

# Supply

## Why It Matters

In order to earn some extra money, you are considering opening a lawn or babysitting service. Brainstorm the resources you would need. What specific services would you offer? What prices would you charge? What information do you need to determine answers to these and other questions? Read Chapter 5 to find out about the factors that influence how businesses make production decisions.

## The BIG Ideas

1. Buyers and sellers voluntarily interact in markets, and market prices are set by the interaction of demand and supply.
2. The profit motive acts as an incentive for people to produce and sell goods and services.

Firms base their supply of products on production costs and the price they can charge for the product. ▶

**Economics ONLINE** Chapter Overview Visit the *Economics: Principles and Practices* Web site at [glencoe.com](http://glencoe.com) and click on Chapter 5—Chapter Overviews to preview chapter information.





# What is Supply?

## GUIDE TO READING

### Section Preview

In this section, you will learn that the higher the price of a product, the more of it a producer will offer for sale.

### Content Vocabulary

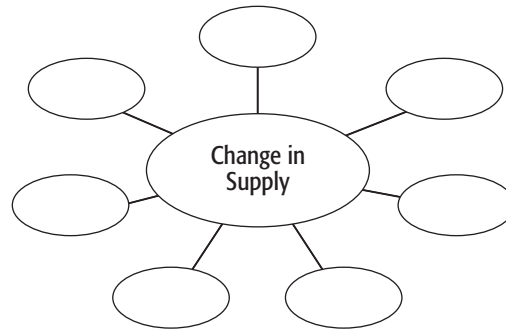
- supply (p. 117)
- quantity supplied (p. 119)
- Law of Supply (p. 117)
- change in quantity supplied (p. 119)
- supply schedule (p. 118)
- change in supply (p. 120)
- supply curve (p. 118)
- subsidy (p. 122)
- market supply curve (p. 119)
- supply elasticity (p. 124)

### Academic Vocabulary

- various (p. 118)
- interaction (p. 120)

### Reading Strategy

**Describing** As you read the section, complete a graphic organizer similar to the one below by describing the causes for a change in supply.



## COMPANIES IN THE NEWS

—www.forbes.com

### Flu Shot Gold Rush

Last year, the U.S. flu shot market was so unappealing that only two players were producing injectable vaccine—leading to a serious shortage when one of them, Chiron, had to shut down its plant. Now, it seems, non-U.S. firms are rushing to make influenza vaccine.

Today, CSL Limited, a \$2 billion biopharmaceutical firm based in Melbourne, Australia, is announcing plans to invest more than \$60 million to enter the U.S. flu shot business. It expects to compete with Sanofi-Aventis, GlaxoSmithKline and Novartis, which plans to buy Chiron. . . . CSL [hopes to] be able to move 20 million doses, giving it a 10% to 15% market share. ■



**T**he concept of supply is based on voluntary decisions made by producers, whether they are proprietorships working out of their homes or large corporations. A producer might decide to offer one amount for sale at one price and a different quantity at another price. **Supply**, then, is defined as the amount of a product that would be offered for sale at all possible prices that could prevail in the market.

Because producers receive payment for their products, it comes as no surprise that they will offer more at higher prices. This forms the basis for the **Law of Supply**, the principle that suppliers will normally offer more for sale at high prices and less at lower prices. The promise of high prices, and hopefully high profits, is what lured the company in the news story into entering the U.S. market.

**supply** amount of a product offered for sale at all possible prices

**Law of Supply** principle that more will be offered for sale at higher prices than at lower prices



**supply schedule**  
a table showing how much a producer will supply at all possible prices

**supply curve**  
a graph that shows the different amounts of a product supplied over a range of possible prices

## An Introduction to Supply

**MAIN Idea** Supply can be illustrated by a supply schedule or a supply curve.

**Economics & You** Earlier you learned how to illustrate demand using schedules and graphs. Read on to learn how to illustrate supply.

All suppliers of products must decide how much to offer for sale at **various** prices—a decision made according to what is best for the individual seller. What is best depends, in turn, upon the cost of producing the goods or services. The concept of supply, like demand, can be illustrated in the form of a table or a graph.

### The Supply Schedule

The **supply schedule** is a listing of the various quantities of a particular product supplied at all possible prices in the market. **Panel A** of **Figure 5.1** presents a hypothetical supply schedule for CDs. It shows the quantities of CDs that will be supplied at various prices, other things being equal.

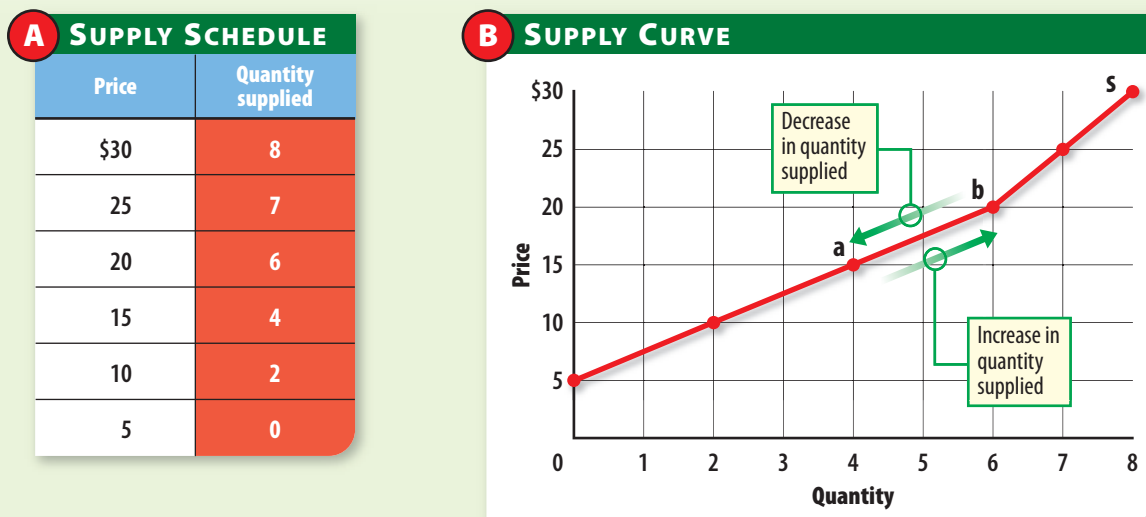
If you compare it to the demand schedule in Panel A of Figure 4.1 on page 92, you will see that the two are remarkably similar. The main difference between them is that for supply, the quantity goes up when the price goes up—rather than down as in the case of demand.

### The Individual Supply Curve

The data presented in the supply schedule can also be illustrated graphically as the upward-sloping line in **Panel B** of Figure 5.1. To draw it, all we do is transfer each of the price-quantity observations in the schedule over to the graph, and then connect the points to form the curve. The result is a **supply curve**, a graph showing the various quantities supplied at all possible prices that might prevail in the market at any given time.

All normal supply curves have a positive slope that goes up from the lower left-hand corner of the graph to the upper right-hand corner. This shows that if the price goes up, the quantity supplied will go up too.

**Figure 5.1** ▶ **Supply of Compact Discs**



▶ The supply schedule and the supply curve both show the quantity of CDs supplied in the market at every possible price. Note that a change in the quantity supplied appears as a movement along the supply curve.

**Economic Analysis** *How does the Law of Supply differ from the Law of Demand?*



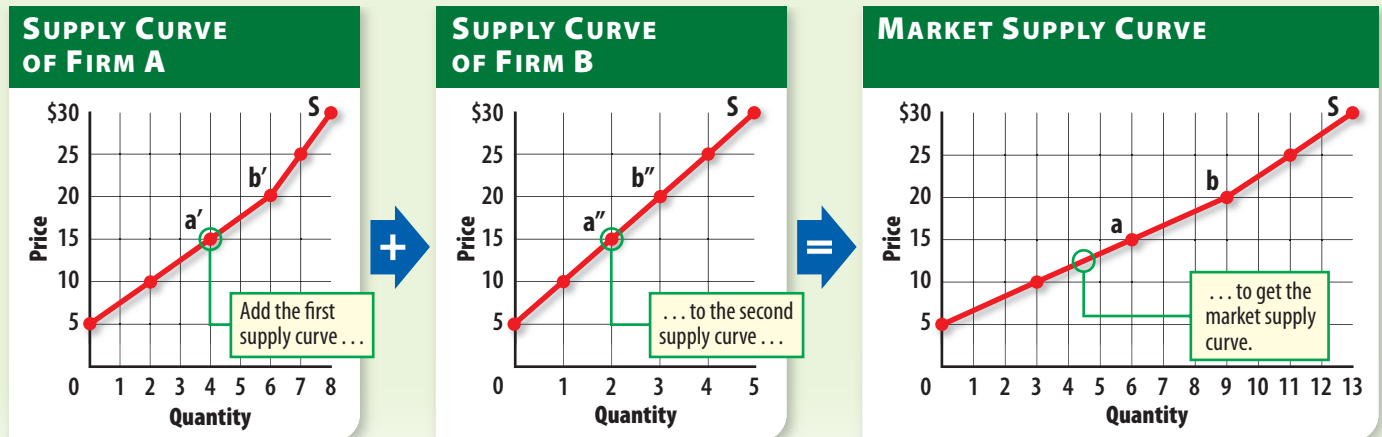
## Figure 5.2 ▶ Individual and Market Supply Curves

Graphs In Motion

See StudentWorks™ Plus  
or [glencoe.com](http://glencoe.com).

- ▶ The market supply curve shows the quantities supplied by all firms that offer the product for sale in a market. Point **a** on the market supply curve represents the four CDs that Firm A would supply and the two CDs that Firm B would supply, at a price of \$15, for a total of six CDs.

**Economic Analysis** Why are the supply curves upward sloping?



While the supply schedule and curve in Figure 5.1 represent the voluntary decisions of a single, hypothetical producer of CDs, we should realize that supply is a very general concept. In fact, you are a supplier whenever you look for a job and offer your services for sale. Your economic product is your labor, and you would probably be willing to supply more labor for a high wage than for a low one.

### The Market Supply Curve

The supply schedule and curve in Figure 5.1 show the information for a single firm. Frequently, however, we are more interested in the **market supply curve**, the supply curve that shows the quantities offered at various prices by all firms that offer the product for sale in a given market.

To obtain the data for the market supply curve, add the number of CDs that individual firms would produce, and then plot them on a separate graph. In **Figure 5.2**, point **a** on the market supply curve represents six CDs—four supplied by the first firm and

two by the second—that are offered for sale at a price of \$15. In the same way, point **b** on the curve represents a total of nine CDs offered for sale at a price of \$20.

### A Change in Quantity Supplied

The **quantity supplied** is the amount that producers bring to market at any given price. A **change in quantity supplied** is the change in amount offered for sale in response to a change in price. In Figure 5.1, for example, four CDs are supplied when the price is \$15. If the price increases to \$20, six CDs are supplied. If the price then changes to \$25, seven units are supplied.

These changes illustrate a change in the quantity supplied, which—like the case of demand—shows as a movement *along* the supply curve. Note that the change in quantity supplied can be an *increase* or a *decrease*, depending on whether more or less of a product is offered. For example, the movement from **a** to **b** in Figure 5.1 shows an increase because the number of products offered for sale goes from four to six when

**market supply curve** a graph that shows the various amounts offered by all firms over a range of possible prices

**quantity supplied** amount offered for sale at a given price

**change in quantity supplied** change in amount offered for sale when the price changes



**change in supply** situation where different amounts are offered for sale at all possible prices in the market; shift of the supply curve

the price goes up. If the movement along the supply curve had been from point **b** to point **a**, there would have been a decrease in quantity supplied because the number of products offered for sale went down. It makes no difference whether we are talking about an individual supply curve or a market supply curve. In either case, a change in quantity supplied takes place whenever a change in price affects the amount of a product offered for sale.

In a market economy, producers usually react to changing prices in just this way. While the **interaction** of supply and demand usually determines the final price of the product, the producer normally has the freedom to adjust production up or down. Take oil as an example. If the price of oil falls, the producer may offer less for sale, or even leave the market altogether if the price goes too low. If the price rises, the producer may offer more output for sale to take advantage of the better prices.

**✓ Reading Check** **Synthesizing** How might a producer of bicycles adjust supply when prices decrease?

## Change in Supply

**MAIN Idea** Several factors can contribute to a change in supply.

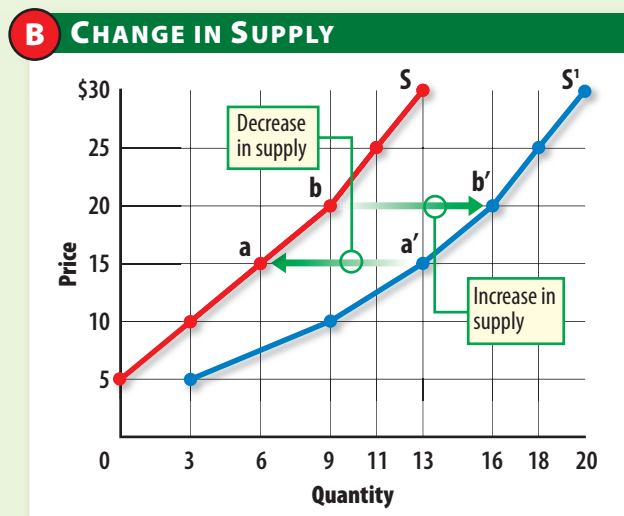
**Economics & You** Can you think of a time when you wanted to buy something, but the product was sold out everywhere? Read on to learn about factors that can affect supply.

Sometimes something happens to cause a **change in supply**, a situation where suppliers offer different amounts of products for sale at all possible prices in the market. This is not the same as the change in quantity supplied illustrated in Figure 5.1, because now we are looking at situations where the quantity changes even though the price remains the same.

For example, the supply schedule in **Figure 5.3** shows that producers are now willing to offer more CDs for sale at every price than before. Where 6 units were offered at a price of \$15, now there are 13. Where 11 were offered at a price of \$25, 18 are now offered, and so on.

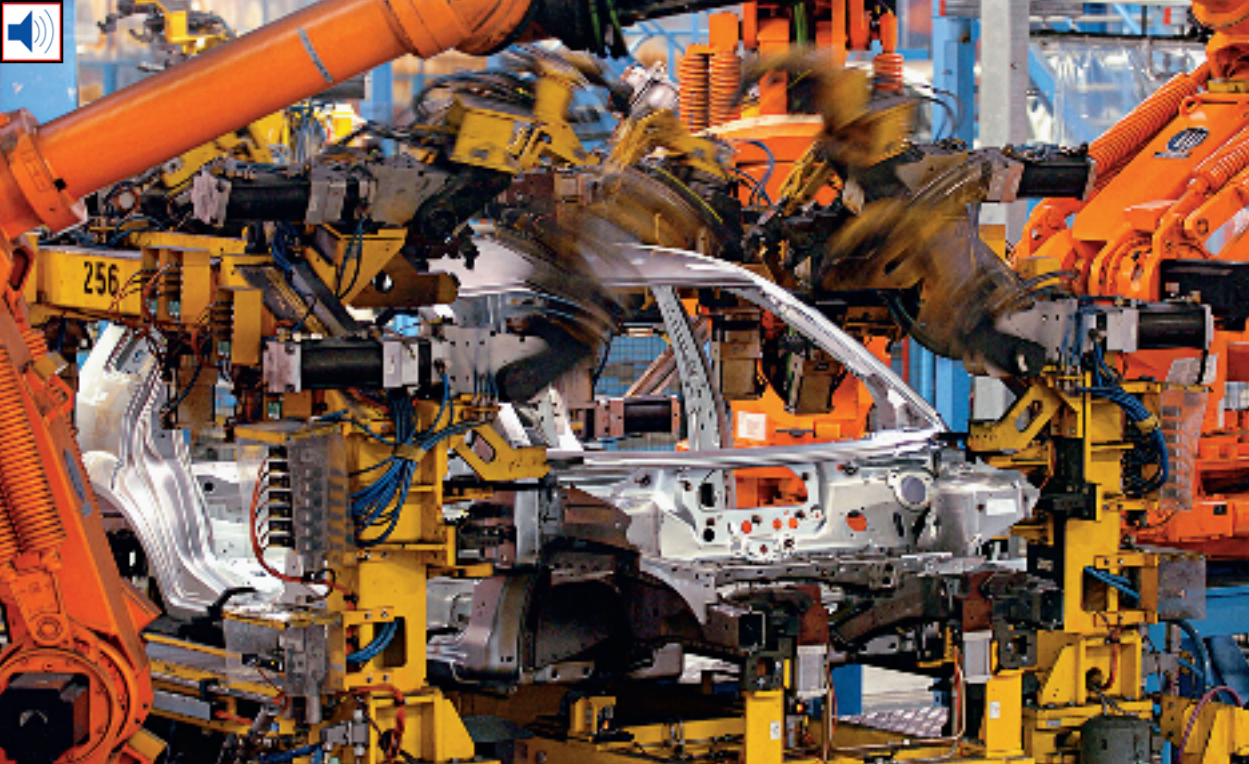
**Figure 5.3** ▶ **A Change in Supply**

A SUPPLY SCHEDULE		
Price	S	S'
\$30	13	20
25	11	18
20	9	16
15	6	13
10	3	9
5	0	3



- ▶ A change in supply means that suppliers will supply different quantities of a product at the same price. When we plot the numbers from the supply schedule, we get two separate supply curves. An increase in supply appears as a shift of the supply curve to the right. A decrease in supply appears as a shift of the supply curve to the left.

**Economic Analysis** How do change in supply and change in quantity supplied differ?



**Technology** In this Ford manufacturing plant, robots assemble the body of a new Fusion sedan. **What effect does the introduction of new technology have on the supply curve?**

---

When both old and new quantities supplied are plotted in the form of a graph, it appears as if the supply curve has shifted to the right, showing an *increase in supply*. For a *decrease in supply* to occur, less would be offered for sale at all possible prices, and the supply curve would shift to the left.

Changes in supply, whether increases or decreases, can occur for several reasons. As you read, keep in mind that all but the last reason—a change in the number of sellers—affects both the individual and the market supply curves.

### Cost of Resources

A change in the cost of productive inputs such as land, labor, and capital can cause a change in supply. Supply might increase because of a decrease in the cost of inputs such as labor or packaging. If the price of the inputs drops, producers are willing to produce more of a product, thereby shifting the supply curve to the right.

An increase in the cost of inputs has the opposite effect. If labor or other costs rise, producers would not be willing to produce as many units. Instead, they would offer fewer products for sale, and the supply curve would shift to the left.

### Productivity

Productivity goes up whenever more output is produced using the same amount of input. When management trains or motivates its workers, productivity usually goes up. Productivity should also go up if workers decide to work harder or more efficiently. In each case, more output is produced at every price, which shifts the supply curve to the right.

On the other hand, if workers are unmotivated, untrained, or unhappy, then productivity could decrease. The supply curve then shifts to the left because fewer goods are produced at every possible price.

### Technology

New technology tends to shift the supply curve to the right. The introduction of a new machine or a new chemical or industrial process can affect supply by lowering the cost of production or by increasing productivity. For example, improvements in the fuel efficiency of jet aircraft engines have lowered the cost of providing passenger air service. When production costs go down, the producer is usually able to produce more goods and services at all possible prices in the market.



LUCKY COW © 2003 Mark Pett. Reprinted with permission of UNIVERSAL PRESS SYNDICATE. All rights reserved.

**Subsidies** Some subsidies pay for farmers not to farm some land to avoid overproduction. *Why does the federal government pay such subsidies?*

**subsidy** government payment to encourage or protect a certain economic activity

New technologies do not always work as expected, of course. Equipment can break down, or the technology—or even replacement parts—might be difficult to obtain. This would shift the supply curve to the left. These examples are exceptions, however. New technologies are usually expected to be beneficial, or producers would not be interested in them.

### Taxes and Subsidies

Firms view taxes as a cost of production, just as they do raw materials and labor. If a company pays taxes on inventory or pays fees for a license to produce, the cost of production goes up. This causes the supply curve to shift to the left. However, if taxes go down, then production costs go down as well. When this happens, supply normally increases and the supply curve shifts to the right.

A **subsidy** is a government payment to an individual, business, or other group to encourage or protect a certain type of economic activity. Subsidies lower the cost of production, encouraging current producers to remain in the market and new producers to enter. When subsidies are repealed, costs go up, producers leave the market, and the supply curve shifts to the left.

Historically, many farmers in the milk, cotton, corn, wheat, and soybean industries received subsidies to support their income. Some farmers would have quit farming without these subsidies. Instead, the subsidies kept them in business and even attracted additional farmers into the industry—thereby shifting the market supply curve to the right.

### Expectations

Expectations about the future price of a product can also affect supply. If producers think the price of their product will go up, they may make plans now to produce more later on. When the new production is ready, the market supply curve will increase, or shift to the right.

On the other hand, producers may expect lower future prices. In this case, they may try to produce something else or even stop producing altogether—causing the supply curve to shift to the left.

## Did You Know?

➔ **Technology and Supply** New technology can affect supply. But did you realize that supply can also affect technology? When supplies are low and prices are high, companies have an incentive to use technology to develop substitute products they can sell for less. If the price of oil gets too high, for example, there is more of an incentive to develop new technologies for solar, geothermal, or wind power.



Expectations can also affect the price a firm plans to pay for some of the inputs used in production, so expectations can affect a business in a number of different ways. This is often compounded by events in the news, so expectations tend to change relatively frequently.

## Government Regulations

When the government establishes new regulations, the cost of production can change, causing a change in supply. For example, when the government requires new auto safety features such as air bags or emission controls, cars cost more to produce. Producers adjust to the higher production costs by producing fewer cars at every possible price.

In general, increased—or tighter—government regulations restrict supply, causing the supply curve to shift to the left. Relaxed government regulations allow producers to lower the cost of production, which results in a shift of the supply curve to the right.

## Number of Sellers

All of the factors we have discussed so far can cause a change in an individual firm's supply curve and, consequently, the market supply curve. It follows, therefore, that a change in the number of suppliers can cause the market supply curve to shift to the right or left.

As more firms enter an industry, the supply curve shifts to the right because more products are offered for sale at the same prices as before. In other words, the larger the number of suppliers, the greater the market supply. However, if some suppliers leave the market, fewer products are offered for sale at all possible prices. This causes supply to decrease, shifting the curve to the left.

In the real world, sellers are entering and leaving individual markets all the time. You see this in your own neighborhood when one store closes and another opens in its place.

Changes in technology can also impact the number of sellers. For example, recently the Internet has attracted a large number of new businesses, as almost anyone with some Internet experience and a few thousand dollars can open an online store. Because of the ease of entry into these new markets, selling a product is no longer just for the big firms.

**✓ Reading Check Explaining** Why do factors that cause a change in individual supply also affect the market demand curve?

## Personal Finance Handbook

See pages **R20–R23** for more information on getting a job.

# CAREERS

## Retail Salesperson

### The Work

- \* Demonstrate products and interest customers in merchandise in an efficient and courteous manner
- \* Stock shelves, take inventory, prepare displays
- \* Record sales transactions and possibly arrange for product's safe delivery

### Qualifications

- \* Ability to tactfully interact with customers and work under pressure
- \* Knowledge of products and the ability to communicate this knowledge to the customer
- \* Strong business math skills for calculating prices and taxes
- \* No formal education required, although opportunities for advancement may depend on a college degree

### Earnings

- \* Median hourly earnings (including commissions): \$8.98

### Job Growth Outlook

- \* Average

**Source:** *Occupational Outlook Handbook*, 2006–2007 Edition

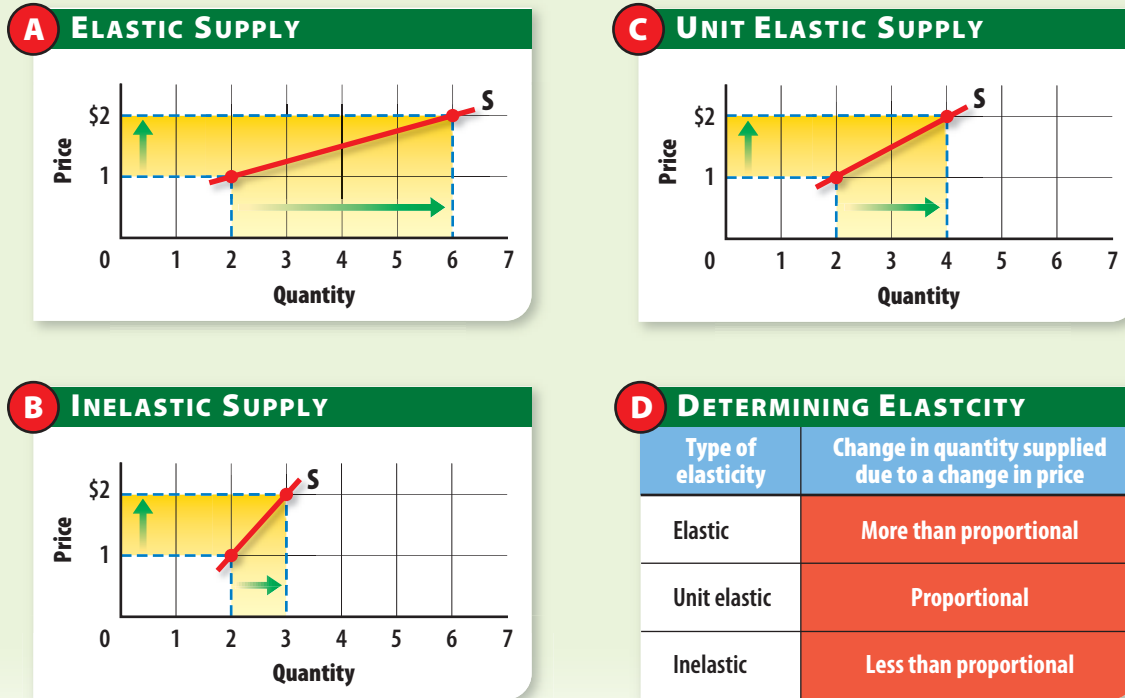




## Figure 5.4 ▶ Elasticity of Supply

▶ The elasticity of supply is a measure of how quantity supplied responds to a price change. If the change in quantity supplied is more than proportional to the price change, supply is elastic; if it is less than proportional, it is inelastic; and if it is proportional, it is unit elastic.

**Economic Analysis** Which factors determine whether a firm's supply curve is elastic or inelastic?



**supply elasticity**  
a measure of how the quantity supplied responds to a change in price

### Elasticity of Supply

**MAIN Idea** The response to a change in price varies for different products.

**Economics & You** You learned earlier that demand can be elastic, inelastic, or unit elastic. Read on to learn about the elasticity of supply.

Just as demand has elasticity, supply also has elasticity. **Supply elasticity** is a measure of the way in which the quantity supplied responds to a change in price. If an increase in price leads to a proportionally larger increase in output, supply is elastic. If an increase in price causes a proportionally smaller change in output, supply is inelastic. If an increase in price causes a proportional change in output, supply is unit elastic.

As you might imagine, there is very little difference between supply and demand elasticities. If quantities of a product are being purchased, the concept is demand elasticity. If quantities of a product are being brought to market for sale, the concept is supply elasticity. In both cases, elasticity is simply a measure of the way quantity adjusts to a change in price.

### Three Elasticities

**Figure 5.4** illustrates three examples of supply elasticity. The supply curve in **Panel A** is elastic because the change in price causes a proportionally larger change in quantity supplied. Doubling the price from \$1 to \$2 causes the quantity brought to market to triple from two to six units.



**Panel B** shows an inelastic supply curve. In this case, a change in price causes a proportionally smaller change in quantity supplied. When the price doubles from \$1 to \$2, the quantity brought to market goes up only 50 percent, or from two units to three units.

**Panel C** shows a unit elastic supply curve. Here a change in price causes a proportional change in the quantity supplied. As the price doubles from \$1 to \$2, the quantity brought to market also doubles.

### Determinants of Supply Elasticity

The elasticity of a producer's supply curve depends on the nature of its production. If a firm can adjust to new prices quickly, then supply is likely to be elastic. If the nature of production is such that adjustments take longer, then supply is likely to be inelastic.

The supply curve for nuclear power, for example, is likely to be inelastic in the short run. No matter what price is being offered, electric utilities will find it difficult to increase output because of the huge amount

of capital and technology needed—not to mention the issue of extensive government regulation—before nuclear production can be increased.

However, the supply curve is likely to be elastic for many toys, candy, and other products that can be made quickly without huge amounts of capital and skilled labor. If consumers are willing to pay twice the price for any of these products, most producers will be able to gear up quickly to significantly increase production.

Unlike demand elasticity, the number of substitutes has no bearing on supply elasticity. In addition, neither the ability to delay the purchase nor the portion of income consumed are important. Instead, only production considerations determine supply elasticity. If a firm can react quickly to a changing price, then supply is likely to be elastic. If the firm takes longer to react to a change in prices, then supply is likely to be inelastic.

**✓ Reading Check** **Comparing** How are the elasticities of supply and demand similar? How do they differ?

## SECTION

# 1

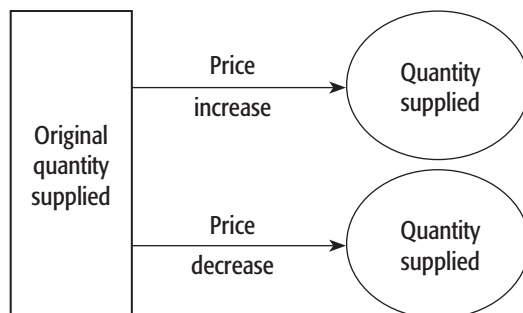
## Review

### Vocabulary

- 1. Explain** the significance of supply, Law of Supply, supply schedule, supply curve, market supply curve, quantity supplied, change in quantity supplied, change in supply, subsidy, and supply elasticity.

### Main Ideas

- 2. Determining Cause and Effect** Use a graphic organizer like the one below to explain how a change in the price of an item affects the quantity supplied.



- 3. Explaining** What is the difference between a change in supply and a change in quantity supplied?

- 4. Describing** How does the quantity supplied change when the price doubles for a unit elastic product?

### Critical Thinking

- 5. The BIG Idea** Explain why the supply curve slopes upward.
- 6. Analyzing Visuals** Look at Figure 5.4 on page 124. How do the supply curves in the three panels differ? How does that difference reflect the types of elasticity?
- 7. Comparing and Contrasting** Explain how supply is different from demand.

### Applying Economics

- 8. Elasticity of Supply** If you were a producer, what might prevent you from increasing the quantity supplied in response to an increase in price? Explain.



# CASE STUDY

## “Green” Suppliers

### From Black Gold to Golden Corn?

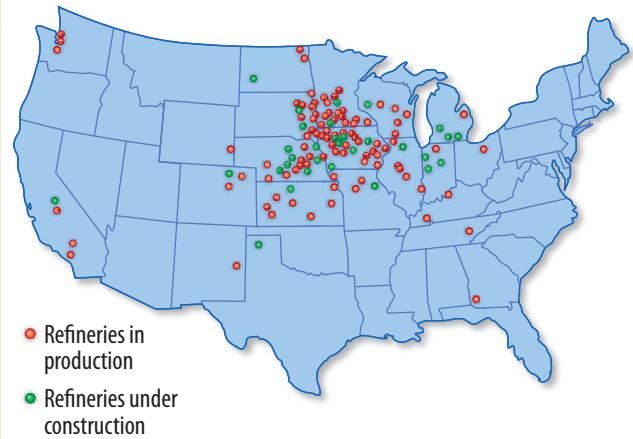
As the world supply of oil is spread among developing nations and becomes increasingly expensive, Americans are looking for alternative fuels. One option is ethanol, a renewable energy source made from corn and other plants. Ethanol suppliers and automakers are touting E85—a mixture of 15 percent gasoline and 85 percent ethanol—as a cleaner, domestic substitute for America’s gas tanks.

### Aventine and VeraSun

Aventine Renewable Energy, Inc., is just one ethanol supplier that is banking on the potential of plants. So far it’s paying off. Aventine reported net income of \$32 million on revenues of \$935 million in 2005. That is an increase of 10 percent from 2004.

Another ethanol supplier, VeraSun Energy Corp., has teamed up with General Motors and Ford to make E85 more available. Revenues for VeraSun look promising—from \$194 million in 2004 to \$111 million in just the first quarter of 2006.

### U.S. ETHANOL REFINERIES



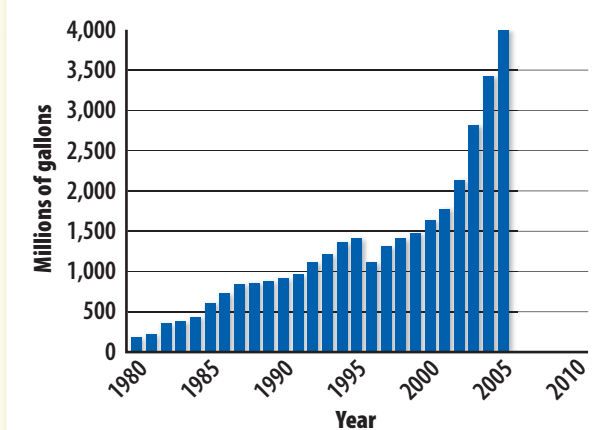
Source: Renewable Fuels Association

### Drawbacks vs. Benefits

Ethanol does have some drawbacks. Only about 600 of the 180,000 U.S. service stations supply it. You also have to fill up more often, because ethanol contains less energy than gasoline. In addition, you have to drive a flexible-fuel vehicle (FFV) to use it.

On the upside, ethanol yields about 26 percent more energy than it takes to produce it. Such a high yield is possible because sunlight is “free” and farming techniques have become highly efficient. As for the labor force, the ethanol industry supported the creation of more than 153,000 U.S. jobs in 2005. Perhaps the greatest benefit of increased ethanol supply will be reducing U.S. dependence on foreign oil.

### U.S. FUEL ETHANOL PRODUCTION



Sources: U.S. Energy Information; Renewable Fuels Association

### Analyzing the Impact

- 1. Comparing and Contrasting** What are the advantages and disadvantages of E85?
- 2. Drawing Conclusions** What is the relationship between the increased cost of oil and the supply of ethanol?



# The Theory of Production

## GUIDE TO READING

### Section Preview

In this section, you will learn how a change in the variable input called “labor” results in changes in output.

### Content Vocabulary

- production function (p. 128)
- short run (p. 128)
- long run (p. 129)
- total product (p. 129)
- marginal product (p. 129)
- stages of production (p. 129)
- diminishing returns (p. 130)

### Academic Vocabulary

- hypothetical (p. 128)
- contributes (p. 130)

### Reading Strategy

**Listing** As you read about production, complete a graphic organizer similar to the one below by listing what occurs during the three stages of production.

Stage I	Stage II	Stage III

## COMPANIES IN THE NEWS

—TIME

### The Hole in the Pipeline

On December 5 [2005], known as Blank Monday in the surfing world, the \$4.5 billion industry’s core snapped like a board caught in the Banzai Pipeline. Reason? The closure of Gordon (Grubby) Clark’s four-decade virtual monopoly on polyurethane blanks, the raw material for most surfboards. (Shapers then customize them for surfers.) Clark’s company produced 80% of blanks worldwide, and his sudden exit left surfers treading water as board prices doubled and deliveries were cut off.

One man’s wipeout, though, could be another’s dream wave. Harold Walker and Gary Linden have quadrupled Walker Foam’s staff and are scouting for a new factory, hoping to produce 800 blanks a day by July, up from 125 now. ■



Changes in manufacturing, such as the fourfold increase in staff described in the news story above, happen all the time in any type of business. In fact, if you have ever worked in the fast food industry, you already know that the number of workers is the easiest factor of production for a business to change.

How many times, for example, have you or one of your friends been called in when the business got busy, or were sent home when sales slowed down? Because it is so easy for firms to change the number of workers it employs whenever demand changes, labor is often thought of as being the *variable* factor of production.



**production function** a graph showing how a change in the amount of a single variable input changes total output

**short run** production period so short that only the variable inputs (usually labor) can be changed

## The Production Function

**MAIN Idea** The production function shows how output changes when a variable input such as labor changes.

**Economics & You** You have learned that changes in demand or supply can be illustrated with graphs. Read on to learn how changes in input are illustrated.

Production can be illustrated with a **production function**—a figure that shows how total output changes when the amount of a single variable input (usually labor) changes while all other inputs are held constant. The production function can be illustrated with a schedule, such as the one in **Panel A** of **Figure 5.5**, or with a graph like the one in **Panel B**.

Both panels list **hypothetical** output as the number of workers changes from zero to 12. According to the numbers in Panel A,

if no workers are used, there is no output. If the number of workers goes up by one, output rises to 7. Add another worker and total output rises to 20. We can use this information to construct the production function that appears as the graph in Panel B, where the number of variable inputs is shown on the horizontal axis, and total production on the vertical axis.

## The Production Period

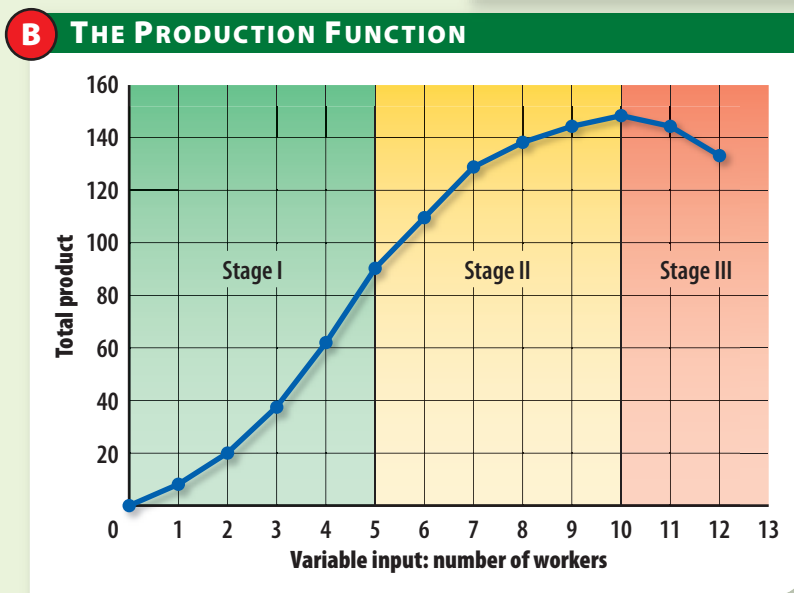
When economists analyze production, they focus on the **short run**, a period so brief that only the amount of the variable input can be changed. The production function in Figure 5.5 reflects the short run because only the total number of workers changes. No changes occur in the amount of machinery, technology or land used. Thus, any change in output must be caused by a change in the number of workers.

**Graphs In Motion**

See StudentWorks™ Plus or [glencoe.com](http://glencoe.com).

**Figure 5.5** ▶ **Short-Run Production**

A THE PRODUCTION SCHEDULE			
Number of workers	Total product	Marginal product*	Regions of production
0	0	0	Stage I
1	7	7	
2	20	13	
3	38	18	
4	62	24	
5	90	28	
6	110	20	Stage II
7	129	19	
8	138	9	
9	144	6	
10	148	4	
11	145	-3	Stage III
12	135	-10	



▶ Short-run production can be shown both as a schedule and as a graph. In Stage I, total output increases rapidly with each worker added. In Stage II, output still increases, but at a decreasing rate. In Stage III output decreases.

**Economic Analysis** *How does marginal product help identify the stages of production?*

\* All figures in terms of output per day



Other changes take place in the **long run**, a period long enough for the firm to adjust the quantities of *all* productive resources, including capital. For example, a firm that reduces its labor force today may also have to close down some factories later on. These are long-run changes because the amount of capital used for production changes.

## Total Product

The second column in Figure 5.5 shows **total product**, or the total output produced by the firm. As you read down the column, you will see that zero units of total output are produced with zero workers, seven are produced with one worker, and so on.

Again, this is a short-run relationship, because the figure assumes that only the amount of labor varies while the amount of other resources used remains unchanged. Now that we have total product, we can easily see how we get our next measure.

## Marginal Product

The measure of output shown in the third column in Figure 5.5 is an important concept in economics. The measure is **marginal product**, the *extra* output or change in total product caused by adding one more unit of variable input.

As we see in the figure, the marginal product, or extra output, of the first worker is 7. Likewise, the marginal product of the second worker is 13. If you look down the column, you will see that the marginal product for every worker is different, with some even being negative.

Finally, note that the sum of the marginal products is equal to the total product. For example, the marginal products of the first and second workers is 7 plus 13, or 20—the same as the total product for two workers. Likewise, the sum of the marginal products of the first three workers is 7 plus 13 plus 18, or 38—the total output for three workers.

**✓ Reading Check Analyzing** Why does the production function represent short-run production?



**Short Run** When companies want to make quick changes in output, they usually change the number of workers. **Why is a change in the number of workers considered a short-run change?**

## Stages of Production

**MAIN Idea** The stages of production help companies determine the most profitable number of workers to hire.

**Economics & You** If you were a business owner, how would you decide on the number of workers you would hire? Read on to find out how the production function could help you.

In the short run, every firm faces the question of how many workers to hire. To answer this question, let us take another look at Figure 5.5, which shows three distinct **stages of production**: increasing returns, diminishing returns, and negative returns.

### Stage I—Increasing Marginal Returns

Stage I of the production function is the phase in which the marginal product of each additional worker increases. This happens because as more workers are added, they can cooperate with each other to make better use of their equipment.

**long run**  
production period long enough to change the amounts of all inputs

**total product**  
total output or production by a firm

**marginal product**  
extra output due to the addition of one more unit of input

**stages of production**  
phases of production that consist of increasing, decreasing, and negative marginal returns



**diminishing returns** stage where output increases at a decreasing rate as more units of variable input are added

As we see in Figure 5.5, the first worker produces 7 units of output. The second is even more productive, with a marginal product of 13 units, bringing total production to 20. As long as each new worker **contributes** more to total output than the worker before, total output rises at an increasing rate. According to the figure, the first five workers are in Stage I.

When it comes to hiring workers, companies do not knowingly produce in Stage I. When a firm learns that each new worker increases output more than the last, it tries to hire yet another worker. Soon, the firm finds itself in the next stage of production.

### Stage II—Decreasing Marginal Returns

In Stage II, the total production keeps growing, but it does so by smaller and smaller amounts. Each additional worker, then, is making a diminishing, but still positive, contribution to total output.

Stage II illustrates the principle of decreasing or **diminishing returns**—the stage where output increases at a diminishing rate as more variable inputs are added. In Figure 5.5, Stage II begins when the sixth

worker is hired, because the 20-unit marginal product of that worker is less than the 28-unit marginal product of the fifth worker. The stage ends when the tenth worker is added, because marginal products are no longer positive after that point.

### Stage III—Negative Marginal Returns

If the firm hires too many workers, they will get in each other’s way, causing output to fall. Stage III, then, is where the marginal products of additional workers are negative. For example, the eleventh worker has a marginal product of *minus* three, and the twelfth’s is *minus* 10, causing output to fall.

Because most companies would not hire workers if this would cause total production to decrease, the number of workers a firm hires can only be found in Stage II. As we will see in the next section, the exact number of workers to be hired also depends on the revenue from the sale of the output. For now, however, we can say that the firm in Figure 5.5 will hire from 6 to 10 workers.

**Reading Check** **Interpreting** What is unique about the third stage of production?

## SECTION

# 2

## Review

### Vocabulary

- 1. Explain** the significance of production function, short run, long run, total product, marginal product, stages of production, and diminishing returns.

### Main Ideas

- 2. Describing** How does the length of the production period affect the output of a firm?
- 3. Explaining** Use a graphic organizer like the one below to explain how marginal product changes in each of the three stages of production.

Stage of production	Marginal product
I	
II	
III	

### Critical Thinking

- 4. The BIG Idea** Explain how a change in inputs affects production.
- 5. Analyzing Visuals** Look at Figure 5.5 on page 128. Explain what happens to marginal product when production moves from Stage II to Stage III.
- 6. Sequencing Information** You need to hire workers for a project and add one worker at a time to measure the added contribution of each worker. At what point will you stop hiring workers? Relate this process to the three stages of the production function.

### Applying Economics

- 7. Diminishing Returns** Provide an example of a time when you entered a period of diminishing returns or even negative returns. Explain why this might have occurred.

# Profiles **in** Economics

## Kenneth I. Chenault (1952–)

- first African American to be CEO of a top-100 company
- responsible for continuing American Express's 155-year-old tradition of "reinvention" during global change

### Stepping Stones

Kenneth Chenault did not start his career in business. Instead, he earned an undergraduate degree in history and a law degree at Harvard. He had keen instincts for business, however, and worked for a management consulting firm before joining American Express in 1981.

At first, Chenault was responsible for strategic planning. His intelligence and hard work moved him up the corporate ranks. Each promotion brought him new challenges and opportunities.

### Tools of Success

In 2001 Chenault became chairman and CEO of American Express. When the terrorist attacks of 9/11 brought a downturn for the company, Chenault acted fast to adjust to market conditions. He changed the focus of American Express from telephone and mail to the Internet. He also cut the workforce by 15 percent. "We had to focus on the moderate and long-term," he explained. "In volatile times, leaders are more closely scrutinized. If you cannot step up in times of crisis, you will lose credibility."

### Returning to Basics

Four years later, Chenault decided to refocus on "plastic." American Express sold off its many financial planning services and regrouped around its core business—credit cards, corporate travel cards, and "reloadable" traveler's checks. In addition, a 2004 Supreme Court decision on an antitrust suit ended Visa's and Mastercard's control over U.S. bank cards—a \$2.1 trillion business. This opened the door for U.S. banks to issue American Express cards.

### Examining the Profile

1. **Summarizing** How did Chenault's decisions improve American Express?
2. **Evaluating** Do you agree with Chenault's claim that being adaptable to change is the most important strategy for a successful business?



*As chairman and CEO of American Express, Kenneth Chenault believes the key to success in the global economy is adaptability. "It's not the strongest or the most intelligent who survive, but those most adaptive to change."*





SECTION  
**3**

# Cost, Revenue, and Profit Maximization

## GUIDE TO READING

### Section Preview

In this section, you will learn how businesses analyze their costs and revenues, which helps them maximize their profits.

### Content Vocabulary

- fixed costs (p. 133)
- overhead (p. 133)
- variable costs (p. 133)
- total cost (p. 134)
- marginal cost (p. 134)
- e-commerce (p. 135)
- break-even point (p. 135)
- total revenue (p. 136)
- marginal revenue (p. 136)
- marginal analysis (p. 137)
- profit-maximizing quantity of output (p. 137)

### Academic Vocabulary

- conducted (p. 135)
- generates (p. 136)

### Reading Strategy

**Explaining** As you read the section, complete a graphic organizer similar to the one below by explaining how total revenue differs from marginal revenue. Then provide an example of each.

Total revenue is:	→	Example:
Marginal revenue is:	→	Example:

## COMPANIES IN THE NEWS

—BusinessWeek

### FedEx Saves the Day

As soon as Motion Computing Inc. in Austin, Texas, receives an order for one of its \$2,200 tablet PCs, workers at a supplier's factory in Kunshan, China, begin assembling the product. When they've finished, they individually box each order and hand them to a driver from FedEx Corp., who trucks it 50 miles to Shanghai, where it's loaded on a jet bound for Anchorage before a series of flights and truck rides finally puts the product into the customer's hands. Elapsed time: as little as five days. Motion's inventory costs? Nada. Zip. Zilch. "We have no inventory tied up in the process anywhere," marvels Scott Eckert, Motion's chief executive. "Frankly, our business is enabled by FedEx."

There are thousands of other Motion Computings that, without FedEx, would be crippled by warehouse and inventory costs. ■



**T**he news story above features a problem that all businesses, nonprofit organizations, and even individuals face—that of having to deal with the costs of running an organization. Scott Eckert could have decided to build a warehouse to store an inventory of tablet PCs waiting for future orders. Instead, he builds the tablet PCs one order

at a time and uses a shipping company to deliver orders immediately.

Anyone who is in charge of a business or a nonprofit organization spends a lot of time with costs. The task may be to identify the costs, and at other times it may be to reduce them. Our first task here, however, is to classify the costs.

## Measures of Cost

**MAIN Idea** Businesses analyze fixed, variable, total, and marginal costs to make production decisions.

**Economics & You** Are you involved in student government? Organizing events can often cost more than you might have originally thought. Read on to find out about the costs that organizations face.

Because businesses want to produce efficiently, they must keep an eye on their costs. For purposes of analysis, they use several measures of cost.

### Fixed Costs

The first measure is **fixed costs**—the costs that an organization incurs even if there is little or no activity. When it comes to this measure of costs, it makes no difference whether the business produces nothing, very little, or a large amount. Total fixed costs, sometimes called **overhead**, remain the same.

Fixed costs include salaries paid to executives, interest charges on bonds, rent payments on leased properties, and state and

local property taxes. Fixed costs also include depreciation—the gradual wear and tear on capital goods through use over time. A machine, for example, will not last forever, because its parts will wear out slowly and eventually break.

### Variable Costs

Other costs are **variable costs**, or costs that change when the business's rate of operation or output changes. While fixed costs are generally associated with machines and other capital goods, variable costs are usually associated with labor and raw materials. For example, wage-earning workers may be laid off or work overtime as output changes. Other examples of variable costs include electric power to run machines and freight charges to ship the final product.

For most businesses, the largest variable cost is labor. If a business wants to hire one worker to produce seven units of output per day, and if the worker costs \$90 per day, the total variable cost is \$90. If the business wants to hire a second worker to produce additional units of output, then its total variable costs are \$180, and so on.

**fixed costs** costs that remain the same regardless of level of production or services offered

**overhead** broad category of fixed costs that includes rent, taxes, and executive salaries

**variable costs** production costs that change when production levels change

**Costs** Businesses need to consider both fixed costs, such as rent and taxes, and variable costs, such as labor. *Why can electricity be considered a variable cost?*



## Figure 5.6 ▶ Production, Costs, and Revenues

▶ When we add the costs and revenues to the production schedule, we can find the firm's profits. Note that fixed costs don't change. Marginal cost and marginal revenue are used to determine the level of productivity with the maximum level of profits.

**Economic Analysis** *How do total costs differ from marginal costs?*

PRODUCTION SCHEDULE				COSTS				REVENUES		PROFIT
Regions of production	Number of workers	Total product	Marginal product	Total fixed cost	Total variable cost	Total cost	Marginal cost	Total revenue	Marginal revenue	Total profit
Stage I	0	0	0	\$50	\$0	\$50	--	\$0	--	-\$50
	1	7	7	50	90	140	\$12.86	105	\$15	-35
	2	20	13	50	180	230	6.92	300	15	70
	3	38	18	50	270	320	5.00	570	15	250
	4	62	24	50	360	410	3.75	930	15	520
	5	90	28	50	450	500	3.21	1,350	15	850
Stage II	6	110	20	50	540	590	4.50	1,650	15	1,060
	7	129	19	50	630	680	4.74	1,935	15	1,210
	8	138	9	50	720	770	10.00	2,070	15	1,300
	9	144	6	50	810	860	15.00	2,160	15	1,300
	10	148	4	50	900	950	22.50	2,220	15	1,270
Stage III	11	145	-3	50	990	1,040	--	2,175	15	1,135
	12	135	-10	50	1,080	1,130	--	2,025	15	895

**total cost** the sum of fixed costs and variable costs

**marginal cost** extra cost of producing one additional unit of production

### Total Cost

Figure 5.6 shows the **total cost** of production, which is the sum of the fixed and variable costs. Total cost takes into account all of the costs a business faces in the course of its operations. If the business decides to use six workers costing \$90 each to produce 110 units of total output, then its total cost will be \$590—the sum of \$50 in fixed costs plus \$540 of variable costs.

### Marginal Cost

The most useful measure of cost is **marginal cost**—the *extra* cost incurred when producing one more unit of output.

In fact, marginal cost is more useful than total cost because it shows the change in total variable costs when output increases.

Figure 5.6 shows that the addition of the first worker increases total product by seven units. Because total variable costs increased by \$90, each additional unit of output has a marginal cost of \$12.86, or \$90 divided by seven. If a second worker is added, 13 more units of output will be produced for an additional cost of \$90. This means that the extra, or marginal, cost of producing each new unit of output is \$90 divided by 13, or \$6.92.

**✓ Reading Check Analyzing** If a firm's total output increases, will the fixed costs increase? Explain.

### Skills Handbook

See page R51 to learn about **Using Tables and Charts**.

# Applying Cost Principles

**MAIN Idea** Fixed and variable costs affect the way a business operates.

**Economics & You** Have you or anyone you know purchased something on the Internet? Read on to find out about the costs of doing business online.

The types of cost a firm faces may affect the way it operates. That is why owners analyze the costs they incur when they run their business.

## Costs and Business Operation

For reasons largely related to costs, many stores are flocking to the Internet, making it one of the fastest-growing areas of business today. Stores do this because the overhead, or the fixed costs of operation, on the Internet is so low. Another reason is that a firm does not need as much inventory.

People engaged in **e-commerce**—an electronic business conducted over the Internet—do not need to spend a large sum of money to rent a building and stock it with inventory. Instead, for just a fraction of the cost of a typical store, the e-commerce business owner can purchase Web access along with an e-commerce software package that provides everything from Web catalog pages to ordering, billing, and accounting software. Then, the owner of the e-commerce business store inserts pictures and descriptions of the products for sale into the software and loads the program.

When customers visit the “store” on the Web, they see a range of goods for sale. In some cases, the owner has the merchandise in stock; in other cases, the merchant simply forwards the orders to a distribution center that handles the shipping. Either

way, the fixed costs of operation are significantly lower than they would be in a typical retail store.

## Break-Even Point

Finally, when a business knows about its costs, it can find the level of production that generates just enough revenue to cover its total operating costs. This is called the **break-even point**. For example, in Figure 5.6, the break-even point is between 7 and 20 units of total product, so at least two workers would have to be hired to break even.

However, the break-even point only tells the firm how much it has to produce to cover its costs. Most businesses want to do more—they want to maximize the amount of profits they can make, not just cover their costs. To do this, they will have to apply the principles of marginal analysis to their costs and revenues.

**Reading Check** **Contrasting** What are the differences between an e-commerce store and a traditional business?

**e-commerce** electronic business conducted over the Internet

**break-even point** production level where total cost equals total revenue

**E-Commerce** Companies such as Amazon.com have been able to offer a wide range of products while keeping their overhead low. **What helps e-commerce firms to reduce cost?**





# The Global Economy & YOU

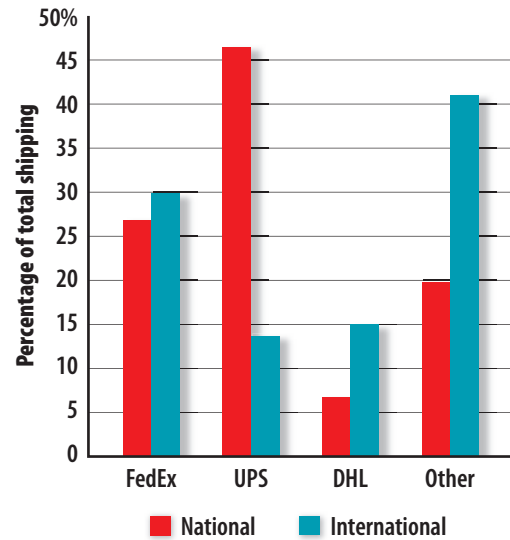


## It Is a Small World . . . After All

If you can't find a product at a local store, you can browse millions of Internet sources to find what you're looking for. It's a simple process that, like any other transaction, involves a buyer and a seller. The Internet serves as a neutral venue for buyers and sellers to come together. What makes this such a unique global process is the efficient shipping that allows you to receive your product in a matter of days from such faraway places as China, the United Kingdom, and Australia.

Previously a luxury, shipping goods from country to country—and continent to continent—has expanded the global marketplace with overnight and express mail options. Companies such as DHL, FedEx, and UPS work around the clock—and around the world—delivering packages to businesses and consumers. FedEx, for example, operates 120 flights weekly to and from Asia, including 26 out of China alone.

AIR & GROUND SHIPPING MARKET



Source: Market Research Service Center

### total revenue

total amount earned by a firm from the sale of its products

### marginal revenue

extra revenue from the sale of one additional unit of output

## Marginal Analysis and Profit Maximization

**MAIN Idea** Businesses compare marginal revenue with marginal cost to find the level of production that maximizes profits.

**Economics & You** You just learned about the importance of costs to a business. Read on to learn how businesses use this information to maximize their profits.

Businesses use two key measures of revenue to find the amount of output that will produce the greatest profits. The first is total revenue, and the second is marginal revenue. The marginal revenue is compared to marginal cost to find the optimal level of production.

### Total Revenue

The **total revenue** is all the revenue that a business receives. In the case of the firm shown in Figure 5.6 on page 134, total revenue is equal to the number of units sold

multiplied by the average price per unit. So, if seven units are sold at \$15 each, the total revenue is \$105. If 10 workers are hired and their 148 units of total output sell for \$15 each, then total revenue is \$2,220. The calculation is the same for any level of output in the table.

### Marginal Revenue

The more important measure of revenue is **marginal revenue**, the extra revenue a business receives from the production and sale of one additional unit of output. You can find the marginal revenue in Figure 5.6 by dividing the change in total revenue by the marginal product.

For example, when the business employs five workers, it produces 90 units of output and generates \$1,350 of total revenue. If a sixth worker is added, output increases by 20 units and total revenues increase to \$1,650. If we divide the change in total revenue (\$300) by the marginal product (20), we have marginal revenue of \$15.



As long as every unit of output sells for \$15, the marginal revenue earned by the sale of one more unit will always be \$15. For this reason, the marginal revenue appears to be constant at \$15 for every level of output in Figure 5.6. In reality, this may not always be the case, as businesses often find that marginal revenues vary.

## Marginal Analysis

Most people, as well as most businesses, use **marginal analysis**, a type of decision making that compares the extra benefits of an action to the extra costs of taking the action. Marginal analysis is useful in a number of situations, from our own individual decision making to production decisions made by corporations.

In the case of our own individual decision making, it is usually best for us to take small, incremental steps to determine if the additional benefits from each step are greater than the additional costs. A business does the same thing. It adds more variable inputs (workers) and then compares the extra benefit (marginal revenue) to the additional cost (marginal cost). If the extra benefit exceeds the extra cost, then the firm hires another worker.

## Profit Maximization

We can now use marginal analysis to find the level of output that maximizes profits for the business represented in Figure 5.6. The business would hire the sixth worker, for example, because the extra output would cost only \$4.50 to produce while generating \$15 in new revenues.

Having made a profit with the sixth worker, the business would hire the seventh and eighth workers for the same reason. While the addition of the ninth worker neither adds to nor takes away from total profits, the firm would have no incentive to hire the tenth worker. If it did, it would quickly discover that profits would go down, and it would go back to using nine workers.

When marginal cost is less than marginal revenue, more variable inputs should be hired to expand output. Eventually, the **profit-maximizing quantity of output** is reached when marginal cost and marginal revenue are equal, as shown in the last column in Figure 5.6. Other levels of output may generate equal profits, but none will be more profitable.

**✓ Reading Check** **Summarizing** Why do people, especially business owners, use marginal analysis?

Economics ONLINE

**Student Web Activity** Visit the *Economics: Principles and Practices* Web site at [glencoe.com](http://glencoe.com) and click on *Chapter 5—Student Web Activities* for an activity on the operation of a company.

**marginal analysis** decision making that compares the extra costs of doing something to the extra benefits gained

**profit-maximizing quantity of output** level of production where marginal cost is equal to marginal revenue

### SECTION

# 3

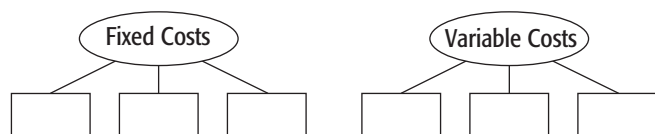
## Review

### Vocabulary

- 1. Explain** the significance of fixed costs, overhead, variable costs, total cost, marginal cost, e-commerce, break-even point, total revenue, marginal revenue, marginal analysis, and profit-maximizing quantity of output.

### Main Ideas

- 2. Identifying** Use a graphic organizer like the one below to identify examples of both fixed and variable costs.



- 3. Explaining** What is the difference between break-even output and profit-maximizing quantity of output?

### Critical Thinking

- 4. The BIG Idea** Explain how businesses use marginal analysis to maximize profits.
- 5. Analyzing Visuals** Look at Figure 5.6 on page 134. Using the numbers in the figure, write a paragraph to explain in your own words how many workers this company should hire and why it should make this decision. Provide specific examples based on the information in the table.
- 6. Inferring** If the total output of a business increases, what will happen to fixed costs? To variable costs?

### Applying Economics

- 7. Total Cost** Many plants use several shifts of workers in order to operate 24 hours a day. How do a plant's fixed and variable costs affect its decision to operate around the clock?



**P**rofit maximization is the goal of all American businesses. Many increase profits by keeping costs as low as possible. One company has taken cost-cutting to new “lows”: Steve & Barry’s University Sportswear.

## Steve & Barry’s Rules the Mall

Steven Shore and Barry Prevor love to fill a void — about 3.5 million square feet of it. That’s how much space Steve & Barry’s University Sportswear took in U.S. shopping centers last year, the most of any mall-based chain.

The co-CEOs soaked up that space by opening 62 supermarket-sized stores, almost doubling their outlets in one year, to 134. The privately held chain, which lures shoppers with casual clothing priced at \$7.98 or less—a 40% discount to prices at Wal-Mart Stores Inc. and Target Corp.—plans to operate more than 200 stores by yearend.

... How can Steve & Barry’s charge so little? One reason: the cut-rate deals it negotiates with landlords. Most of its stores are in middle-market malls, which have seen rising vacancies. . . .

Low rents are hardly the only way the men keep costs low. While malls usually give new tenants allowances of \$20 to \$30 a square foot to build interiors, the popularity of Steve & Barry’s has allowed the chain to command [allowances] as high as \$80, considerably more than actual costs. . . .



Steve & Barry’s also saves money in purchasing. It buys direct from overseas factories, like many others, but cuts costs by accepting longer lead times. It also saves by offering steady production throughout the year rather than seasonal ramp-ups. The chain cuts expenses further by deft navigation of import quotas and duties. . . . That’s why it buys more from factories in Africa and less from China than many rivals—most African countries face neither U.S. quotas nor duties. Advertising isn’t an expense Steve & Barry’s wrestles with, either—it relies mostly on word of mouth.

—Reprinted from *BusinessWeek*

Item	Store	Price
Carpenter jeans	Wal-Mart	\$14.88
	Target	16.99
	S&B’s	7.98
Polo shirt	Wal-Mart	9.83
	Target	11.99
	S&B’s	7.98
Baseball cap	Wal-Mart	7.00
	Target	11.89
	S&B’s	7.98
Hooded sweatshirt	Wal-Mart	12.77
	Target	12.99
	S&B’s	7.98

Sources: [www.walmart.com](http://www.walmart.com), [www.target.com](http://www.target.com), [www.steveandbarrys.com](http://www.steveandbarrys.com)

### Examining the Newsclip

- 1. Summarizing** How has Steve & Barry’s University Sportswear cut costs?
- 2. Making Connections** How do the cost-cutting steps help Steve & Barry’s increase its profits?

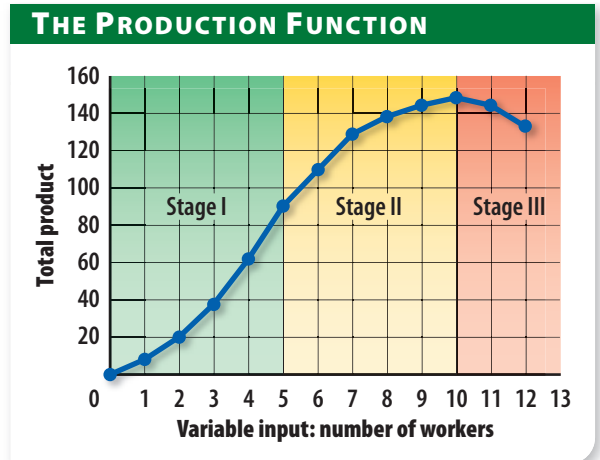


Study anywhere, anytime!  
Download quizzes and flash cards to your PDA from [glencoe.com](http://glencoe.com).

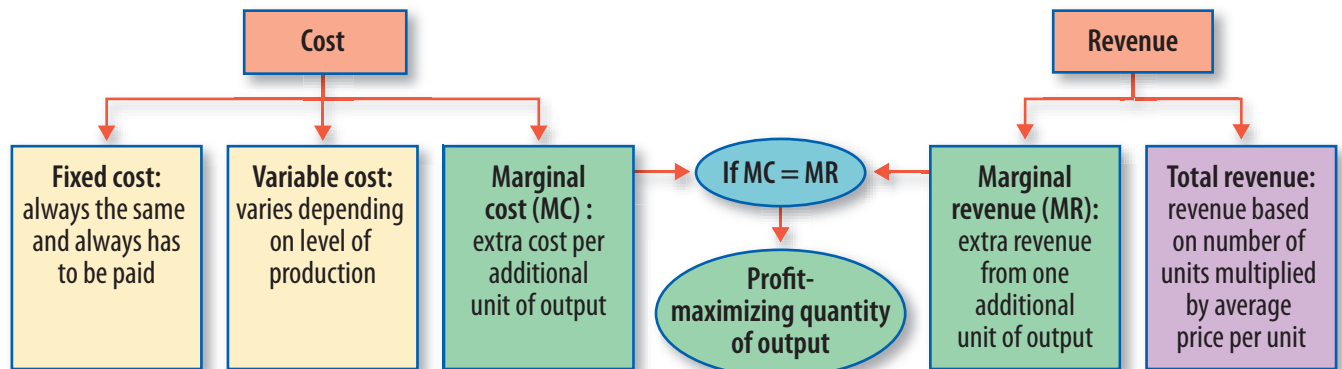
▶ **Law of Supply** When the price of a product goes up, quantity supplied goes up.  
When the price goes down, quantity supplied goes down.



▶ **Production Function** The production function helps us find the optimal number of variable units (labor) to be used in production. As workers are added in Stage I, production increases at an increasing rate. In Stage II, production increases at a decreasing rate because of diminishing returns. In Stage III, production decreases because more workers cannot make a positive contribution.



▶ **Cost and Revenue** While businesses have several types of costs, they can find the profit-maximizing quantity of output by comparing **marginal cost** to their **marginal revenue**.





# Assessment & Activities

## Review Content Vocabulary

On a separate sheet of paper, write the letter of the key term that best matches each definition below.

- |                                |                        |
|--------------------------------|------------------------|
| a. change in quantity supplied | g. production function |
| b. diminishing returns         | h. Law of Supply       |
| c. fixed costs                 | i. total cost          |
| d. marginal analysis           | j. change in supply    |
| e. marginal product            | k. overhead            |
| f. marginal revenue            | l. total product       |

- a production cost that does not change as total business output changes
- decision making that compares the additional costs with the additional benefits of an action
- associated with Stage II of production
- situation where the amount of products for sale changes while the price remains the same
- a graphical representation of the theory of production
- the additional output produced when one additional unit of input is added
- change in total revenue from the sale of one additional unit of output
- change in the amount of products for sale when the price changes
- the sum of variable and fixed costs
- principle that more will be offered for sale at high prices than at lower prices
- total output produced by a firm
- total fixed costs

## Review Academic Vocabulary

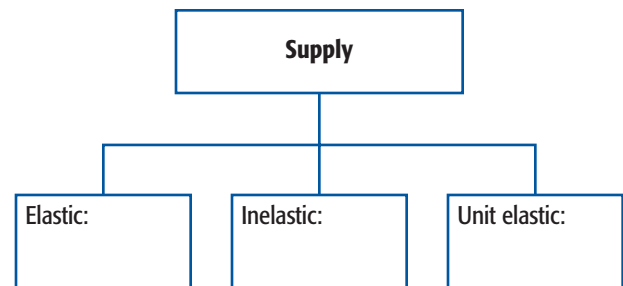
On a separate sheet of paper, write a paragraph about “supply” that uses all of the following terms.

- |                  |                 |
|------------------|-----------------|
| 13. interaction  | 16. contributes |
| 14. various      | 17. conducted   |
| 15. hypothetical | 18. generates   |

## Review Main Ideas

### Section 1 (pages 117–125)

- Describe** what economists mean by *supply*.
- Distinguish** between the individual supply curve and the market supply curve.
- Describe** the factors that can cause a change in supply.
- Identify** the three types of elasticity, using a graphic organizer similar to the one below.



### Section 2 (pages 127–130)

- Explain** the difference between total product and marginal product.
- Describe** the three stages of production.

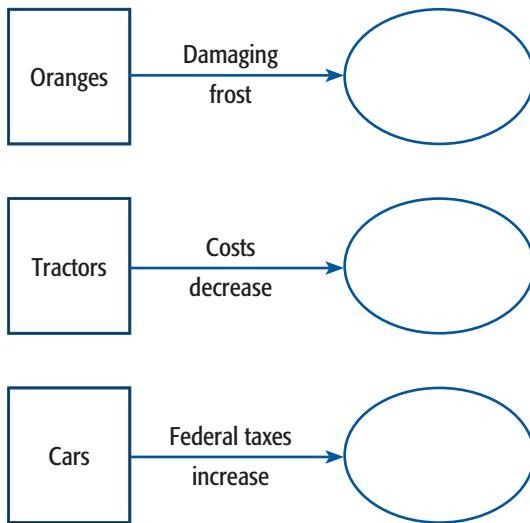
### Section 3 (pages 132–137)

- Describe** the relationship between marginal cost and total cost.
- Explain** the difference between fixed and variable costs.
- Discuss** why businesses analyze their costs.
- Explain** how businesses determine their profit maximization output.

## Critical Thinking

- The BIG Idea** Imagine that gas prices have increased to \$5.00 per gallon. What will happen to the supply of fuel-efficient cars in the short run and in the long run? Explain.
- Determining Cause and Effect** Explain why e-commerce reduces fixed costs.

- 31. Making Generalizations** Why might production functions tend to differ from one firm to another?
- 32. Interpreting** Return to the chapter opener activity on page 116. Now that you have learned about supply, review the questions you answered at the beginning of the chapter. How would you revise your earlier decisions on services and prices, and why?
- 33. Understanding Cause and Effect** According to the Law of Supply, what will happen to the number of products a firm offers for sale when prices go down? What will happen if the cost of production increases while prices remain the same?
- 34. Drawing Conclusions** Use a graphic organizer like the one below to illustrate what will happen to supply in each of the situations provided.



### Applying Economic Concepts

- 35. Marginal Analysis** Think about a recent decision you made in which you used the tools of marginal analysis. Describe in detail the problem, the individual steps you took to solve the problem, and the point at which you stopped taking further steps. Explain why you decided to make no further changes.
- 36. Overhead** Overhead is a concern not just for businesses, but also for individuals. What overhead costs do you have to take into consideration if you want to own a car?

### Thinking Like an Economist

- 37.** Label the following actions according to their placement in the stages of production:
- After many hours of studying, you are forgetting some of the material you learned earlier.
  - You are studying for a test and learning rapidly.
  - After a few hours, you are still learning but not as fast as before.

### Analyzing Visuals

- 38. Making Connections** Look at Panel B in Figure 5.5 on page 128. Describe the shape of the curve as it goes through the three different stages. How does the shape correspond to the total product and the marginal product listed in Panel A?

### Writing About Economics

- 39. Persuasive Writing** Research the way government regulates a business or industry in your region. Write a short paper discussing how you think the regulation affects the supply curve of the product both for the firm and for the industry.

### Math Practice

- 40.** Using the schedule below as a starting point, create a supply schedule and a supply curve that shows the following information: American automakers are willing to sell 200,000 cars per year when the price of a car is \$20,000. They are willing to sell 400,000 when the price is \$25,000 and 600,000 at a price of \$30,000.

Price	Quantity supplied
\$20,000	200,000
\$25,000	