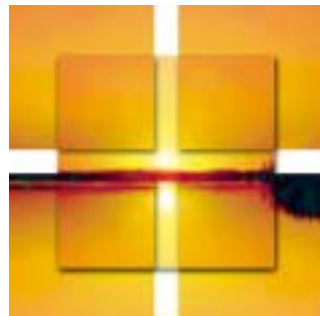


# Demand and Supply

## CHAPTER CHECKLIST

When you have completed your study of this chapter, you will be able to:

- 1 Distinguish between quantity demanded and demand and explain what determines demand.
- 2 Distinguish between quantity supplied and supply and explain what determines supply.
- 3 Explain how demand and supply determine price and quantity in a market and explain the effects of changes in demand and supply.



Because we face scarcity, we must make choices. One of these choices is to specialize in the activity in which we have a comparative advantage. Because we specialize, we sell the services of our factors of production in factor markets and we buy the goods and services that we consume in goods markets.

In this chapter, you study the tools of demand and supply that explain how markets work. You will learn how the choices people make about what to buy and sell determine the quantities and prices of the goods and services produced and consumed and the quantities of the factors of production employed.

Throughout your course in economics, you will use these demand and supply tools to understand the forces that allocate scarce resources. Soon, you will find yourself using the tools of demand and supply in your everyday life whenever you need to think about a price or a quantity.

## COMPETITIVE MARKETS

When you need a new pair of running shoes, want a bagel and a latte, plan to upgrade your entertainment system, or need to fly home for Thanksgiving, you must find a place where people sell those items or offer those services. The place in which you find them is a *market*. You learned in Chapter 2 that a market is any arrangement that brings buyers and sellers together. A market has two sides: buyers (demanders) and sellers (suppliers). There are markets for *goods* such as apples and hiking boots, for *services* such as haircuts and tennis lessons, for *resources* such as computer programmers and earthmovers, and for other manufactured *inputs* such as memory chips and auto parts. There are also markets for money such as Japanese yen and for financial securities such as Yahoo! stock. Only imagination limits what can be traded in markets.

Some markets are physical places where the buyers and sellers meet and where an auctioneer or a broker helps to determine the prices. Examples of this type of market are the New York Stock Exchange and wholesale fish, meat, and produce markets.

Some markets are groups of people spread around the world who never meet and know little about each other but are connected through the Internet or by telephone. Examples of this type of market are the e-commerce markets and currency markets.

But most markets are unorganized collections of buyers and sellers. You do most of your trading in this type of market. An example is the market for basketball shoes. The buyers in this \$3 billion-a-year market are the 45 million Americans who play basketball (or those who want to make a fashion statement) and are looking for a new pair of shoes. The sellers are the tens of thousands of retail sports equipment and footwear stores. Each buyer can visit several different stores, and each seller knows that the buyer has a choice of stores.

Markets vary in the intensity of competition that buyers and sellers face. In this chapter, we're going to study a *competitive market* that has so many buyers and so many sellers that no one can influence the price.



Markets for stocks...



currency...



and running shoes.

## 4.1 DEMAND

First, we'll study the behavior of buyers in a competitive market. The **quantity demanded** of any good, service, or resource is the amount that people are willing and able to buy during a specified period at a specified price. For example, when spring water costs \$1 a bottle, you decide to buy 2 bottles a day. The 2 bottles a day is your quantity demanded of spring water.

The quantity demanded is measured as an amount *per unit of time*. For example, your quantity demanded of water is 2 bottles *per day*. We could express this quantity as 14 bottles per week or some other number per month or per year. But without a time dimension, a particular number of bottles has no meaning.

Many things influence buying plans, and one of them is price. We look first at the relationship between quantity demanded and price. To study this relationship, we keep all other influences on buying plans the same and we ask: How, other things remaining the same, does the quantity demanded of a good change as its price varies? The law of demand provides the answer.

### ■ The Law of Demand

The law of demand states

**Other things remaining the same, if the price of a good rises, the quantity demanded of that good decreases; and if the price of a good falls, the quantity demanded of that good increases.**

So the law of demand states that when all else remains the same, if the price of a Palm Pilot falls, people will buy more Palm Pilots; or if the price of a baseball ticket rises, people will buy fewer tickets.

Why does the quantity demanded increase if the price falls, all other things remaining the same?

The answer is that, faced with a limited budget, people always have an incentive to find the best deals they can. If the price of one item falls and the prices of all other items remain the same, the item with the lower price is a better deal than it was before. So people buy more of this item. Suppose, for example, that the price of bottled water fell from \$1 a bottle to 25 cents a bottle while the price of Gatorade remained at \$1 a bottle. Wouldn't some people switch from Gatorade to water? By doing so, they save 75 cents a bottle, which they can spend on other things they previously couldn't afford.

Think about the things that you buy and ask yourself: Which of these items does *not* obey the law of demand? If the price of a new textbook were lower, other things remaining the same (including the price of a used textbook), would you buy more new textbooks? Then think about all the things that you do not now buy but would if you could afford them. How cheap would a PC have to be for you to buy *both* a desktop and a laptop? There is a price that is low enough to entice you!

### ■ Demand Schedule and Demand Curve

**Demand** is the relationship between the quantity demanded and the price of a good when all other influences on buying plans remain the same. The quantity demanded is *one* quantity at *one* price. *Demand* is a *list of quantities at different prices* illustrated by a demand schedule and a demand curve.

### Quantity demanded

The amount of any good, service, or resource that people are willing and able to buy during a specified period at a specified price.

### Demand

The relationship between the quantity demanded and the price of a good when all other influences on buying plans remain the same.

**Demand schedule**

A list of the quantities demanded at each different price when all the other influences on buying plans remain the same.

**Demand curve**

A graph of the relationship between the quantity demanded of a good and its price when all the other influences on buying plans remain the same.

A **demand schedule** is a list of the quantities demanded at each different price when all the other influences on buying plans remain the same. The table in Figure 4.1 is one person's (Tina's) demand schedule for bottled water. It tells us that if the price of water is \$2 a bottle, Tina buys no water. Her quantity demanded is 0 bottles a day. If the price of water is \$1.50 a bottle, her quantity demanded is 1 bottle a day. Tina's quantity demanded increases to 2 bottles a day at a price of \$1.00 a bottle and to 3 bottles a day at a price of 50 cents a bottle.

A **demand curve** is a graph of the relationship between the quantity demanded of a good and its price when all the other influences on buying plans remain the same. The points on the demand curve labeled *A* through *D* represent the rows *A* through *D* of the demand schedule. For example, point *B* on the graph represents row *B* of the demand schedule and shows that the quantity demanded is 1 bottle a day when the price is \$1.50 a bottle. Point *C* on the demand curve represents row *C* of the demand schedule and shows that the quantity demanded is 2 bottles a day when the price is \$1.00 a bottle.

The downward slope of the demand curve illustrates the law of demand. Along the demand curve, when the price of the good *falls*, the quantity demanded *increases*. For example, in Figure 4.1, when the price of a bottle of water falls from \$1.00 to 50 cents, the quantity demanded increases from 2 bottles a day to 3 bottles a day. And when the price *rises*, the quantity demanded *decreases*. For example, when the price rises from \$1.00 to \$1.50 a bottle, the quantity demanded decreases from 2 bottles a day to 1 bottle a day.

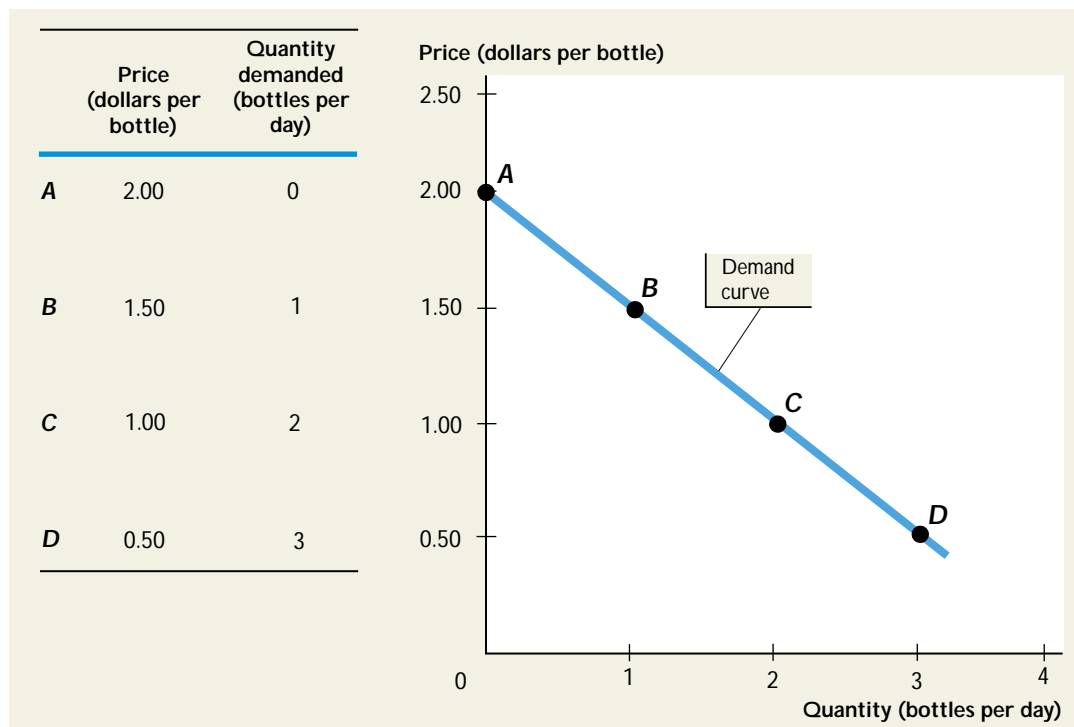
**FIGURE 4.1**

Demand Schedule and Demand Curve

[Practice Online](#)

The table shows a demand schedule, which lists the quantity of water demanded at each price if all other influences on buying plans remain the same. At a price of \$1.50 a bottle, the quantity demanded is 1 bottle a day.

The demand curve shows the relationship between the quantity demanded and price, everything else remaining the same. The downward-sloping demand curve illustrates the law of demand. When the price falls, the quantity demanded increases; and when the price rises, the quantity demanded decreases.



## Individual Demand and Market Demand

The demand schedule and the demand curve that you've just studied are for one person. To study a market, we must determine the market demand.

**Market demand** is the sum of the demands of all the buyers in a market. To find the market demand, imagine a market in which there are only two buyers: Tina and Tim. The table in Figure 4.2 shows three demand schedules: Tina's, Tim's, and the market demand schedule. Tina's demand schedule is the same as before. It shows the quantity of water demanded by Tina at each different price. Tim's demand schedule tells us the quantity of water demanded by Tim at each price. To find the quantity of water demanded in the market, we sum the quantities demanded by Tina and Tim. For example, at a price of \$1.00 a bottle, the quantity demanded by Tina is 2 bottles a day, the quantity demanded by Tim is 1 bottle a day, and so the quantity demanded in the market is 3 bottles a day.

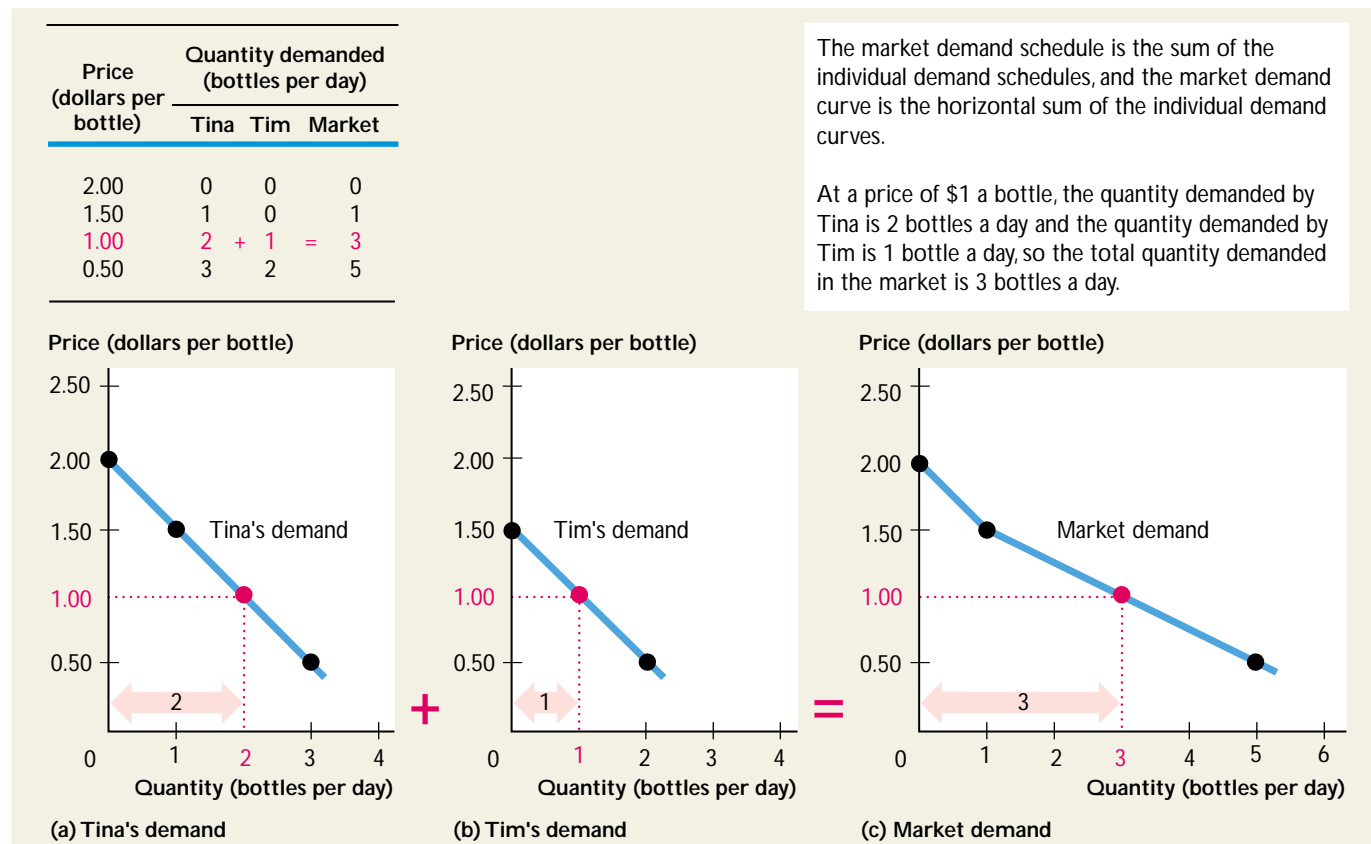
Tina's demand curve in part (a) and Tim's demand curve in part (b) are graphs of the two individual demand schedules. The market demand curve in part (c) is a graph of the market demand schedule. At a given price, the quantity demanded on the market demand curve equals the horizontal sum of the quantities demanded on the individual demand curves.

### Market demand

The sum of the demands of all the buyers in the market.

**FIGURE 4.2**  
Individual Demand and Market Demand

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**Change in the quantity demanded**

A change in the quantity of a good that people plan to buy that results from a change in the price of the good.

**Change in demand**

A change in the quantity that people plan to buy when any influence on buying plans other than the price of the good changes.

**Substitute**

A good that can be consumed in place of another good.

**Changes in Demand**

The demand curve shows how the quantity demanded changes when the price changes but *all other influences on buying plans remain the same*. When the price changes, we call the resulting change in buying plans a **change in the quantity demanded**, and we illustrate this change by a movement along the demand curve.

When any influence on buying plans other than the price of the good changes, there is a **change in demand**. When demand changes, *the demand curve shifts*. Figure 4.3 illustrates two changes in demand. Initially, the demand curve is  $D_0$ . When the demand for bottled water decreases, the demand curve shifts leftward to  $D_1$ . On demand curve  $D_1$ , the quantity demanded is smaller at each price. And when the demand for bottled water increases, the demand curve shifts rightward to  $D_2$ . On demand curve  $D_2$ , the quantity demanded is greater at each price.

The main influences on buying plans that change demand are

- Prices of related goods
- Income
- Expectations
- Number of buyers
- Preferences

**Prices of Related Goods**

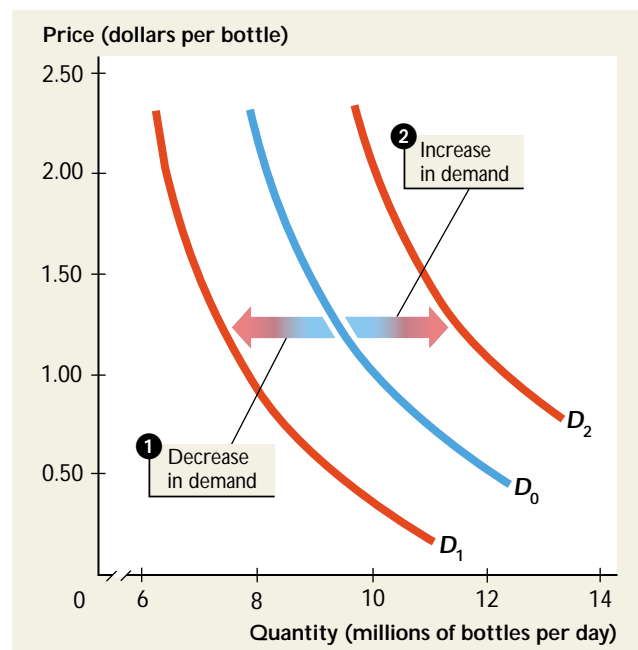
A change in the price of one good can bring a change in the demand for a related good. Related goods are either substitutes or complements. A **substitute** for a good is another good that can be consumed in its place. Chocolate cake is a substitute for cheesecake, a taxi ride is a substitute for a subway ride, and bottled water is a substitute for Gatorade.

**FIGURE 4.3**  
Changes in Demand

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A change in any influence on buyers' plans, other than a change in the price of the good itself, changes demand and shifts the demand curve.

- 1 When demand decreases, the demand curve shifts leftward from  $D_0$  to  $D_1$ .
- 2 When demand increases, the demand curve shifts rightward from  $D_0$  to  $D_2$ .



A **complement** of a good is another good that is consumed with it. Salsa is a complement of tortilla chips, wrist guards are a complement of in-line skates, and bottled water is a complement of fitness center services.

**A Change in the Price of a Substitute** The demand for a good *increases* if the price of one of its substitutes *rises*; and the demand for a good *decreases* if the price of one of its substitutes *falls*. That is, the demand for a good and the price of one of its substitutes move in the *same direction*. For example, cheesecake and chocolate cake are substitutes, so the demand for cheesecake increases when the price of chocolate cake rises.

**A Change in the Price of a Complement** The demand for a good *decreases* if the price of one of its complements *rises*; and the demand for a good *increases* if the price of one of its complements *falls*. That is, the demand for a good and the price of one of its complements move in *opposite directions*. For example, salsa and tortilla chips are complements, so the demand for salsa decreases when the price of tortilla chips rises.

### Income

A good is a **normal good** if a rise in income brings an increase in demand and a fall in income brings a decrease in demand. For example, if you buy more bottled water when your income increases, then bottled water is a normal good. Most goods are normal goods (hence the name). A good is an **inferior good** if a rise in income brings a *decrease* in demand and a fall in income brings an *increase* in demand. For example, if when your income increases, you buy fewer plastic milk crates and more bookcases, then a plastic milk crate is an inferior good.

### Expectations

Expected future income and prices influence demand. For example, you are offered a well-paid summer job, so you go to Cancun during spring break. Your demand for vacation travel has increased. Or if you expect the price of ramen noodles to rise next week, you buy a big enough stockpile of it now to get you through the rest of the school year. Your demand for ramen noodles today has increased.

### Number of Buyers

The greater the number of buyers in a market, the larger is demand. For example, the demand for parking spaces, movies, bottled water, or just about anything is greater in New York City than it is in Boise, Idaho.

### Preferences

Tastes or, as economists call them, *preferences* influence demand. When preferences change, the demand for one item increases and the demand for another item (or items) decreases. For example, preferences have changed as people have become better informed about the health hazards of tobacco. This change in preferences has decreased the demand for cigarettes and increased the demand for nicotine patches.

Preferences also change when new goods become available. For example, the development of MP3 technology has decreased the demand for CDs and increased the demand for Internet services and personal computers.

### Complement

A good that is consumed with another good.

### Normal good

A good for which demand increases when income increases.

### Inferior good

A good for which demand decreases when income increases.

## ■ Demand: A Summary

Let's now summarize what you've learned about demand. A change in any influence on buyers' plans causes either a *change in the quantity demanded* or a *change in demand*. When you are thinking about the influences on demand, it is a good idea to get into the habit of asking yourself: Does this influence change the quantity demanded or does it change demand?

The distinction is crucial for figuring out how a market responds to the forces that hit it. The test for which of these two changes is occurring is simple. If the price of the good changes, other things remaining the same, there is a change in the quantity demanded and a movement along the demand curve. If any influence other than the price of the good changes, there is a change in demand and a shift of the demand curve.

Figure 4.4 illustrates and summarizes these distinctions:

- If the price of bottled water *rises* when everything else remains the same, the quantity demanded of bottled water *decreases* and there is a *movement up* along the demand curve  $D_0$ . If the price *falls* when everything else remains the same, the quantity demanded *increases* and there is a *movement down* along the demand curve  $D_0$ .
- If some other influence on buyers' plans changes, there is a change in demand. When the demand for bottled water *decreases*, the demand curve *shifts leftward* (to the red demand curve  $D_1$ ). When the demand for bottled water *increases*, the demand curve *shifts rightward* (to the red demand curve  $D_2$ ).

■ FIGURE 4.4

Change in Quantity Demanded Versus Change in Demand

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### 1 A decrease in the quantity demanded

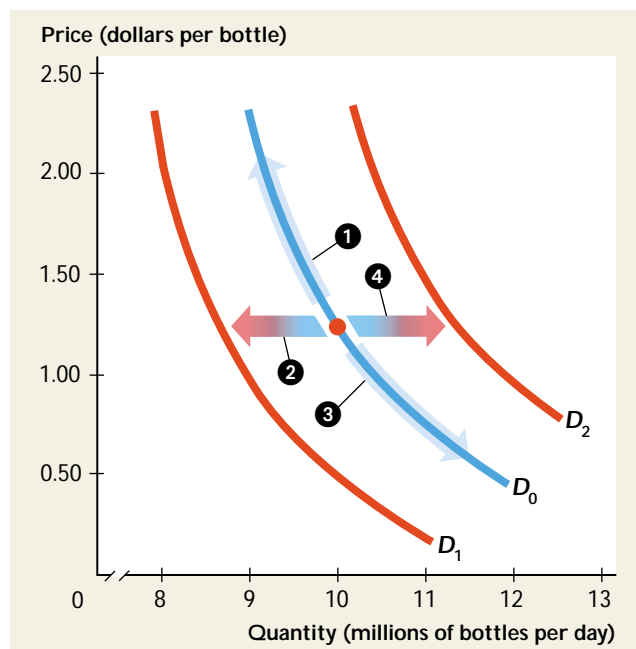
If the price of a good rises, *cet. par.*, the quantity demanded decreases. There is a movement up along the demand curve  $D_0$ .

### 2 A decrease in demand

Demand decreases and the demand curve shifts leftward (from  $D_0$  to  $D_1$ ) if

- The price of a substitute falls.
- The price of a complement rises.
- The price of the good is expected to fall or income is expected to fall in the future.
- Income decreases.\*
- The number of buyers decreases.

\* Bottled water is a normal good



### 3 An increase in the quantity demanded

If the price of a good falls, *cet. par.*, the quantity demanded increases. There is a movement down along the demand curve  $D_0$ .

### 4 An increase in demand

Demand increases and the demand curve shifts rightward (from  $D_0$  to  $D_2$ ) if

- The price of a substitute rises.
- The price of a complement falls.
- The price of the good is expected to rise or income is expected to rise in the future.
- Income increases.\*
- The number of buyers increases.

## CHECKPOINT 4.1

- 1 Distinguish between quantity demanded and demand and explain what determines demand.

### Practice Problem 4.1

In the market for scooters, several events occur, one at a time. Explain the influence of each event on the quantity demanded of scooters and on the demand for scooters. Illustrate the effects of each event by either a movement along the demand curve or a shift in the demand curve for scooters, and say which event (or events) illustrates the law of demand in action. These events are

- a. The price of a scooter falls.
- b. The price of a bicycle falls.
- c. Citing rising injury rates, cities and towns ban scooters from sidewalks.
- d. Income increases.
- e. Rumor has it that the price of a scooter will rise next month.
- f. Scooters become unfashionable and the number of buyers decreases.

### Exercise 4.1

The cell phone was invented in 1973, and during the first 20 years of its life, few people used one, except as a car phone. But during the 1990s, the use of cell phones increased dramatically and the price of cell phone service fell.

- a. Are there any substitutes for cell phones? If so, provide an example.
- b. Do cell phones have any complements? If so, provide an example.
- c. What are the main developments that brought about the dramatic increase in cell phone use during the 1990s?
- d. Which of the developments that you have identified increased the demand for cell phones? Illustrate these effects by using the demand curve for cell phones.
- e. Which of the developments that you have identified increased the quantity demanded of cell phones? Illustrate these effects by using the demand curve for cell phones.

### Solution to Practice Problem 4.1

- a. A fall in the price of a scooter increases the quantity demanded of scooters, shown by a movement down along the demand curve for scooters (Figure 1) and is an example of the law of demand in action.
- b. A bicycle is a substitute for a scooter. So when the price of a bicycle falls, the demand for scooters decreases. The demand curve shifts leftward (Figure 2).
- c. The ban on scooters on sidewalks changes preferences and decreases the demand for scooters. The demand curve shifts leftward (Figure 2).
- d. A scooter is (likely) a normal good. So when income increases, the demand for scooters increases. The demand curve for scooters shifts rightward (Figure 2).
- e. A rise in the expected price of a scooter increases the demand for scooters now. The demand curve for scooters shifts rightward (Figure 2).
- f. A decrease in the number of buyers decreases the demand for scooters. The demand curve shifts leftward (Figure 2).

Study Guide pp. 55–58

[Practice Online 4.1](#)

FIGURE 1

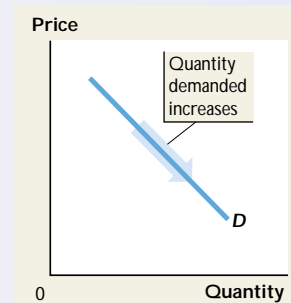
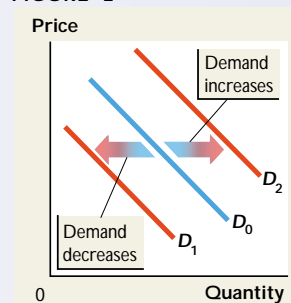


FIGURE 2



**Quantity supplied**

The amount of any good, service, or resource that people are willing and able to sell during a specified period at a specified price.

**Supply**

The relationship between the quantity supplied and the price of a good when all other influences on selling plans remain the same.

## 4.2 SUPPLY

A market has two sides. On one side are the buyers, or demanders, that we've just studied. On the other side of the market are the sellers, or suppliers. We now study the forces that determine suppliers' plans.

The **quantity supplied** of a good, service, or resource is the amount that people are willing and able to sell during a specified period at a specified price. For example, when the price of spring water is \$1.50 a bottle, a spring owner decides to sell 2,000 bottles a day. The 2,000 bottles a day is the quantity supplied of spring water by this individual producer. (As in the case of demand, the quantity supplied is measured as an amount *per unit of time*.)

Many things influence selling plans, and one of them is the price. We look first at the relationship between quantity supplied of a good and its price. To study this relationship, we keep all other influences on selling plans the same. And we ask: How, other things remaining the same, does the quantity supplied of a good change as its price varies? The law of supply provides the answer.

### ■ The Law of Supply

The law of supply states

**Other things remaining the same, if the price of a good rises, the quantity supplied of that good increases; and if the price of a good falls, the quantity supplied of that good decreases.**

So the law of supply states that when all else remains the same, if the price of bottled water rises, spring owners will offer more water for sale; if the price of a CD falls, Sony Corp. will offer fewer CDs for sale.

Why, other things remaining the same, does the quantity supplied increase if the price rises and decrease if the price falls?

The basic answer is that, faced with scarce resources, suppliers have an incentive to use their resources in the way that brings the biggest return. If the price of what they sell rises and the prices of all other items remain the same, the item with the higher price brings a greater return than it did before. So suppliers will want to sell more of this item. Suppose, for example, that the price of bottled water rose from \$1 a bottle to \$2 a bottle while the prices of everything else, including wages and other costs, remained the same. Wouldn't the spring owners offer more water for sale? By doing so, they receive an extra \$1 a bottle.

Think about the resources that you own and can offer for sale to others and ask yourself: Which of these items does *not* obey the law of supply? If the wage rate for summer jobs increased, wouldn't you be encouraged to work longer hours? If the bank offered a higher interest rate on deposits, wouldn't you be inclined to make a greater deposit in the bank? If the used book dealer offered a higher price for last year's textbooks, wouldn't you think about selling that handy math text?

### ■ Supply Schedule and Supply Curve

**Supply** is the relationship between the quantity supplied and the price of a good when all other influences on selling plans remain the same. The quantity supplied is *one* quantity at *one* price. *Supply* is a *list of quantities at different prices* illustrated by a supply schedule and a supply curve.

A **supply schedule** lists the quantities supplied at each different price when all the other influences on selling plans remain the same. The table in Figure 4.5 is one firm's (Agua's) supply schedule for bottled water. It tells us that if the price of water is 50 cents a bottle, Agua plans to sell no water. Its quantity supplied is 0 bottles a day. If the price of water is \$1.00 a bottle, Agua's quantity supplied is 1,000 bottles a day. Agua's quantity supplied increases to 2,000 bottles a day at a price of \$1.50 a bottle and to 3,000 bottles a day at a price of \$2.00 a bottle.

A **supply curve** is a graph of the relationship between the quantity supplied of a good and its price when all the other influences on selling plans remain the same. The points on the supply curve labeled *A* through *D* represent the rows *A* through *D* of the supply schedule. For example, point *C* on the supply curve represents row *C* of the supply schedule and shows that the quantity supplied is 1,000 bottles a day when the price is \$1.00 a bottle. Point *B* on the supply curve represents row *B* of the supply schedule and shows that the quantity supplied is 2,000 bottles a day when the price is \$1.50 a bottle.

The upward slope of the supply curve illustrates the law of supply. Along the supply curve, when the price of the good *rises*, the quantity supplied *increases*. For example, in Figure 4.5, when the price of a bottle of water rises from \$1.50 to \$2.00, the quantity supplied increases from 2,000 bottles a day to 3,000 bottles a day. And when the price *falls*, the quantity supplied *decreases*. For example, when the price falls from \$1.50 to \$1.00 a bottle, the quantity supplied decreases from 2,000 bottles a day to 1,000 bottles a day.

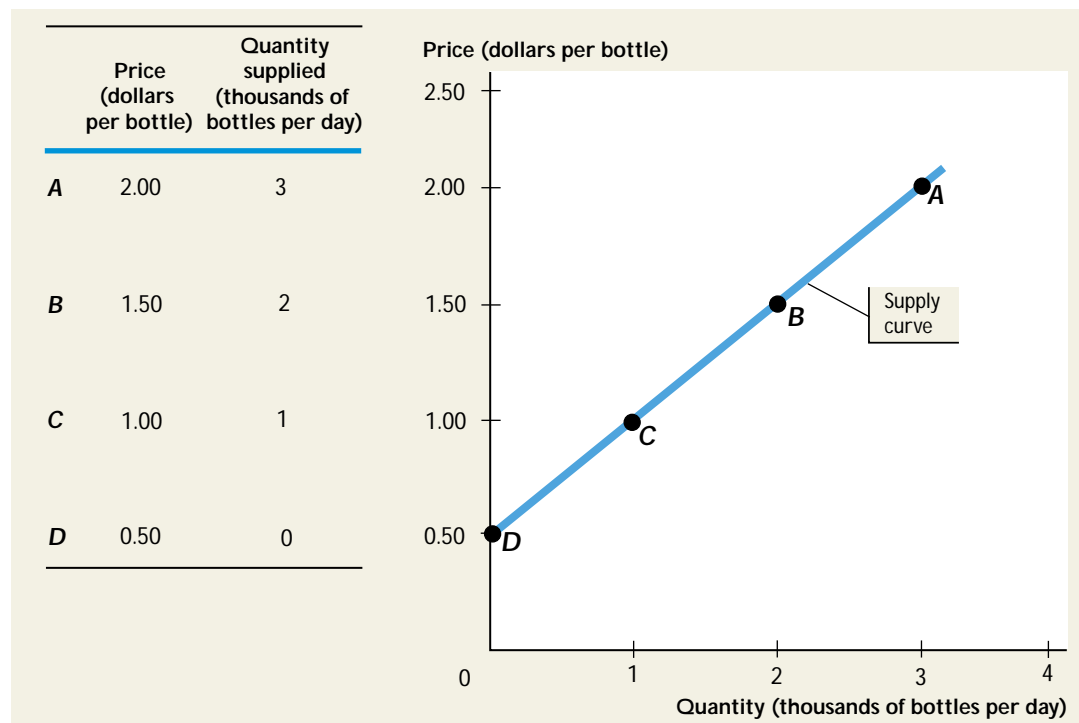
### Supply schedule

A list of the quantities supplied at each different price when all the other influences on selling plans remain the same.

### Supply curve

A graph of the relationship between the quantity supplied of a good and its price when all the other influences on selling plans remain the same.

**FIGURE 4.5**  
Supply Schedule and Supply Curve



### Practice Online

The table shows a supply schedule, which lists the quantity of water supplied at each price if all other influences on selling plans remain the same. At a price of \$1.50 a bottle, the quantity supplied is 2,000 bottles a day.

The supply curve shows the relationship between the quantity supplied and price, everything else remaining the same. The upward-sloping supply curve illustrates the law of supply. When the price rises, the quantity supplied increases; and when the price falls, the quantity supplied decreases.

**Market supply**

The sum of the supplies of all the sellers in the market.

**Individual Supply and Market Supply**

The supply schedule and the supply curve that you’ve just studied are for one seller. To study a market, we must determine the market supply.

**Market supply** is the sum of the supplies of all the sellers in the market. To find the market supply of water, imagine a market in which there are only two sellers: Agua and Prima. The table in Figure 4.6 shows three supply schedules: Agua’s, Prima’s, and the market supply schedule. Agua’s supply schedule is the same as before. Prima’s supply schedule tells us the quantity of water that Prima plans to sell at each price. To find the quantity of water supplied in the market, we sum the quantities supplied by Agua and Prima. For example, at a price of \$1.00 a bottle, the quantity supplied by Agua is 1,000 bottles a day, the quantity supplied by Prima is 2,000 bottles a day, and the quantity supplied in the market is 3,000 bottles a day.

Agua’s supply curve in part (a) and Prima’s supply curve in part (b) are graphs of the two individual supply schedules. The market supply curve in part (c) is a graph of the market supply schedule. At a given price, the quantity supplied on the market supply curve equals the horizontal sum of the quantities supplied on the individual supply curves.

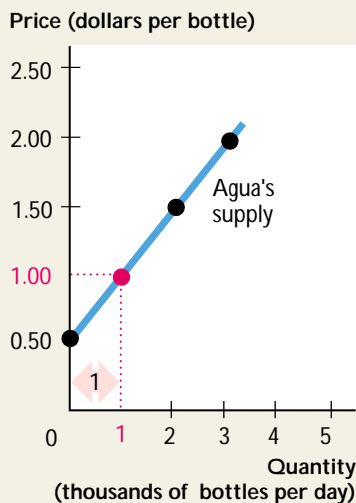
**FIGURE 4.6**  
Individual Supply and Market Supply

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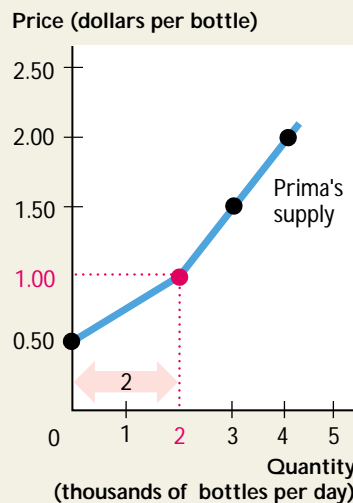
Price (dollars per bottle)	Quantity supplied (thousands of bottles per day)		
	Agua	Prima	Market
2.00	3	4	7
1.50	2	3	5
1.00	1	2	3
0.50	0	0	0

The market supply schedule is the sum of the individual supply schedules, and the market supply curve is the horizontal sum of the individual supply curves.

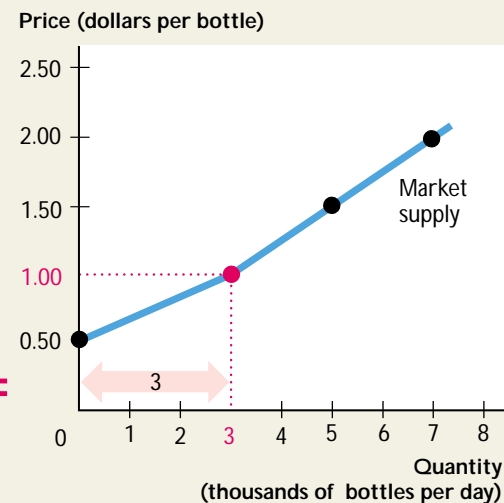
At a price of \$1 a bottle, the quantity supplied by Agua is 1,000 bottles a day and the quantity supplied by Prima is 2,000 bottles a day, so the total quantity supplied in the market is 3,000 bottles a day.



(a) Agua's supply



(b) Prima's supply



(c) Market supply

+

=

## ■ Changes in Supply

The supply curve shows how the quantity supplied changes when the price changes but *all other influences on selling plans remain the same*. When the price changes, we call the resulting influence on selling plans the **change in the quantity supplied**, and we illustrate this change by a movement along the supply curve.

When any influence on selling plans other than the price of the good changes, there is a **change in supply**. When supply changes, *the supply curve shifts*. Figure 4.7 illustrates two changes in supply. Initially, the supply curve is  $S_0$ . When the supply of bottled water decreases, the supply curve shifts leftward to  $S_1$ . On supply curve  $S_1$ , the quantity supplied is smaller at each price. And when the supply of bottled water increases, the supply curve shifts rightward to  $S_2$ . On supply curve  $S_2$ , the quantity supplied is greater at each price.

The main influences on selling plans that change supply are

- Prices of related goods
- Prices of resources and other inputs
- Expectations
- Number of sellers
- Productivity

### Prices of Related Goods

A change in the price of one good can bring a change in the supply of a related good. Related goods are either substitutes in production or complements in production. A **substitute in production** for a good is another good that can be produced in its place. Button-fly jeans are substitutes in production for cargo pants in a clothing factory, and cookie dough ice cream is a substitute in production for chocolate chip ice cream in an ice cream factory.

### Change in the quantity supplied

A change in the quantity of a good that suppliers plan to sell that results from a change in the price of the good.

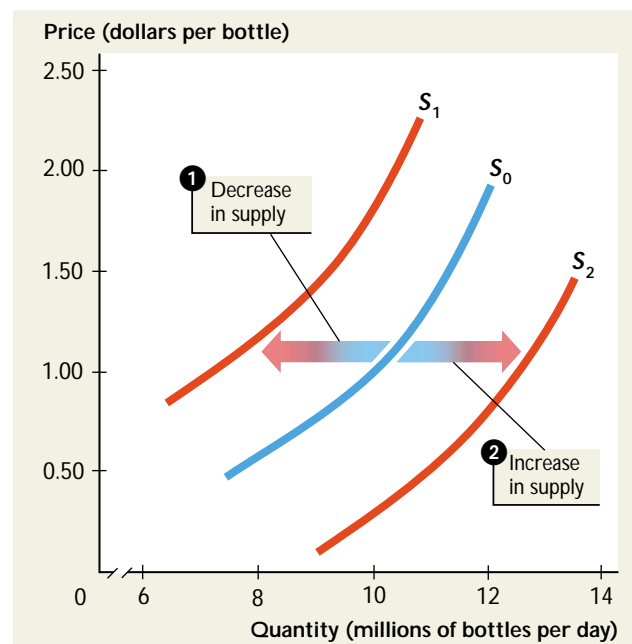
### Change in supply

A change in the quantity that suppliers plan to sell when any influence on selling plans other than the price of the good changes.

### Substitute in production

A good that can be produced in place of another good.

■ FIGURE 4.7  
Changes in Supply



A change in any influence on sellers' plans other than a change in the price of the good itself changes supply and shifts the supply curve.

- 1 When supply decreases, the supply curve shifts leftward from  $S_0$  to  $S_1$ .
- 2 When supply increases, the supply curve shifts rightward from  $S_0$  to  $S_2$ .

[Practice Online](#)

**Complement in production**

A good that is produced along with another good.

A **complement in production** of a good is another good that is produced along with it. Cowhide is a complement in production of beef. And straw is a complement in production of wheat.

**A Change in the Price of a Substitute in Production** The supply of a good *decreases* if the price of one of its substitutes in production *rises*; and the supply of a good *increases* if the price of one of its substitutes in production *falls*. That is, the supply of a good and the price of one of its substitutes in production move in *opposite directions*. For example, a clothing factory can produce cargo pants or button-fly jeans, so these goods are substitutes in production. The supply of cargo pants decreases when the price of button-fly jeans rises.

**A Change in the Price of a Complement in Production** The supply of a good *increases* if the price of one of its complements in production *rises*; and the supply of a good *decreases* if the price of one of its complements in production *falls*. That is, the supply of a good and the price of one of its complements in production move in the *same direction*. For example, when a slaughterhouse produces beef, it also produces cowhide, so these goods are complements in production. The supply of cowhide increases when the price of beef rises.

**Prices of Resources and Other Inputs**

Supply changes when the price of a resource or other input used to produce the good changes. The reason is that resource and input prices influence the cost of production. And the more it costs to produce a good, the smaller is the quantity supplied of that good at each price (other things remaining the same). For example, if the wage rate of bottling-plant workers rises, it costs more to produce a bottle of water. So the supply of bottled water decreases.

**Expectations**

Expectations about future prices influence supply. For example, Boston's Big Dig is placing its freeways underground. A real estate developer expects the price of office space to rise when the Big Dig is completed. So instead of building new office space now, she plans to build it later when the price is higher. This action makes the supply of office space today less than it otherwise would have been. Expectations of future input prices also influence supply. If the developer expects builders' wages to rise next year, she might build new office space now before the wage rise occurs. This action increases the supply of office space today.

**Number of Sellers**

The greater the number of sellers in a market, the larger is the supply. For example, many new sellers have developed springs and water-bottling plants in the United States and the supply of bottled water has increased.

**Productivity**

*Productivity* is output per unit of input. An increase in productivity lowers costs and increases supply. A decrease in productivity has the opposite effect and decreases supply. Technological change is the main influence on productivity. For example, advances in electronic technology have lowered the cost of computers and increased their supply. Natural events such as weather patterns change farm productivity and change the supply of agricultural products.

## Supply: A Summary

Let's now summarize what you've learned about supply. Changes in influences on sellers' plans cause either a *change in the quantity supplied* or a *change in supply*. Just as in the case of demand, when you are thinking about the influences on supply, try to develop the habit of asking yourself: Does this influence change the quantity supplied or does it change supply?

The test for which of these two changes is occurring is simple. If the price of the good changes, other things remaining the same, there is a change in the quantity supplied and a movement along the supply curve. If any influence other than the price of the good changes, there is a change in supply and a shift of the supply curve.

Figure 4.8 illustrates and summarizes these distinctions:

- If the price of bottled water *falls* when other things remain the same, the quantity supplied of bottled water *decreases* and there is a *movement down* along the supply curve  $S_0$ . If the price *rises* when other things remain the same, the quantity supplied *increases* and there is a *movement up* along the supply curve  $S_0$ .
- If any other influence on water bottlers' plans changes, there is a change in the supply of bottled water. When the supply of bottled water *decreases*, the supply curve *shifts leftward* (to the red supply curve  $S_1$ ). When the supply of bottled water *increases*, the supply curve *shifts rightward* (to the red supply curve  $S_2$ ).

**FIGURE 4.8**

Change in Quantity Supplied Versus Change in Supply

[Practice Online](#)

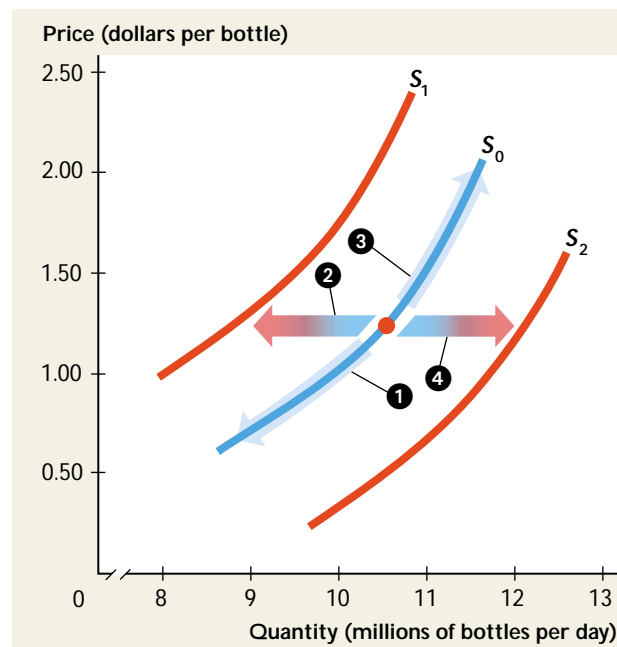
**1 A decrease in the quantity supplied**

If the price of a good falls, *cet. par.*, the quantity supplied decreases. There is a movement down along the demand curve  $S_0$ .

**2 A decrease in supply**

Supply decreases and the supply curve shifts leftward (from  $S_0$  to  $S_1$ ) if

- The price of a substitute in production rises.
- The price of a complement in production falls.
- A resource price or other input price rises.
- The price of the good is expected to rise.
- The number of sellers decreases.
- Productivity decreases.



**3 An increase in the quantity supplied**

If the price of a good rises, *cet. par.*, the quantity supplied increases. There is a movement up along the supply curve  $S_0$ .

**4 An increase in supply**

Supply increases and the supply curve shifts rightward (from  $S_0$  to  $S_2$ ) if

- The price of a substitute in production falls.
- The price of a complement in production rises.
- A resource price or other input price falls.
- The price of the good is expected to fall.
- The number of sellers increases.
- Productivity increases.

## CHECKPOINT 4.2

Study Guide pp. 58–62

[Practice Online 4.2](#)

- 2** Distinguish between quantity supplied and supply and explain what determines supply.

### Practice Problem 4.2

In the market for timber beams, several events occur one at a time. Explain the influence of each event on the quantity supplied of timber beams and the supply of timber beams. Illustrate the effects of each event by either a movement along the supply curve or a shift of the supply curve of timber beams, and say which event (or events) illustrates the law of supply in action. These events are

- The wage rate of sawmill workers rises.
- The price of sawdust rises.
- The price of a timber beam rises.
- The price of a timber beam is expected to rise next year.
- Environmentalists convince Congress to introduce a new law that reduces the amount of forest that can be cut for timber products.
- A new technology lowers the cost of producing timber beams.

### Exercise 4.2

In the market for DVDs, several events occur one at a time. Explain the influence of each event on the quantity supplied of DVDs and the supply of DVDs. Illustrate the effects of each event by either a movement along the supply curve or a shift of the supply curve of DVDs, and say which event (or events) illustrates the law of supply in action. These events are

- The price of a CD falls.
- The price of a DVD falls.
- The price of a DVD is expected to fall next year.
- The number of producers of DVDs increases.
- The wage rate paid to DVD factory workers increases.
- A new robot technology lowers the cost of producing DVDs.

FIGURE 1

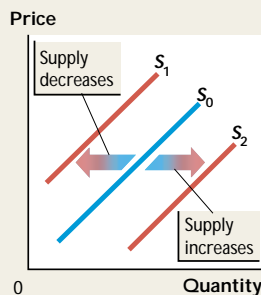
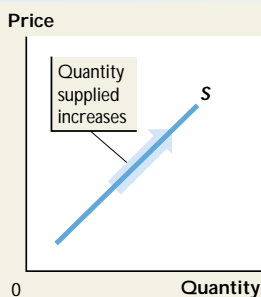


FIGURE 2



### Solution to Practice Problem 4.2

- A rise in the wage rate of sawmill workers decreases the supply of timber beams. The supply curve of timber beams shifts leftward (Figure 1).
- Sawdust and timber beams are complements in production. A rise in the price of sawdust increases the supply of timber beams. The supply curve of timber beams shifts rightward (Figure 1).
- A rise in the price of a timber beam increases the quantity supplied of timber beams, which is shown as a movement up along the supply curve of timber beams and is an example of the law of supply in action (Figure 2).
- The expected rise in the price of a timber beam decreases the supply of timber beams now. The supply curve of timber beams shifts leftward (Figure 1).
- The new law decreases the supply of timber beams. The supply curve of timber beams shifts leftward (Figure 1).
- The new technology increases the supply of timber beams and shifts the supply curve rightward (Figure 1).

### 4.3 MARKET EQUILIBRIUM

In everyday language, “equilibrium” means “opposing forces are in balance.” In a market, the opposing forces are those of demand and supply. Buyers want the lowest possible price, and the lower the price, the greater is the quantity that they plan to buy. Sellers want the highest possible price, and the higher the price, the greater is the quantity that they plan to sell.

**Market equilibrium** occurs when the quantity demanded equals the quantity supplied—when buyers’ and sellers’ plans are consistent. The **equilibrium price** is the price at which the quantity demanded equals the quantity supplied. The **equilibrium quantity** is the quantity bought and sold at the equilibrium price.

Figure 4.9 shows the market for bottled water. The market equilibrium occurs where the demand curve and the supply curve intersect. The equilibrium price is \$1 a bottle, and the equilibrium quantity is 10 million bottles a day.

At the equilibrium price, buying plans and selling plans are balanced. People would buy more water at a lower price, and bottlers would sell more water at a higher price. But at a price of \$1 a bottle, the quantity that people plan to buy equals the quantity that bottlers plan to sell. The opposing forces of buying plans and selling plans are exactly balanced at a price of \$1 a bottle.

An equilibrium might be stable or unstable. Balance an egg on its pointed end (if you can!) and then give it a nudge. The egg rolls over onto its side. The equilibrium was unstable. Now balance an egg on its side and give it a nudge. The egg rocks for a moment but soon settles down in its equilibrium again. Market equilibrium is like an egg balanced on its side. The market is constantly pulled toward a stable equilibrium in which neither buyers nor sellers can improve their positions by changing either the price or the quantity.

#### Market equilibrium

When the quantity demanded equals the quantity supplied—when buyers’ and sellers’ plans are consistent.

#### Equilibrium price

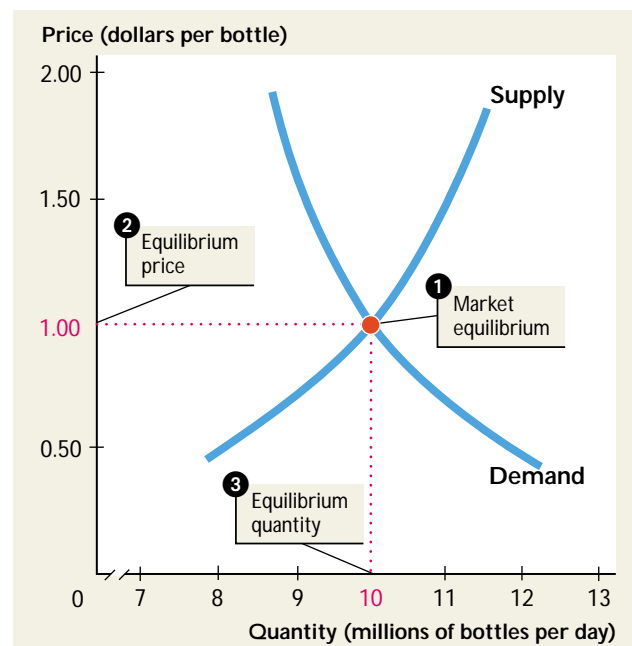
The price at which the quantity demanded equals the quantity supplied.

#### Equilibrium quantity

The quantity bought and sold at the equilibrium price.

**FIGURE 4.9**  
Equilibrium Price and Equilibrium Quantity

[Practice Online](#)



- 1 Market equilibrium occurs at the intersection of the demand curve and the supply curve.
- 2 The equilibrium price is \$1 a bottle.
- 3 At the equilibrium price, the quantity demanded and the quantity supplied are 10 million bottles a day, which is the equilibrium quantity.

## Price: A Market's Automatic Regulator

When equilibrium is disturbed, market forces restore it. The law of market forces states

**When there is a shortage, the price rises; and when there is a surplus, the price falls.**

### Surplus or excess supply

A situation in which the quantity supplied exceeds the quantity demanded.

### Shortage or excess demand

A situation in which the quantity demanded exceeds the quantity supplied.

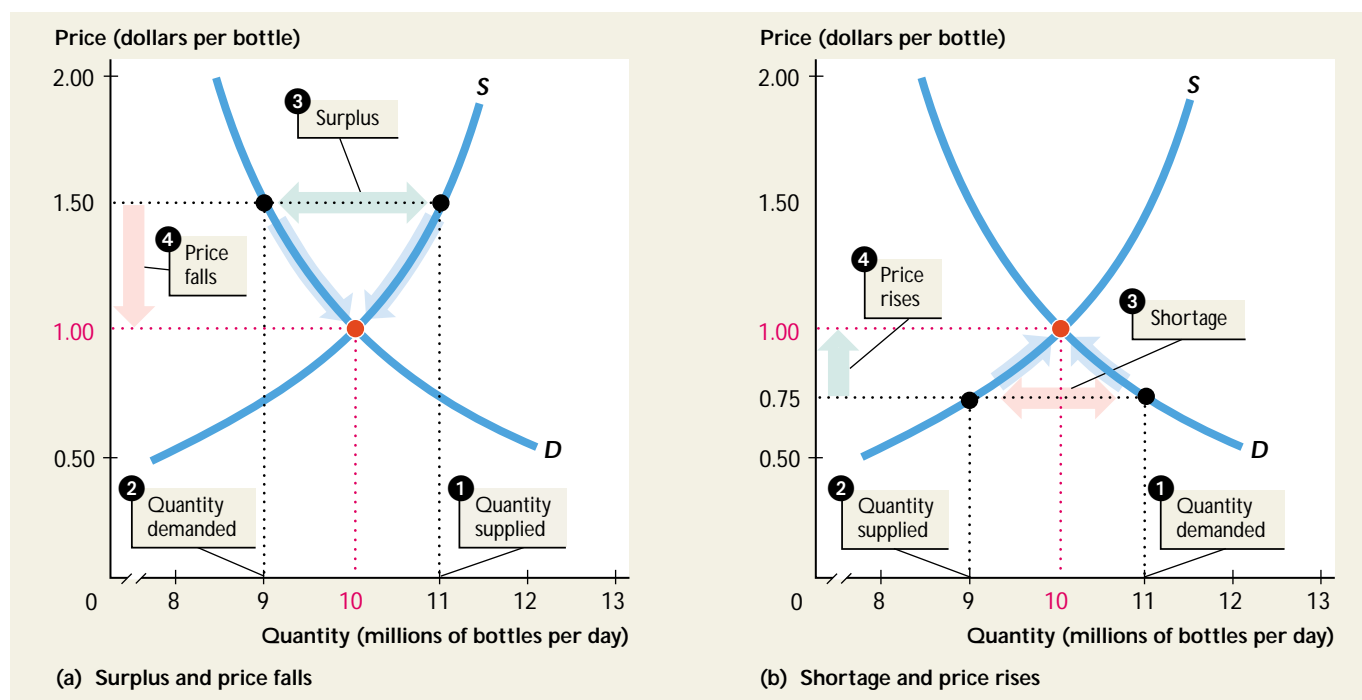
Price is the regulator that pulls the market toward its equilibrium. If the price is above the equilibrium price, there is a **surplus** or **excess supply**—the quantity supplied exceeds the quantity demanded—and the price falls. If the price is below the equilibrium price, there is a **shortage** or **excess demand**—the quantity demanded exceeds the quantity supplied—and the price rises.

In Figure 4.10(a), at \$1.50 a bottle, suppliers plan to sell 11 million bottles but demanders buy only 9 million bottles. There is a surplus of 2 million bottles, and the price begins to fall. As the price falls, the quantity demanded increases, the quantity supplied decreases, and the surplus decreases. The price falls until there is no surplus and comes to rest at \$1 a bottle.

In Figure 4.10(b), at 75 cents a bottle, demanders plan to buy 11 million bottles but suppliers sell only 9 million bottles. There is a shortage of 2 million bottles, and the price begins to rise. As the price rises, the quantity supplied increases, the quantity demanded decreases, and the shortage decreases. The price rises until there is no shortage and comes to rest at \$1 a bottle.

**FIGURE 4.10**  
The Forces That Achieve Equilibrium

[Practice Online](#)



At \$1.50 a bottle, ① the quantity supplied is 11 million bottles, ② the quantity demanded is 9 million bottles, ③ the surplus is 2 million bottles, and ④ the price falls.

At 75 cents a bottle, ① the quantity demanded is 11 million bottles, ② the quantity supplied is 9 million bottles, ③ the shortage is 2 million bottles, and ④ the price rises.

## ■ Effects of Changes in Demand

Markets are constantly hit by events that change demand and supply and bring changes in price and quantity. Some events change demand, and some events change supply. And sometimes these events occur together. We'll look at all the possible cases. But we'll look first at the effects of changes in demand.

In Figure 4.11, the supply curve is  $S$  and, initially, the demand curve is  $D_0$ . The equilibrium price is \$1 a bottle, and the equilibrium quantity is 10 million bottles.

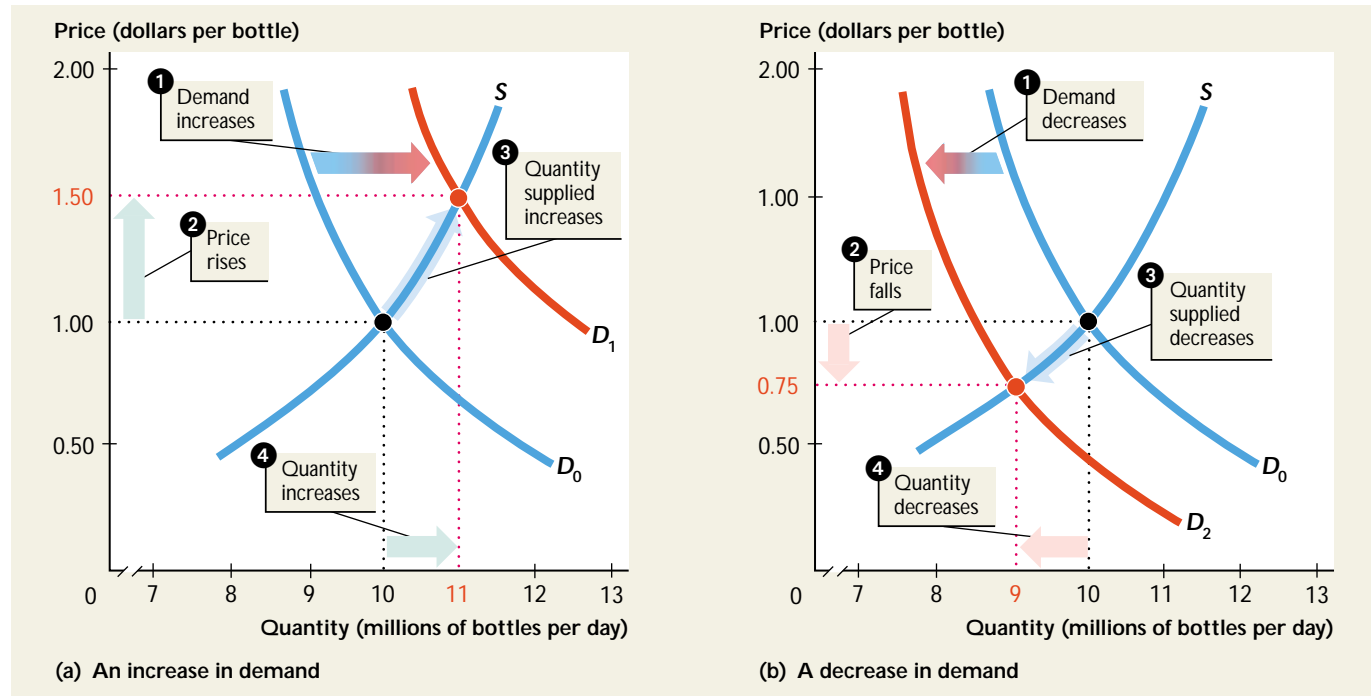
Suppose that a new study is published that raises concerns about the safety of the public water supply. The demand for bottled water increases. In Figure 4.11(a), the demand curve *shifts rightward* to  $D_1$ . At \$1 a bottle, there is now a shortage, so the price rises and the quantity supplied increases. The price rises to \$1.50 a bottle, and the quantity increases to 11 million bottles a day.

Next, suppose that a new zero-calorie sports drink is invented and the demand for bottled water decreases. In Figure 4.11(b), the demand curve *shifts leftward* to  $D_2$ . At the initial price of \$1 a bottle, there is now a surplus, so the price falls and the quantity supplied decreases. The price falls to 75 cents a bottle, and the quantity decreases to 9 million bottles a day.

In both cases, when demand changes, there is *no change in supply*. But there is a *change in the quantity supplied*—a movement along the supply curve.

**FIGURE 4.11**  
The Effects of a Change in Demand

[Practice Online](#)



An increase in demand **1** shifts the demand curve rightward to  $D_1$ , **2** raises the price, **3** increases the quantity supplied, and **4** increases the equilibrium quantity.

A decrease in demand **1** shifts the demand curve leftward to  $D_2$ , **2** lowers the price, **3** decreases the quantity supplied, and **4** decreases the equilibrium quantity.

## ■ Effects of Changes in Supply

Let's now work out what happens when supply changes.

In Figure 4.12, the demand curve is  $D$  and, initially, the supply curve is  $S_0$ . The equilibrium price is \$1 a bottle, and the equilibrium quantity is 10 million bottles.

Suppose that European water bottlers buy springs and open up bottling plants in the United States. The supply of bottled water increases. In Figure 4.12(a), the supply curve shifts rightward to  $S_1$ . At the initial price of \$1 a bottle, there is now a surplus, so the price falls and the quantity demanded increases. The price falls to 75 cents a bottle, and the quantity increases to 11 million bottles a day.

When supply changes, there is *no change in demand*. But there is a *change in the quantity demanded*—a movement along the demand curve.

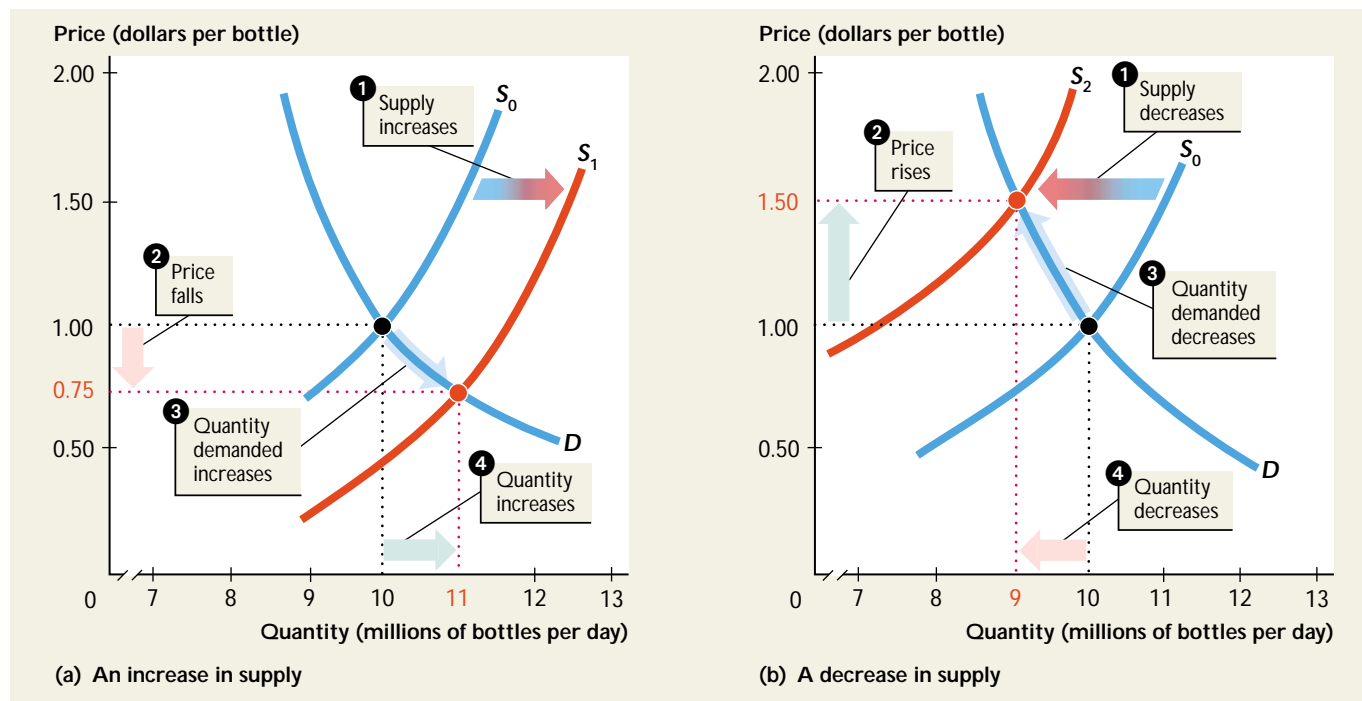
Next, suppose that a drought dries up some springs and the supply of bottled water decreases. In Figure 4.12(b), the supply curve shifts leftward to  $S_2$ . At the initial price of \$1 a bottle, there is now a shortage, so the price rises and the quantity demanded decreases. The price rises to \$1.50 a bottle, and the quantity decreases to 9 million bottles a day.

The new equilibrium price is \$1.50 a bottle. Again, there is *no change in demand*. There is a *decrease in the quantity demanded*—a movement along the demand curve. The equilibrium quantity decreases to 9 million bottles a day.

■ FIGURE 4.12

The Effects of a Change in Supply

[Practice Online](#)



An increase in supply ① shifts the supply curve rightward to  $S_1$ , ② lowers the price, ③ increases the quantity demanded, and ④ increases the equilibrium quantity.

A decrease in supply ① shifts the supply curve leftward to  $S_2$ , ② raises the price, ③ decreases the quantity demanded, and ④ decreases the equilibrium quantity.



## Eye on the Global Economy

### A Change in the Demand for Roses

Colombia and Ecuador grow most of the world's roses. On the average, the quantity of roses sold worldwide is around 6 million bunches a month. And the average price that consumers pay is around \$40 a bunch.

But one month, February, is not a normal month. Each year, in February, the quantity of roses bought increases to four times that of any other month. The reason: Valentine's Day. And on Valentine's Day, the price of a bunch of roses doubles.

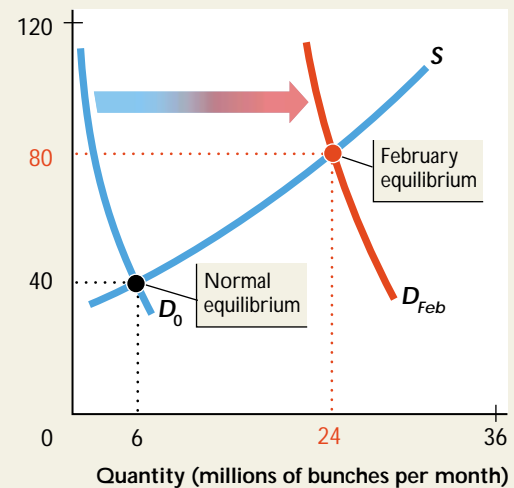
The demand-supply model explains these facts. The figure shows the sup-

ply curve of roses and two demand curves. The blue demand curve is the demand for roses in a normal month. This demand curve intersects the supply curve at an equilibrium price of \$40 a bunch and an equilibrium quantity of 6 million bunches.

In February, the demand curve shifts rightward to the red curve. The February demand curve for roses intersects the supply curve at an equilibrium price of \$80 a bunch and an equilibrium quantity of 24 million bunches.



Price (dollars per bunch)



### A Change in the Supply of Wheat

During 2002, the price of wheat soared from around \$130 per metric ton to \$190. The price increase was the consequence of a widespread global drought that decreased production and decreased the supply of wheat.

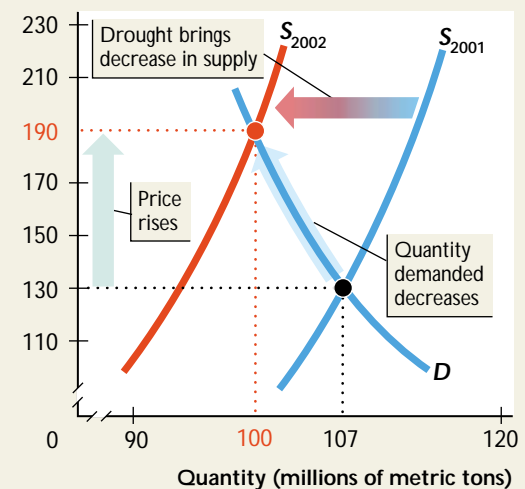
According to USDA estimates, wheat production fell from about 107 million metric tons in 2001 to about 100 million in 2002. Production was worst hit in the United States, Canada, Argentina, Australia, and the EU—the five largest wheat exporters. Production was up in Russia, Ukraine, and Kazakstan, allowing these countries to gain market share.

The figure shows the effect of the decrease in production. The supply of wheat decreased and the supply curve shifted leftward. The price of wheat

increased and the quantity of wheat demanded decreased. (The figure assumes there was no change in the demand for wheat in 2002.)



Price (dollars per metric ton)



SOURCES: [www.fas.usda.gov/grain/circular/2002/06-02/wht\\_txt.htm](http://www.fas.usda.gov/grain/circular/2002/06-02/wht_txt.htm) and [www.uswheat.org/](http://www.uswheat.org/)

### Changes in Both Demand and Supply

What happens to the price and quantity in the market for bottled water when an event that changes demand occurs at the same time as an event that changes supply? Let's find out by studying the four possible combinations of simultaneous changes in demand and supply.

#### Increase in Demand and Increase in Supply

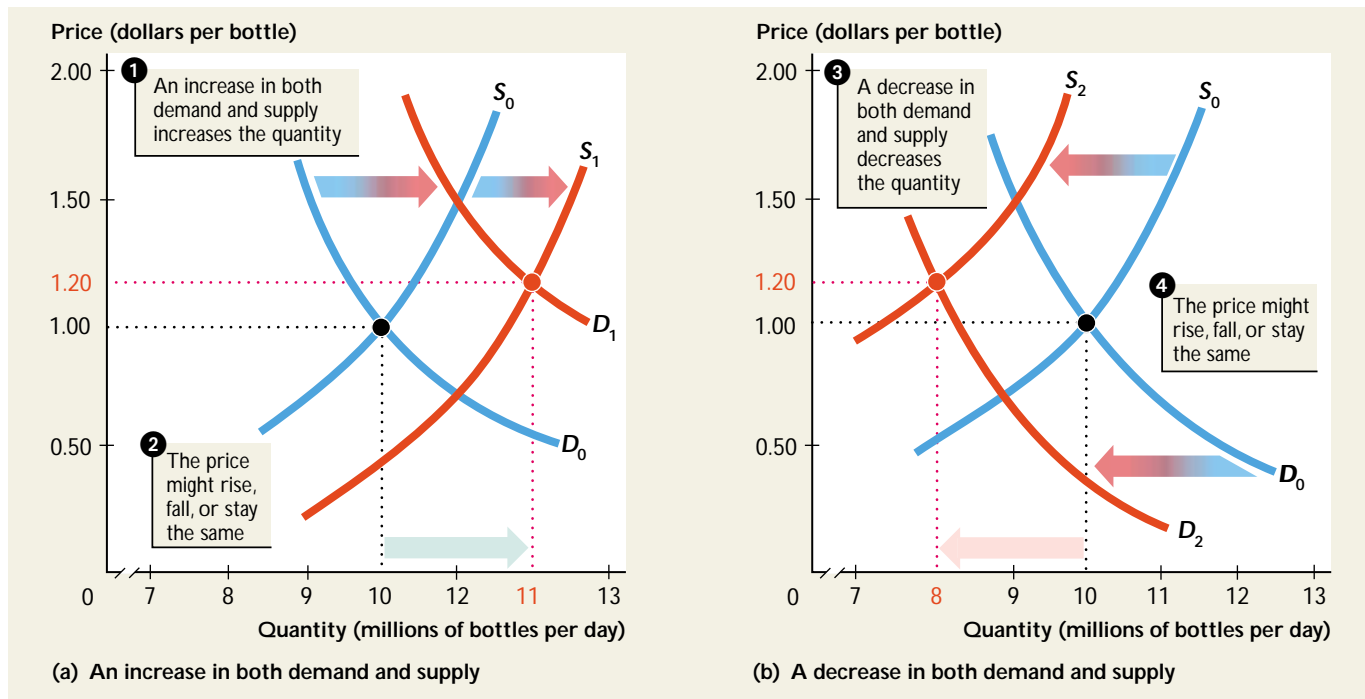
Either an increase in demand or an increase in supply increases the equilibrium quantity. But an increase in demand raises the price, and an increase in supply lowers the price. So when demand and supply increase together, the quantity increases and the price might rise, fall, or stay the same. Figure 4.13(a) shows what happens in the market for bottled water when concern about the safety of tap water increases demand and the opening of new bottling plants increases supply. The quantity increases and, because the increase in demand is greater than the increase in supply, the price rises.

#### Decrease in Demand and Decrease in Supply

Either a decrease in demand or a decrease in supply decreases the equilibrium quantity. But a decrease in demand lowers the price, and a decrease in supply raises the price. So when demand and supply decrease together, the quantity decreases and the price might rise, fall, or stay the same. Figure 4.13(b) shows what happens in the market for bottled water when the invention of a new sports

**FIGURE 4.13**  
Demand and Supply Change in the Same Direction

[Practice Online](#)



drink decreases demand and a drought decreases supply. The quantity decreases and, because the decrease in supply is greater than the decrease in demand, the price rises.

### Increase in Demand and Decrease in Supply

Either an increase in demand or a decrease in supply raises the equilibrium price. But an increase in demand increases the quantity, and a decrease in supply decreases the quantity. So when an increase in demand and a decrease in supply occur together, the price rises and the quantity might increase, decrease, or stay the same. Figure 4.14(a) shows what happens in the market for bottled water when concern about the safety of tap water increases demand and a drought decreases supply. The price rises and, because the increase in demand equals the decrease in supply, the quantity remains constant.

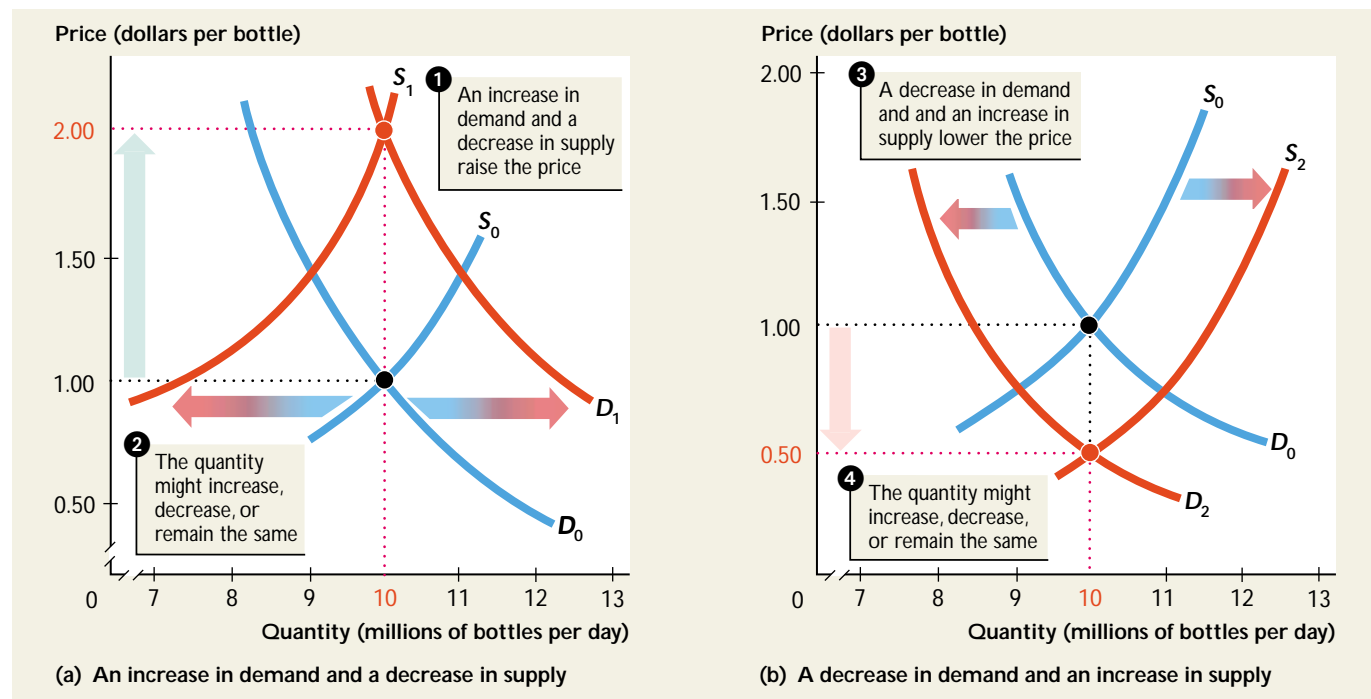
### Decrease in Demand and Increase in Supply

Either a decrease in demand or an increase in supply lowers the price. But a decrease in demand decreases the quantity, and an increase in supply increases the quantity. So when a decrease in demand and an increase in supply occur together, the price falls and the quantity might increase, decrease, or stay the same. Figure 4.14(b) shows what happens in the market for bottled water when the invention of a new sports drink decreases demand and the opening of new bottling plants increases supply. The price falls and, because the decrease in demand equals the increase in supply, the quantity remains constant.

**FIGURE 4.14**

Demand and Supply Change in Opposite Directions

[Practice Online](#)



## CHECKPOINT 4.3

Study Guide pp. 62–65

Practice Online 4.3

Price (dollars per carton)	Quantity demanded (cartons per day)	Quantity supplied
1.00	200	110
1.25	175	130
1.50	150	150
1.75	125	170
2.00	100	190

Price (dollars per roll)	Quantity demanded (rolls per week)	Quantity supplied
2.00	3,000	1,000
3.00	2,500	1,500
4.00	2,000	2,000
5.00	1,500	2,500
6.00	1,000	3,000

FIGURE 1

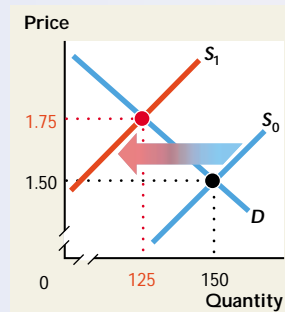
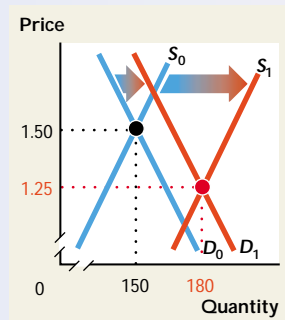


FIGURE 2



- 3** Explain how demand and supply determine price and quantity in a market and explain the effects of changes in demand and supply.

### Practice Problem 4.3

The table shows the demand and supply schedules for milk.

- What is the market equilibrium in the milk market?
- Describe the situation in the milk market if the price were \$1.75 a carton.
- If the price is \$1.75 a carton, explain how the market reaches equilibrium.
- A drought decreases the quantity supplied by 45 cartons a day at each price. What is the new equilibrium and how does the market adjust to it?
- Milk becomes more popular and the quantity demanded increases by 5 cartons a day at each price. Better feeds increase the quantity of milk supplied by 50 cartons a day at each price. If there is no drought, what is the new equilibrium, and how does the market adjust to it?

### Exercise 4.3

The table shows the demand and supply schedules for rolls of film.

- What is the market equilibrium?
- If the price of film is \$3 a roll, describe the situation in the film market. Explain how market equilibrium is restored.
- A rise in income increases the quantity demanded of film by 1,000 rolls a week at each price. Explain how the film market adjusts to its new equilibrium.
- The number of film production lines increases the quantity supplied of film by 750 rolls a week at each price. People switch to digital cameras and the quantity demanded of film decreases by 250 rolls a week at each price. With no rise in income, explain how the film market adjusts to its new equilibrium.

### Solution to Practice Problem 4.3

- Market equilibrium occurs at \$1.50 a carton and 150 cartons a day.
- At \$1.75 a carton, the quantity demanded (125 cartons) is less than the quantity supplied (170 cartons), so there is a surplus of 45 cartons a day.
- At \$1.75 a carton, there is a surplus of 45 cartons a day. As suppliers lower the price, the quantity demanded increases, the quantity supplied decreases, and the surplus decreases. The price falls until the surplus disappears. The price falls to \$1.50 a carton.
- The supply curve *shifts leftward* by 45 cartons a day. At \$1.50, the quantity demanded (150 cartons) exceeds the quantity supplied (105 cartons) and there is a shortage of milk and the price begins to rise. As the price rises, the quantity demanded decreases, the quantity supplied increases, and the shortage decreases. The price rises to \$1.75 a carton, and the quantity decreases to 125 cartons a day (Figure 1).
- The demand curve *shifts rightward* by 5 cartons a day. The supply curve *shifts rightward* by 50 cartons a day. At \$1.50 a carton, the quantity demanded (155 cartons) is less than the quantity supplied (200 cartons). There is a surplus and the price begins to fall. As the price falls to \$1.25 a carton, the quantity increases to 180 cartons a day (Figure 2).



## CHAPTER CHECKPOINT

### Key Points

- 1** Distinguish between quantity demanded and demand and explain what determines demand.
  - Other things remaining the same, the quantity demanded increases as the price falls and decreases as the price rises—the law of demand.
  - The demand for a good is influenced by the prices of related goods, income, expectations about income and future prices, the number of buyers, and preferences. A change in any of these influences changes the demand for the good.
  
- 2** Distinguish between quantity supplied and supply and explain what determines supply.
  - Other things remaining the same, the quantity supplied increases as the price rises and decreases as the price falls—the law of supply.
  - The supply of a good is influenced by the prices of related goods, prices of resources and other inputs, expectations about future prices and input prices, the number of sellers, and productivity. A change in any of these influences changes the supply of the good.
  
- 3** Explain how demand and supply determine price and quantity in a market and explain the effects of changes in demand and supply.
  - The law of market forces brings market equilibrium—the equilibrium price and equilibrium quantity at which buyers and sellers trade.
  - The price adjusts to maintain market equilibrium—to keep the quantity demanded equal to the quantity supplied. A surplus brings a fall in the price to restore market equilibrium; a shortage brings a rise in the price to restore market equilibrium.
  - Market equilibrium responds to changes in demand and supply. An increase in demand increases both the price and the quantity; a decrease in demand decreases both the price and the quantity. An increase in supply increases the quantity but decreases the price; and a decrease in supply decreases the quantity but increases the price.

### Key Terms

Change in demand, 94	Equilibrium quantity, 105	Quantity supplied, 98
Change in the quantity demanded, 94	Inferior good, 95	Shortage or excess demand, 106
Change in the quantity supplied, 101	Law of demand, 91	Substitute, 94
Change in supply, 101	Law of market forces, 106	Substitute in production, 101
Complement, 95	Law of supply, 98	Supply, 98
Complement in production, 102	Market demand, 93	Supply curve, 99
Demand, 91	Market equilibrium, 105	Supply schedule, 99
Demand curve, 92	Market supply, 100	Surplus or excess supply, 106
Demand schedule, 92	Normal good, 95	
Equilibrium price, 105	Quantity demanded, 91	

## Exercises

1. Explain how each of the following situations changes the demand or supply of air travel.
  - a. Airfares tumble, while long-distance bus fares don't change.
  - b. The price of jet fuel rises.
  - c. Airlines reduce the number of flights each day.
  - d. People expect airfares to increase next summer.
  - e. As the winter in the Northeast turns very cold, many people decide to take a mid-winter break in Florida.
  - f. With deep snow in the Rockies, many people flock to the ski slopes.
  - g. The price of train travel falls.
  - h. The price of a pound of air cargo increases.
2. Explain how each of the following items influences the demand for and supply of jeans.
  - a. A new technology becomes available that cuts the time it takes to manufacture a pair of jeans by 50 percent.
  - b. The price of the cloth (denim) used to make jeans falls.
  - c. Jeans go out of fashion.
  - d. The price of a pair of jeans falls.
  - e. The wage rate paid to garment workers increases.
  - f. Disney, CNN, and most baseball clubs start to produce jeans.
  - g. The price of a denim skirt doubles.
  - h. People's incomes increase.
3. Use the laws of demand and supply to explain whether the following statements are true or false. In your explanation, distinguish between a change in demand and a change in the quantity demanded and between a change in supply and a change in the quantity supplied.
  - a. The United States does not allow oranges from Brazil (the world's largest producer of oranges) to be sold in the United States. If Brazilian oranges were sold in the United States, oranges and orange juice would be cheaper.
  - b. If soccer becomes more popular in the United States and basketball becomes less popular, the price of a pair of basketball shoes will rise.
  - c. It is more expensive to ski in Aspen in the winter than in the spring.
  - d. If the price of frozen yogurt falls, the quantity of ice cream consumed will decrease and the price of ice cream will rise.
4. What is the effect on the equilibrium price and quantity of orange juice of the following events if they occur one at a time?
  - a. The price of apple juice decreases.
  - b. The price of apple juice decreases and the wage rate paid to orange grove workers increases.
  - c. Orange juice becomes more popular and a cheaper machine for picking oranges is used.
  - d. Joggers switch from bottled water to orange juice.
5. Gasoline producers invent a new fuel that is cheaper and cleaner than gasoline. All new cars use the new fuel. Use a demand-supply graph to explain the effect of this new fuel on
  - a. The price of gasoline and the quantity of gasoline bought.
  - b. The price of a used car.

6. The table shows the demand and supply schedules for mouse pads.
- What is the market equilibrium?
  - If the price of a mouse pad is \$7.00, describe the situation in the market. Explain how market equilibrium is restored.
  - Explain what happens to the market equilibrium and how the market adjusts to its new equilibrium if a fall in the price of a computer changes the quantity demanded of mouse pads by 20 a week at each price.
  - Explain what happens to the market equilibrium in part **a** and how the market adjusts if new voice-recognition software changes the quantity demanded by 10 mouse pads a week at each price and at the same time the cost of producing a mouse pad falls and changes the quantity supplied by 30 a week at each price.
7. “As more people buy computers, the demand for Internet service will increase and the price of an Internet service will decrease. The decrease in the price of an Internet service will decrease the supply of Internet services.” Is this statement true or false? Explain your answer.
8. “With oil \$30 a barrel, war drums beating, and world economic recovery hanging in the balance, expectations are that the Organization of the Petroleum Exporting Countries (OPEC) will increase production at their September 21 meeting,” according to a news item on September 15, 2002.
- Draw a demand-supply graph to illustrate the situation in the world oil market on September 15, 2002. The price is \$30 a barrel, and output is 76.7 million barrels a day.
  - OPEC was expected to increase its production in October by 1 million barrels a day. Show the effect of this expected increase on your graph. How will the price of oil change? Explain your answer.
  - If war breaks out in the Middle East, what changes will occur in the world oil market? Use a demand-supply graph to illustrate your answer.
  - If a Middle East war does not occur but average income in the world falls, what changes do you think will occur in the world oil market? Use a demand-supply graph to illustrate your answer.
  - The price of oil increased 50 percent from January 2002 to September 2002. The Qatari oil minister said, “There is no shortage—on the contrary, the market is saturated with more than enough oil supplies.” Why would the price have increased 50 percent since January if the market were saturated with oil?
9. During 2002, wheat growers in Canada and Australia experienced drought. As a result, the amount of wheat harvested in Canada and Australia was expected to be smaller than usual.
- Draw a demand-supply graph to show the equilibrium in the world wheat market in a normal year.
  - Use your graph to illustrate the effect of the smaller harvests in Canada and Australia, assuming that other wheat-growing countries have experienced normal growing conditions.
  - What do you predict will happen to the price of wheat and the quantity bought and sold in 2002?
  - What do you predict will happen to the price of bread in 2002?

Price (dollars per pad)	Quantity demanded	Quantity supplied
	(mouse pads per week)	
3.00	160	120
4.00	150	130
5.00	140	140
6.00	130	150
7.00	120	160
8.00	110	170

## Critical Thinking

10. In 1995, 90 salmon farms operated in British Columbia. In 1995, the Canadian government banned the creation of any new salmon farms because the farms create pollution and might introduce disease into the wild salmon population. In September 2002, the Canadian government lifted this ban. The Heart and Stroke Foundation tells us that “salmon is one of the healthiest foods we can eat. There’s no shortage of it. We’re eating three times as much of it as we did just a few years ago.”
  - a. What do you predict happened to the price of farm-raised salmon and the quantity of farm-raised salmon grown from 1996 through 2001?
  - b. What effect do you think the lifting of the ban will have on the price of farm-raised salmon and the quantity of farm-raised salmon bought?
  - c. If disease breaks out in the salmon farms of British Columbia, describe what effects it will have on the market for wild Pacific salmon.
11. The Andean Trade Preferences Act, signed in 1988, was designed to encourage South American farmers to switch from growing drug crops such as coca to growing flowers. U.S. restrictions on flower imports from these South American countries were removed.
  - a. What incentives do you think were needed to encourage Andean farmers to switch from growing drug crops to growing roses?
  - b. As Andean farmers started to grow roses, what happened to the world price of roses?
  - c. How did U.S. rose growers respond as Andean roses entered the U.S. rose market?

## Practice Online

## Web Exercises

Use the links on your Foundations Web site to work the following exercises.

12. Obtain information about the history of the price of crude oil.
  - a. What are the major changes that have occurred in the market for crude oil?
  - b. On what two occasions did the price of oil rise by the largest amount?
  - c. What events occurred to trigger the price hikes that you’ve just described?
  - d. Did the events that you’ve just described change the demand for crude oil, the supply, both, or neither? Explain your answer.
  - e. Use the law of market forces and demand-supply graphs to explain the changes in the price and quantity of crude oil on the two occasions you identified in part **b**.
  - f. How do you think the price of crude oil influences the markets for coal and natural gas?
  - g. How do you think the advances in technology that increased fuel efficiency in automobiles, airplanes, and home heating furnaces have influenced the world market for crude oil?
13. Visit eBay.
  - a. What is eBay? Describe how eBay works.
  - b. Do you think the prices of the items traded on eBay are determined by demand and supply or in some other way? Explain your answer.