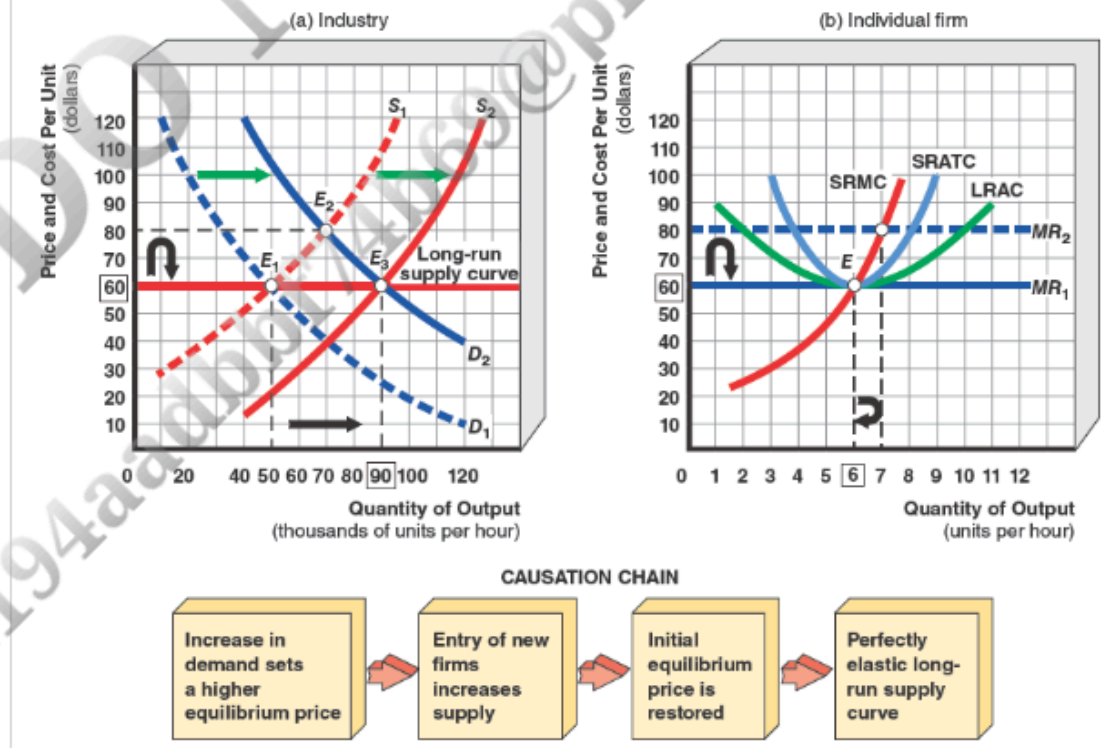
8-4b. Three Types of Long-Run Supply Curves

There are three possibilities for a perfectly competitive industry's long-run supply curve. The **perfectly competitive industry's long-run supply curve** shows the quantities supplied by the industry at different equilibrium prices after firms complete their entry and exit. The shape of each of these long-run supply curves depends on the response of input prices as new firms enter the industry.

Constant-Cost Industry

In a constant-cost industry, input prices remain constant as new firms enter or exit the industry. A **constant-cost industry** is an industry in which the expansion of industry output by the entry of new firms has no effect on the firm's SRATC cost curve. Exhibit 11 reproduces the long-run equilibrium situation from Exhibit 10.

Exhibit 11 Long-Run Supply in a Constant-Cost Industry



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Part (a) shows an industry in equilibrium at point E_1, producing 50,000 units per hour and selling them for $60 per unit. In part (b), the firm is in equilibrium, producing 6 units per hour and earning a normal profit. Then industry demand increases from D_1 to D_2, and the equilibrium price rises to $80. Industry output rises temporarily to 70,000 units per hour, and the individual firm increases output to 7 units per hour. Firms are now earning an economic profit, which attracts new firms into the industry. In the long run, the entry of these firms causes the short-run supply curve to shift rightward from S_1 to S_2, the price is reestablished at $60, and a new industry equilibrium point, E_1, is established. At E_3, industry output rises to 90,000 units per hour, the SRATC curve remains constant, and the firm's output returns to 6 units per hour. Now the typical firm earns a normal profit, and new firms stop entering the industry. Connecting point E_1 to point E_3 generates the long-run supply curve.

Begin in part (a) of Exhibit 11 at the initial industry equilibrium point E_1 with short-run industry supply curve S_1 and industry demand curve D_1. Now assume the industry demand curve increases from D_1 to D_2. As a result, the industry equilibrium moves temporarily to E_2. Correspondingly, the equilibrium price rises from $60 to $80, and industry output increases from 50,000 to 70,000 units.

The short-run result for the individual firm in the industry happens this way. As shown in part (b) of Exhibit 11, the firm takes the increase in price and adjusts its output from 6 to 7 units per hour. At the higher price and output, the firm changes from earning a normal profit to making a positive economic profit because the new price is above its SRATC curve. All the other firms in the industry make the same adjustment by moving upward along their SRMC curves.

In perfect competition, new firms are free to enter the industry in response to a profit opportunity, and they will do so. As we showed in Chapter 3, the addition of new firms shifts the short-run supply curve rightward. Firms will continue to enter the industry until profit is eliminated. This occurs at equilibrium point E_3, where short-run industry demand curve D_2 intersects short-run supply curve

, where short-run industry demand curve D_2 intersects short-run supply curve S_2. Thus, the entry of new firms has restored the initial equilibrium price of $60. The firm responds by moving downward along its SRMC curve until it once again produces 6 units and earns a normal profit.

As shown in the exhibit, connecting the long-run equilibrium points traces a horizontal line, which is the industry's long-run supply curve.

Take Note

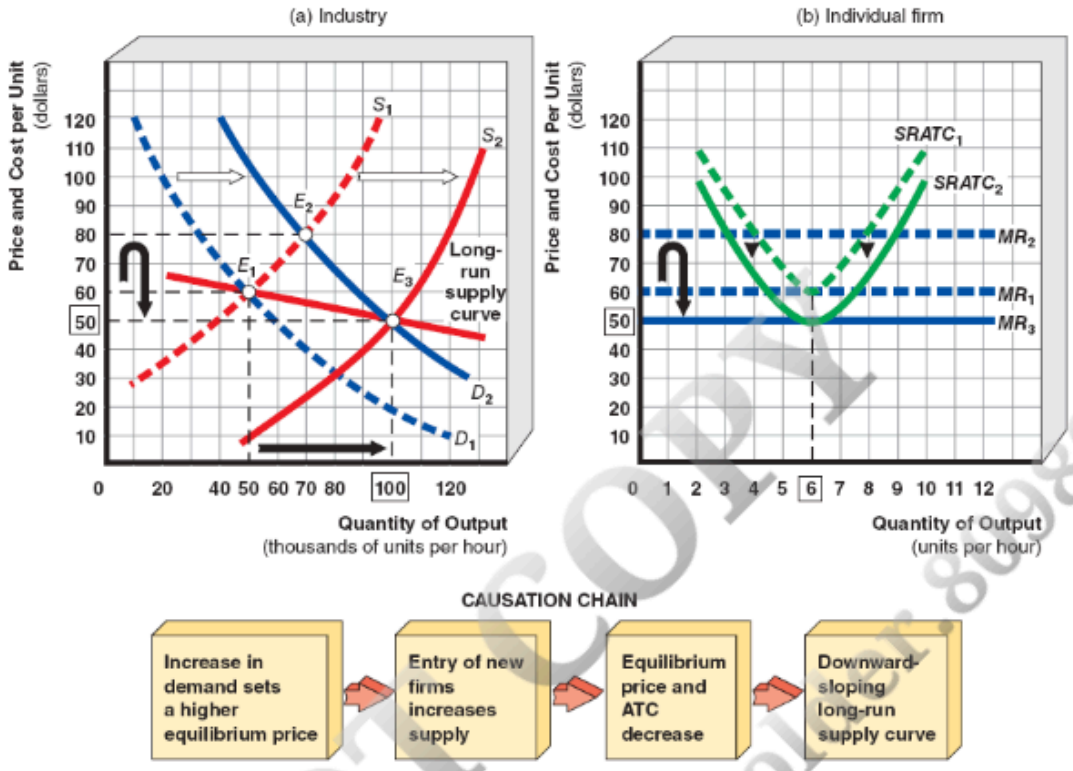
The long-run supply curve in a perfectly competitive constant-cost industry is perfectly elastic and drawn as a horizontal line.

Now we reconsider Exhibit 11 and ask what happens if the demand curve shifts leftward from D_2 to D_1. Beginning in part (a) at point E_3, the decrease in demand causes the price to fall temporarily below $60. As a result, firms incur short-run losses, and some firms leave the industry. The exodus of firms shifts the short-run supply curve leftward from S_2 to S_1, establishing a new equilibrium at point E_1. This decrease in supply restores the equilibrium price to the initial price of $60 per unit. Once equilibrium is reestablished at E_1, there are a smaller number of firms, each earning a normal profit.

Decreasing-Cost Industry

Input prices fall as new firms enter a decreasing-cost industry, and output expands. A **decreasing-cost industry** is an industry in which the expansion of industry output by the entry of new firms decreases each individual firm's cost curve (cost curve shifts downward). For example, as production of electronic components expands, the price of computer chips may decline. The reason is that greater sales volume allows the suppliers to achieve economies of scale and lower their input prices to firms in the electronic components industry. Exhibit 12 illustrates the adjustment process of an increase in demand based on the assumption that our example is a decreasing-cost industry.

Exhibit 12 Long-Run Supply in a Decreasing-Cost Industry



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The long-run supply curve for a decreasing-cost industry is downward sloping. The increase in industry demand shown in part (a) causes the price to rise to $80 in the short run. Temporarily, the individual firm illustrated in part (b) earns an economic profit. Higher profits attract new firms, and supply increases. As the industry expands, input prices fall causing the SRATC curve for the firm to shift downward from $SRATC_1$ to $SRATC_2$, and the firm reestablishes long-run equilibrium at the lower price of $50.

Take Note

The long-run supply curve in a perfectly competitive decreasing-cost industry is downward sloping.

Summary

- Market structure consists of three market characteristics:

  (1) the number of sellers,

  (2) the nature of the product, and

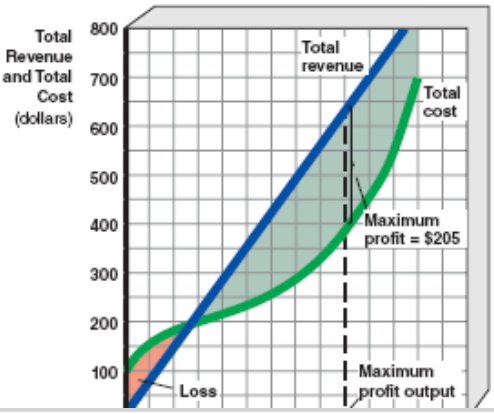
  (3) the ease of entry into or exit from the market.

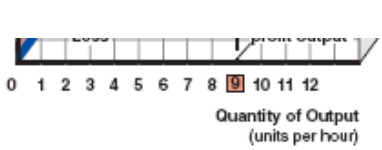
- Perfect competition is a market structure in which an individual firm cannot affect the price of the product it produces. Each firm in the industry is very small relative to the market as a whole, all the firms sell a homogeneous product, and firms are free to enter and exit the industry.

- A homogeneous product is a good or service that is identical regardless of which firm produces it.

- A price-taker firm in perfect competition faces a perfectly elastic demand curve. It can sell all it wishes at the market-determined price, but it will sell nothing above the given market price. This is because so many competitive firms are willing to sell the same product at the going market price.

- The total revenue–total cost method is one way a firm determines the level of output that maximizes profit. Profit reaches a maximum when the vertical difference between the total revenue and the total cost curves is at a maximum.





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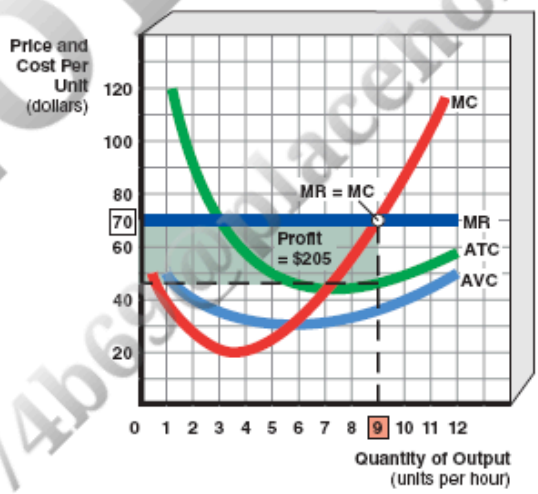
Total Revenue–Total Cost Method

- The marginal revenue equals marginal cost method is a second approach to finding where a firm maximizes profits. Marginal revenue (MR) is the change in total revenue from a one-unit change in output. Marginal revenue for a perfectly competitive firm equals the market price. The MR = MC rule states that the firm maximizes profit or minimizes loss by producing the output where marginal revenue equals marginal cost. If the price (average revenue) is below the minimum point on the average variable cost curve, the MR = MC rule does not apply, and the firm shuts down to minimize its losses.



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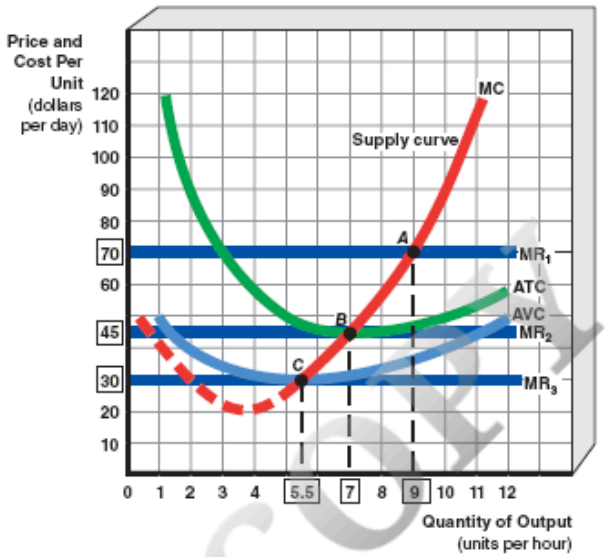
Marginal Revenue Equals Marginal Cost Method

- The perfectly competitive firm's short-run supply curve is a curve showing the relationship between the price of a product and the quantity supplied in the short run. The individual firm always produces along its marginal cost curve above its intersection with the average variable cost

curve. The perfectly competitive industry's short-run supply curve is the horizontal summation of the short-run supply curves of all firms in the industry.



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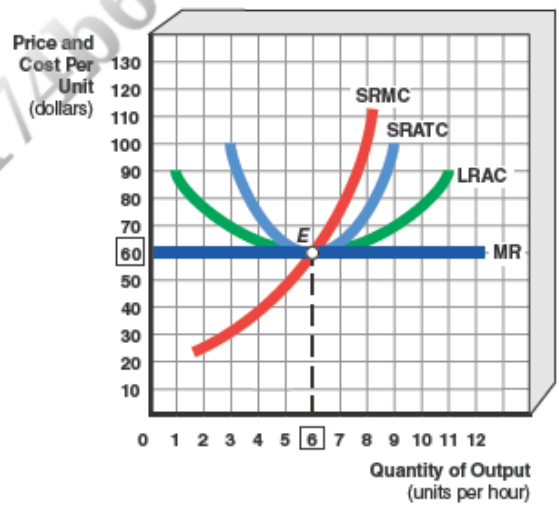
Short-Run Supply Curve

- Long-run perfectly competitive equilibrium occurs when a firm earns a normal profit by producing where price equals the minimum long-run average cost, the minimum short-run average total cost, and the short-run marginal cost.



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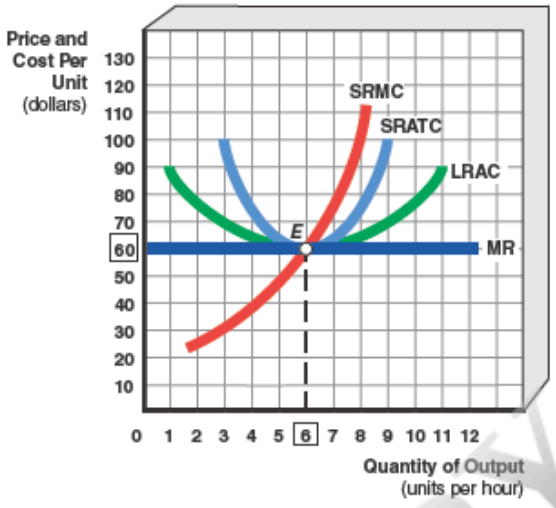
- In a constant-cost industry, total output can be expanded without an increase in the individual firm's average total cost. Because input prices remain constant, the long-run supply curve in a constant-cost industry is perfectly elastic.
- In a decreasing-cost industry, lower input prices result in a downward-sloping industry long-run supply curve. As industry output expands, an individual firm's average total cost curve declines (shifts downward), and the long-run equilibrium market price falls.
- In an increasing-cost industry, input prices rise as industry output increases. As a result, an individual firm's average total cost curve rises (shifts upward), and the industry long-run supply curve for an increasing-cost industry is upward sloping.



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Long-Run Perfectly Competitive Equilibrium

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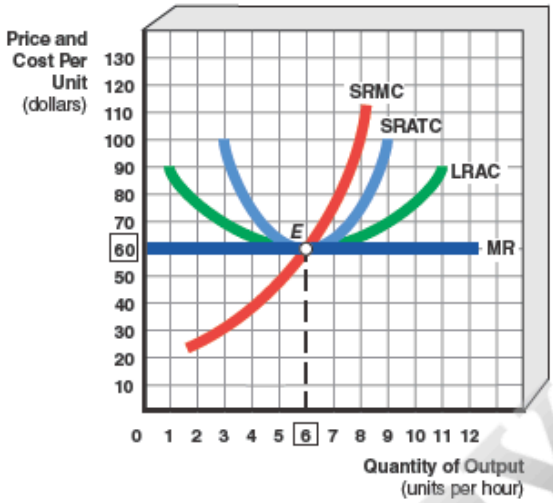

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- In a decreasing-cost industry, lower input prices result in a downward-sloping industry long-run supply curve. As industry output expands, an individual firm's average total cost curve declines (shifts downward), and the long-run equilibrium market price falls.

- In an increasing-cost industry, input prices rise as industry output increases. As a result, an individual firm's average total cost curve rises (shifts upward), and the industry long-run supply curve for an increasing-cost industry is upward sloping.

Take Note Revisited

- Perfect competition is characterized by a large number of small firms each producing a homogeneous product in a market with very easy entry

each producing a homogeneous product in a market with very easy entry and exit of firms.

- A perfectly competitive firm has no control over the price of the product it sells, so it "takes" the market equilibrium price. As a result, the individual firm's demand curve is perfectly elastic (horizontal) at this price.
- In perfect competition, the firm's marginal revenue equals the price, which the firm views as a horizontal demand curve.
- Perfectly competitive firms choose the level of output that maximizes profit. This occurs when total revenue minus total cost is as large as possible, or equivalently, when marginal revenue is equal to marginal cost.
- Profit can be calculated as $(\mathrm{P} - \mathrm{ATC}) \times \mathrm{Q}$, so when price exceeds ATC the firm earns a positive economic profit, when they are equal a normal profit is earned, and when price falls below ATC the firm earns a loss.
- The firm will shut down when the price drops below the minimum average variable cost (AVC).
- A perfectly competitive firm's short-run supply curve is its marginal cost curve above the minimum point on its average variable cost curve.
- The long-run supply curve in a perfectly competitive constant-cost industry is perfectly elastic and drawn as a horizontal line.
- The long-run supply curve in a perfectly competitive decreasing-cost industry is downward sloping.
- The long-run supply curve in a perfectly competitive increasing-cost industry is upward sloping.

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. As shown in Exhibit 15, suppose the firm's price is *B*. The firm's total economic profit at this price is equal to the area of

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *CJID*.

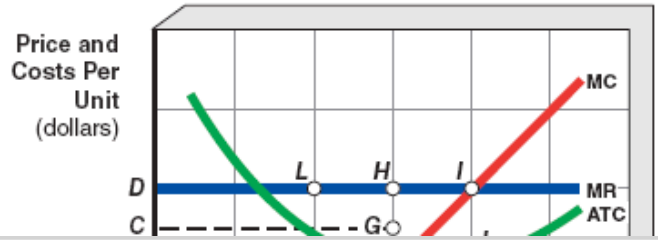
b. *BFHD*.

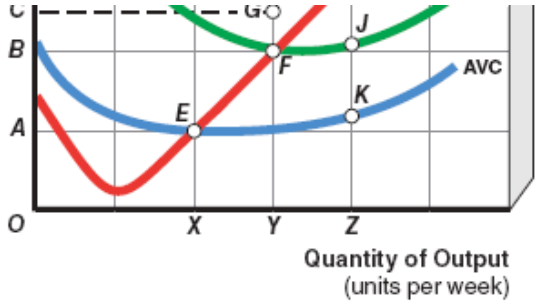
c. *AEXD*.

d. *CGHD*.

e. zero.

Exhibit 15 Marginal Revenue and Cost per Unit Curves





Details

2. The firm shown in Exhibit 15 will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. produce where marginal cost equals marginal revenue.

b. be a price taker.

c. not produce below a price of *A*.

d. All of the above answers are correct.

3. As shown in Exhibit 15, if the price is *D*, a perfectly competitive firm maximizes profit at which point on its marginal cost curve?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *E*

b. *F*

c. *I*

d. Between *E* and *I*

4. As shown in Exhibit 15, if the price is *B*, the firm's total cost of producing at its most profitable level of output is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *YF*.

b. *XL*.

c. *OYFB*.

d. *OXEA*.

5. As shown in Exhibit 15, if the price is *D*, the firm's total revenue at its most profitable level of output is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *OZID*.

b. *OYHD*.

c. *OXLD*.

d. *OYFB*.

6. As shown in Exhibit 15, suppose the firm's price is D. At this price the firm

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. will maximize profits by producing OX units.

b. will maximize profits by producing OY units.

c. will shut down.

d. is earning a zero economic profit.

e. is earning positive economic profits.

7. As shown in Exhibit 15, if the price is *B*, the firm's total revenue of producing at its most profitable level of output is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *YF*.

b. *XL*.

c. *OYFB*.

d. *OXEA*.

8. When there is a permanent increase in market demand in a constant-cost industry, a firm's short-run average total cost curve will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. become vertical.

b. shift up.

c. shift down.

d. remain the same.

9. Perfect competition is defined as market structure in which

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. there are many small sellers.

b. the product is homogeneous.

c. it is very easy for firms to enter or exit the market.

d. All of the above answers are correct.

10. Under perfect competition, which of the following are the same (equal) at all levels of output?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Price and marginal cost

b. Price and marginal revenue

c. Marginal cost and marginal revenue

d. All of the above answers are correct.

11. A portrait photographer produces output in packages of 100 photos each. If the output sold increases from 600 to 700 photos, total revenue increases from $1,200 to $1,400. What is the marginal revenue per photo?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. $200

b. $100

c. $20

d. $2

e. $1

12. In the short run, a perfectly competitive firm is producing at a price below average total cost. What is its economic profit?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Positive

b. Zero

c. Negative

d. Normal

13. In Exhibit 16, if output is 200 units per week, economic profit for the firm is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. zero.

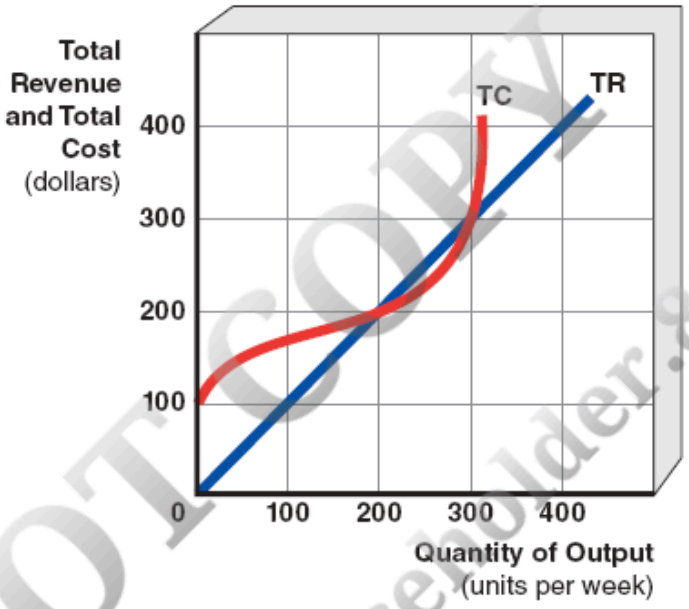
b. at its minimum.

c. at its maximum

c. at its maximum.

d. None of the above answers are correct.

Exhibit 16 Total Revenue and Total Cost Graph



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14. In Exhibit 16, economic profit for the firm is at a maximum when output per week equals

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. 0 units.

b. 100 units.

c. 200 units.

d. 250 units.

15. The point of maximum profit for a business firm is where

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. P = AC.

b. TR = TC.

c. MR = AR.

d. MR = MC.

16. When there is a permanent increase in market demand in a decreasing-cost industry, a firm's short-run average total cost curve will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. become vertical.

b. shift down.

c. remain the same.

d. shift up.

17. A perfectly competitive firm's short-run supply curve is the

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. average total cost curve.

b. demand curve above the marginal revenue curve.

c. same as the market supply curve.

d. marginal cost curve above the average variable cost curve.

18. When there is a permanent increase in market demand in an increasing-cost industry, a firm's short-run average total cost curve will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. shift down.

b. shift up.

c. remain the same.

d. become vertical.

19. You are considering building a Rent Your Own Storage Center. You are trying to decide whether to build 50 storage units at a total economic cost of $200,000, 100 storage units at a total economic cost of $300,000, 150 storage units at a total economic cost of $525,000, or 200 storage units at a total economic cost of $800,000. If you want to survive in the long run, which size will you choose?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. 50

b. 100

c. 150

d. 200

20. If there is a permanent increase in demand for the product of a perfectly competitive industry, the process of transition to a new long-run equilibrium will include

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. the entry of new firms.

b. temporarily higher profits.

c. both a and b.

d. neither a nor b.

Chapter 9. Monopoly

Chapter Objectives

1. Describe the characteristics of a monopoly market and sources of monopoly power.
2. Describe how a profit maximizing monopolist determines how much output to produce and what price to charge.
3. Analyze how a firm decides whether to stay in business or shut down.
4. Define price discrimination, as well as the conditions that must be met for a seller to be able to price discriminate.
5. Explain why a perfectly competitive market yields an efficient outcome while a monopoly market yields an inefficient outcome.

Introduction

In the last chapter we studied perfect competition, a market structure with many sellers, each lacking any power to influence price. We now look at the monopoly market structure, the model at the opposite end of the spectrum from

perfect competition. The word *monopoly* is derived from two Greek words meaning "single seller." Unlike a perfectly competitive firm, a monopoly firm has the market power to set its price and not worry about competitors.

9-1. The Monopoly Market Structure

Under monopoly, the consumer has a simple choice—either buy the monopolist's product or do without it. **Monopoly** is a market structure characterized by:

1. a single seller
2. a unique product with no close substitutes
3. impossible entry into the market.

Monopoly, like perfect competition, corresponds only approximately to real-world industries, but it serves as a useful benchmark model. Following are brief descriptions of each monopoly characteristic.

9-1a. Characteristics of Monopoly

Single Seller

In perfect competition, many firms make up the industry. By contrast, a monopoly means that a single firm is the entire industry. As such, one firm provides the total supply of a product in the market. Local monopolies are more common real-world approximations of the model than national or world market monopolies. Examples of local monopolies might include: a campus bookstore; an electric power company; the only gas station, drugstore, or grocery store in a small town; and a hotdog stand at a football game. Nationally, the U.S. Postal Service monopolizes first-class mail.

Unique Product

A unique product means there are *no close substitutes* for the monopolist's product. Thus, the monopolist faces little or no competition. In reality, however, there are few, if any, products that have no close substitutes. For example, students can buy textbooks online, solar energy could substitute for electric heat, and email can often be used in place of first-class mail. But the idea is that there are few if any *suitable* substitutes for the monopolist's product.

Impossible Entry

Unlike perfect competition, a monopoly market structure includes extremely high barriers that make it very difficult or impossible for new firms to enter an industry. Following are three major barriers that could prevent new firms from entering a market and competing with a monopolist.

- **Ownership of a Vital Resource** Sole control of the entire supply of a strategic input is one way a monopolist can prevent a newcomer from

entering an industry. A famous historical example is Alcoa's monopoly of the U.S. aluminum market from the late nineteenth century until the end of World War II. The source of Alcoa's monopoly was its control of bauxite ore, which is necessary to produce aluminum.

- **Legal Barriers** Legal barriers include franchises, licenses, patents, and copyright requirements. The oldest and most effective barriers protecting a firm from potential competitors are the result of government franchises and licenses that legally permit only a single firm to provide a certain product. For example, local governments grant rights to water and sewer service. Many state governments run monopoly liquor stores and lotteries, and nationally, the U.S. Postal Service has a government franchise to deliver first-class mail. Government-granted licenses also restrict entry into some industries and occupations such as physicians, lawyers, dentists, nurses, teachers, real estate agents, hair stylists, taxicabs, liquor stores, and funeral homes. Patents and copyrights are yet another form of government barriers to entry. To encourage innovation, the government grants patents to inventors, thereby legally prohibiting other firms from selling the patented product for 20 years. Copyrights give creators of literature, art, music, and movies exclusive rights to sell or license their works.

- **Economies of Scale** Why might competition among firms be unsustainable so that one firm becomes a monopolist? Recall the concept of *economies of scale* from Chapter 7 on production costs. As a result of large-scale production, the long-run average cost (LRAC) of production falls, allowing a firm to lower its per-unit cost as it expands output. This in turn enables this firm to charge lower prices than its smaller competitors who are then driven out of the market. Thus, if a large firm continues to grow and obtain enough of a cost advantage over its rivals, it can become a monopoly and remain dominant in an industry. Would-be competitors may find it virtually impossible to raise enough money to set up operations on a large-enough scale to effectively compete in this industry.

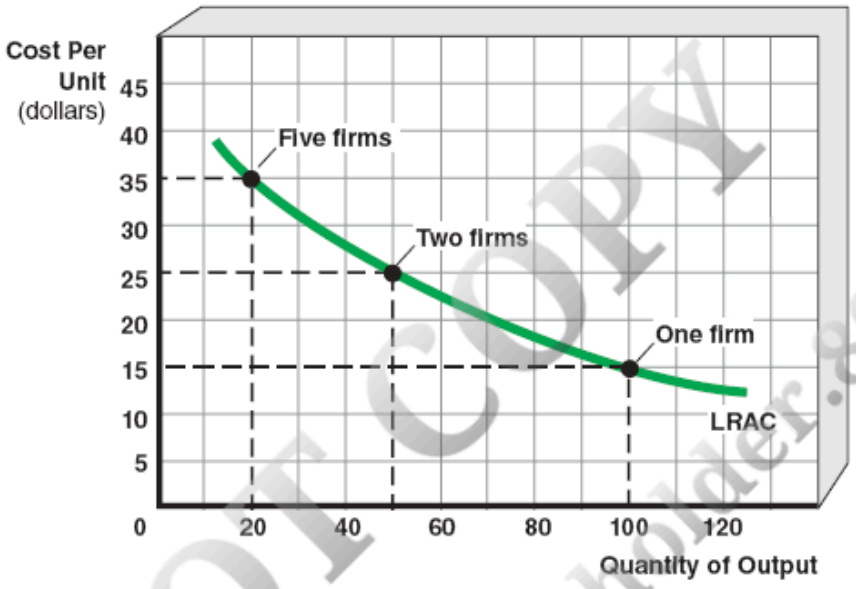
9-1b. Natural Monopoly

Economists call the situation in which one seller emerges in an industry because of economies of scale a natural monopoly. A **natural monopoly** is an industry in which the long-run average cost of production declines over the full range of output demanded in the market. As a result, a single firm, rather than two or more firms, can supply the entire market demand at the lowest possible cost. Public utilities, such as natural gas, water, and cable television, are examples of natural monopolies. The government regulates these monopolies through a board of commissioners to prevent exploitation.

Exhibit 1 depicts the LRAC curve for a natural monopoly. A single firm can produce 100 units at an average cost of $15 and a total cost of $1,500. If two firms

each produce 50 units, the total cost of producing 100 total units rises to $2,500 and the average cost rises to $25 per unit. With five firms producing 20 units each, the total cost of producing 100 units rises further to $3,500 and average cost rises to $35 per unit. So, because of economies of scale, it is least costly for only one firm to produce 100 units of output. In Chapter 13, regulation of a natural monopoly will be explored in greater detail.

Exhibit 1 Minimizing Costs in a Natural Monopoly



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In a natural monopoly, a single firm, rather than multiple firms, provides the lowest cost option for producing the industry's output. The single firm's cost advantage occurs because the LRAC curve for any firm decreases over the full range of output demanded in the market. For example, one firm can produce 100 units at an average cost of $15 and a total cost of $1,500. Two firms in the industry can produce 100 units of output (50 units each) for a total cost of $2,500, and five firms can produce the same output for a total cost of $3,500.

Take Note

A natural monopoly occurs when, due to economies of scale, a single firm in an industry can produce enough output to satisfy market demand and produce this output at a lower per-unit cost than would be possible if the market were served by more than one firm.

Economies of scale and monopoly power can exist because consumers choose a product that everyone else is using, which then increases the value of that good. A **network good** is a good that increases in value to each user as the total number of users increases. Examples include Twitter, Etsy, and Match.com. By selling network goods, a firm can increase sales rapidly and thus achieve economies of scale. One large firm emerges because smaller firms are left with high costs, which prevent them from matching the price set by a large volume producer.

Am I on Track?

1. Which of the following might result in a monopoly industry?

SHOW ANSWER

SHOW ANSWER

a. Having a patent on a product

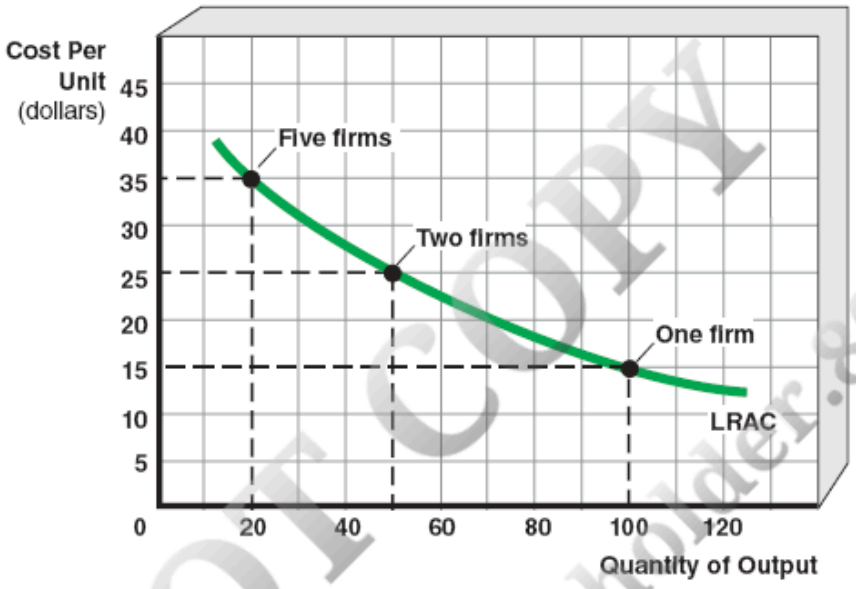
b. Selling a network good

c. Economies of scale

d. All of the above

each produce 50 units, the total cost of producing 100 total units rises to $2,500 and the average cost rises to $25 per unit. With five firms producing 20 units each, the total cost of producing 100 units rises further to $3,500 and average cost rises to $35 per unit. So, because of economies of scale, it is least costly for only one firm to produce 100 units of output. In Chapter 13, regulation of a natural monopoly will be explored in greater detail.

Exhibit 1 Minimizing Costs in a Natural Monopoly



▸ Details

In a natural monopoly, a single firm, rather than multiple firms, provides the lowest cost option for producing the industry's output. The single firm's cost advantage occurs because the LRAC curve for any firm decreases over the full range of output demanded in the market. For example, one firm can produce 100 units at an average cost of $15 and a total cost of $1,500. Two firms in the industry can produce 100 units of output (50 units each) for a total cost of $2,500, and five firms can produce the same output for a total cost of $3,500.

Take Note

A natural monopoly occurs when, due to economies of scale, a single firm in an industry can produce enough output to satisfy market demand and produce this output at a lower per-unit cost than would be possible if the market were served by more than one firm.

Economies of scale and monopoly power can exist because consumers choose a product that everyone else is using, which then increases the value of that good. A **network good** is a good that increases in value to each user as the total number of users increases. Examples include Twitter, Etsy, and Match.com. By selling network goods, a firm can increase sales rapidly and thus achieve economies of scale. One large firm emerges because smaller firms are left with high costs, which prevent them from matching the price set by a large volume producer.

Am I on Track?

1. Which of the following might result in a monopoly industry?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Having a patent on a product

b. Selling a network good

c. Economies of scale

d. All of the above

9-2. Price and Output Decisions for a

9.2. Price and Output Decisions for a Monopolist

The major difference between perfect competition and monopoly is the shape of the demand curve a single firm faces, not the shapes of the cost curves. As explained in the previous chapter, a perfectly competitive firm is a *price taker*. In contrast, the next section explains that a monopolist is a price maker. A **price maker** is a firm that faces a downward-sloping demand curve. This means a monopolist has the ability to select the product's price. To understand the monopolist, we again apply the marginal approach to our hypothetical electronics company—Computech.

One final note about the marginal revenue curve. In Exhibit 2(a), observe that the MR curve cuts the quantity axis at 6 units, which is *half* of 12 units, the quantity where the demand curve intersects the *x*-axis. This will always be the case. Following this easy rule helps you locate the point along the quantity axis where marginal revenue equals zero. Now we turn to the question of what quantity will the monopolist produce and what price will it charge to maximize profit.

Take Note

The marginal revenue curve for a straight-line demand curve intersects the quantity axis halfway between the origin and the quantity axis intercept of the demand curve.

Am I on Track?

2. Which of the following is true in the elastic portion of a monopolist's demand curve?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Marginal revenue is positive.

b. Marginal revenue is above the demand curve.

c. If the firm lowers the price and sells more output, total revenue will decrease.

revenue will decrease.

d. All of the above are true.

9-2b. Short-Run Profit Maximization for a Monopolist Using the Total Revenue–Total Cost Method

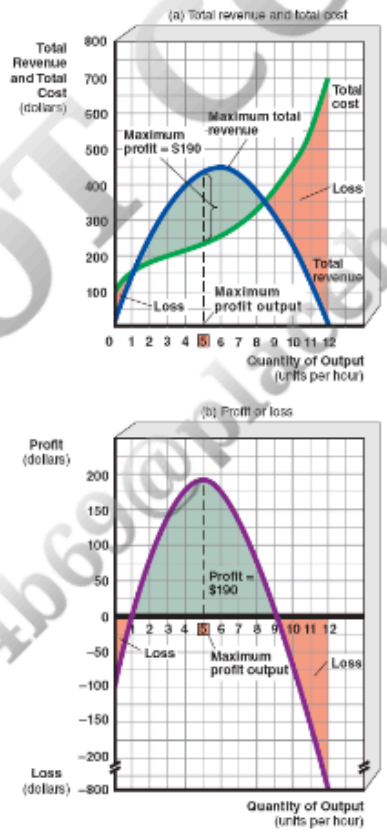
Exhibit 3 reproduces the demand, total revenue, and marginal revenue data from Exhibit 2 and adds cost data from the previous two chapters. These data illustrate a situation in which Computech can earn monopoly economic profit in the short run. Subtracting total cost in column 6 from total revenue in column 3 gives the total profit or loss in column 8 that the firm earns at each level of output. From 0 to 1 unit, the monopolist incurs losses, and then a break-even point occurs before 2 units per hour. If the monopolist produces 5 units per hour, it earns the maximum profit of $190 per hour. As output expands between 5 and 8 units of output, the monopolist's profit diminishes. After 8 units of output, there is a second break-even point, and losses increase as output expands. Exhibit 4 graphically illustrates the values of total cost, total revenue, and profit over a range of quantities the monopolist could produce.

Exhibit 3 Short-Run Profit Maximization Schedule for Computech as a Monopolist

(1) Output per Hour (Q)	(2) Price per Unit (P)	(3) Total Revenue (TR)	(4) Marginal Revenue (MR)	(5) Marginal Cost (MC)	(6) Total Cost (TC)	(7) Average Total Cost (ATC)	(8) Profit (+) or Loss (−)
0	$150	$0			$100	–	−$100
			$138	$50			
1	138	138			150	$150	−12
			112	34			
2	125	250			184	92	66
			89	24			
3	113	339			208	69	131
			61	19			
4	100	400			227	57	173
			40	23			
5	88	440	25	25	250	50	190

			10	30		
6	75	450		280	47	170
			−9	38		
7	63	441		318	45	123
			−41	48		
8	50	400		366	46	34
			−58	59		
9	38	342		425	47	−83
			−92	75		
10	25	250		500	50	−250
			−107	95		
11	13	143		595	54	−452
			−143	117		
12	0	0		712	59	−712

Exhibit 4 Short-Run Profit Maximization for a Monopolist Using the Total Revenue–Total Cost Method



▸ Details

The profit-maximizing level of output for Computech as a monopolist is shown in this exhibit. Part (a) shows that maximum profit is earned by producing 5 units per hour where the vertical distance between the total revenue and total cost curves is the greatest. In part (b), the maximum profit of $190 per hour corresponds to the profit-maximizing output of 5 units per hour illustrated in part (a). At output levels below 2 or above 8, the

units per hour illustrated in part (a). At output levels below 2 or above 8, the monopolist incurs losses.

Take Note

The monopolist maximizes profit by producing the level of output where MR = MC and charging the corresponding price from the demand curve. This always occurs at a price on the elastic segment of its demand curve.

Profit is maximized where the vertical distance between the total revenue and total cost curves is greatest, which occurs at 5 units of output. Note that the total revenue is maximized at an output level of 6 units, which is greater than the profit-maximizing output of 5 units.

220

9-2c. Short-Run Profit Maximization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method

Exhibit 5 reproduces the demand and cost curves from the table in Exhibit 3. Like the perfectly competitive firm, a monopolist maximizes profit by producing the quantity of output where MR = MC and charging the corresponding price on its demand curve. In this case, 5 units is the quantity at which MR = MC. The monopolist charges a price of $88 as represented by point *A* on the demand curve. Point *B* represents

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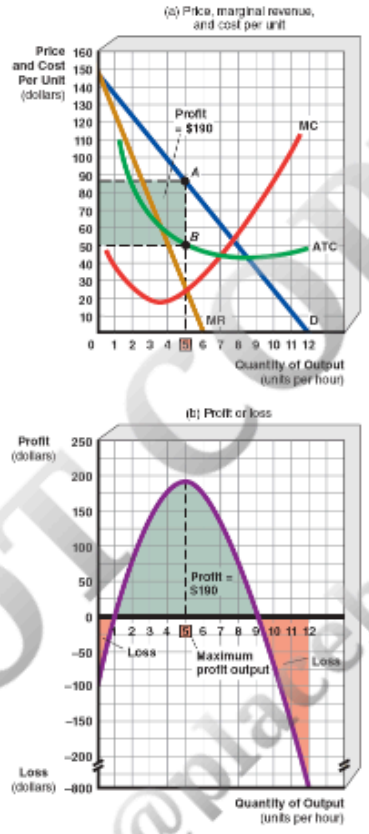
an average total cost (ATC) of $50 at 5 units. Recall that profit is calculated as (P – ATC) × Q. Because the price ($88) is above the ATC ($50) at the MR = MC output, the monopolist earns a positive profit of $190 per hour $[(\$88 - \$50) \times 5]$, as shown by the shaded area.

Exhibit 5 Short-Run Profit Maximization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method



▸ Details

Part (a) illustrates a monopolist electronics firm, Computech, maximizing profit by producing 5 units of output where the marginal revenue (MR) and the marginal cost (MC) curves intersect. The profit-maximizing price the monopolist charges at 5 units of output is $88, which is point *A* on the demand curve. Because $88 is above the average total cost (ATC) of $50 at point *B*, the monopolist earns a short-run profit of $190 per hour, represented by the shaded area ($38 profit per unit × 5 units).
At a price of $88 and output of 5 units per hour in part (a), the shaded area in part (b) shows that the profit curve is maximized at $190 per hour. At output levels below 2 or above 8, the monopolist incurs losses.

Observe that a monopolist charges neither the highest possible price nor the

total revenue-maximizing price. In Exhibit 5(a), $88 is not the highest possible price. Because Computech is a *price maker*, it could have set a price above $88 and sold less output than 5 units. However, that would not maximize profit. In addition, the profit maximizing output level of 5 units is below the output level of 6 units where MR intersects the quantity axis and total revenue is maximized. Consequently, the price charged to maximize profit is higher on the demand curve than the price that maximizes total revenue. Remember: A firm's objective is to maximize profits, not total revenue!

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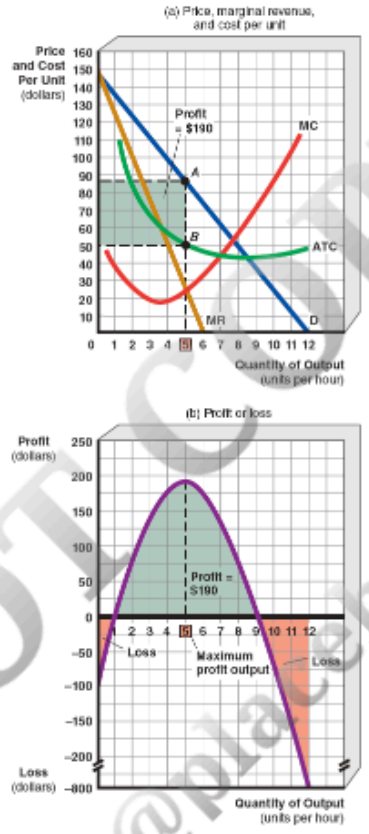

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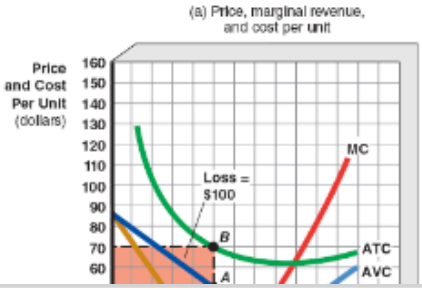
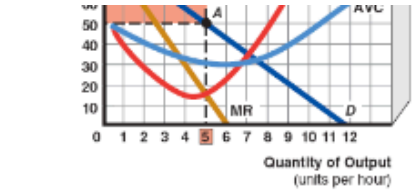
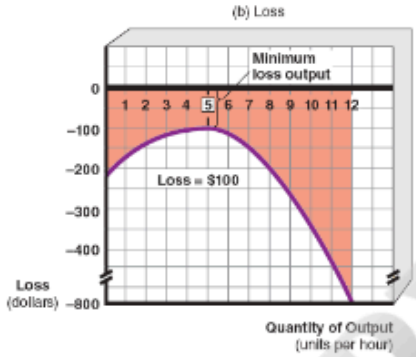
9-2d. A Monopolist Facing a Short-Run Loss

Having a monopoly does not guarantee profits. A monopolist has no protection against changes in demand or cost conditions. Exhibit 6 shows a situation in which the demand curve is lower at every point than the ATC curve, total cost therefore exceeds total revenue at any price charged, and a loss will be incurred. Because the price ($50) at the point on the demand curve where MR = MC (point *A*) is above the AVC curve, but below the ATC curve, the best Computech can do is to minimize its loss by remaining in operation. This means the monopolist, like the perfectly competitive firm, produces in the short run where MR = MC, and like any other firm, if the price is below ATC but above AVC the firm incurs a loss and remains in operation. For this monopolist, it produces a quantity of 5 units per hour. Profit, which is calculated as $[(\mathrm{P} - \mathrm{ATC}) \times \mathrm{Q}]$ or $[(\$50 - \$70) \times 5 = -100]$, and Computech incurs a loss of $100 per hour, represented by the shaded area ($20 × 5 units).

Exhibit 6 Short-Run Loss Minimization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method







▸ Details

In part (a), all points along the demand curve lie below the ATC curve. If the market price charged corresponds to the output where the marginal revenue (MR) and marginal cost (MC) curves intersect, the firm will keep its loss to a minimum. At an output of 5 units per hour, the marginal revenue equals the marginal cost, the loss-minimizing price is $50 per unit (point *A*), and the ATC equals $70 per unit (point *B*). The short-run loss represented by the shaded area is $100 ($20 loss per unit × 5 units).
Part (b) shows that the firm's short-run loss will be greater at any output other than where the marginal revenue and the marginal cost curves intersect at an output of 5 units per hour. Because the price of $50 is above the average variable cost, each unit of output sold pays for the average variable cost and a portion of the average fixed cost.

What if MR = MC at a price on the demand curve that is below the AVC for a monopolist? As with perfect competition or any other firm, the monopolist will shut down. To operate would only add further to its losses.

9-2e. Monopoly in the Long Run

In perfect competition, economic profits are impossible in the long run. The entry of new firms into the industry drives the product's price down until profits reach zero. Extremely strong barriers to entry, however, protect a monopolist from potential competitors, allowing monopolists to earn economic profits in the

long run.

Take Note

If the positions of a monopolist's demand and cost curves give it a profit and nothing disturbs these curves, the monopolist will earn profit in the long run.

In the long run, the monopolist has great flexibility. The monopolist can alter its plant size to lower cost just as a perfectly competitive firm does. But firms such as Computech will not remain in business in the long run when losses persist—regardless of their monopoly status. Facing long-run losses, the monopolist will transfer its resources to a more profitable industry. In reality, no monopolist can
224 depend on barriers to protect it fully from competition in the long run. One threat is that entrepreneurs will find innovative ways to compete with a monopoly. For example, Computech must fear that firms will use their ingenuity and new electronic discoveries to develop a better and cheaper gasoline-saving device.
225

A Closer Look Applicable Concept: Monopoly

The Standard Oil Monopoly

Oil was discovered in western Pennsylvania by Colonel Edwin L. Drake in 1859, and after the Civil War, oil wells sprang up across the landscape. Because oil was plentiful, there was cutthroat competition, and the result was low prices and profits. At this time, John D. Rockefeller, who had grown up selling eggs, was a young produce wholesaler in Cleveland during his early twenties. He was doing well in produce, but realized that greater profits could be made in refining oil, where there was less competition than in drilling for oil. So in 1869, Rockefeller borrowed all the money he could and began with two small oil refineries.

To boost his market power, Rockefeller's Standard Oil of Ohio negotiated secret agreements with the railroads. In addition to getting the railroads to provide him with information on his competitors' shipments, Rockefeller negotiated contracts with the railroads to pay rebates to Standard Oil, not only on Standard Oil's oil shipments, but also on its competitors' shipments. Soon Standard Oil was able to buy 21 of its 26 refining competitors in the Cleveland area. As its profits grew, Standard Oil expanded its refining empire by acquiring its own oil fields, railroads, pipelines, and ships. The objective was to control oil from the oil well to the consumer. Over time, Rockefeller came to own a major part of the petroleum industry. Competitors found railroads and pipelines closed to their oil shipments. Rivals that could not be forced out of business were merged with Standard Oil.

Keystone-France/Gamma-Keystone/Getty Images

In 1870, Standard Oil controlled only 10 percent of the oil industry in the United States. By 1880, Standard Oil controlled over 90 percent of the industry, and its oil was being shipped throughout the world. The more Standard Oil monopolized the petroleum industry, the higher its profits rose, and the greater its power to eliminate competition became. As competitors dropped out of the industry, Rockefeller became a price maker. He raised prices, and Standard Oil's profits soared. Finally, in 1911, Standard Oil was broken up under the Sherman Antitrust Act of 1890 into competing companies, including companies that eventually became ExxonMobil and Chevron.

Am I on Track?

3. A monopolist will shut down if

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. it is earning a loss in the short run.

b. the demand curve is below the AVC curve in the short run.

c. price is greater than ATC.

d. all of the above.

9-3. Price Discrimination

Our discussion so far has assumed the monopolist charges each customer the same price. What if Computech decides to sell identical SAV-U-GAS units for, say, $50 to truckers and $100 to everyone else? Under certain conditions, a monopolist may practice price discrimination to maximize profit.

226 **Price discrimination** occurs when a seller charges different prices for the same product that are not justified by cost differences.

practice price discrimination to maximize profit. **Price discrimination** occurs when a seller charges different prices for the same product that are not justified by cost differences.

9-3a. Conditions for Price Discrimination

Not all firms can engage in price discrimination. The following three conditions must exist before a seller can price discriminate:

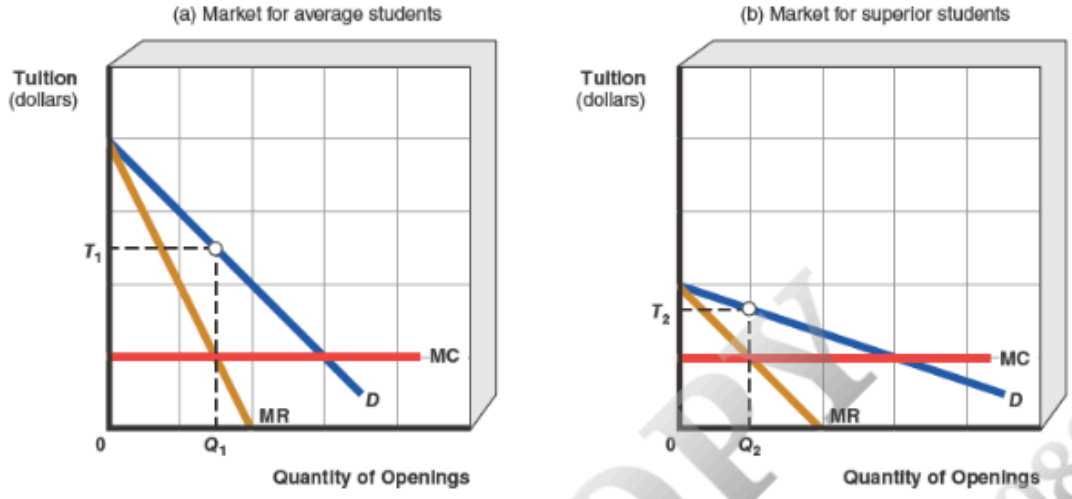
1. The seller must be a price maker and, therefore, face a downward-sloping demand curve. This means that monopoly is not the only market structure in which price discrimination may occur.
2. The seller must be able to segment the market by distinguishing between consumers willing to pay different prices. This separation of buyers will be shown to be based on different price elasticities of demand.
3. It must be impossible or too costly for customers to engage in arbitrage. **Arbitrage** is the practice of earning a profit by buying a good at a low price and reselling the good at a higher price. For example, suppose your campus bookstore tried to boost profits by selling textbooks at a 50 percent discount to seniors. It would not take seniors long to cut the bookstore's profits by buying textbooks at the low price, selling these texts under the list price to all students who are not seniors, and pocketing the difference. In so doing, even without knowing the word *arbitrage*, the seniors would destroy the bookstore's price discrimination scheme.

Although not monopolies, college and university tuition policies meet the conditions for price discrimination. For example, colleges and universities have some control over the tuition they charge, and lower tuition increases the quantity of students applying for entrance. Applicants' high school grades and SAT scores allow the admissions office to classify "consumers" with different price elasticities of demand. Students with lower grades and SAT scores have fewer substitutes, and their demand curve is more inelastic than that of students with higher grades and SAT scores. If the tuition rises at University X, few students with lower grades will be lost because they have few offers of

admission from other universities. On the other hand, the loss of students with higher grades and SAT scores, who have a more elastic demand curve, is greater because they have more admissions opportunities. Further, the nature of the product prevents arbitrage. A student cannot buy University X admission at one price and sell it to another student for a higher price.

Exhibit 7 illustrates how University X price discriminates. For simplicity, assume the marginal cost of providing education to students is constant and therefore is represented by a horizontal MC curve. To maximize profit, University X follows the MR = MC rule in each market. Given the different price elasticities of demand, the price at which MR = MC differs for average and superior students. As a result, University X sets a higher tuition, T_1 , in the average-student market, where demand is less responsive to the higher price. In the superior-student market, where demand is more responsive, these students receive scholarships, and their tuition is lower at T_2 . As a result, University X earns a larger total profit than if it were to charge the same price to all students.

Exhibit 7 Price Discrimination



▸ Details

To maximize profit, University X separates students applying for admission into two distinct markets. The demand curve for admission of average students in part (a) is less elastic than the demand curve for admission of superior students in part (b). Profit maximization occurs when MR = MC in each market. Therefore, University X sets a tuition of T_1 for average students and gives scholarships to superior students, which lowers their tuition to T_2. Using price discrimination, University X earns a greater profit than it would by charging a single tuition to all students.

Take Note

By separating the market into groups with different price elasticities of demand for their product and charging a higher price to customers with a more inelastic demand, a firm that price discriminates earns a higher profit than they would if they charged the same price to all buyers.

9-3b. Is Price Discrimination Unfair?

Examples of price discrimination abound. Movie theaters offer lower prices for children than for adults. Electric utilities charge industrial users of electricity

lower rates than residential users. Hotels and restaurants often give discounts to senior citizens, and airlines offer lower fares to vacationers who buy weeks early.

From the viewpoint of buyers who pay the higher prices, price discrimination may feel unfair. But, look at the other side of price discrimination. Not only is the seller pleased because price discrimination increases profits, some buyers benefit from price discrimination with lower prices. In Exhibit 7, price discrimination makes it possible for superior students who could not afford to pay a higher tuition to attend University X. Price discrimination also allows retired persons to enjoy hotels and restaurants they could not otherwise afford and enables more children to attend movies.

Am I on Track?

1. At the movies, adults pay a higher ticket price than children. However, when they go to the concession stand, both adults and children pay the same amount for popcorn and other snacks. Which of the following statements best explains why price discriminating theaters are able to price discriminate when selling tickets but not when selling popcorn?

SHOW ANSWER

SHOW ANSWER

a. The demand curve for popcorn is perfectly elastic.

b. The theater has no way to divide the buyers of popcorn based on different price elasticities of demand.

c. The theater cannot prevent resale of popcorn.

d. All of the above.

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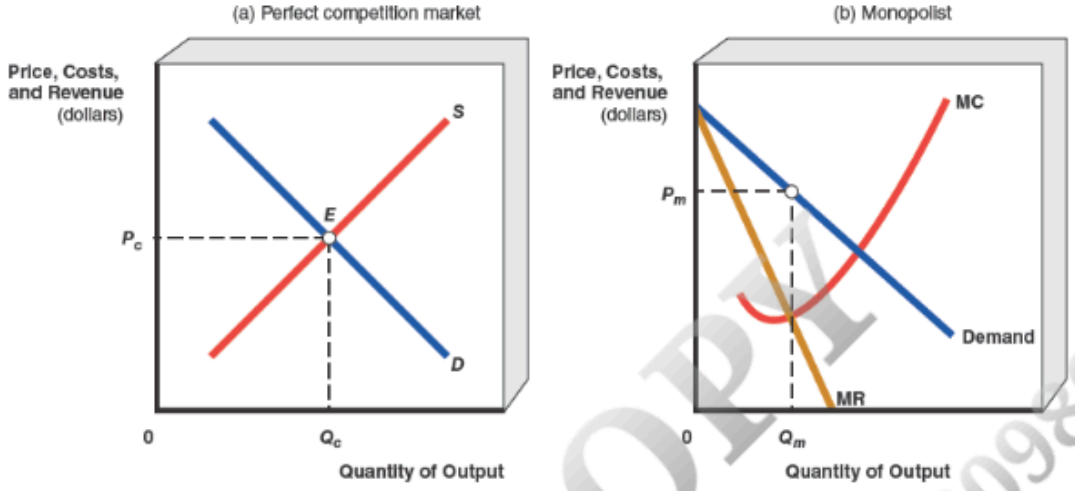
d. All of the above.

9-4. Comparing Monopoly and Perfect Competition

Now that the basics of the two extremes of perfect competition and monopoly have been presented, we can compare and evaluate these market structures. This is an important assessment because the contrast between the disadvantages of monopoly and the advantages of perfect competition is the basis for many government policies, such as antitrust laws. To keep the analysis simple, we assume the monopolist charges a single price, rather than engaging in price discrimination.

Exhibit 8 Comparing a Perfectly Competitive Firm and a Monopolist



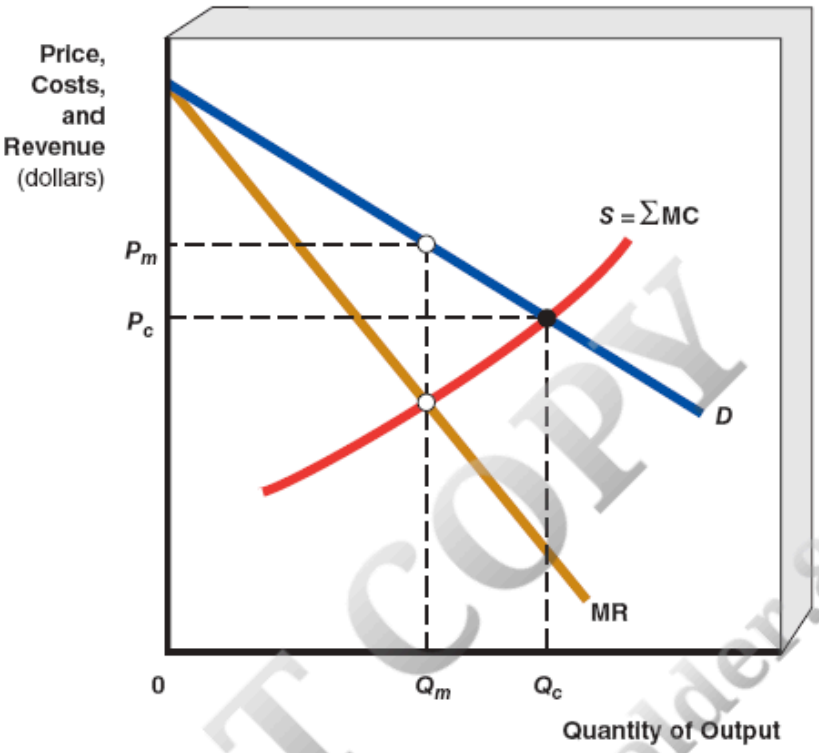
▸ Details

The perfectly competitive market equilibrium shown in part (a) occurs where demand and supply are equal, so MB = MC and an efficient allocation of resources occurs. Similarly, the firm in part (a) sets *P* = MC and produces Q_c output, so at the last unit of output, the marginal benefit, measured by the price, is equal to the marginal cost of resources used to produce it and once again we see perfect competition achieves efficiency.
Part (b) shows that the monopolist produces output Q_m where P_m > MC. By so doing, consumers are shortchanged because the marginal benefit of the last unit produced exceeds the marginal cost of producing it. Under monopoly, inefficiency occurs because the monopolist underallocates resources to the production of its product. As a result, Q_m is less than Q_c .

9-4b. The Case For and Against Monopoly

Exhibit 9 presents a comparison of perfect competition and monopoly in the same graph. Suppose the industry begins as perfectly competitive. The market demand curve, *D*,and the market supply curve, *S*, establish a perfectly competitive price, P_c , and output, Q_c . Recall from Exhibit 8 in the previous chapter that the competitive industry's supply curve, *S*, is the horizontal sum of the marginal cost (MC) curves of all the firms in the industry.

Exhibit 9 The Impact of Monopolizing an Industry



▸ Details

Assume an industry is perfectly competitive, with market demand curve *D* and market supply curve *S*. The market supply curve is the horizontal summation of all the individual firms' marginal cost curves above their minimum average variable costs (Chapter 8, Exhibit 8). The intersection of market supply and market demand establishes the equilibrium price of P_c and the equilibrium quantity of Q_c. Now assume the industry suddenly changes to a monopoly. The monopolist produces the MR = MC output of Q_m, which is less than Q_c. By restricting output to Q_m, the monopolist is able to charge the higher price of P_m.

Now let's suppose the market structure changes when one firm buys out all the competing firms and the industry becomes a monopoly. Assume further that the demand and cost curves are unaffected by this dramatic change. In a monopoly, the industry demand curve *is* the monopolist's demand curve. Because the single firm is a price maker, the MR curve lies below the demand curve. The industry supply curve now becomes the MC curve for the monopolist. To maximize profit, the monopolist sets MR = MC by restricting the output to Q_m and raising the

the monopolist sets MR = MC by restricting the output to Q_m and raising the price to P_m .

Take Note

The monopolist charges a higher price and produces a lower output than would result under a perfectly competitive market structure.

A Closer Look Applicable Concept: Perfect Competition Versus Monopoly

New York Taxicabs: Where Have All the Fare Flags Gone?

Yellow taxicabs in New York City, which are today one of the most famous icons of the city, engender a love and hate relationship. The upside is that you can stick your arm in the air to hail a cab that will take you to your destination. The downside is the traffic jams speckled with yellow cabs that service the city. Flash back to the 1920s, when New York taxicabs were competitive. There was no limit on the number of taxis, and hack licenses were only $10. In addition to a low barrier to entry, taxis engaged in price competition. Cabbies could choose among three different flags to attach to their cars. A red flag cab charged a surcharge for extra passengers. A white flag signaled no surcharge for extra passengers. A green flag meant the cabbie was offering a discount fare. Price wars often erupted, and the vast majority of cabbies flew green flags and charged bargain fares. One strategy was to fly the red flag (high rate) during rush hour and the green flag to offer discounts at off-peak times. Taxi companies also offered a variety of cabs—old, new, big, and small.

As years passed, the system changed because of the concern that competition was causing an overabundance of taxis that congested city streets. The solution was to create a monopoly by law in 1937 designed to limit the number of cabs by requiring all cabs accepting street hails to be painted yellow and possess a medallion on the hood of the taxi. The Taxi and Limousine Commission (TLC) set rates and imposed regulations. For years, there were no price wars, and the barrier to entry was high because there was a very limited supply of medallions. With so few medallions available, taxicab companies bid up the price until these aluminum badges sold for $1.1 million in 2013. Although it is illegal for cabs without medallions to cruise and pick up passengers who hail them, there is a loophole in this regulation that has caused taxicabs to have to compete for

passengers. Nonmedallion cabs are authorized to respond to customers who have ordered the cab in advance by phone or other means. There's no limit on the number of nonmedallion cabs or what the drivers may charge.

Vacclav/Shutterstock.com

Companies like Uber and Lyft have taken advantage of this loophole, and they provide their customers with a cheaper ride option. The average cost of a yellow taxi cab ride is $34.62, whereas the average Uber ride costs only $24.75. In the face of this competition, taxi cabs provided 37 percent fewer rides in 2016 than they did in 2014. As a result, taxi cab medallions, and the barrier to entry that they represent, are now worth half of what they were worth only a few years ago.

A Closer Look Applicable Concept: Perfect Competition Versus Monopoly

New York Taxicabs: Where Have All the Fare Flags Gone?

Yellow taxicabs in New York City, which are today one of the most famous icons of the city, engender a love and hate relationship. The upside is that you can stick your arm in the air to hail a cab that will take you to your destination. The downside is the traffic jams speckled with yellow cabs that service the city. Flash back to the 1920s, when New York taxicabs were competitive. There was no limit on the number of taxis, and hack licenses were only $10. In addition to a low barrier to entry, taxis engaged in price competition. Cabbies could choose among three different flags to attach to their cars. A red flag cab charged a surcharge for extra passengers. A white flag signaled no surcharge for extra passengers. A green flag meant the cabbie was offering a discount fare. Price wars often erupted, and the vast majority of cabbies flew green flags and charged bargain fares. One strategy was to fly the red flag (high rate) during rush hour and the green flag to offer discounts at off-peak times. Taxi companies also offered a variety of cabs—old, new, big, and small.

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Key Terms

Monopoly

Natural monopoly

Network good

Price maker

Price discrimination

Arbitrage

Summary

- A monopolist is the only seller of a unique product, and extremely high barriers to entry protect it from competition.

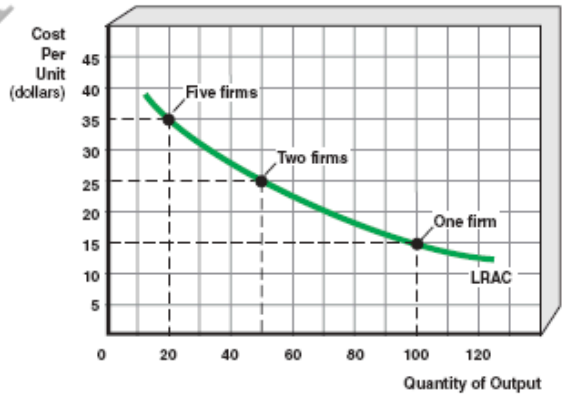
As the only seller of a product, a monopoly faces the entire industry demand.

- Barriers to entry that prevent new firms from entering an industry are:
    - Ownership of an essential resource
    - Legal barriers
    - Economies of scale

Government franchises, licenses, patents, and copyrights are the most obvious legal barriers to entry.

- A natural monopoly arises because of the existence of economies of scale in which the long-run average cost (LRAC) curve falls over the full range of output demanded in the market. Economies of scale allow a single firm, rather than several firms, to produce enough output to satisfy the entire market demand at the lowest possible cost.

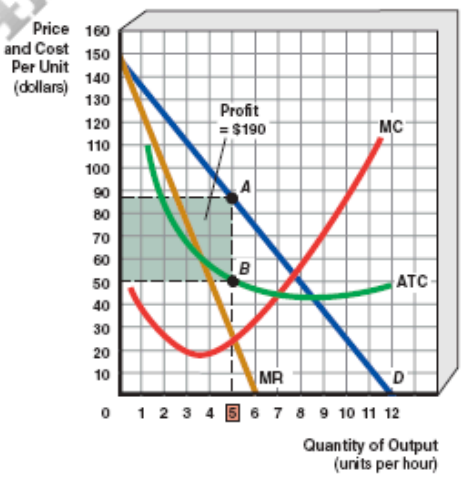
Natural Monopoly



▸ Details

- A network good is a good that increases in value to each user as the total number of users increases. Examples are Etsy and Match.com.
- A price-maker firm faces a downward-sloping demand curve. It therefore searches its demand curve to find the price-output combination that maximizes its profit (or minimizes its loss).
- The marginal revenue and demand curves are downward sloping for a monopolist. The marginal revenue curve for a monopolist lies below the demand curve, and the total revenue curve reaches its maximum where marginal revenue equals zero.
- The short-run profit-maximizing monopolist, like the perfectly competitive firm, locates the profit-maximizing price by producing the output where the MR and MC curves intersect. If the corresponding price, which is read off the demand curve, is greater than average total cost (ATC), the firm earns an economic profit. If the price is less than ATC but greater than average variable cost (AVC), the firm loses money but remains in operation. Finally, if the price is less than the AVC, the monopolist shuts down to minimize losses.

Short-Run Profit Maximizing Monopolist



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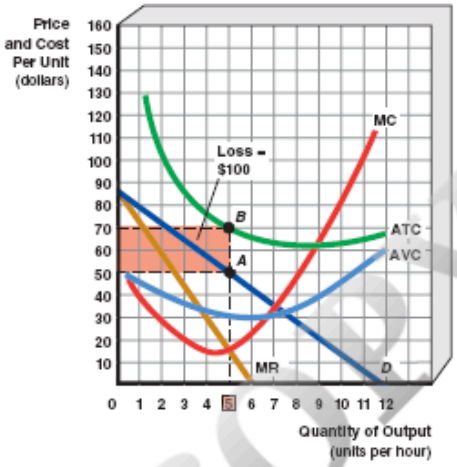
Short-Run Loss-Minimizing Monopolist



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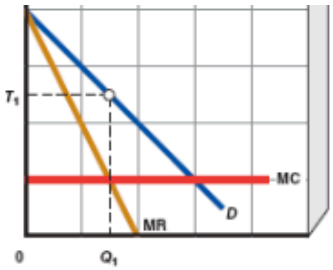
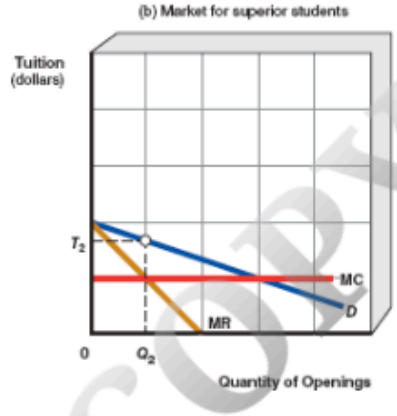
- The long-run profit-maximizing monopolist may earn a profit because of barriers to entry. The monopolist will leave the industry if they would experience losses in the long-run.
- Under certain conditions, price discrimination allows a monopolist to increase profits by charging buyers different prices rather than a single price. Three conditions are necessary for price discrimination:
    - The seller possesses some price-setting ability.
    - Buyers in different markets must have different price elasticities of demand.
    - Buyers must be prevented from reselling the product at a price higher than the purchase price.

Price Discrimination





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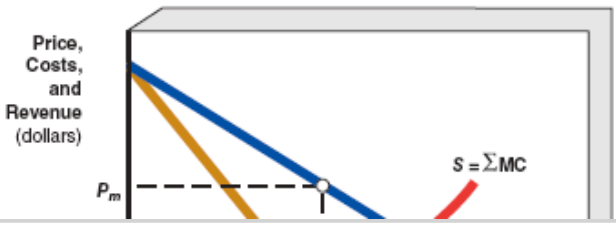
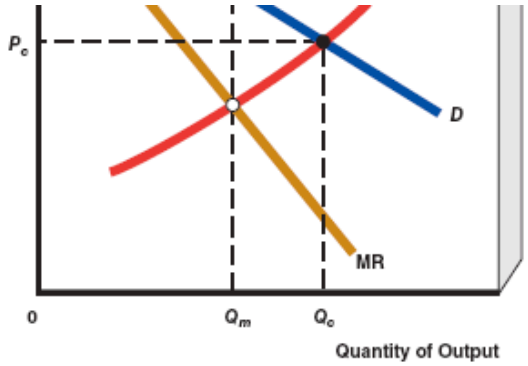
- Monopoly disadvantages include the following:
  - A monopolist charges a higher price and produces less output than a perfectly competitive firm.
  - A profit maximizing monopolist produces an output level at which P > MC so is inefficient.
  - Monopoly can earn higher long-run profits than if competition existed.
  - Monopoly transfers income from consumers to producers to a greater degree than under perfect competition.

Monopoly Disadvantages





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Take Note Revisited

- A natural monopoly occurs when, due to economies of scale, a single firm in an industry can produce enough output to satisfy market demand and produce this output at a lower per-unit cost than would be possible if the market were served by more than one firm.
- Because a monopolist is the only seller of a product, its demand curve is the downward sloping market demand curve. The monopolist's marginal revenue curve is also downward sloping and always lies below the demand curve.
- The marginal revenue curve for a straight-line demand curve intersects the quantity axis halfway between the origin and the quantity axis intercept of the demand curve.
- The monopolist maximizes profit by producing the level of output where MR = MC and charging the corresponding price from the demand curve. This always occurs at a price on the elastic segment of its demand curve.
- If the positions of a monopolist's demand and cost curves give it a profit and nothing disturbs these curves, the monopolist will earn profit in the long run.
- By separating the market into groups with different price elasticities of demand for their product and charging a higher price to customers with a more inelastic demand, a firm that price discriminates earns a higher profit than they would if they charged the same price to all buyers.
- Monopoly markets are characterized by inefficiency because resources are underallocated to the production of that product. Perfectly competitive markets are characterized by efficiency as the marginal benefit of the last unit exchanged equals the marginal cost of producing it.
- The monopolist charges a higher price and produces a lower output than

would result under a perfectly competitive market structure.

Study Questions and Problems

Please see Appendix A for answers to the odd-numbered questions. Your instructor has access to the answers for even-numbered questions.

1. Using the three characteristics of monopoly, explain why each of the following is a monopolist:
    a. Local water service
    b. A newly invented cancer drug with patent protection
    c. U.S. postal service

SHOW ANSWER

2. Why is the demand curve facing a monopolist downward sloping while the demand curve facing a perfectly competitive firm is horizontal?

3. Suppose an investigator finds that the prices charged for drugs at a hospital are higher than the prices charged for the same products at drugstores in the area served by the hospital. What might explain this situation?

SHOW ANSWER

4. Explain why you agree or disagree with the following statements:
    a. "All monopolies are created by the government."
    b. "The monopolist charges the highest possible price."

c. "The monopolist never takes a loss."

5. Suppose the average cost of producing a kilowatt-hour of electricity is lower for one firm than for another firm serving the same market. Without the government granting a franchise to one of these competing power companies, explain why a single seller is likely to emerge in the long run.

SHOW ANSWER

6. Use the demand schedule in Exhibit 10 for a monopolist to calculate total revenue and

New York, even though it can deliver its textbooks to any state at the same costs.
price discrimination

c.

The Japanese sell cars at higher prices in the United States than in Japan, even though the cost to the companies of selling these cars is the same across different countries.

price discrimination

- Suppose the candy bar industry approximates a perfectly competitive industry. Suppose also that a single firm buys all the assets of the candy bar firms and establishes a monopoly. Contrast these two market structures with respect to price, output, and allocation of resources. Draw a graph of the market demand and market supply for candy bars before and after the takeover.

- Name three places you frequent that use price discrimination and explain the discrimination used.

Answers vary with students.

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. The monopolist faces

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. a perfectly inelastic demand curve.

b. a perfectly elastic demand curve.

c. the entire market demand curve.

d. All of the answers above are correct.

2. A profit maximizing monopolist will produce at a price where demand is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. elastic.

b. inelastic.

c. unitary elastic.

d. vertical.

3. When marginal revenue is zero for a monopolist facing a downward-sloping straight-line demand curve, the price elasticity of demand is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. greater than 1.

b. equal to 1.

c. less than 2.

d. equal to 0.

4. Both a perfectly competitive firm and a monopolist

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. always earn an economic profit.

b. maximize profit by setting marginal cost equal to marginal revenue.

c. maximize profit by setting marginal cost equal to average total cost.

d. are price takers.

5. Suppose a monopolist's demand curve lies below its average variable

5. Suppose a monopolist's demand curve lies below its average variable cost curve. The firm will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. stay in operation in the short run.

b. earn an economic profit.

c. earn an economic profit in the long run.

d. shut down.

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6. Which of the following statements best describes the price, output, and profit conditions of monopoly?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Price will equal marginal cost at the profit- maximizing level of output, and profits will be positive in the long run.

b. Price will always equal average variable cost in the short run, and either profits or losses may result in the long run.

c. In the long run, positive economic profit can be earned.

d. All of the answers above are correct.

7. Which of the following is true for the monopolist?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Marginal revenue is less than the price charged.

b. Economic profit is possible in the long run.

c. Profit maximizing or loss minimizing occurs when marginal revenue equals marginal cost.

d. All of the answers above are correct.

8. Although a monopoly can charge any price it wishes, it chooses

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. the highest price.

b. the price equal to marginal cost.

c. the price that maximizes profit.

d. competitive prices.

e. a fair price.

9. As shown in Exhibit 12, the profit-maximizing price for the monopolist is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. P_1 .

b. P_2 .

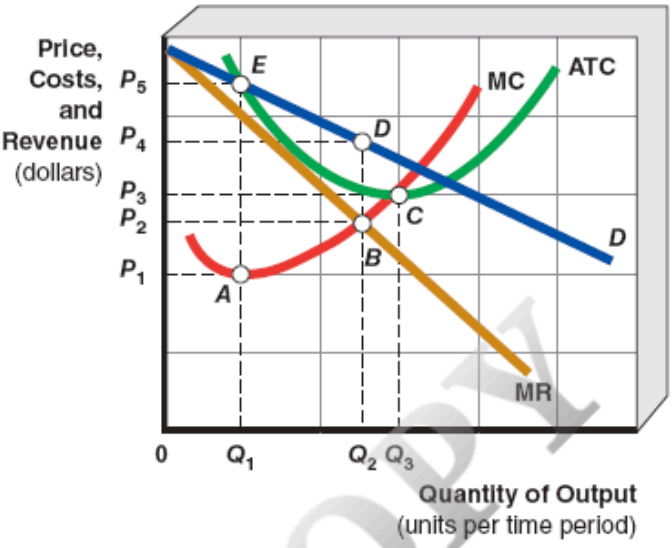
c. P_3 .

d. P_4 .

e. P_5 .

Exhibit 12 Profit Maximizing for a Monopolist

Monopolist



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10. As shown in Exhibit 12, if the monopolist produces the profit-maximizing output, total revenue is the rectangular area

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. $OQ_1 \quad AP_1$.

b. $OQ_2 \quad BP_2$.

c. $OQ_3 \quad CP_3$.

d. $OQ_2 \quad DP_4$.

11. As shown in Exhibit 12, the monopolist's total cost is which of the following areas?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. $P_1 \quad AEP_5$

b. $P_2 \quad BDP_4$

c. $P_3 \quad CDP_5$

d. $P_4 \quad DEP_5$

e. None of the answers above are correct

12. The profit-maximizing output for the monopolist in Exhibit 12 is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. zero.

b. Q_1 .

b. Q_1 .

c. Q_2 .

d. Q_3 .

13. Consider the monopolist's profit maximizing output in Exhibit 12. At this level of output, consumers will want the monopolist to

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. charge a higher price.

b. use more resources to produce less output.

c. use fewer resources to produce less output.

d. use more resources to produce additional output.

14. As shown in Exhibit 12, the monopolist's profit- maximizing price-quantity point is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. *A*.

b. *B*.

c. *C*.

d. *D*.

15. Suppose a monopolist charges a price corresponding to the intersection of marginal cost and marginal revenue. If the price is between its average variable cost and average total cost curves, the firm will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. earn an economic profit.

b. stay in operation in the short run, but shut down in the long run if demand remains the same.

c. shut down.

d. None of the above answers is correct.

Chapter 10. Monopolistic Competition and Oligopoly

Chapter Objectives

1. Describe the characteristics of a monopolistically competitive market.
2. Describe how the equilibrium price and quantity are determined for a monopolistically competitive firm in the short run and the long run.
3. Compare monopolistic competition and perfect competition in terms of efficiency.
4. Describe the characteristics of an oligopoly market.
5. Contrast the four models of oligopoly.

Introduction

Monopoly is not the only market structure where firms face a downward sloping demand and have *market power*, the ability to restrict output and set prices to maximize profit. We will show that if firms can distinguish their product from

maximize profit. We will show that if firms can distinguish their product from the competition by advertising or offering unique features, then firms will still be *price makers* and will be able to charge a higher price without losing all of their customers. Consider, for example, Ivan's Oyster Bar, one of many restaurants in town. Ivan's distinguishes its product by advertising and by offering excellent service and a great salad bar. As a result, Ivan's faces a downward sloping demand and is a price maker like a monopoly firm. But Ivan's must share the market with other firms the way a perfectly competitive firm does. Most real-world firms are like Ivan's and do not fit either of the two extreme models studied in the previous two chapters. Instead, they are a blend of monopoly and perfect competition. We now look at two such market structures: *monopolistic competition* and *oligopoly*.

10-1. The Monopolistic Competition Market Structure

Economists define **monopolistic competition** as a market structure characterized by:

1. many small sellers,
2. a differentiated product, and
3. easy market entry and exit.

Monopolistic competition is by far the most common market structure in the United States. In fact, most real-world businesses operate within a monopolistically competitive market environment. Examples include grocery stores, hair salons, gas stations, clothing stores, and restaurants. The following briefly explains the characteristics of this market structure.

restaurant business can get loans, lease space, and start serving seafood without too much trouble. However, if they want to survive, they have to do something new and exciting; otherwise, people will stick with Ivan's, the restaurant with the established reputation for the best seafood in town.

restaurant business can get loans, lease space, and start serving seafood without too much trouble. However, if they want to survive, they have to do something new and exciting; otherwise, people will stick with Ivan's, the restaurant with the established reputation for the best seafood in town.

10-1b. The Monopolistically Competitive Firm as a Price Maker

Given the characteristics of monopolistic competition, you might think the monopolistic competitor is a *price taker*, but it is not. The primary reason is that its product is differentiated, which gives the firm some control over its price. When the price is raised, brand loyalty ensures some customers will remain steadfast. Similar to a monopolist, the demand curve and the corresponding marginal revenue curve for a monopolistically competitive firm are downward sloping. But the existence of close substitutes means consumers are more sensitive to price changes and as such, the demand curve for the monopolistically competitive firm is more elastic than the demand curve for a monopolist. With other seafood restaurants in town, when Ivan's raises its prices, the quantity of seafood dinners demanded declines more than if Ivan's had a monopoly with no close substitutes.

Take Note

Monopolistic competition is a market structure characterized by many small firms, easy entry and exit in the industry, and most importantly, product differentiation, which gives firms some market power and that means they face a downward sloping demand curve.

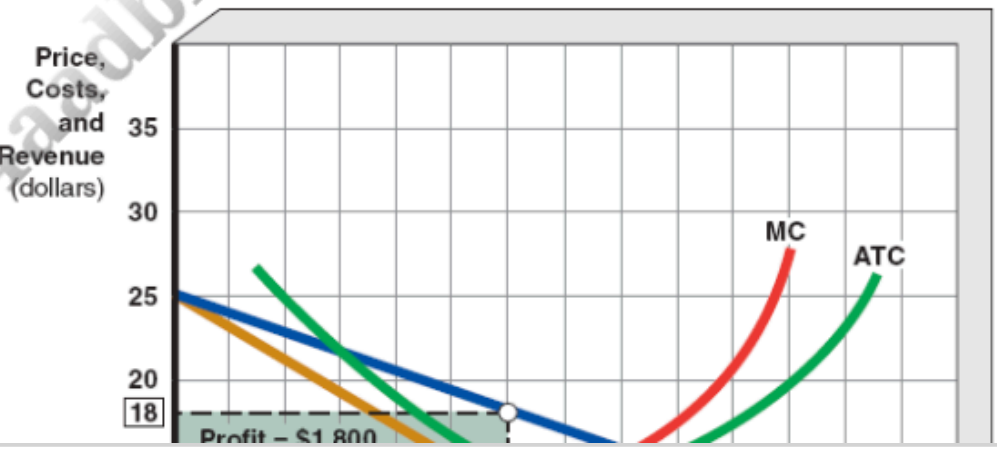
10-2. Price and Output Decisions for a Monopolistically Competitive Firm

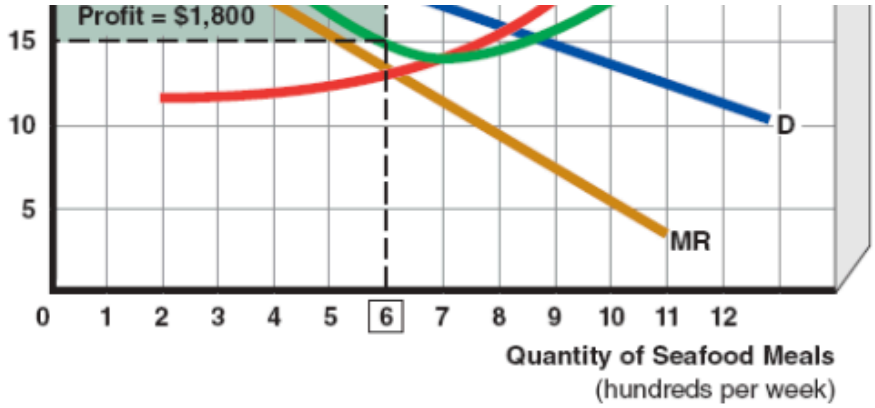
Now we are prepared to develop the short-run and long-run graphical models for monopolistic competition. In the short run, you will see that monopolistic competition resembles monopoly. In the long run, however, entry by new firms leads to a more competitive market outcome. This section presents a graphical analysis that shows why a monopolistically competitive firm is part perfectly competitive and part monopolistic.

10-2a. Monopolistic Competition in the Short Run

Exhibit 2 shows the short-run equilibrium position for Ivan's Oyster Bar—a typical firm under monopolistic competition. As explained earlier, the demand curve slopes downward because customers like Ivan's family atmosphere, location, or quality of service. These nonprice factors differentiate Ivan's product and allow the restaurant to raise the price of sautéed alligator, shrimp, and oysters at least slightly without losing many sales. Remember: successful
245 differentiation not only increases demand but also makes the demand curve less elastic (steeper).

Exhibit 2 A Monopolistically Competitive Firm in the Short Run





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Ivan's Oyster Bar is a monopolistically competitive firm that maximizes short-run profit by producing the output where marginal revenue equals marginal cost. At an output of 600 seafood dinners per week, the price of $18 per dinner is dictated by the firm's demand curve. Given the firm's costs, output, and prices, Ivan's will earn a short-run profit of $1,800 per week.

Like the monopolist, the monopolistically competitive firm maximizes short-run profit by following the MR = MC rule. In this case, the marginal cost (MC) and marginal revenue (MR) curves intersect at an output of 600 seafood meals per week. The price per meal of $18 is the point on the demand curve corresponding to this level of output. Because the price exceeds the average total cost (ATC) of $15 per meal, Ivan's earns a short-run economic profit of $1,800 ($3 × 600) per week. As with other market structures, if the price equals the ATC, the firm earns no economic profit; if the price is below the ATC, the firm suffers a short-run loss; and if the price is below the average variable cost (AVC), the firm shuts down.

Take Note

Like a monopolist, a monopolistically competitive firm faces a downward sloping demand curve and maximizes profit by producing the level of output where MR = MC and charging the corresponding price read off the demand curve at that level of output.

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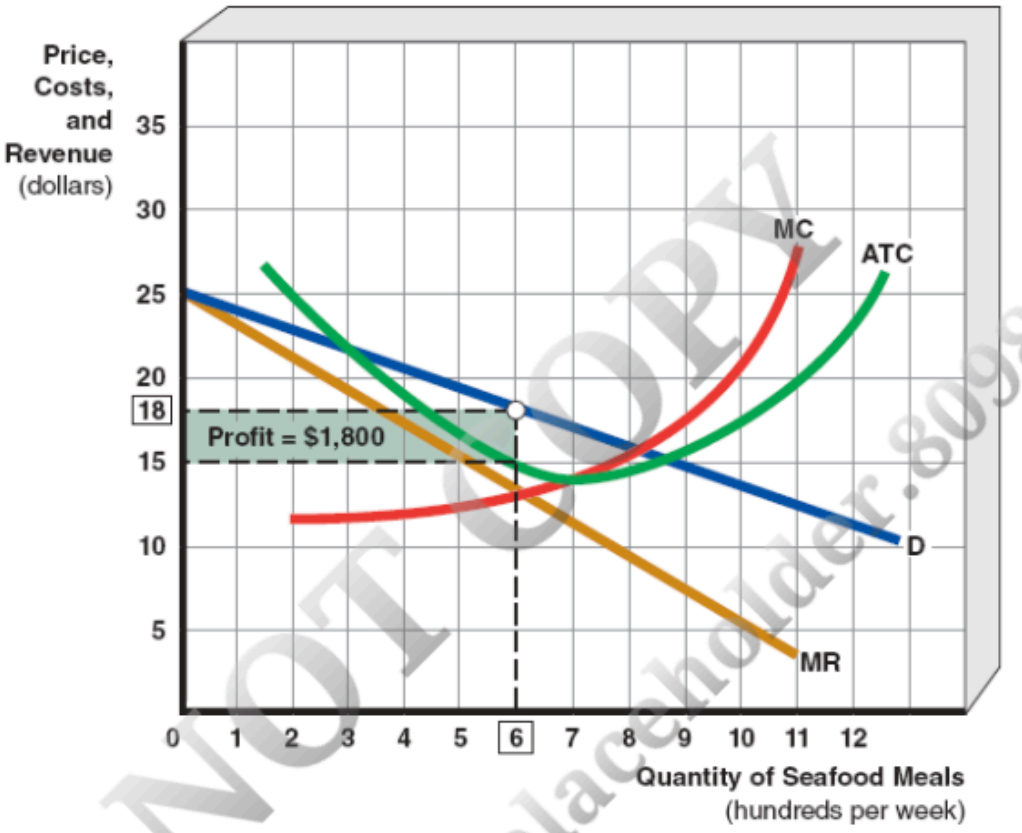

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Take Note

Like a monopolist, a monopolistically competitive firm faces a downward sloping demand curve and maximizes profit by producing the level of output where MR = MC and charging the corresponding price read off the demand curve at that level of output.

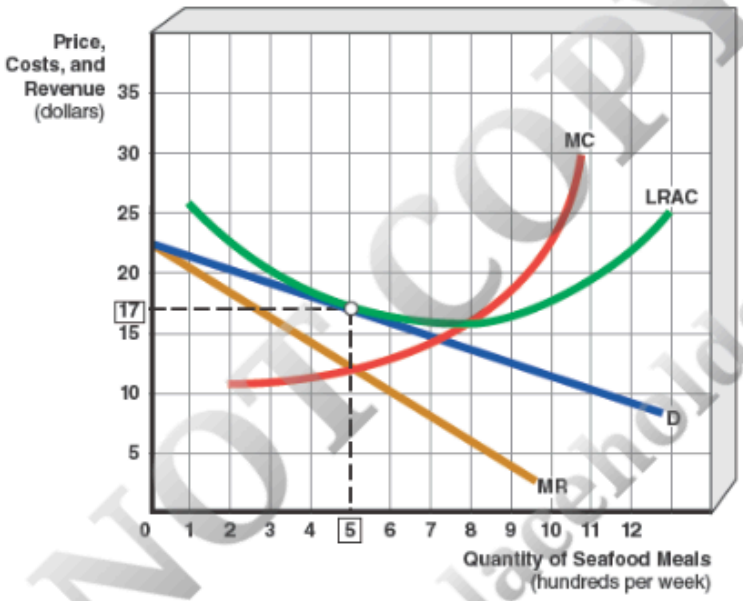
10-2b. Monopolistic Competition in the Long Run

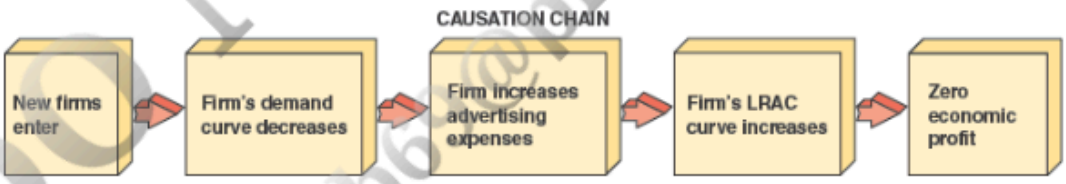
The monopolistically competitive firm, unlike a monopolist, will not earn an economic profit in the long run. Rather, like a perfect competitor, the monopolistically competitive firm earns only a normal profit (that is, zero economic profit) in the long run. Recall from the chapter on production costs that *normal profit* is the minimum profit necessary to keep a firm in operation. The reason is that short-run profits and easy entry attract new firms into the industry. When Ivan's Oyster Bar earns a short-run profit, as shown in Exhibit 2, two things happen. First, Ivan's demand curve shifts downward as some of each seafood restaurant's market share is taken away by new firms seeking profit. Second, Ivan's, and other seafood restaurants as well, tries to recapture market share by advertising, improving its decor, and utilizing other forms of nonprice competition. As a result, long-run average costs increase, and the firm's LRAC curve shifts upward.

The combination of the leftward shift in the firm's demand curve and the upward shift in its LRAC curve continues until a long-run equilibrium is reached where the monopolistically competitive firm earns zero or normal economic profit. The result is the long-run equilibrium condition shown in Exhibit 3. At a

profit. The result is the long-run equilibrium condition shown in Exhibit 3. At a price of $17 per meal, the demand curve is tangent to the LRAC curve at the MR = MC output of 500 meals per week. Once long-run equilibrium is achieved in a monopolistically competitive industry, there is no incentive for new firms to enter or for established firms to leave.

Exhibit 3 A Monopolistically Competitive Firm in the Long Run





Details

In the long run, the entry of new seafood restaurants decreases the demand for Ivan's seafood. In addition, Ivan's shifts its average cost curve upward by increasing advertising and other expenses in order to compete against new entrants. In the long run, the firm earns zero economic profit at a price of $17 per seafood meal and produces an MR = MC output of 500 meals per week.

Take Note

Like a perfectly competitive firm, a monopolistically competitive firm will earn only a normal (zero) profit in the long run because easy entry of firms means any short run profits will be competed away as new firms enter the industry.

Am I on Track?

2. Which of the following does monopolistic competition have in common with perfect competition?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. A downward sloping demand curve due to product differentiation

b. High barriers to entry restricting the entry of new firms

c. Normal (zero) profits in the long run resulting from the easy entry and exit of firms

d. Significant use of advertising to distinguish its product from competitors

10-3. Monopolistic Competition and Efficiency

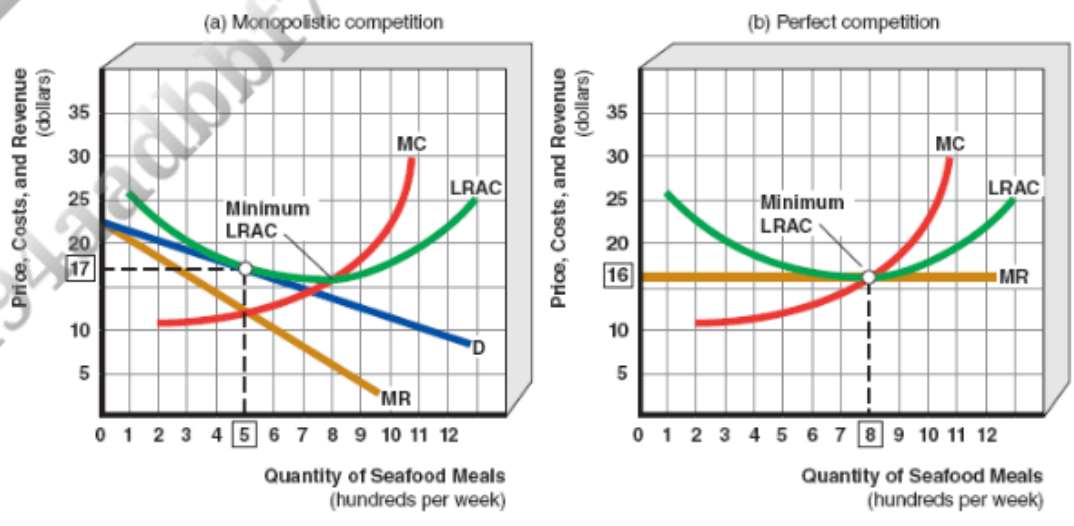
In Chapter 8 we showed that the perfectly competitive market structure results

in an efficient use of resources while in Chapter 9 we saw that this was not true for the monopoly market structure as monopolists charge higher prices and sell less output than would be efficient. Now we turn our attention the efficiency implications of the monopolistically competitive market structure.

Like a monopolist, the monopolistically competitive firm fails the efficiency test. An efficient production level occurs where marginal benefit (price) equals marginal cost. As shown in Exhibit 3, under monopolistic competition, Ivan's price exceeds the marginal cost of the last unit produced. If the firm were to produce additional meals, the marginal benefit of these meals to consumers (as measured by the prices read off the demand curve at these quantities) would be greater than the marginal cost of serving them. However, doing so would lower Ivan's profits. So, monopolistic competition results in too little production and, therefore, too few resources devoted to the production of the goods or services.

Exhibit 4(a) reproduces the long-run condition from Exhibit 3. Exhibit 4(b) assumes that the seafood restaurant market is perfectly competitive. Recall from Chapter 8 that the characteristics of perfect competition include the condition that customers perceive seafood meals as *homogeneous* and, as a result, no firms engage in advertising or in other forms of nonprice competition.

Exhibit 4 A Comparison of Monopolistic Competition and Perfect Competition in the Long Run



▸ Details

In part (a), Ivan's Oyster Bar is a monopolistically competitive firm that sets its price at $17 per seafood meal and produces 500 meals per week. As a monopolistic competitor, Ivan's earns zero economic profit in the long run and does not produce at the lowest point on its LRAC curve.
Under conditions of perfect competition in part (b), individual firms are price takers. Here the firm faces a flat demand curve at a price of $16 per seafood meal, which is the equilibrium price set by the market demand and supply curves. Because the firm produces until its marginal revenue, given by the price of $16, equals its marginal cost, the output is 800 meals a week, which corresponds to the lowest point on the LRAC curve. The perfectly competitive firm charges a lower price and produces 300 more meals a week than a monopolistically competitive firm.

Also, recall from Chapter 8 that long-run equilibrium for a perfectly competitive firm is established by the entry of new firms until the minimum point of $16 per meal on the firm's LRAC curve where P = MR = MC = LRAC.

A comparison of parts (a) and (b) of Exhibit 4 reveals two important points. First, the firms in both monopolistically competitive and perfectly competitive industries earn zero economic profit in the long run. Second, the long-run equilibrium output of the monopolistically competitive firm is to the left of the minimum point on the LRAC curve and the price exceeds MC. Like a monopolist, monopolistically competitive firms, therefore, charge higher prices and produce less output than if they were perfectly competitive firms.

The perfectly competitive firm would charge $1 less per meal and produce 300 more seafood meals per week than the monopolistically competitive firm. The extra 300 meals not produced by the monopolistically competitive firm are *excess capacity*, which represents underutilized resources. The criticism of monopolistic competition, then, is that there are too many firms producing too little output at inflated prices,

10-4. The Oligopoly Market Structure

Now we turn to oligopoly, another imperfectly competitive market structure that lies between perfect competition and monopoly. Economists define an **oligopoly** as a market structure characterized by:

1. a few large sellers,
2. either a homogeneous or a differentiated product, and
3. difficult market entry.

Like monopolistic competition, oligopoly is found in many real-world industries. Many manufacturing industries, such as steel, aluminum, automobiles, aircraft, pharmaceutical drugs, and tobacco, are best described as oligopolistic. This is the "big business" market structure in which firms aggressively compete through advertising Let's examine each characteristic.

10-4a. Characteristics of Oligopoly

A Few Large Sellers

Oligopoly is competition "among the few." Here we sometimes refer to the "Big Three" or "Big Four" to mean that three or four firms dominate an industry. There is no specific number of firms that must dominate an industry before it is an oligopoly; rather, an oligopoly is a consequence of mutual interdependence. **Mutual interdependence** is a condition in which an action by one firm may cause a reaction from other firms. When General Motors (GM) considers a price hike or a style change, it must predict how Ford, Chrysler, and Toyota will change their prices and styling in response. The large number of firms under perfect competition or monopolistic competition and the absence of other firms in a market served by a monopoly enable firms operating in these types of market structures to ignore the actions and reactions of other firms. The decisions under oligopoly, then, are more complex than under other market structures.

Homogeneous or Differentiated Product

Under oligopoly, firms can produce either a homogeneous (identical) or a differentiated product. The steel produced by USX is identical to the steel from Republic Steel. The oil sold by Saudi Arabia is identical to the oil from Iran. Similarly, zinc, copper, and aluminum are standardized or homogeneous products. But cars produced by the major auto-makers are differentiated products. Tires, cigarettes, and soft drinks are also differentiated products sold by oligopolies.

Difficult Entry

Similar to a monopoly, an oligopoly is protected from the threat of new entrants by barriers to entry. These barriers include exclusive financial requirements, control over an essential resource, patent rights, and other legal barriers. But the most significant barrier to entry in an oligopoly is *economies of scale*. For

example, larger automakers achieve lower average total costs than those incurred by smaller auto-makers. Consequently, the U.S. auto industry has moved over time from more than 60 firms to only two major U.S.-owned firms.

Take Note

The oligopoly market structure is characterized by a few large mutually interdependent firms producing either a homogeneous or differentiated product with barriers to entry that make it difficult for new firms to enter the industry.

player's move depends on the anticipated reactions of the opposing player. A firm in an oligopoly can have many different possible reactions to the price, nonprice, and output changes of another firm. Consequently, there are different oligopoly models because no single model can cover all cases. The following is a discussion of four well-known oligopoly models:

1. the kinked demand curve,
2. price leadership,
3. the cartel, and
4. game theory.

10-5a. The Kinked Demand Curve

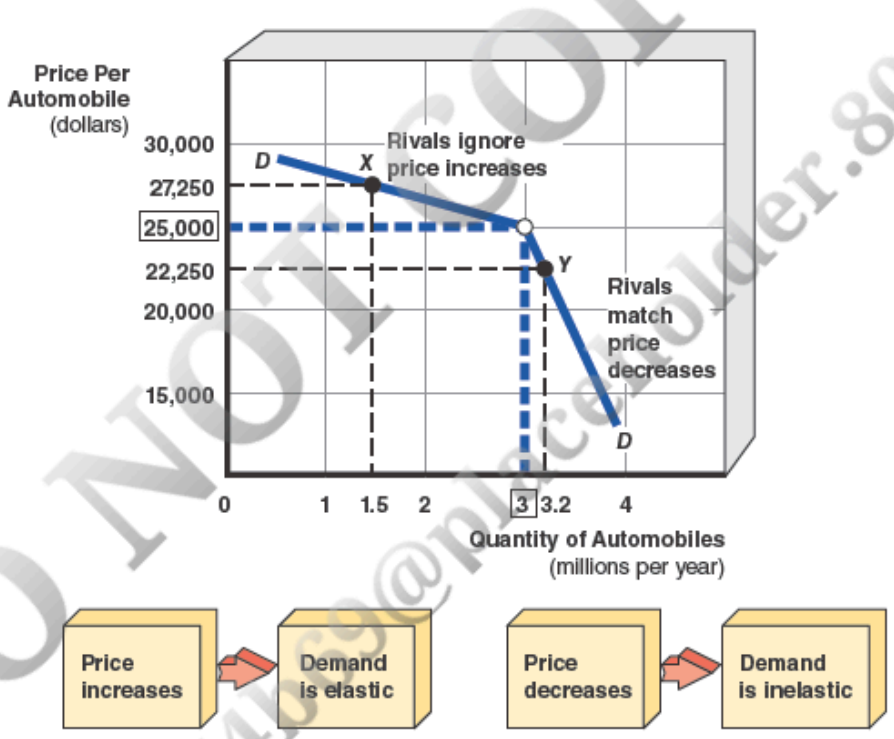
We begin with the kinked demand curve model. The strange shape of this curve explains why a firm in an oligopolistic market selling cars changes prices far less often than firms change prices in a perfectly competitive market selling wheat.

The **kinked demand curve** is a demand curve facing an oligopolist that assumes rivals will match a price decrease, but will ignore a price increase. Management believes that the competition will not be "undersold," so will match any price decreases it makes. On the other hand, a price hike by one firm allows competitors to capture some share of the market if they ignore the price increase by attracting customers who move away from purchasing the more expensive product. Oligopolistic firms must make pricing decisions, so they are *price makers*, rather than price takers, but the high degree of interdependence among oligopolists impacts their pricing decisions.

In Exhibit 5, a kinked demand curve is drawn for Tucker Motor Company, which we assume competes with GM, Ford, Toyota, and Chrysler in the automobile market. The current price per Tucker car is $25,000, and the quantity demanded at this price is 3 million cars per year. Tucker's management assumes that if it raises its price even slightly above $25,000, the other automakers will ignore this and *will not follow* with higher prices. This price gap between the Tucker cars and other cars would drive many of Tucker's customers over to its rivals, and revenues would fall. The segment of the demand curve above $25,000 is

revenues would fall. The segment of the demand curve above $25,000 is therefore relatively flat, or more elastic as the price increase corresponds to a large decrease in quantity demanded. What if instead Tucker cuts the price of its cars from, say, $25,000 to $22,250? The model shows that Tucker gains just a few customers as other automakers also cut their prices to protect their market share, and again, revenues fall. The segment of the demand curve below the kink is therefore more inelastic and relatively steep as the quantity demanded is not very responsive to the change in price.

Exhibit 5 The Kinked Demand Curve



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An oligopolist's demand curve may be kinked. A price hike from $25,000 to $27,250 per auto causes a sizable reduction in the quantity demanded from 3 million to 1.5 million autos (point *X*). Demand above the kink is elastic, because rivals ignore the firm when it raises the price. Below the kink, the demand curve is more inelastic. A price reduction from $25,000 to $22,250 per auto causes rivals to drop their prices as well. Consequently, the firm attracts very few new customers, and the quantity demanded increases from 3 million to only 3.2 million autos per year (point *Y*). Under the kinked demand curve theory, prices tend to be rigid.

Given the kinked demand curve facing the oligopolist, management predicts revenue losses either way so does not raise or lower the price of its product. Under this model of oligopoly, the price established at the kink changes very infrequently. However, oligopolists will change their prices if large cost increases or decreases force a new kinked demand curve with the kink at a higher or lower price.

Economists continue to debate the importance of the kinked demand model. Critics challenge the theory on theoretical and empirical grounds. On a theoretical level, there is no explanation for how the original price at the kink was determined. On empirical grounds, studies of certain oligopolistic industries fail to find price stickiness. On the other hand, widespread use of price lists in catalogs that remain fixed for a long time is consistent with kinked demand theory. Although the kinked demand theory does not provide a complete explanation of price and output decisions, it does allow us to explore pricing and output decisions when firms are interdependent.

- they will face a more inelastic demand because other firms will not also raise their prices.
- they will face a more elastic demand because other firms will not also raise their prices.

- they will face a more inelastic demand because other firms will not also raise their prices.

- they will face a more elastic demand because other firms will not also raise their prices.

10-5b. Price Leadership

Without formal agreement, firms can play a game of follow-the-leader that economists call price leadership. **Price leadership** is a pricing strategy in which a dominant firm sets the price for an industry and the other firms follow. Following this tactic, firms in an industry simply match the price of perhaps, but not necessarily, the biggest firm.

Price leadership is not uncommon. In addition to GM, USX Corporation (steel), Alcoa (aluminum), DuPont (nylon), R.J. Reynolds (cigarettes), and Goodyear Tire and Rubber (tires) are examples of price leaders in U.S. industries.

10-5c. The Cartel

The price leadership model assumes that firms do not collude (or "get-together") to avoid price competition. Instead, firms avoid price wars by informally playing by the established pricing rules. Another way to avoid price wars is for oligopolists to agree to a peace treaty. Instead of allowing mutual interdependence to lead to rivalry, firms openly or secretly conspire to essentially form a monopoly by establishing a cartel. A **cartel** is a group of firms that formally agree to reduce competition by coordinating the price and output of a product. The goal of a cartel is to reap monopoly profits by replacing competition with cooperation. Cartels are illegal in the United States, but not in other nations. The best-known cartel is the Organization of the Petroleum Exporting Countries (OPEC). The members of OPEC divide "black gold" output among themselves according to quotas openly agreed upon at meetings of the OPEC oil ministries. Saudi Arabia is the largest producer and has the largest

OPEC oil ministries. Saudi Arabia is the largest producer and has the largest quota. The Global Economics feature provides a brief summary of some of today's major global cartels.

Using Exhibit 6, we can demonstrate how a cartel works and why keeping members from cheating is a problem. Our analysis begins before oil-producing firms have

its output while other firms stick to their quotas? The profit-maximizing output corresponding to the point at which $MR_2 = MC$ is 8 million barrels per day. If a cheating firm expands its output to this level, it can double its profit by earning an extra $120 million. Of course, if all firms cheat, the cartel breaks up, in which case the price and output of each firm return to the initial levels, and economic profit again falls to zero.

Take Note

As long as the benefits exceed the costs, cheating can threaten formal or informal agreements among oligopolists to maximize joint profits.

10-5d. Game Theory

Game theory is a model of the strategic moves and countermoves of rivals. To illustrate, let's use a noncollusive example of Delta Air Lines competing with American Airlines. Each airline independently sets its fare, and Exhibit 7 is a *payoff matrix* that shows profit outcomes for the two airlines resulting from charging either a high fare or a low fare. If both charge the high fare in cell A, they split the market, and each makes a profit of $8 billion. If both decide to charge the low fare in cell D, they also split the market, and the profit for each falls to $5 billion. If one charges the high fare and the other charges the low fare in cell B or cell C, then the low-fare airline attracts most of the customers and earns the maximum possible profit of $10 billion, while the high-fare airline loses $2 billion.

Exhibit 7 A Two-Firm Payoff Matrix

American Airlines' options \ Delta Air Lines' options	High fare	Low fare
High fare	A: Delta Air Lines' profit = $8 billion American Airlines' profit = $8 billion	B: Delta Air Lines' profit = $10 billion American Airlines' loss = −$2 billion
Low fare	C: Delta Air Lines' loss = −$2 billion American Airlines' profit = $10 billion	D: Delta Air Lines' profit = $5 billion American Airlines' profit = $5 billion

▸ Details

Details

Game theory is a method of analyzing the oligopoly puzzle. Two fare options of charging either a high fare or a low fare are given for Delta Air Lines and American Airlines. The profit or loss that each earns in cells A–D depends on the pricing decisions of these two rivals. Their collective interest is best served in cell A where each charges the high fare and each makes the maximum profit of $8 billion. But once either airline independently seeks the higher profit of $10 billion by using a low-fare strategy in cell B or C, the other airline counters with a low fare, and both end up charging the low fare in cell D. As a result, mutual profits are $5 billion, rather than $8 billion in cell A. Cell D is the equilibrium outcome because both airlines fear changing the price and causing the other to counter.

Both rivals in our example are clearly *mutually interdependent* because an action by one firm may cause a reaction from the other firm. Suppose both airlines initially select the most mutually profitable option and both charge high fares in
255 cell A. This outcome creates an incentive for either airline to charge a lower fare in cell B or cell C and earn the highest possible profit by pulling customers away from its rival. Consequently, assume the next day one airline cuts its fare to gain higher profits. In order to avoid losing customers, this action causes the other airline to counter with an equally low fare. Price competition has therefore forced both airlines to charge the low fare in cell D and earn less than maximum joint profits. Once cell D is reached, neither airline has an incentive to increase the fare since doing so would create a loss of $2 billion. Note that when both firms charge the low fare in equilibrium at cell D, consumers benefit from not paying the higher fares found in the other cells.

Take Note

The payoff matrix demonstrates why a competitive oligopoly tends to result in both rivals using a low-price strategy that does not maximize mutual profits.

How can these oligopolists avoid the low-fare outcome in cell D and instead

stabilize the more jointly profitable high-fare payoffs in cell A? One possible strategy is called *tit-for-tat*. Under this approach, a player will do whatever the other player did the last time. If one airline defects from cell A by cutting its fare to gain a profit advantage, the other competitor will also cut its fare. After repeated trials, these price-cutting responses serve as a signal that says, "You are not going to get the best of me, so move your fare up!" Once the defector responds by moving back to the high fare, the other airline cooperates and also moves to the high fare. The result is that both players return to cell A without a formal agreement.

Another informal approach is for rivals to coordinate their pricing decisions based on price leadership, as discussed earlier in this chapter. For example, one airline may be much more established or dominant, and the other airline follows whatever price the leader sets. Another approach would be to informally rotate the leadership. Thus, without a formal agreement, the leader sets the profit-maximizing high price in cell A and the other competitor follows. However, this system does not eliminate the threat that the price follower will cheat.

Finally, if cartels were legal in the United States, the airlines could collude and make a formal agreement that each will charge the high fare. However, as explained in the previous section, there is always the incentive for one firm to cheat by moving from cell A to either cell B or cell C, and therefore cartels tend to break down. A remedy might be for the rivals to agree on a penalty for any party that reneges by lowering its fare.

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10-5e. An Evaluation of Oligopoly

Oligopoly is much more difficult to evaluate than other market structures. None of the models just presented gives a definite answer to the question of efficiency under oligopoly. Depending on the assumptions made, an oligopolist can behave much like a perfectly competitive firm or more like a monopoly. Nevertheless, let's assume some likely changes that occur if a perfectly competitive industry is suddenly turned into an oligopoly selling a differentiated product.

First, the price charged for the product will be higher than under perfect competition. The smaller the number of firms in an oligopoly and the more difficult it is to enter the industry, the higher the oligopoly price will be in comparison to the perfectly competitive price.

Second, an oligopoly is likely to spend money on advertising, product differentiation, and other forms of nonprice competition. These expenditures can shift the

demand curve to the right. As a result, both price and output may be higher under oligopoly than under perfect competition. Moreover, as with a monopoly, the oligopoly may promote technological advances that enhance the quality of life for many people.

Third, in the long run, a perfectly competitive firm earns zero economic profit. The oligopolist, however, can earn an economic profit in the long run because it is more difficult for competitors to enter the industry.

Take Note

In an oligopoly market structure, the price charged for the product will be higher than under perfect competition, there will likely be significant advertising as firms try to differentiate their product, and economic profits can be earned in the long run.

10-6. Review of the Four Market Structures

Now that we have completed the discussion of perfect competition, monopoly, monopolistic competition, and oligopoly, you are prepared to compare these four market structures. Exhibit 8 summarizes the characteristics and gives examples of each market structure.

A Closer Look Applicable Concept: Oligopoly

How Oligopolists Compete at the Final Four

Suppose March Madness included your basketball team making it all the way to the Final Four and you were going to be there. Before leaving, you checked the official website and noticed a Coke ad giving a prize to the person who submitted the best video commercial for a new Coke product. But this was only the beginning of the Great Cola Wars. Shortly after leaving the plane at the airport, you encountered a group of students who were giving away huge inflatable plastic hands with index fingers sticking up in

the air signaling that your team is number one. The plastic hands were imprinted with the Pepsi-Cola logo and your choice of a Final Four team. And the group was also giving away free ice-cold cans of Pepsi. As you walked along the streets to your hotel, giant inflatable "cans" of Pepsi appeared all over the downtown area on the sidewalks and on top of gas stations. And not to be outdone, the entire side of a prominent three-story building was painted Coca-Cola red and white with the 64 NCAA basketball finalists and all the winners listed bracket by bracket. Following the first-round games, painters were on scaffolding three stories up filling in the Coke sign's brackets for the final two teams, in school colors no less. Inside the arena, the colas continued their battle by scrolling cola ads with other ads under the press rows along either side of the basketball court. This was indeed competition between showboating industry giants worthy of the Final Four competition among the basketball teams.

Chris Steppig/NCAA Photos/Getty Images

▸ Details

Chris Steppig/NCAA Photos/Getty Images

Many fascinating markets function during the Final Four basketball tournament, including competitive markets that determine prices for parking lots, restaurants, and tickets. Then there were the hotels surrounding the arena, which joined a centralized booking service. Each hotel had raised its normal price by 75 percent for the weekend.

Exhibit 8 Comparison of Market Structures

Market Structure	Number of Sellers	Type of Product	Entry Condition	Control of Price
Perfect competition	Large	Homogeneous	Very easy	Price taker
Monopoly	One	Unique	Impossible	Price maker
Monopolistic competition	Many	Differentiated	Easy	Price maker
Oligopoly	Few	Homogeneous or differentiated	Difficult	Price maker

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Key Terms

Monopolistic competition

Product differentiation

Nonprice competition

Oligopoly

Mutual interdependence

Kinked demand curve

Kinked demand curve

Price leadership

Cartel

Game theory

Take Note Revisited

- Monopolistic competition is a market structure characterized by many small firms, easy entry and exit in the industry, and most importantly, product differentiation, which gives firms some market power and that means they face a downward sloping demand curve.
- Like a monopolist, a monopolistically competitive firm faces a downward sloping demand curve and maximizes profit by producing the level of output where MR = MC and charging the corresponding price read off the demand curve at that level of output.
- Like a perfectly competitive firm, a monopolistically competitive firm will earn only a normal (zero) profit in the long run because easy entry of firms means any short run profits will be competed away as new firms enter the industry.
- The oligopoly market structure is characterized by a few large mutually interdependent firms producing either a homogeneous or differentiated product with barriers to entry that make it difficult for new firms to enter the industry.
- As long as the benefits exceed the costs, cheating can threaten formal or informal agreements among oligopolists to maximize joint profits.
- The payoff matrix demonstrates why a competitive oligopoly tends to result in both rivals using a low-price strategy that does not maximize mutual profits.
- In an oligopoly market structure, the price charged for the product will be higher than under perfect competition, there will likely be significant advertising as firms try to differentiate their product, and economic profits can be earned in the long run.

Study Questions and Problems

Please see Appendix A for answers to the odd-numbered questions. Your instructor has access to the answers for even-numbered questions.

1. Compare the monopolistically competitive firm's demand curve to those of a perfect competitor and a monopolist.

   SHOW ANSWER

2. Suppose the minimum point on the LRAC curve of a soft-drink firm's cola is $1 per liter. Under conditions of monopolistic competition, will the price of a liter bottle of cola in the long run be above $1, equal to $1, less than $1, or impossible to determine?

3. Exhibit 9 represents a monopolistically competitive firm in long-run equilibrium.

   a. Which price represents the long-run equilibrium price?

   SHOW ANSWER

   b. Which quantity represents the long-run equilibrium output?

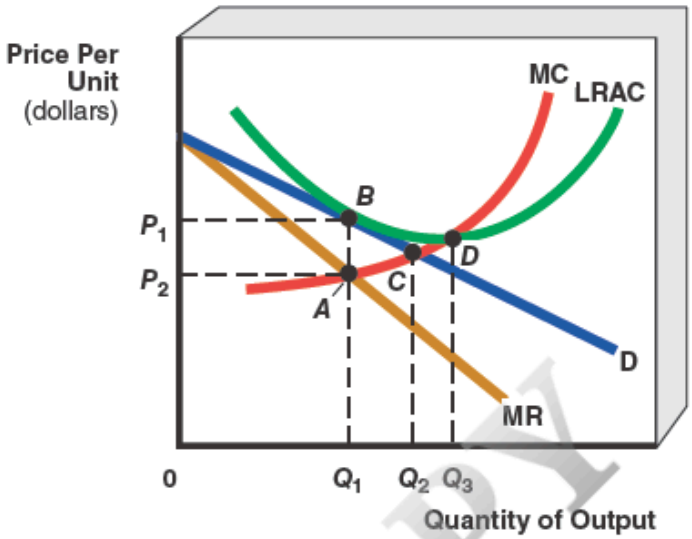
   SHOW ANSWER

   c. At which quantity is the LRAC curve at its minimum?

   SHOW ANSWER

   d. Is the long-run equilibrium price greater than, less than, or equal to the marginal cost of producing the equilibrium output?

Exhibit 9 Firm in Long-Run Equilibrium



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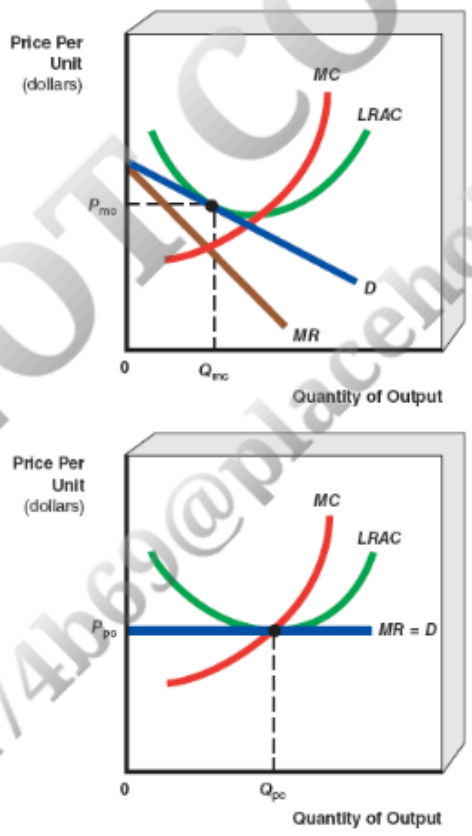
greater than the marginal cost ($B > A$)

- Consider this statement: “Because price equals long-run average cost and profits are zero, a monopolistically competitive firm is efficient.” Do you agree or disagree? Explain.

- Assuming identical long-run cost curves, draw two graphs, and indicate the price and output that result in the long run under monopolistic competition and perfect competition. Evaluate the differences between these two market structures.



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Because $P_{mc} > MC$, the monopolistically competitive firm fails to achieve allocative efficiency. The monopolistically competitive firm is also inefficient because it charges a higher price and produces less output than under perfect competition. The perfectly competitive firm sets P_{pc} equal to *MC* and produces

a level of output corresponding to the minimum point on the *LRAC* curve.

- Draw a graph that shows how advertising affects a firm's ATC curve. Explain how advertising can lead to lower prices in a monopolistically competitive industry.

- List four goods or services that you have purchased that were produced by an oligopolist. Why are these industries oligopolistic, rather than monopolistically competitive?

Answers might include automobiles, airline travel, personal computers, and cigarettes. An oligopoly differs from monopolistic competition by having few sellers rather than many sellers; either a homogeneous or a differentiated product rather than all differentiated products; and difficult entry rather than easy entry.

- Why is mutual interdependence important under oligopoly, but not so important under perfect competition, monopoly, or monopolistic competition?

- Suppose the jeans industry is an oligopoly in which each firm sells its own distinctive brand of jeans. Each firm believes its rivals will not follow its price increases, but will follow its price cuts. Explain the demand curve facing each firm. Does this demand curve mean that firms in the jeans industry do or do not compete against one another?

Any jeans firm that raises or lowers its price will earn less profits. Therefore, firms in the jeans industry face a kinked demand curve, and prices remain rigid. Although firms do not engage in price competition, they can engage in nonprice competition. Each firm can use advertising and style to market its brand-name product.

- What might be a general distinction between oligopolists that advertise and

What might be a general distinction between oligopolists that advertise and those that do not?

- Suppose Canon raised the price of its printers, but Hewlett-Packard (the largest seller) refused to follow. Two years later Canon cut its price, and Hewlett-Packard retaliated with an even deeper price cut, which Canon was forced to match. For the next five years, Hewlett-Packard raised its prices five times, and each time Canon followed suit within 24 hours. Does the pricing behavior of these printer industry firms follow the cartel model or the price leadership model? Why?

The pricing behavior follows the price leadership model. The price leader is Hewlett-Packard, which is the largest and most dominant firm in the computer printer industry. After a price war, Canon followed each of Hewlett-Packard's price hikes.

- Evaluate the following statement: "A cartel will put an end to price war, which is a barbaric form of competition that benefits no one."

- Assume the payoff matrix in Exhibit 7 applies to spending for advertising rather than airline fares. Substitute "*Don't Advertise*" for "*High fare*" and "*Advertise*" for "*Low fare*." Assume the same profit and loss figures in each cell, but substitute "*Marlboro*" for "*Delta Air Lines*," and "*Camel*" for "*American Airlines*." Explain the dynamics of the model and why cigarette companies might be pleased with a government ban on all cigarette advertising.

If both firms spend no money on advertising, they each earn a profit of $8 billion in cell A. If one firm does not advertise and the other firm does in cell B or cell C, then the advertising firm attracts more customers and earns $10 billion compared to a $2 billion loss for the rival without ads. This outcome forces both firms to advertise and reduces mutual profits in cell D. As a result of both firms spending large budgets on advertising, their mutual profits are reduced to $5 billion. If the government bans all cigarette advertising, the result is that both

billion. If the government bans all cigarette advertising, the result is that both firms will move to the mutually high profit cell A.

- There are many different brands of the same product cereal, each slightly different from the others, including General Mills' Wheaties, Total, and Cheerios; Kellogg's Corn Flakes, Cracklin' Oat Bran, Frosted Flakes, and Rice Krispies; Quaker Oats' Cap'n Crunch and 100% Natural; and Post's Golden Crisp, etc. Is the breakfast cereal industry's market structure monopolistic competition or oligopoly?

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. Clothing stores in cities are an illustration of

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. perfect competition.

b. monopoly.

c. monopolistic competition.

d. oligopoly.

2. Firms in a monopolistically competitive industry produce

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. homogeneous goods and services.

b. differentiated products.

c. competitive goods only.

d. consumption goods only.

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Chapter 11. Labor Markets

Chapter Objectives

1. Explain how the demand for and supply of labor are determined.
2. Describe how the equilibrium wage rate is determined.
3. Analyze the impact of unions on wages.
4. Discuss the characteristics of a monopsony and how a monopsonist determines its wage rate.

Introduction

In 2018, singer Lady Gaga earned $50 million, but Taylor Swift did even better. She earned $80 million. The Chief Justice of the Supreme Court is paid $277,700 per year. The worker with a bachelor's degree or more earns an average of over $66,000 while the average high school graduate earns just over $36,000. Many others, including college students, toil for the minimum wage. How are earnings determined? What accounts for the wide differences in earnings?

This chapter explores the answers to these questions by analyzing the labor market that determines wages paid workers as well as the quantity of workers

market that determines wages paid workers as well as the quantity of workers firms hire. The chapter begins with the competitive labor market model in which no single buyer or seller can influence the price (wage rate) of labor.

11-1. The Labor Market Under Perfect Competition

In the market for goods and services first introduced in Chapter 3, consumers demand products and firms supply them. Chapters 8, 9, and 10 identified the price and quantity determinants of goods and services produced by firms operating under different market structures—perfect competition, monopoly, oligopoly, and monopolistic competition. Market structure affects the price and the quantity of a good or service sold by firms to consumers. In the market for labor, on the other hand, firms demand labor and consumers supply labor. We will also see in this chapter that the price (wage rate) paid to labor and the
265 quantity of labor hired by firms are influenced by whether or not the labor market is competitive.

We start by assuming a perfectly competitive labor market. Recall from Chapter 8 that we considered a hypothetical firm, Computech, that produces and sells electronic components in a perfectly competitive product market and hires workers in a perfectly competitive labor market. In a perfectly competitive labor market, there are many sellers and buyers of labor services so wages and salaries are determined by the intersection of the demand for labor and the supply of labor.

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We start by assuming a perfectly competitive labor market. Recall from Chapter 8 that we considered a hypothetical firm, Computech, that produces and sells electronic components in a perfectly competitive product market and hires workers in a perfectly competitive labor market. In a perfectly competitive labor market, there are many sellers and buyers of labor services so wages and salaries are determined by the intersection of the demand for labor and the supply of labor.

11-1a. The Demand for Labor

How many workers should a firm hire? To answer this question, Computech must know how much each worker contributes to its output. Column (1) of Exhibit 1 lists various numbers of workers Computech might hire per day, and as discussed in Chapter 7, column (2) shows the total output per day. So, columns (1) and (2) constitute a *production function* showing one worker would produce 5 units per day, 2 workers together would produce 9 units per day, and so on. Column (3) then lists the additional output from hiring each worker, the *marginal product of labor* (see Exhibit 2 in Chapter 7). The first worker hired would add 5 units of output per day, the second would produce an additional 4 units (found as the difference in the total product: 9–5 units produced), and so on. Consistent with the *law of diminishing returns*, the marginal product of labor falls as the firm hires more workers.

So, let's think carefully about why a firm hires a worker. A worker produces output, and by selling that output, the firm brings in revenue. The next step in Computech's hiring decision, then, is to convert the marginal product of labor into dollars by calculating the **marginal revenue product (MRP)**, the increase in a firm's total revenue resulting from hiring an additional unit of labor. Stated simply, MRP of labor is the dollar value of worker productivity.

As we did in Exhibit 1 in Chapter 8 on perfect competition, we suppose the market equilibrium price per unit is $70. Because Computech operates in a

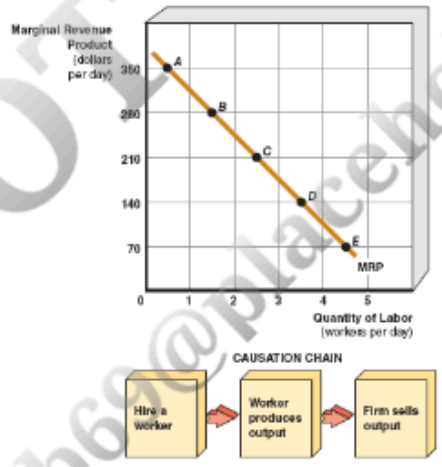
perfectly competitive market, the firm can sell any quantity of its product at the $70 market-determined price. Given a $70 market price, the first unit of labor contributes a MRP of $350 per day to revenue (we multiply the 5 units of output the worker contributed times the $70 each unit sold for). Column (5) of Exhibit 1 lists the MRP of each additional worker hired.

Exhibit 1 Computech's Marginal Revenue Product of Labor

(a) Marginal Revenue Product Table

Points	(1) Labor Input (workers per day)	(2) Total Output (units per day)	(3) Marginal Product (units per day)	(4) Product Price	(5) Marginal Revenue Product ((3) × (4))
	0	0		$70	
			5		$350
A	1	5		70	
			4		280
B	2	9		70	
			3		210
C	3	12		70	
			2		140
D	4	14		70	
			1		70
E	5	15		70	

(b) Marginal Revenue Product Graph



Details

In deciding how many workers to hire, the firm must decide the value of that worker to the firm, or the marginal revenue product. In part (a) the table lists the total output produced (column 2) when various numbers of workers are hired (column 1). As we saw in Chapter 7, the marginal product of labor (column 3) is the additional output from hiring each worker. If the firm sells this output for the market determined price (column 4), the value of the worker to the firm, or the marginal revenue product, can be calculated in column 5 as the marginal product of labor times the price. Part (b) illustrates the marginal revenue product of labor curve graphically using numbers from column 5. The downward slope of the marginal revenue product curve is a result of the law of diminishing returns reflected in

column 3 and first introduced in Chapter 7.

Take Note

A perfectly competitive firm's marginal revenue product of labor, or the dollar value of worker productivity, is equal to the marginal product of its labor times the price of its product (P). Expressed as a formula:
$\text{MRP} = \text{MP} \times \text{P}$.

How does a firm decide whether to hire a worker? If the value of the worker to the firm, as measured by the MRP of labor, is greater than (or equal to) the wage the firm must pay, then the firm should hire that worker. Assuming all other inputs are fixed, a firm can use this concept to derive its demand curve for labor which conforms

Take Note

A firm hires additional workers up to the point where the MRP equals the wage rate.

Each firm in the market has a demand for labor based on its MRP data. Summing these individual demand curves for labor provides the market demand curve for labor in the electronic components industry. Another important point must be made. The demand for labor is called derived demand. The **derived demand** for labor and other factors of production depends on the consumer demand for the final goods and services the factors produce. If consumers are not willing to purchase products requiring electronic components, such as personal computers, there is no MRP, and firms will hire no workers to make electronic components for them. On the other hand, if customer demand for personal computers increases, the price rises, and the MRP of firms in the electronic components industry also rises. The result would be a rightward shift in the market demand curve for labor.

11-1b. The Supply of Labor

The supply curve of labor is also consistent with the law of supply discussed in Chapter 3. The **supply curve of labor** shows the different quantities of labor workers are willing to offer employers at various wage rates. Summing the individual supply curves of labor for firms willing to produce electronic units for personal computers provides the market supply curve of labor. As shown in Exhibit 3, as the wage rate rises, more workers are willing to supply their labor. Each point indicates the wage rate that must be paid to attract the corresponding number of workers. At point *A*, 20,000 workers offer their services to the industry for $16 per hour. At the higher wage rate of $32 per hour (point *B*), the quantity of labor supplied is 40,000 workers. More people are willing to work at higher wage rates because as the wage rate increases, workers are willing to give up their time that they would otherwise use for other activities. Higher

wages also attract workers from other industries that require similar skills, but have lower wage rates.

Exhibit 3 The Market Supply Curve for Labor

▸ Details

The upward-sloping supply curve of labor within the electronic components industry indicates a direct relationship between the wage rate and the quantity of labor supplied. At point *A*, 20,000 workers are willing to work at a wage rate of $16 per hour. If the wage rate rises to $32 per hour, 40,000 workers will supply their services to the electronic components labor market.

Take Note

The upward sloping supply curve of labor depicts a direct relationship between the wage rate and the quantity of labor supplied as more workers are willing to work at higher wages.

Ignoring differences in wage scales, why might the supply of less-skilled workers

(e.g., cashiers) be greater than that of more-skilled workers (e.g., physicians)? The explanation for this difference is the human capital required to perform various occupations. **Human capital** is the accumulation of education, training, and experience, as well as the condition of a person's health that enables a worker to enter an occupation and be productive. Less human capital is required to be a cashier than a physician. Because so many more people are qualified to be cashiers than physicians, the supply of cashiers is larger than the supply of physicians.

11-1c. The Equilibrium Wage Rate

Wage rates are determined in perfectly competitive labor markets by the interaction of labor supply and labor demand. Labor markets with a higher demand or lower supply of labor will result in higher equilibrium wages just as higher demand by or lower supply for products increased prices in the product market.

The equilibrium wage rate for the entire electronic components market, shown in Exhibit 4(a), is $24 per hour. This wage rate clears the market because the quantity of 30,000 workers demanded equals the quantity of 30,000 workers who are willing to supply their labor services at that wage rate (point E). In a competitive labor market, no single worker can set their wage above the equilibrium wage. Such a worker fears not being hired because there are so many workers who will work for $24 per hour. Similarly, so many firms are hiring labor that a single firm cannot influence the wage by paying workers more or less than the prevailing wage. Doing so would risk no workers willing to work for that employer. Hence, in the market, a wage rate above $24 per hour would create a surplus of workers seeking employment (unemployment) in the electronic components labor market, and a wage rate below $24 per hour would cause a shortage.

Am I on Track?

1. A decrease in the supply curve for labor in a market will result in a(n) _____ in the equilibrium wage rate and a(n) _____ in the number of workers hired in that labor market.

SHOW ANSWER

SHOW ANSWER

a. increase; increase

b. increase; decrease

c. decrease; increase

d. decrease; decrease

Am I on Track?

1. A decrease in the supply curve for labor in a market will result in a(n) _____ in the equilibrium wage rate and a(n) _____ in the number of workers hired in that labor market.

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. increase; increase

b. increase; decrease

c. decrease; increase

d. decrease; decrease

11-2. Labor Unions: Employee Power

During the Great Depression, when millions of people were out of work, President Franklin D. Roosevelt's National Industrial Recovery Act (NIRA) of 1933 established the right of employees to bargain collectively with their

employers. Although the act was declared unconstitutional by the Supreme Court in 1935, the 1935 National Labor Relations Act (NLRA), known as the Wagner Act, successfully incorporated the labor provisions of the NIRA and guaranteed workers the right to form unions and to engage in collective bargaining. The combined impact of this legislation and the production demands of World War II created a surge in union membership between 1935 and 1945. Since then, union membership has fallen from about 35 percent of the labor force in 1945 to 11 percent today.

The perfectly competitive model described in the previous section does not apply to workers who belong to unions. Unions arose because workers recognized that acting together gave them more bargaining power than acting individually when interacting with their employers. Some of the biggest unions are the Teamsters, United Auto Workers, National Education Association, and American Federation of Government Employees. Two primary objectives of unions are to improve working conditions and raise the wages of union members above the level that would exist in a competitive labor market. To raise wages, unions use three basic strategies:

(1) increase the demand for labor,

(2) decrease the supply of labor, and

(3) exert power to force employers to pay a wage rate above the equilibrium wage rate.

11-2a. The Impact of Unions on the Demand for Labor

Suppose workers form a union. One way to increase wages is to find a way to increase the demand for their labor. One approach is to boost the domestic demand for labor by decreasing the quantity of goods from other nations. For example, the union might lobby Congress to protect the U.S. electronic parts industry by pushing for stricter trade barriers on electronic components imported from China. Another approach might be to advertise and try to

imported from China. Another approach might be to advertise and try to convince the public to “Look for the Union Label.” If effective, this advertising campaign would boost the demand for electronic products with union-made components and, in turn, the demand for union labor because it is derived demand. Yet another approach, called *featherbedding*, pushes firms to hire more workers than they otherwise would or to impose work rules that reduce output per worker, which also results in the need for employers to hire more workers than they otherwise would. For example, contract provisions may prohibit any workers but carpenters from doing even the simplest carpentry work.

Exhibit 6(a) shows how union power can be used to increase the demand curve for labor. Begin at equilibrium point E_1, with the wage rate of $24 per hour paid

Take Note

To increase wages, unions could undertake actions that increase the demand curve for labor.

Take Note

To increase wages, unions could undertake actions that increase the demand curve for labor.

11-2b. The Impact of Unions on the Supply of Labor

Another way for unions to increase wages is find a way to decrease the supply of labor. For example, the union might lobby for legislation to reduce immigration or to shorten working hours, which reduces the supply of all labor. Additionally, unions may require a longer apprenticeship, charge higher membership fees, or use some other device designed to reduce union membership and therefore the supply of unionized laborers.

Exhibit 6(b) shows how union power can be used to decrease the supply curve for labor. Suppose the labor market is in equilibrium at point E_1, with 40,000 workers making electronic units and earning $24 per hour. If the union uses its power to shift the supply curve of labor leftward from S_1 to S_2. Then the equilibrium wage rate rises to $32 per hour at point E_2, and employment is reduced to 20,000 workers.

Take Note

To increase wages, unions could undertake actions that decrease the supply of labor.

11-2c. The Impact of Union Collective Bargaining on Wages

A third way a union could raise their wages above the competitive equilibrium level is to use collective bargaining. **Collective bargaining** is the process of

level is to use collective bargaining. **Collective bargaining** is the process of negotiating labor contracts between the union and management concerning wages and working conditions. By law, after a union has been certified as the representative of a majority of the workers, employers must deal with the union. If employers deny union demands, the union can strike and reduce profits until firms agree to a higher wage rate.

The result of collective bargaining is shown in Exhibit 6(c). At the equilibrium wage rate of $24 per hour (point *E*), there is no surplus or shortage of workers. If the union's collective bargaining agreement takes effect in which firms agree to pay the union wage rate of $32 per hour, then at this higher wage rate, employment falls from 30,000 to 20,000 workers. However, 40,000 workers want to work for $32 per hour. The result is a surplus of 20,000 unemployed workers in the industry (the quantity supplied of 40,000 minus the quantity demanded of 20,000). How might firms react to a situation in which they must pay higher wages and employ fewer workers? Employers might respond by substituting capital for labor or by transferring operations overseas, where labor costs are lower than in the United States.

Take Note

Unions could use collective bargaining to negotiate higher wages. However, this will create some unemployment in that industry.

Am I on Track?

1. Which of the following union actions would result in both higher wages for union members and an increase in the number of workers employed?

SHOW ANSWER

SHOW ANSWER

a. The union undertakes a successful "Buy American" campaign.

b. The union restricts the number of workers who can practice their trade or craft through longer apprenticeship requirements and by charging significantly higher membership fees.

c. The union uses a threat of a strike to negotiate higher wages for its members.

d. All of the above.

Am I on Track?

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SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

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c. The union uses a threat of a strike to negotiate higher wages for its members.

d. All of the above.

11-3. Employer Power: Monopsony

So far, labor markets have been explained with employees possessing varying degrees of power to influence wage rates and employment while employers were competitive with no market power. However, significant power can exist on the employer side of the labor market. The extreme case occurs in a monopsony. **Monopsony** is a labor market in which a single firm hires labor. For example, a single textile mill, mining company, or housing contractor might be the only buyer of labor in a particular labor market. The classical phrase for this situation is the "company town," where for miles around a small town everyone's livelihood depends on a single employer. The reason for the monopsony is the absence of other firms in the area competing for labor that is relatively immobile because workers are either unwilling to relocate or they would need to acquire new skills to find work outside the local labor market. Even if a firm doesn't dominate a local labor market, it may have monopsony power over certain types of labor. A hospital, for example, may be the only large employer of nurses in a local market; therefore, it has monopsony power.

If General Griffin's pays $13 per hour, the upward-sloping supply curve of labor in Plainsville shows that only 1 worker will be willing to work at that wage rate (at point *A*). If the monopsonist wants to hire more labor, it must offer higher wages. If the firm raises its wage offer to $16 per hour for each worker (point *B*), the quantity of labor supplied increases to 2 workers per hour. In the exhibit, the total wage cost per hour in column (3) is computed by multiplying the wage rate per hour in column (1) times the number of workers per hour in column (2). At point *A*, the total wage cost per hour is $13, which equals the wage rate. At point *B*, the total wage cost per hour rises to $\$32(\$16 \times 2)$. The MFC is determined by the change in the firm's total wage cost caused by each additional hire. For example, hiring the second worker increases total labor cost from $13 to $32. The $19 difference between these costs is the MFC and is shown in column 4. Notice that with 1 and 2 workers, the $19 MFC is greater than the wage rate of $16 per hour. Why? The explanation is that all workers are assumed to perform the same job. Consequently, the first worker will demand to be paid the same wage rate as the second worker hired at the higher wage rate. Stated differently, General Griffin's must pay a higher wage not only to each additional worker but also to all previously hired workers. If General Griffin's attempts to pay different wage rates for the same job, worker morale will deteriorate causing labor unrest. So, when hiring the second worker, they will have to pay not just the $16 to that worker, but an additional $3 to the first worker to bring their wage up from $13 to $16 per hour (and therefore the MFC of hiring the second worker is $19). Comparing points *A* through *D* confirms that MFC is greater than the wage rate for a monopsonist, much like the monopolist's price, which is greater than the marginal revenue.

Take Note

Because the monopsonist can hire additional workers only by raising the wage rate for all workers, the marginal factor cost exceeds the wage rate.

11-3b. Monopsonistic Equilibrium

How many workers will General Griffin's hire? To answer this question requires the addition of the demand curve for labor, which traces labor's marginal revenue product (MRP), to our graph. Recall that MRP reflects the value or contribution of each additional worker because MRP is the increase in total revenue produced by hiring each additional worker. Also, as explained in Chapter 8, the profit-maximizing producer selects the level of output where marginal revenue equals marginal cost. Similarly, *the monopsonist in the labor market hires the quantity of labor at which the marginal revenue product of labor equals its marginal factor cost.*

In Exhibit 7, General Griffin's will follow the MRP = MFC rule by hiring 2 workers, determined by the intersection of the MRP and MFC curves at point *E*. Pay special attention to this point: the monopsonist is a "wage maker" and has labor market power. Instead of paying these 2 workers the $22 their services are worth (as measured by their MRP), the monopsonist follows the supply curve of labor and pays only $16 per hour (point B) as this is all that is required to attract and hire two workers.

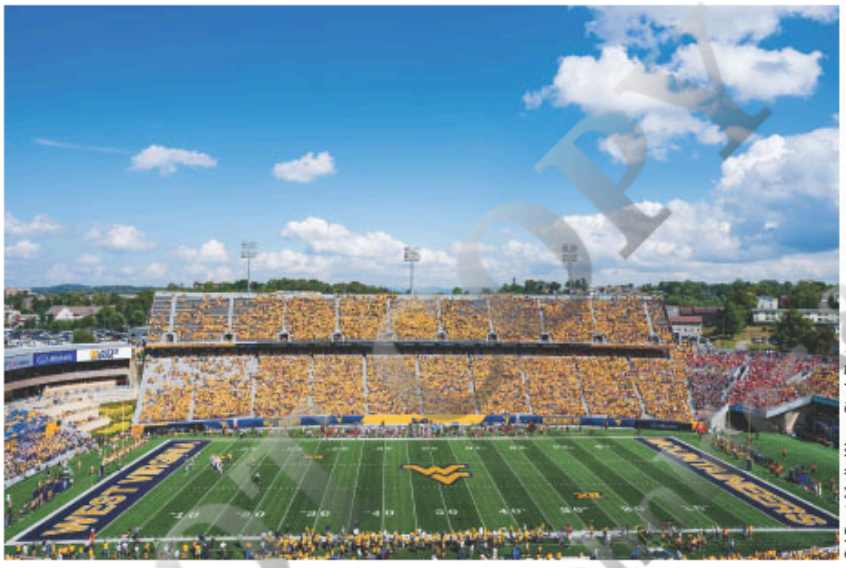
A Closer Look Applicable Concept: Monopsony

Should College Athletes Be Paid?

It was perfect football weather on a beautiful autumn Saturday at Nebraska State's stadium. There was a hush in the crowd of 80,000 as the clock showed 5 seconds left in the game and the scoreboard read Home 26 Visitor 30. The Screaming Eagles were playing the Fighting Irish, and the season was on the line. With time running out, the Eagles All-American quarterback Joe Wyoming launched a desperation pass from his 45-yard line. The pass hit the extended fingers of a wide receiver who leaped over three defenders at the Irish 25-yard line and then ran into the end zone all alone. The home crowd roared with joy after staring defeat in the face.

So the season had been in the hands of Joe Wyoming, who received a full

scholarship that cost the university more than $120,000 over four years. Because Joe led the Eagles to victory over Notre Dame, the team played in the Sugar Bowl, which paid Nebraska State $18 million for the appearance. In addition, the next year's ticket sales, alumni contributions, and trademark licensing boosted revenues $30 million, while applications for admission to the university increased sharply.



Cal Sport Media/Alamy Stock Photo

Economist Robert Brown argued that college athletes are clearly underpaid because players cannot be paid salaries under National Collegiate Athletic Association (NCAA) rules. His study estimated that a star college football player, who was drafted into the National Football League (NFL), generates a marginal revenue product of over $1,000,000 per year for the university.

- Yet that athlete is paid only a $40,000 scholarship per year.

In Chapter 10, a cartel was explained as a group of firms that use a collusive agreement to act as a monopoly. NCAA regulations serve as a collusive agreement among colleges and universities to act as a monopsony and hire the services of college-bound athletes. Just like an output or sellers' cartel, such as the Organization of Petroleum Exporting Countries (OPEC), the NCAA must enforce the rules against cheaters.

Because this agreement holds players' wages far below their marginal

Because this agreement holds players' wages far below their marginal revenue product, the gap creates an incentive for schools to offer "illegal" inducements of cars, money, clothes, and trips to attract good players. Such cheating benefits the college athletes whose wages are raised closer to their marginal revenue products. A school that is not caught will benefit by recruiting better players, achieving athletic success, and receiving greater sports revenue. Schools that follow the rules must depend on the NCAA to punish cheaters by taking away TV appearances, tournament play, bowl invitations, and scholarships.

The issue of whether college athletes should get paid is far from resolved. In January of 2015, the NCAA's "power five" conferences passed legislation that allows universities to provide stipends to cover the cost of attendance. In June of 2021, the U.S. Supreme Court ruled that the NCAA could not prohibit payments to student-athletes for certain education related expenses. We will likely see more cases in the years to come as players push to be paid closer to their marginal revenue product in this monopsony labor market.

One option for labor facing a powerful monopsonistic employer is to organize a powerful union and engage in collective bargaining. Totally successful collective bargaining by a labor union could raise the wage rate from $16 per hour at point *B* to $22 per hour at point *E*. General Griffin's will resist the union's demands and offer a lower wage closer to point *B*. Thus, points *B* and *E* represent the boundaries of a potential final settlement. What the negotiated final equilibrium wage rate will be depends on the tactics and resources of the negotiating parties.

Finally, suppose the monopsony is broken up into a large number of smaller firms. Recall from earlier in this chapter that in competitive labor markets additional workers are hired to the point where the wage rate is equal to the MRP. In this case, the supply curve of labor intersects the MRP (demand) curve at point *C*, and more workers would be hired with $19 per hour paid to each worker if the labor market were competitive.

Take Note

A monopsonist hires fewer workers and pays a lower wage than a firm in a competitive labor market by hiring the number of workers where MRP = MFC.

Am I on Track?

1. Which of the following is true about a monopsonist?

SHOW ANSWER

SHOW ANSWER

a. A monopsonist's marginal factor cost of employing additional workers exceeds the wage rate.

b. The monopsonist will hire workers where the marginal revenue product is equal to the marginal factor cost.

c. The monopsonist will pay a lower wage and hire fewer workers compared to a competitive market outcome.

d. All of the above.

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d. All of the above.

Key Terms

Marginal revenue product (MRP)

Demand curve for labor

Derived demand

Supply curve of labor

Human capital

Collective bargaining

Monopsony

Marginal factor cost

Summary

- Marginal revenue product (MRP) is determined by a worker's contribution to a firm's total revenue. Algebraically, the marginal revenue product

to a firm's total revenue. Algebraically, the marginal revenue product equals the price of the product times the worker's marginal product: $\text{MRP} = \text{P} \times \text{MP}$.

- The demand curve for labor shows the quantities of labor a firm is willing to hire at different prices of labor. The marginal revenue product (MRP) of labor curve is the firm's demand curve for labor. Summing individual firm's

Take Note Revisited

- A perfectly competitive firm's marginal revenue product of labor, or the dollar value of worker productivity, is equal to the marginal product of its labor times the price of its product (P). Expressed as a formula: $\text{MRP} = \text{MP} \times \text{P}$.
- A firm hires additional workers up to the point where the MRP equals the wage rate.
- The upward sloping supply curve of labor depicts a direct relationship between the wage rate and the quantity of labor supplied as more workers are willing to work at higher wages.
- To increase wages, unions could undertake actions that increase the demand curve for labor.
- To increase wages, unions could undertake actions that decrease the supply of labor.
- Unions could use collective bargaining to negotiate higher wages. However, this will create some unemployment in that industry.
- Because the monopsonist can hire additional workers only by raising the wage rate for all workers, the marginal factor cost exceeds the wage rate.
- A monopsonist hires fewer workers and pays a lower wage than a firm in a competitive labor market by hiring the number of workers where MRP = MFC.

Study Questions and Problems

Please see Appendix A for answers to the odd-numbered questions. Your instructor has access to the answers for even-numbered questions.

1. Consider this statement: “Workers demand jobs, and employers supply jobs.” Do you agree or disagree? Explain.

SHOW ANSWER

2. The Zippy Paper Company has no control over either the price of paper or the wage it pays its workers. The following table shows the relationship between the number of workers Zippy hires and total output:

Labor Input (workers per day)	Total Output (boxes of paper per day)
0	0
1	15
2	27
3	36
4	43
5	48
6	51

Assuming the selling price is $10 per box, answer the following questions:

a. What is the marginal revenue product (MRP) of each worker?

b. How many workers will Zippy hire if the wage rate is $100 per day?

c. How many workers will Zippy hire if the wage rate is $75 per day?

d. Assume the wage rate is $75 per day and the price of a box of paper is $20. How many workers will Zippy hire?

3. Assume the Grand Slam Baseball Store sells $100 worth of baseball cards each day, with 1 employee operating the store. The owner decides to hire a second worker, and the 2 workers together sell $150 worth of baseball cards. What is the second worker's marginal product (MP)? If the price per card sold is $5, what is the second worker's marginal revenue product (MRP)?

SHOW ANSWER

4. What is the relationship between the marginal revenue product (MRP) and the demand curve for labor?

5. The market supply curve of labor is upward sloping, but the supply curve of labor for a single firm is horizontal. Explain why.

SHOW ANSWER

6. Assume the labor market for loggers is perfectly competitive. How would each of the following events influence the wage rate loggers are paid?

- **a.** Consumers boycott products made with wood.

- **b.** Loggers form a union that requires longer apprenticeships, charges high fees, and uses other devices designed to reduce union membership.

- How does a human capital investment in education increase your lifetime earnings?

  Students investing in education are increasing their human capital. As a student's human capital increases, their marginal product and MRP increase as well. At a given product price, firms find it profitable to hire the better-educated worker and pay higher wages.

- Suppose states pass laws requiring public school teachers to have a master's degree in order to retain their teaching certificates. What effect would this legislation have on the labor market for teachers?

- Use the data in question 2, and assume the equilibrium wage rate is $90 per day, determined in a perfectly competitive labor market. Now explain the impact of a union-negotiated collective bargaining agreement that changes the wage rate to $100 per day.

  At a wage rate of $90 per day, Zippy Paper Company hires 3 workers because each worker's *MRP* exceeds or equals the wage rate. Setting the wage rate at $100 per day causes Zippy Paper Company to cut employment from 3 to 2 workers because the third worker's *MRP* is $10 below the union-caused wage rate of $100 per day.

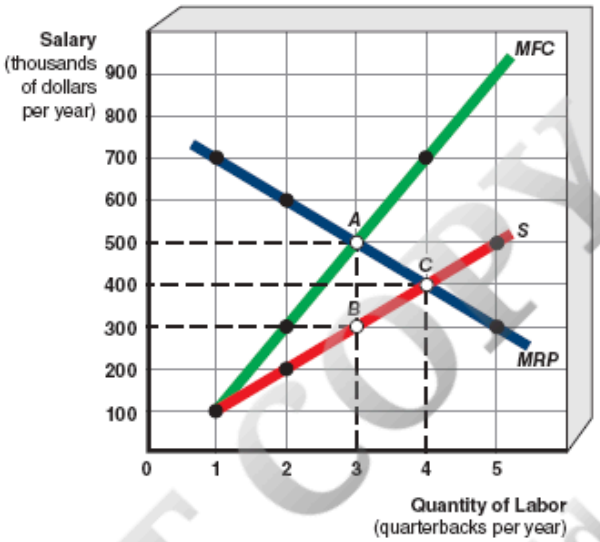
- Some economists argue that the American Medical Association and the American Bar Association create an effect on labor markets similar to that of a labor union. Do you agree?

Assume the Jaguars were in the process of hiring players. Using the following hypothetical table of data, construct a graph to determine the number of quarterbacks the Jaguars hired and the salary paid to each quarterback. Assuming the labor market was competitive, what would be the number of quarterbacks hired and the salary each was paid?

(1) Salary (thousands of dollars)	(2) Number of Quarterbacks	(3) Total Cost of Quarterback (thousands of dollars)	(4) Marginal Factor Cost (MFC) (thousands of dollars)	(5) Margina Revenu Produc (MRP) (thousan of dollar
0	0	0	–	–
100	1	100	$100	$700
200	2	400	300	600
300	3	900	500	500
400	4	1,600	700	400
500	5	2,500	900	300

As shown in the following exhibit, for a monopsony, the optimum quantity of labor is 3 quarterbacks, determined at point A, where the *MFC* curve intersects the *MRP* curve. However, the team can attract and hire 3 quarterbacks for an

the *MRP* curve. However, the team can attract and hire 3 quarterbacks for an annual salary of $300,000 each at point B on the supply of labor curve rather than paying a quarterback's contribution to the team's revenues (*MRP*), which is $500,000 per year at point A. In a competitive labor market, the Jacksonville Jaguars hire 4 quarterbacks and pay each $400,000 per year.



▸ Details

- Assume that the minimum wage is $19, so by law a firm cannot hire a worker for a lower wage. Recall from Chapter 4 that the effect of a minimum wage above the equilibrium wage in a *competitive* labor market is to decrease the number of unskilled workers employed and create unemployment. Now, consider the effect of a $19 minimum wage on the monopsonist represented in Exhibit 7. Explain how in the case of monopsony, contrary to the case of perfect competition, the minimum wage may increase the number of persons working.

Sample Quiz

Please see Appendix B for answers to Sample Quiz questions.

1. Alan Jones owns a company that sells life insurance. When he employs 10 salespersons, his firm sells $200,000 worth of contracts per week

10 salespersons, his firm sells $200,000 worth of contracts per week, and when he employs 11 salespersons, total revenue is $210,000. The marginal revenue product of the 11th salesperson is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. $410,000.

b. $10,000.

c. $20,000.

d. $210,000.

2. The demand for labor is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. derived demand.

b. featherbedding demand.

c. marginal utility demand.

d. All of the answers above are correct.

Road Map for Chapters 8, 9, 10 and 11

Market Structures

This road map feature helps you tie together material in the part as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The correct answers to the multiple-choice questions are given in Appendix C.

Chapter 8: Perfect Competition

1. Key Concept: Short-Run Shutdown Point

Suppose product price is fixed at $24, MR = MC at Q = 200, AFC = $6, AVC = $25. What do you advise this firm to do?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. Increase output

b. Decrease output

c. Shut down operations

d. Stay at the current output; the firm is earning a profit of $1,400

e. Stay at the current output; the firm is losing $1,400

2. Key Concept: Long-Run Equilibrium

Consider a firm operating with the following: price = 10, MR = 10, MC = 10, ATC = 10. This firm is

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. making an economic profit of 10.

b. an example of monopolistic competition.

c. going to go out of business in the long run.

d. a monopolist for a product with a relatively inelastic demand.

e. perfectly competitive in long-run equilibrium.

3. Key Concept: Constant-Cost Industry

Assume the short-run average total cost for a perfectly competitive industry remains constant as the output of the industry expands. In the long run, the industry supply curve will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. have a positive slope.

b. have a negative slope.

c. be perfectly horizontal.

d. be perfectly vertical.

Chapter 9: Monopoly

4. Key Concept: Profit Maximization

Assume a monopolist's marginal cost and marginal revenue curves intersect and the demand curve passes above its average total cost curve. The firm will

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

make an economic profit.

stay in operation in the short run, but shut down in the long run.

shut down in the short run.

lower the price.

5. Key Concept: Price discrimination

Suppose there are two markets for college football games, and each market contains the same number of potential consumers. The first market consists of rich alumni, and the second market is made up of low-income students. Based on this information, which group will be charged a higher price for football tickets?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

Students.

Alumni.

Students and alumni will be charged equal prices.

Cannot be determined.

Chapter 10: Monopolistic Competition and Oligopoly

6. Key Concept: Long-Run Monopolistic Competition

In the long run, the economic profits of Hoot's Chicken 'n' Ribs, a monopolistic competitor, are

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

not eliminated, because competition is not perfect.

not eliminated, because the demand curve slopes downward.

eliminated due to firms entering the industry.

eliminated, because firms cannot enter the industry.

7. Key Concept: Kinked Demand Curve

If an oligopoly firm faces a kinked demand curve,

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a price decrease by one of its rivals will motivate the firm to decrease its price as well.

a price decrease by one of its rivals will motivate the firm to increase its price.

a price decrease by one of its rivals will motivate the firm to keep its price the same.

a price increase by one of its rivals will motivate the firm to increase its price as well.

Chapter 11: Labor Markets

8. Key Concept: Market Supply Curve of Labor

Which of the following statements concerning the supply of labor is true?

Which of the following statements concerning the supply of labor is true?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

The supply curve of labor shifts when the prevailing wage rate changes.

The labor supply curve is downward sloping.

The wage rate has no effect on the quantity of labor supplied.

None of the answers above are correct.

9. Key Concept: Union Impact on Demand for Labor

Featherbedding allows unions to increase wages by

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

limiting the supply of labor.

increasing firms' demand for labor.

forcing firms to accept higher-than-equilibrium wages.

reducing labor share of payroll taxes.

10. Key Concept: Labor Market

Which of the following statements is true?

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

Derived demand for labor depends on the demand for the product labor produces.

Unions can either increase demand or decrease the supply of labor to increase wages.

Investment in human capital is expected to increase the demand for those workers.

All of the answers above are correct.

- All of the answers above are correct.

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- All of the answers above are correct.

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- All of the answers above are correct.

Chapter 12. Income Distribution, Poverty, and Discrimination

Chapter Objectives

1. Explain the equity versus efficiency trade offs associated with the distribution of income.
2. Explain how the Lorenz curve is calculated and how it represents income inequality.
3. Describe how income inequality has changed over time in the US and how it compares to other countries.
4. Discuss how poverty is measured and how poverty is related to discrimination.
5. Describe common antipoverty programs and welfare reform proposals.

Introduction

The previous chapter examined how variations in wages are determined in competitive and monopsonistic labor markets. In this chapter, we turn our attention to the distribution of income, poverty, and discrimination, which are important topics related to labor market wage decisions. The chapter begins by exploring how the national income "pie" is cut into various size "slices" or shares for different groups of families. We then define poverty, identify who is experiencing poverty, and discuss government programs designed to assist people experiencing poverty. The chapter concludes with a brief discussion of discrimination and how our demand and supply model can help us analyze the issue as it relates to income inequality.

12-1. The Distribution of Income

One function of labor markets is to determine the *distribution of income*—that is, how wages and salaries are divided among members of society. Recall from Chapter 1 that the *For Whom* question is one of the three basic questions that any economic system must answer. Here, we study the *For Whom* question in more detail.

12-1a. Trends in Income Distribution

One way to analyze the distribution of income in the United States is illustrated in Exhibit 1. Imagine lining families up in order of increasing family income from families

that increase a worker's productivity. Workers with a greater investment in human capital are likely to be worth more to an employer. Data in this exhibit also indicate that families headed by a male generally earn more than those headed by a female.

Exhibit 2 Median Money Income of Families, 2020

Characteristic	Median Income *
All families	$84,008
Families headed by a male	60,216
Families headed by a female	43,895
Families with head aged 25–34 years	71,785
Families with head aged 65 years and over	60,067
Families headed by person with less than 9th-grade education	39,473
Families headed by a high school graduate	60,583
Families headed by a person with at least a bachelor's degree	130,139

Source: U.S. Bureau of the Census, Historical Income Tables, https://census.gov/data/tables/time-series/demo/income-poverty/historical-income-families.html, Tables F-7, F-11, and F-18.

12.1b Equity versus Efficiency

12-1b. Equity versus Efficiency

Our discussion of income distribution returns us to the important economic concepts of equity versus efficiency and positive versus normative economic analysis. The data presented in Exhibits 1 and 2 show the positive concept "there *is* an unequal distribution of income in the United States." For example, the percentages of total income received by the highest groups has increased in recent decades, while the percentages received by the lowest groups has decreased.

Equity, as first introduced in chapter 1, is concerned with way the economic pie is divided among members of society. Economists study the trade-off between efficiency, making the economic pie as large as possible, and equity, distributing the pie fairly. This brings us to normative questions related to the pros and cons of a more or less equal income distribution.

Those who argue that "the income distribution *should be* more equal" favor equity over efficiency. One concern is the link between people with higher incomes and political power. Those with higher incomes may use their money to influence national policies that benefit the rich. Another concern is that income inequality results in unequal opportunities for various groups. For example, the children of people experiencing poverty have difficulty obtaining a college education. Consequently, their underutilized productive capacity is a waste of human capital. People experiencing poverty are also less able to afford health care, which is a national concern. Those in favor of more equality point to concerns surrounding fairness, human dignity, and economic security.

Those who argue that "the income distribution *should be* unequal" favor efficiency over equity. Suppose, for example, you had your choice of living in egalitarian society *A*, where every person earns $40,000 a year, or society *B*, where 20 percent earn $100,000 and 80 percent earn $30,000. You may likely choose society *B* because the incentive to earn more and live better is worth the risk of earning less and living worse. After all, why is the average income higher in society *B*? The answer is that income inequality gives people an incentive to be productive. In contrast, people in society *A* may lack motivation because

be productive. In contrast, people in society *A* may lack motivation because everyone earns the same income. Furthermore, when those who have obtained more education or training earn more, it provides an incentive for workers to increase their human capital, thus increasing the size of the economic pie. Although few would argue that every worker should earn the same amount, those who favor some income inequality point to the importance of market rewards for hard work, motivation, education, and experience.

Take Note

A more equal distribution of income is preferred by those who favor equity over efficiency, while a more unequal distribution is preferred by those who favor efficiency over equity.

It is important to note that simply observing changes in income distribution over time does not tell the whole story. Exhibit 3 traces real median family income, adjusted for rising prices, for the period 1980–2020. This measure indicates the trend of the median level of income received by all groups. Fifty percent of families earn less, and fifty percent earn more, than the median income. The overall trend for real median income since the 1980s has been upward. This means the size of the income "pie" grew. However, consistent with the distribution data in Exhibit 1, the relative share of the pie for those with the biggest slices increased, and for those with the smallest slices, it decreased. In 2000, real median income reached a new high before falling following the recession of 2001 and the Great Recession of 2007–2009. The trend had reversed and was rising again in recent years until the pandemic brought declining median income once again.

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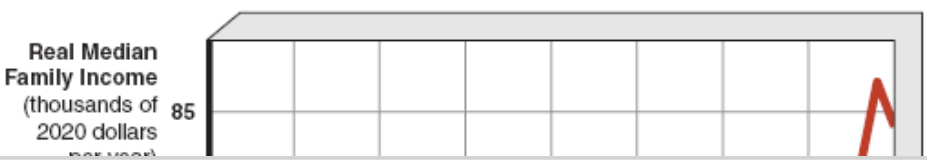
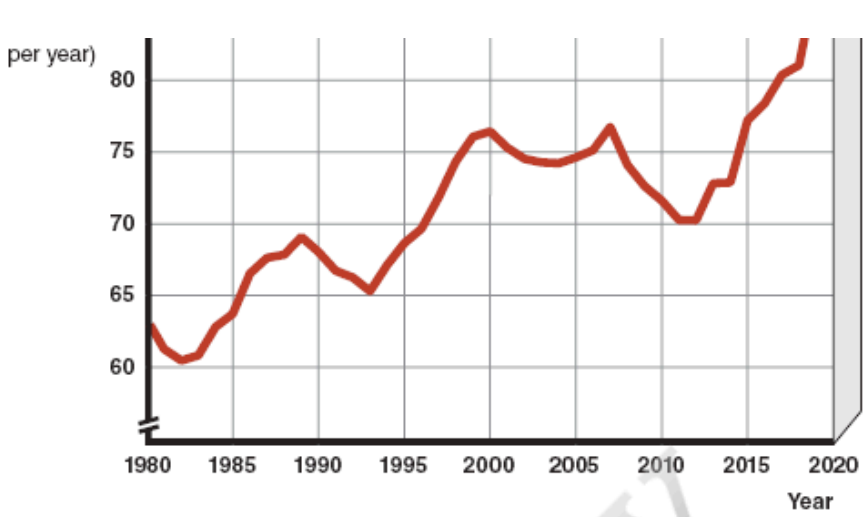
Exhibit 3 Real Median Family Income, 1980–2020





▸ Details

Source: U.S. Bureau of the Census, Historical Income Tables, http://www.census.gov/hhes/www/income/income.html, Table F-7.

Real median income measures the income adjusted for inflation received by all families in the United States. Fifty percent of families earn less, and 50 percent earn more, than the median income. The trend of this measure was generally upward until 2000. In 2000, real median income reached a new high before falling during the recession of 2001 and the Great Recession of 2007–2009. The long-term upward trend had returned in recent years, but the pandemic has brought a new dip in the trend.

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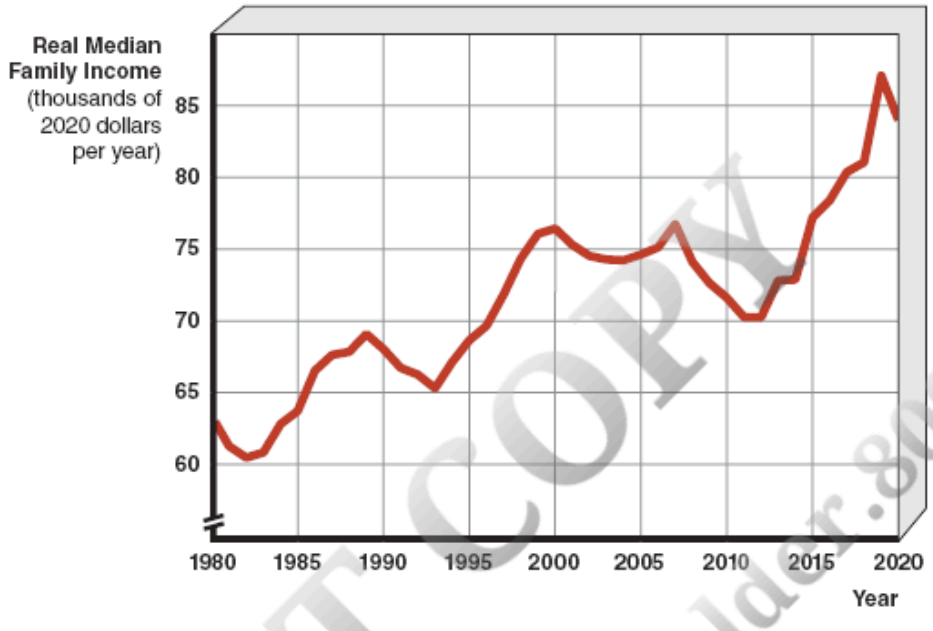
Exhibit 3 Real Median Family Income, 1980–2020



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12-1c. The Lorenz Curve

The distribution of income data presented in Exhibit 1 can be represented by the Lorenz curve. The **Lorenz curve** is a graph of the actual cumulative distribution of income compared to a perfectly equal cumulative distribution of income. This curve is a primary tool for measuring income distribution that was developed in 1905 by statistician M. O. Lorenz. Exhibit 4 shows a hypothetical Lorenz curve.

The vertical axis measures the *cumulative* percentage of family income, and the horizontal axis measures the *cumulative* percentage of families from lowest to highest income. Starting at the lower left-hand corner on the graph, 0 percent of the families earned 0 percent of the cumulative percentage of money income. At the upper right-hand corner on the graph, 100 percent of the families earned 100 percent of the cumulative percentage of money income. The combination of other total family-total money income points between 0 and 100 percent forms the Lorenz curve.

Exhibit 4. A Hypothetical Lorenz Curve

A Lorenz curve shows the cumulative percentage of money earned by the cumulative percentage of families. Here, families in the lowest fifth of the income distribution earn 5 percent of total money income while those in the next lowest fifth earn 10 percent. Cumulatively, this means the bottom 20 percent of families earn 5 percent (Point A) and, summing the two, the bottom 40 percent earn 15% (Point B). We continue to add in each group to find points C, D and eventually point E where 100 percent of families earn 100% of money income.

The Lorenz curve can be contrasted with the perfect equality line, a line indicating that each fifth earns 20% of money income, so cumulatively 20% of families earn 20% of income (Point F), 40% of families earn 40% of income (Point G), etc. The shaded area between the perfect equality line and the Lorenz curve measures the degree of inequality in the distribution of income. The more the Lorenz curve is bowed outward, the more unequal the distribution of income.

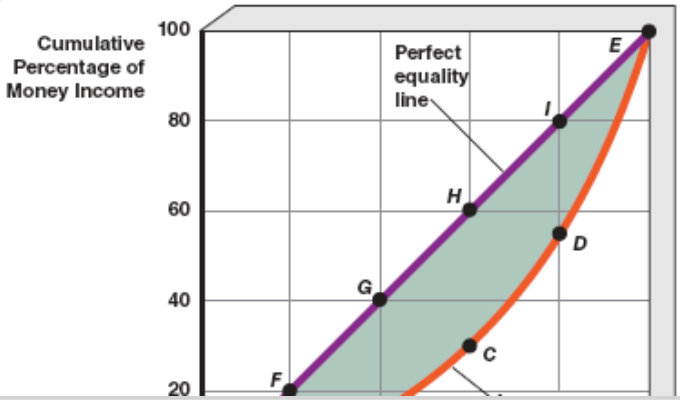
Lorenz Curve

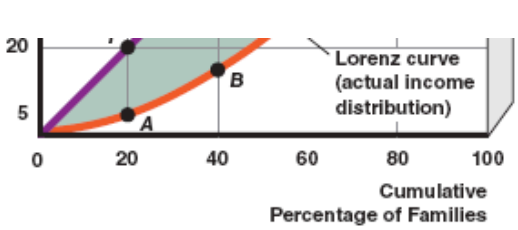
	Percentage of Families	Percent of Money Income	Cumulative Percent of Families	Cumulative Percent of Money Income	Poi
Lowest fifth	20	5	20	5	A
Second-lowest fifth	20	10	40	15	B
Middle fifth	20	15	60	30	C
Second-highest fifth	20	25	80	55	D
Highest fifth	20	45	100	100	E

Perfect Equality Line

Perfect Equality Line

	Percentage of Families	Percent of Money Income	Cumulative Percent of Families	Cumulative Percent of Money Income	Poi
Lowest fifth	20	20	20	20	F
Second-lowest fifth	20	20	40	40	G
Middle fifth	20	20	60	60	H
Second-highest fifth	20	20	80	80	I
Highest fifth	20	20	100	100	E





▸ Details

In this example, families in the lowest fifth of the income distribution earn 5 percent of the total money income. This gives us Point A in Exhibit 4. The next lowest fifth earn 10 percent, so cumulatively, this means the bottom 40 percent of families earn 15% of the total income (Point B). We continue to add in each group to find points C, D, and eventually point E where 100 percent of families earn 100% of the money income.

We now turn to the 45-degree line above the Lorenz curve that cuts the box in half. This line represents perfect equality: 20 percent of the families receive 20 percent of the total income, 40 percent of the families receive 40 percent of the total income, and so on. The distance of the Lorenz curve from the perfect equality line is, therefore, a measure of unequal income distribution. The gap between points *C* and *H*, for example, indicates that 60 percent of families earn 30 percent less of the total income than required for perfect equality. Similar measurements generate the shaded area between the Lorenz curve and the perfect equality line. Thus, the shaded area is a measure of the degree of income inequality for our hypothetical data. A larger shaded area would mean greater income inequality, and the shape of the Lorenz curve would become more bowed outward. A smaller shaded area would represent a more equal income distribution, and the Lorenz curve would be a flatter curve.

It is important to note that there are limitations associated with using money income statistics. Such data are not adjusted for government-provided food stamps, medical care, housing, or other goods and services. Money income also reflects income before taxes and does not measure unreported income. At the same time, the Lorenz curve makes no mention of wealth distribution. Wealth, or the accumulated value of assets, is much more unequally distributed in the

population than is income. Still, used carefully, the Lorenz curve is a convenient tool for visualizing the degree of income inequality.

Take Note

The Lorenz curve allows us to visualize income inequality by comparing the actual cumulative distribution of income with a perfectly equal distribution of income.

Am I on Track?

1. An increase in income inequality would be represented in a Lorenz curve diagram as:

SHOW ANSWER

SHOW ANSWER

SHOW ANSWER

a. an increase in the shaded area caused by a parallel shift upward of the straight line.

b. a decrease in the shaded area caused by a parallel shift downward of the straight line.

c. an increase in the shaded area caused by increased bowing of the Lorenz curve.

d. a decrease in the shaded area cause by decreased bowing (flattening) of the Lorenz curve.

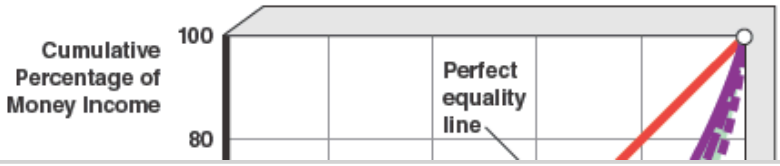
12-1d. Income Distribution Trends

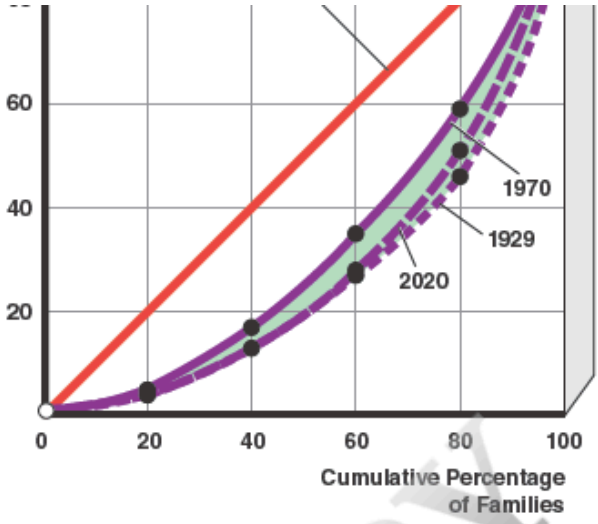
In Exhibit 1, we looked at income distributions for selected years between 1929 and 2020. What can we conclude from these data using the Lorenz curve? Has the overall income distribution become more or less equal? The table in Exhibit 5 restates the income share data for 1929, 1970, and 2020 from Exhibit 1, and calculates the cumulative percentage shares.

Exhibit 5 suggests that overall money income distribution has changed little over this period. Between 1929 and 1970, the distribution of income became a bit more equal, and the Lorenz curve moved closer to the line of equality. While still more equal in 2020 than in 1929, the income distribution since 1970 has once again become a bit more unequal. The biggest changes in the distribution
293 of income can be seen at the top of the income distribution as the share of income received by the highest fifth of families fell from 54 percent in 1929 to 41 percent in 1970 and increased to 50 percent in 2020.

Exhibit 5. A Comparison of Lorenz Curves over Time for Family Income Distribution in the United States

A comparison of Lorenz curves over time for family income distribution shows that between 1929 and 1970, the distribution of income became somewhat more equal. While still more equal in 2020 than 1929, the distribution since 1970 has become more unequal, primarily at the top of the distribution.





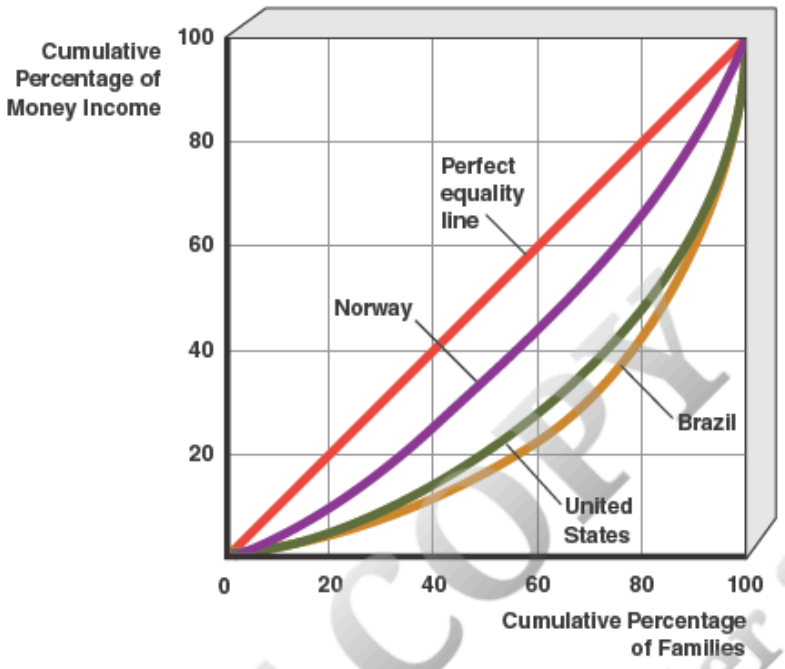
▸ Details

	1929		1970	
	Percentage Share	Cumulative Share	Percentage Share	Cumulative Share
Lowest fifth	4	4	5	5
Second-lowest fifth	9	13	12	17
Middle fifth	14	27	18	35
Second-highest fifth	19	46	24	59

Highest fifth	54	100	41	100

How does the distribution of income in the United States compare with that of other countries? Exhibit 6 presents separate Lorenz curves for the United States, Norway, and Brazil. This exhibit indicates that the degree of income inequality in the United States exceeds that of Norway. On the other hand, income distribution is more equal in the United States than in Brazil. In general, the distribution of income in developed nations, such as the United States, Germany, Italy, and Sweden, is more equal than in developing nations, such as Brazil, Mexico, and Zimbabwe.

Exhibit 6 Lorenz Curves for Selected Countries



▸ Details

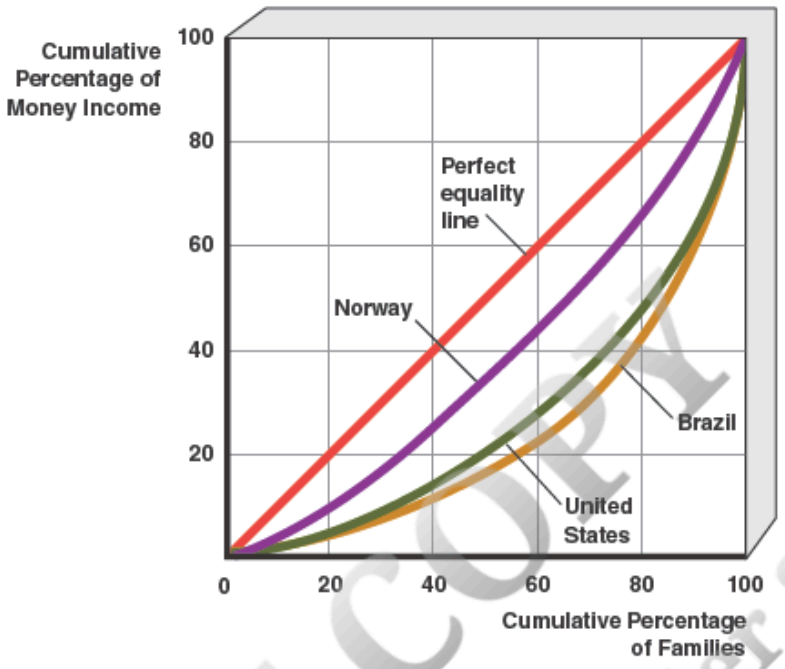
Source: The World Bank Group, "World Development Indicators" http://data.worldbank.org/data-catalog.

Comparing Lorenz curves for the United States, Norway, and Brazil reveals that income is distributed more equally in Norway than in the United States and Brazil. As illustrated by the Lorenz curve for Brazil, income inequality is usually greater in developing countries.

Take Note

A comparison of Lorenz curves shows that the income distribution in the United States is more equal in 2020 than it was in 1929, but is less equal than it was in 1970. Additionally, comparing Lorenz curves across countries shows that Norway has a more equal distribution of income than the United States, while Brazil has a less equal distribution of income.

Exhibit 6 Lorenz Curves for Selected Countries



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Take Note

A comparison of Lorenz curves shows that the income distribution in the United States is more equal in 2020 than it was in 1929, but is less equal than it was in 1970. Additionally, comparing Lorenz curves across countries shows that Norway has a more equal distribution of income than the United States, while Brazil has a less equal distribution of income.

12-2. Poverty

12-2. Poverty

Having discussed the broader question of how the degree of income distribution inequality is measured, we now turn the spotlight on the issue of poverty. We are all disturbed by people experiencing homelessness and children experiencing poverty. How can poverty exist in a nation of abundance such as the United States? Can economists offer useful ideas to reform and improve our current welfare system? The first step to understanding the problem is to ask this question: Who is experiencing poverty?

12-2a. Defining Poverty

What is poverty? Is it eating Spam when others are eating steak? Or is poverty a family having one car when others have two or more? Indeed, the term *poverty* is

A Closer Look Applicable Concept: Income and Wealth Distribution

Pulling Back the Curtain on Income and Wealth Distribution

The reward for working hard and innovating is necessary for a well-functioning economy. But when does income and wealth inequality become a problem? The table shows the amount of income one would have to make to be in each of the income quintiles in 2020, and to be in the top 5 percent, top 1 percent, and top 0.1 percent of the income distribution.

Income inequality has been on the rise in recent decades. "In 1928, the top 1 percent of families received 23.9 percent of all pretax income, while the bottom 90 percent received 50.7 percent. By 1944 the top 1 percent's share was down to 11.3 percent, while the bottom 90 percent were receiving 67.5 percent, levels that would remain more or less constant for the next three decades. But starting in the midto late 1970s, the uppermost tier's income share began rising dramatically, while that of the bottom 90 percent started to fall. By 2012, the top 1 percent group was receiving nearly 22.5 percent of all pretax income, while the bottom 90 percent's share is below 50 percent for the first time ever." "For the United States overall, the top 1 percent captured 85.1 percent of total income growth between 2009 and 2013. In 2013 the top 1 percent of families nationally made 25.3 times as much as the bottom 99 percent." CEO compensation was around 30 times greater than the average pay of their employees in 1978. Now it is around 300 times greater.

Wealth (the value of assets, like stock, bonds, real estate, and other things of value) is even more unequally distributed than income and is also becoming increasingly concentrated in the hands of the very few. All told, the top 0.1 percent now owns about as much wealth as the bottom 90 percent of America combined. The 80 richest people on the planet have the same wealth as the poorest 3.5 billion people.

As a result of these staggering numbers, many are voicing their concerns over growing income and wealth inequality. Perhaps one of the most vocal economists in the effort to combat increasing income inequality is Robert Reich, Chancellor's Professor of Public Policy at the University of California at Berkeley, Senior Fellow at the Blum Center for Developing Economies, and former Secretary of Labor under President Clinton. Professor Reich has sought to increase awareness of the danger income inequality poses to our economy for the last several decades. He said in a 2014 testimony before the Joint Economic Committee of the U.S. Congress that, "The question is not whether inequality is good or bad. It is at what point inequality becomes so wide as to pose a serious threat to economic growth, to our ideal of equal opportunity, and to our democracy. I believe we are reaching that tipping point, or have already reached it."

According to Robert Reich income inequality threatens our economy because when people have less income to spend, spending falls, and the economy contracts. "We cannot have a growing economy without a growing and buoyant middle class. We cannot have a growing middle class if almost all of the economic gains go to the top 1 percent."

Lowest 20%	Second Lowest 20%	Middle 20%	Second Highest 20%	Highest 20%	Hi 5%
<$38,000	$38,000–67,500	$67,500–103,000	$103,000–164,000	>$164,000	>$

Equal opportunity can be threatened because it becomes more difficult for people to move up the economic ladder. Moreover, he argues, democracy itself may be at stake "as income and wealth flow upward, political power follows. Money flowing to political campaigns, lobbyists, think tanks

follows. Money flowing to political campaigns, lobbyists, think tanks, 'expert' witnesses and media campaigns buys disproportionate influence."

What has caused the growing gap between those with high incomes and those with low incomes and the shrinking middle class in the last 30 years? Professor Reich points to technological advances and globalization that have put downward pressure on wages, keeping them low—even as the productivity of workers has grown. "Instead of responding to these gale-force winds with policies designed to upgrade the skills of Americans, modernize our infrastructure, strengthen our safety net and adapt the workforce—and pay for much of this with higher taxes on the wealthy—we did the reverse. We began disinvesting in education, job training and infrastructure. We began shredding our safety net. We made it harder for many Americans to join unions. (The decline in unionization directly correlates with the decline of the portion of income going to the middle class.) And we reduced taxes on the wealthy...We also deregulated."

What to do? According to Secretary Reich, we should:

- Raise the minimum wage.
- Unionize low-wage workers.
- Invest in education.
- Invest in infrastructure.
- Pay for these investments with higher taxes on the wealthy.
- Make the payroll tax progressive.
- Raise the estate tax and eliminate the "stepped-up basis" for determining capital gains at death.
- Constrain Wall Street.
- Give all Americans a share in future economic gains.

- Get big money out of politics.

What is a "fair" distribution of income and wealth is a normative issue that equally reasonable people can disagree over. If you believe this is a problem, then it will likely take some time to turn this ship around, even if there is agreement on what needs to be done and there's the political will to take the necessary steps to do so.

12-2b. Who Are the People Experiencing Poverty?

Exhibit 8 lists selected characteristics of families with incomes below the poverty level in 2020. Geographically, families experiencing poverty are most likely to live in the South. An important characteristic of families living below the poverty line in the United States is family structure. The poverty rate was 23 percent for families headed by a female with no spouse present and 11 percent for families headed by a male with no spouse present, compared to only 5 percent for married couples. Finally, poverty is greatly influenced by the educational achievement of the head of household. As shown in the exhibit, 25 percent of families with household heads who have not received a high school diploma live below the poverty line compared to only 4 percent of families whose heads have at least a bachelor's degree.

Exhibit 8 Characteristics of U.S. Persons and Families Living below the 2020 Poverty Level

Characteristic	Percentage Below the Poverty Line
Region	
South	13%

West	11
Midwest	10
Northeast	10
Type of Family	
Headed by married couple	5
Headed by male, no spouse present	11
Headed by female, no spouse present	23
Education of Household Head	
No high school diploma	25
High school diploma, no college	13
Bachelor's degree or more	4

Source: U.S. Bureau of the Census, "Income and Poverty in the United States,census.gov Tables B-1 and B-2.

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Education of Household Head	
[illegible]	[illegible]

No high school diploma	25
High school diploma, no college	13
Bachelor's degree or more	4

Source: U.S. Bureau of the Census, "Income and Poverty in the United States,census.gov Tables B-1 and B-2.

12-3. Antipoverty Programs

The government has a number of programs specifically designed to aid people experiencing poverty. The groups eligible for such assistance include people with disabilities, older adults, and families with dependent children who are experiencing poverty. People become eligible for public assistance if their income is below certain levels as measured by a *means test*. A **means test** is a requirement that a family's income not exceed a certain level to be eligible for public assistance. People who pass the means test may be *entitled* to government assistance. Thus, government welfare programs are often called *entitlement programs*.

Federal programs to assist people experiencing poverty in the United States are classified into two broad types of programs: *cash* assistance and *in-kind transfers*.

298 As explained previously, the current definition of the poverty threshold excludes in-kind transfers because these programs did not exist when the poverty rate measure was adopted decades ago.

12-3a. Cash Transfer Programs

The following are major government programs that alleviate poverty by providing eligible persons with cash payments needed to purchase food, shelter, clothing, and other basic needs.

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