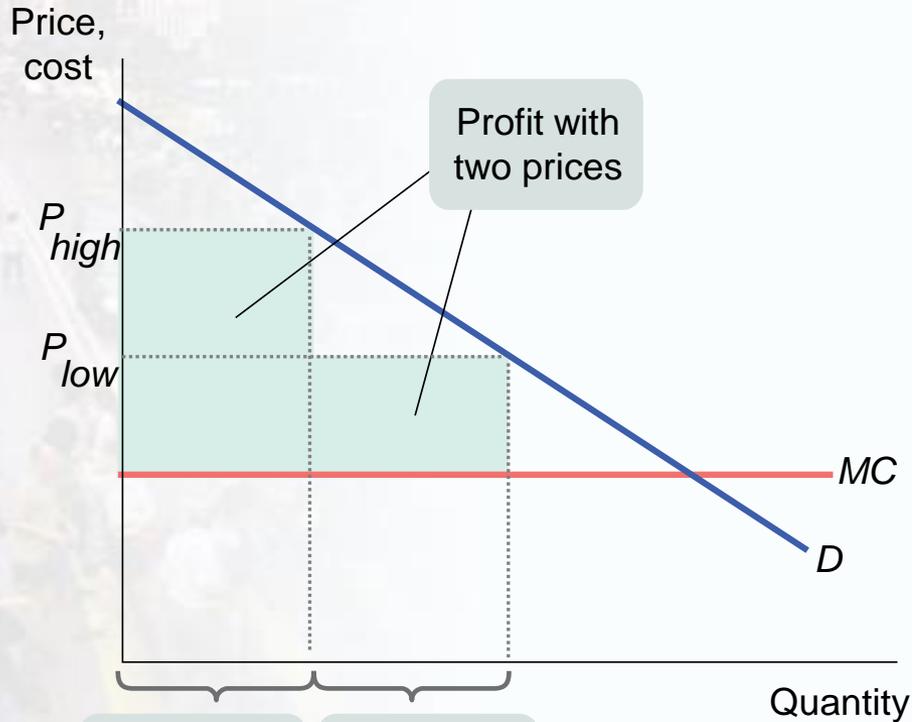
*MC*

# Price Discrimination and Elasticity

- A monopolist able to charge each consumer according to his or her willingness to pay for the good achieves *perfect price discrimination* and does not cause inefficiency because all mutually beneficial transactions are exploited.
- In this case, the consumers do not get any consumer surplus! The entire surplus is captured by the monopolist in the form of profit.
- The following graphs depict different types of price discrimination.

# Price Discrimination

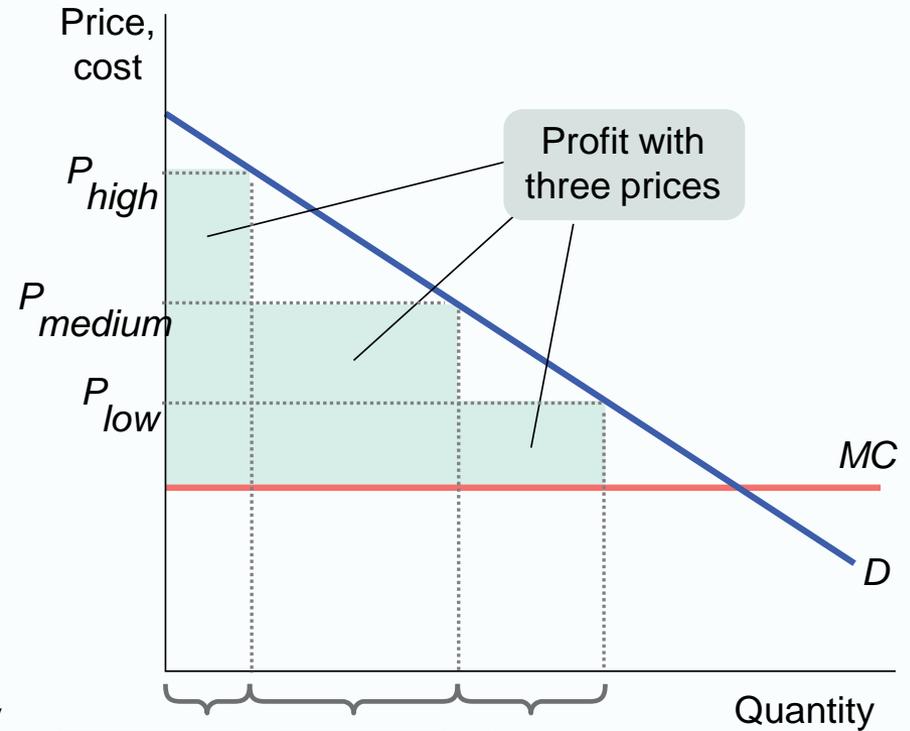
(a) Price Discrimination with Two Different Prices



Sales to consumers with a high willingness to pay

Sales to consumers with a low willingness to pay

(b) Price Discrimination with Three Different Prices



Sales to consumers with a high willingness to pay

Sales to consumers with a medium willingness to pay

Sales to consumers with a low willingness to pay

# Perfect Price Discrimination

**Perfect price discrimination** takes place when a monopolist charges each consumer according to his or her willingness to pay—the maximum that the consumer is willing to pay.



# Price Discrimination

(c) Perfect Price Discrimination



# Perfect Price Discrimination

- Perfect price discrimination is probably never possible in practice.
  - The inability to achieve perfect price discrimination is a problem of prices as economic signals because consumer's true willingness to pay can easily be disguised.
- However, monopolists try to move in the direction of perfect price discrimination through a variety of pricing strategies.
- Common techniques for price discrimination are:
  - Advance purchase restrictions
  - Volume discounts
  - Two-part tariffs

# ECONOMICS IN ACTION

## SALES, FACTORY OUTLETS, AND GHOST CITIES

- Why do department stores occasionally hold sales, offering their merchandise for considerably less than the usual prices?
- Or why, when driving along America's highways, do you sometimes encounter clusters of "factory outlet" stores, often a couple of hours' drive from the nearest city?
- Why should sheets and towels be suddenly cheaper for a week each winter, or raincoats be offered for less in Freeport, Maine, than in Boston?
- In each case the answer is that the sellers—who are often oligopolists or monopolistic competitors—are engaged in a subtle form of price discrimination.

# ECONOMICS IN ACTION

## SALES, FACTORY OUTLETS, AND GHOST CITIES

- Stores are aware that some consumers buy these goods only when they discover that they need them; they are not likely to put a lot of effort into searching for the best price and so have a relatively low price elasticity of demand.
  - So, the store wants to charge high prices for customers who come in on an ordinary day.
- But shoppers who plan ahead, looking for the lowest price, will wait until there is a sale.
  - By scheduling such sales only now and then, the store is in effect able to price discriminate between high-elasticity and low-elasticity customers.

# ECONOMICS IN ACTION

## SALES, FACTORY OUTLETS, AND GHOST CITIES

- An outlet store serves the same purpose: by offering merchandise for low prices, but only at a considerable distance away, a seller is able to establish a separate market for those customers who are willing to make a significant effort to search out lower prices—and who therefore have a relatively high price elasticity of demand.

# VIDEO



*PBS NewsHour*: Google's Goal: Digitize Every Book Ever Printed:

[http://www.pbs.org/newshour/bb/entertainment/july-dec09/google\\_12-30.html](http://www.pbs.org/newshour/bb/entertainment/july-dec09/google_12-30.html)

# Summary

1. There are four main types of market structure based on the number of firms in the industry and product differentiation: perfect competition, monopoly, oligopoly, and monopolistic competition.
2. A **monopolist** is a producer who is the sole supplier of a good without close substitutes. An industry controlled by a monopolist is a **monopoly**.

# Summary

3. The key difference between a monopoly and a perfectly competitive industry is that a single perfectly competitive firm faces a horizontal demand curve but a monopolist faces a downward-sloping demand curve.

This gives the monopolist **market power**, the ability to raise the market price by reducing output compared with a perfectly competitive firm.

# Monopoly

4. To persist, a monopoly must be protected by a **barrier to entry**. This can take the form of control of a natural resource or input, increasing returns to scale that give rise to **natural monopoly**, technological superiority, or government rules that prevent entry by other firms, such as **patents** or **copyrights**.
5. The marginal revenue of a monopolist is composed of a quantity effect (the price received from the additional unit) and a price effect (the reduction in the price at which all units are sold). Because of the price effect, a monopolist's marginal revenue is always less than the market price, and the marginal revenue curve lies below the demand curve.

# Monopoly

6. At the monopolist's profit-maximizing output level, marginal cost equals marginal revenue, which is less than market price. At the perfectly competitive firm's profit-maximizing output level, marginal cost equals the market price. So in comparison with perfectly competitive industries, monopolies produce less, charge higher prices, and earn profits in both the short run and the long run.
7. A monopoly creates deadweight losses by charging a price above marginal cost: the loss in consumer surplus exceeds the monopolist's profit. Thus, monopolies are a source of market failure and should be prevented or broken up, except in the case of natural monopolies.

# Monopoly

8. Natural monopolies can still cause deadweight losses. To limit these losses, governments sometimes impose **public ownership** and at other times impose **price regulation**.

A price ceiling on a monopolist, as opposed to a perfectly competitive industry, need not cause shortages and can increase total surplus.

# Monopoly

9. Not all monopolists are **single-price monopolists**. Monopolists, as well as oligopolists and monopolistic competitors, often engage in **price discrimination** to make higher profits.

A monopolist that achieves **perfect price discrimination** charges each consumer a price equal to his or her willingness to pay and captures the total surplus in the market. Although perfect price discrimination creates no inefficiency, it is practically impossible to implement.

# KEY TERMS



- Monopolist
- Monopoly
- Market power
- Barrier to entry
- Natural monopoly
- Network externality
- Patent
- Copyright
- Public ownership
- Price regulation
- Single-price monopolist
- Price discrimination
- Perfect price discrimination