CHAPTER

4

The Market Forces of Supply and Demand

When a cold snap hits Florida, the price of orange juice rises in supermarkets throughout the country. When the weather turns warm in New England every summer, the price of hotel rooms in the Caribbean plummets. When a war breaks out in the Middle East, the price of gasoline in the United States rises, and the price of a used Cadillac falls. What do these events have in common? They all show the workings of supply and demand.

Supply and *demand* are the two words economists use most often—and for good reason. Supply and demand are the forces that make market economies work. They determine the quantity of each good produced and the price at which it is sold. If you want to know how any event or policy will affect the economy, you must think first about how it will affect supply and demand.

This chapter introduces the theory of supply and demand. It considers how buyers and sellers behave and how they interact with one another. It shows how supply and demand determine prices in a market economy and how prices, in turn, allocate the economy's scarce resources.

MARKETS AND COMPETITION

The terms *supply* and *demand* refer to the behavior of people as they interact with one another in competitive markets. Before discussing how buyers and sellers behave, let's first consider more fully what we mean by the terms *market* and *competition.*

What Is a Market?

market
a group of buyers and sellers of a particular good or service

A **market** is a group of buyers and sellers of a particular good or service. The buyers as a group determine the demand for the product, and the sellers as a group determine the supply of the product.

Markets take many forms. Sometimes markets are highly organized, such as the markets for many agricultural commodities. In these markets, buyers and sellers meet at a specific time and place, where an auctioneer helps set prices and arrange sales.

More often, markets are less organized. For example, consider the market for ice cream in a particular town. Buyers of ice cream do not meet together at any one time. The sellers of ice cream are in different locations and offer somewhat different products. There is no auctioneer calling out the price of ice cream. Each seller posts a price for an ice-cream cone, and each buyer decides how much ice cream to buy at each store. Nonetheless, these consumers and producers of ice cream are closely connected. The ice-cream buyers are choosing from the various ice-cream sellers to satisfy their hunger, and the ice-cream sellers are all trying to appeal to the same ice-cream buyers to make their businesses successful. Even though it is not organized, the group of ice-cream buyers and ice-cream sellers forms a market.

What Is Competition?

The market for ice cream, like most markets in the economy, is highly competitive. Each buyer knows that there are several sellers from which to choose, and each seller is aware that his or her product is similar to that offered by other sellers. As a result, the price of ice cream and the quantity of ice cream sold are not determined by any single buyer or seller. Rather, price and quantity are determined by all buyers and sellers as they interact in the marketplace.

competitive market
a market in which there are many buyers and many sellers so that each has a negligible impact on the market price

Economists use the term **competitive market** to describe a market in which there are so many buyers and so many sellers that each has a negligible impact on the market price. Each seller of ice cream has limited control over the price because other sellers are offering similar products. A seller has little reason to charge less than the going price, and if he or she charges more, buyers will make their purchases elsewhere. Similarly, no single buyer of ice cream can influence the price of ice cream because each buyer purchases only a small amount.

In this chapter, we assume that markets are *perfectly competitive.* To reach this highest form of competition, a market must have two characteristics: (1) the goods offered for sale are all exactly the same, and (2) the buyers and sellers are so numerous that no single buyer or seller has any influence over the market price. Because buyers and sellers in perfectly competitive markets must accept the price the market determines, they are said to be *price takers.* At the market price, buyers can buy all they want, and sellers can sell all they want.

There are some markets in which the assumption of perfect competition applies perfectly. In the wheat market, for example, there are thousands of farmers who sell wheat and millions of consumers who use wheat and wheat products. Because no single buyer or seller can influence the price of wheat, each takes the price as given.

Not all goods and services, however, are sold in perfectly competitive markets. Some markets have only one seller, and this seller sets the price. Such a seller is called a *monopoly.* Your local cable television company, for instance, may be a monopoly. Residents of your town probably have only one cable company from which to buy this service. Still other markets fall between the extremes of perfect competition and monopoly.

Despite the diversity of market types we find in the world, assuming perfect competition is a useful simplification and, therefore, a natural place to start. Perfectly competitive markets are the easiest to analyze because everyone participating in the market takes the price as given by market conditions. Moreover, because some degree of competition is present in most markets, many of the lessons that we learn by studying supply and demand under perfect competition apply in more complicated markets as well.

QUICK QUIZ What is a market? • What are the characteristics of a perfectly competitive market?

DEMAND

We begin our study of markets by examining the behavior of buyers. To focus our thinking, let's keep in mind a particular good—ice cream.

The Demand Curve: The Relationship between Price and Quantity Demanded

The **quantity demanded** of any good is the amount of the good that buyers are willing and able to purchase. As we will see, many things determine the quantity demanded of any good, but when analyzing how markets work, one determinant plays a central role—the price of the good. If the price of ice cream rose to $20 per scoop, you would buy less ice cream. You might buy frozen yogurt instead. If the price of ice cream fell to $0.20 per scoop, you would buy more. This relationship between price and quantity demanded is true for most goods in the economy and, in fact, is so pervasive that economists call it the **law of demand**: Other things equal, when the price of a good rises, the quantity demanded of the good falls, and when the price falls, the quantity demanded rises.

quantity demanded
the amount of a good that buyers are willing and able to purchase

law of demand
the claim that, other things equal, the quantity demanded of a good falls when the price of the good rises

The table in Figure 1 shows how many ice-cream cones Catherine buys each month at different prices of ice cream. If ice cream is free, Catherine eats 12 cones per month. At $0.50 per cone, Catherine buys 10 cones each month. As the price rises further, she buys fewer and fewer cones. When the price reaches $3.00, Catherine doesn't buy any ice cream at all. This table is a **demand schedule**, a table that shows the relationship between the price of a good and the quantity demanded, holding constant everything else that influences how much consumers of the good want to buy.

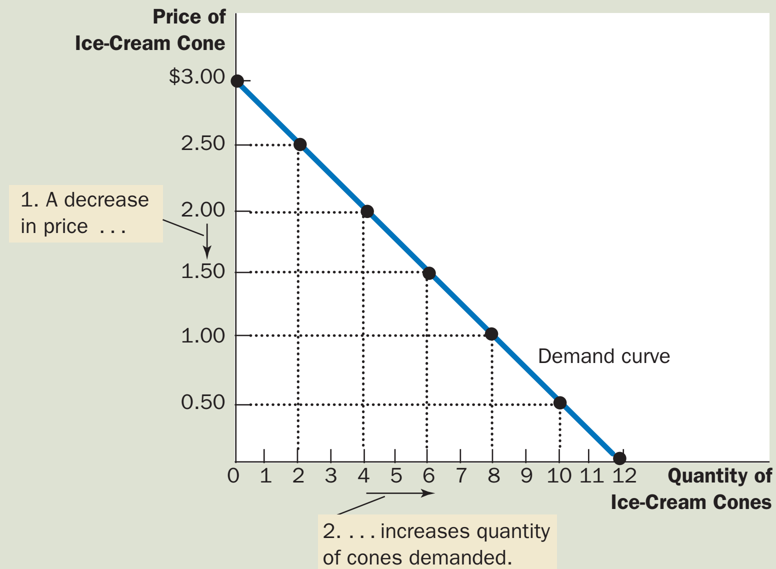
demand schedule
a table that shows the relationship between the price of a good and the quantity demanded

1 FIGURE

Catherine's Demand Schedule and Demand Curve

The demand schedule is a table that shows the quantity demanded at each price. The demand curve, which graphs the demand schedule, illustrates how the quantity demanded of the good changes as its price varies. Because a lower price increases the quantity demanded, the demand curve slopes downward.

Price of Ice-Cream Cone	Quantity of Cones Demanded
$0.00	12 cones
0.50	10
1.00	8
1.50	6
2.00	4
2.50	2
3.00	0



The graph in Figure 1 uses the numbers from the table to illustrate the law of demand. By convention, the price of ice cream is on the vertical axis, and the quantity of ice cream demanded is on the horizontal axis. The downward-sloping line relating price and quantity demanded is called the **demand curve**.

demand curve
a graph of the relationship between the price of a good and the quantity demanded

Market Demand versus Individual Demand

The demand curve in Figure 1 shows an individual's demand for a product. To analyze how markets work, we need to determine the *market demand*, the sum of all the individual demands for a particular good or service.

The table in Figure 2 shows the demand schedules for ice cream of the two individuals in this market—Catherine and Nicholas. At any price, Catherine's demand schedule tells us how much ice cream she buys, and Nicholas's demand schedule tells us how much ice cream he buys. The market demand at each price is the sum of the two individual demands.

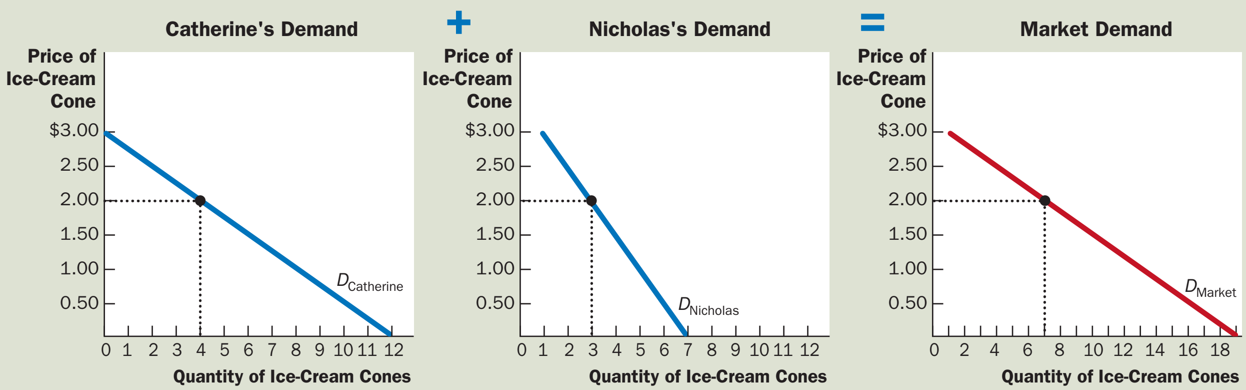
The graph in Figure 2 shows the demand curves that correspond to these demand schedules. Notice that we sum the individual demand curves horizontally to obtain the market demand curve. That is, to find the total quantity demanded at any price, we add the individual quantities, which are found on the horizontal axis of the individual demand curves. Because we are interested in analyzing how markets function, we work most often with the market demand curve. The market demand curve shows how the total quantity demanded of a good varies as the

FIGURE 2

Market Demand as the Sum of Individual Demands

The quantity demanded in a market is the sum of the quantities demanded by all the buyers at each price. Thus, the market demand curve is found by adding horizontally the individual demand curves. At a price of $2.00, Catherine demands 4 ice-cream cones, and Nicholas demands 3 ice-cream cones. The quantity demanded in the market at this price is 7 cones.

Price of Ice-Cream Cone	Catherine		Nicholas		Market
$0.00	12	+	7	=	19 cones
0.50	10		6		16
1.00	8		5		13
1.50	6		4		10
2.00	4		3		7
2.50	2		2		4
3.00	0		1		1



price of the good varies, while all the other factors that affect how much consumers want to buy are held constant.

Shifts in the Demand Curve

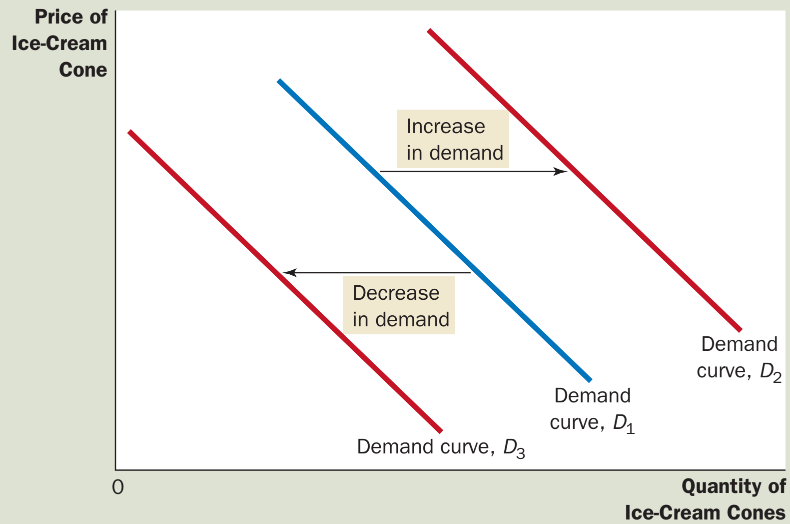
Because the market demand curve holds other things constant, it need not be stable over time. If something happens to alter the quantity demanded at any given price, the demand curve shifts. For example, suppose the American Medical Association discovered that people who regularly eat ice cream live longer, healthier lives. The discovery would raise the demand for ice cream. At any given price, buyers would now want to purchase a larger quantity of ice cream, and the demand curve for ice cream would shift.

Figure 3 illustrates shifts in demand. Any change that increases the quantity demanded at every price, such as our imaginary discovery by the American Medical Association, shifts the demand curve to the right and is called an *increase in demand*. Any change that reduces the quantity demanded at every price shifts the demand curve to the left and is called a *decrease in demand.*

There are many variables that can shift the demand curve. Here are the most important.

3 FIGURE

Shifts in the Demand Curve
Any change that raises the quantity that buyers wish to purchase at any given price shifts the demand curve to the right. Any change that lowers the quantity that buyers wish to purchase at any given price shifts the demand curve to the left.



Income What would happen to your demand for ice cream if you lost your job one summer? Most likely, it would fall. A lower income means that you have less to spend in total, so you would have to spend less on some—and probably most—goods. If the demand for a good falls when income falls, the good is called a **normal good**.

Not all goods are normal goods. If the demand for a good rises when income falls, the good is called an **inferior good**. An example of an inferior good might be bus rides. As your income falls, you are less likely to buy a car or take a cab and more likely to ride a bus.

normal good
a good for which, other things equal, an increase in income leads to an increase in demand

inferior good
a good for which, other things equal, an increase in income leads to a decrease in demand

Prices of Related Goods Suppose that the price of frozen yogurt falls. The law of demand says that you will buy more frozen yogurt. At the same time, you will probably buy less ice cream. Because ice cream and frozen yogurt are both cold, sweet, creamy desserts, they satisfy similar desires. When a fall in the price of one good reduces the demand for another good, the two goods are called **substitutes**. Substitutes are often pairs of goods that are used in place of each other, such as hot dogs and hamburgers, sweaters and sweatshirts, and movie tickets and video rentals.

Now suppose that the price of hot fudge falls. According to the law of demand, you will buy more hot fudge. Yet in this case, you will buy more ice cream as well because ice cream and hot fudge are often used together. When a fall in the price of one good raises the demand for another good, the two goods are called **complements**. Complements are often pairs of goods that are used together, such as gasoline and automobiles, computers and software, and peanut butter and jelly.

substitutes
two goods for which an increase in the price of one leads to an increase in the demand for the other

complements
two goods for which an increase in the price of one leads to a decrease in the demand for the other

Tastes The most obvious determinant of your demand is your tastes. If you like ice cream, you buy more of it. Economists normally do not try to explain people's tastes because tastes are based on historical and psychological forces that are beyond the realm of economics. Economists do, however, examine what happens when tastes change.

TABLE 1

Variables That Influence Buyers

This table lists the variables that affect how much consumers choose to buy of any good. Notice the special role that the price of the good plays: A change in the good's price represents a movement along the demand curve, whereas a change in one of the other variables shifts the demand curve.

Variable	A Change in This Variable . . .
Price of the good itself	Represents a movement along the demand curve
Income	Shifts the demand curve
Prices of related goods	Shifts the demand curve
Tastes	Shifts the demand curve
Expectations	Shifts the demand curve
Number of buyers	Shifts the demand curve

Expectations Your expectations about the future may affect your demand for a good or service today. For example, if you expect to earn a higher income next month, you may choose to save less now and spend more of your current income buying ice cream. As another example, if you expect the price of ice cream to fall tomorrow, you may be less willing to buy an ice-cream cone at today's price.

Number of Buyers In addition to the preceding factors, which influence the behavior of individual buyers, market demand depends on the number of these buyers. If Peter were to join Catherine and Nicholas as another consumer of ice cream, the quantity demanded in the market would be higher at every price, and market demand would increase.

Summary The demand curve shows what happens to the quantity demanded of a good when its price varies, holding constant all the other variables that influence buyers. When one of these other variables changes, the demand curve shifts. Table 1 lists the variables that influence how much consumers choose to buy of a good.

If you have trouble remembering whether you need to shift or move along the demand curve, it helps to recall a lesson from the appendix to Chapter 2. A curve shifts when there is a change in a relevant variable that is not measured on either axis. Because the price is on the vertical axis, a change in price represents a movement along the demand curve. By contrast, income, the prices of related goods, tastes, expectations, and the number of buyers are not measured on either axis, so a change in one of these variables shifts the demand curve.

CASE STUDY TWO WAYS TO REDUCE THE QUANTITY OF SMOKING DEMANDED

Public policymakers often want to reduce the amount that people smoke. There are two ways that policy can attempt to achieve this goal.

One way to reduce smoking is to shift the demand curve for cigarettes and other tobacco products. Public service announcements, mandatory health warnings on cigarette packages, and the prohibition of cigarette advertising on television are all policies aimed at reducing the quantity of cigarettes demanded at any given price. If successful, these policies shift the demand curve for cigarettes to the left, as in panel (a) of Figure 4.

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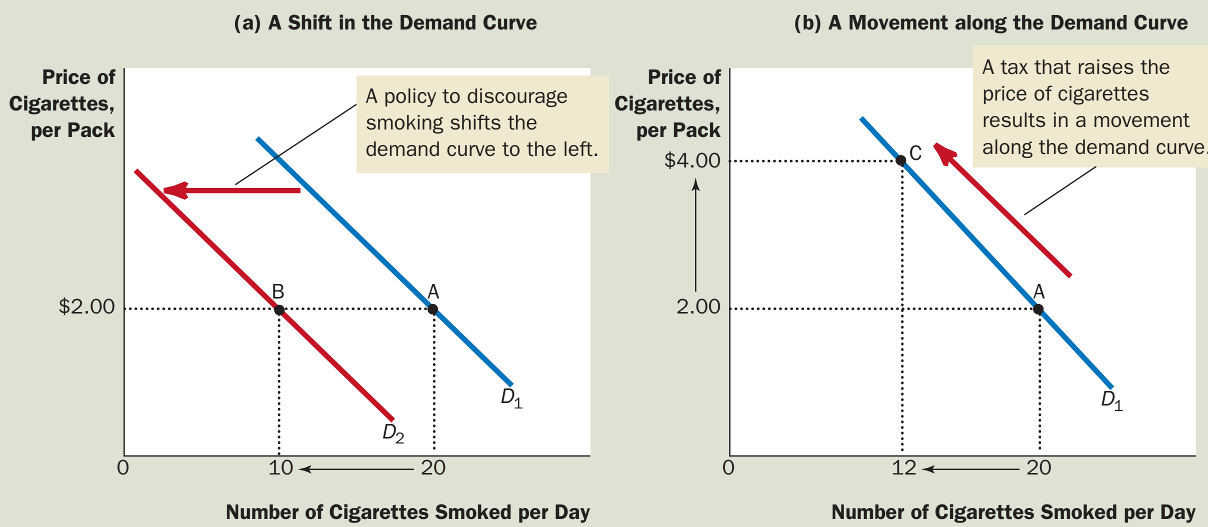
WHAT IS THE BEST WAY TO STOP THIS?

4 FIGURE

Shifts in the Demand Curve versus Movements along the Demand Curve

If warnings on cigarette packages convince smokers to smoke less, the demand curve for cigarettes shifts to the left. In panel (a), the demand curve shifts from D_1 to D_2. At a price of $2.00 per pack, the quantity demanded falls from 20 to 10 cigarettes per day, as reflected by the shift from point A to point B. By contrast, if a tax raises the price of cigarettes, the demand curve does not shift. Instead, we observe a movement to a different point on the demand curve. In panel (b), when the price rises from $2.00 to $4.00, the quantity demanded falls from 20 to 12 cigarettes per day, as reflected by the movement from point A to point C.



Alternatively, policymakers can try to raise the price of cigarettes. If the government taxes the manufacture of cigarettes, for example, cigarette companies pass much of this tax on to consumers in the form of higher prices. A higher price encourages smokers to reduce the numbers of cigarettes they smoke. In this case, the reduced amount of smoking does not represent a shift in the demand curve. Instead, it represents a movement along the same demand curve to a point with a higher price and lower quantity, as in panel (b) of Figure 4.

How much does the amount of smoking respond to changes in the price of cigarettes? Economists have attempted to answer this question by studying what happens when the tax on cigarettes changes. They have found that a 10 percent increase in the price causes a 4 percent reduction in the quantity demanded. Teenagers are found to be especially sensitive to the price of cigarettes: A 10 percent increase in the price causes a 12 percent drop in teenage smoking.

A related question is how the price of cigarettes affects the demand for illicit drugs, such as marijuana. Opponents of cigarette taxes often argue that tobacco and marijuana are substitutes so that high cigarette prices encourage marijuana use. By contrast, many experts on substance abuse view tobacco as a "gateway drug" leading the young to experiment with other harmful substances. Most studies of the data are consistent with this latter view: They find that lower cigarette prices are associated with greater use of marijuana. In other words, tobacco and marijuana appear to be complements rather than substitutes.

QUICK QUIZ Make up an example of a monthly demand schedule for pizza and graph the implied demand curve. • Give an example of something that would shift this demand curve, and briefly explain your reasoning. • Would a change in the price of pizza shift this demand curve?

SUPPLY

We now turn to the other side of the market and examine the behavior of sellers. Once again, to focus our thinking, let's consider the market for ice cream.

The Supply Curve: The Relationship between Price and Quantity Supplied

The **quantity supplied** of any good or service is the amount that sellers are willing and able to sell. There are many determinants of quantity supplied, but once again, price plays a special role in our analysis. When the price of ice cream is high, selling ice cream is profitable, and so the quantity supplied is large. Sellers of ice cream work long hours, buy many ice-cream machines, and hire many workers. By contrast, when the price of ice cream is low, the business is less profitable, and so sellers produce less ice cream. At a low price, some sellers may even choose to shut down, and their quantity supplied falls to zero. This relationship between price and quantity supplied is called the **law of supply**: Other things equal, when the price of a good rises, the quantity supplied of the good also rises, and when the price falls, the quantity supplied falls as well.

quantity supplied
the amount of a good that sellers are willing and able to sell

law of supply
the claim that, other things equal, the quantity supplied of a good rises when the price of the good rises

The table in Figure 5 shows the quantity of ice-cream cones supplied each month by Ben, an ice-cream seller, at various prices of ice cream. At a price below $1.00, Ben does not supply any ice cream at all. As the price rises, he supplies a greater and greater quantity. This is the **supply schedule**, a table that shows the relationship between the price of a good and the quantity supplied, holding constant everything else that influences how much producers of the good want to sell.

supply schedule
a table that shows the relationship between the price of a good and the quantity supplied

The graph in Figure 5 uses the numbers from the table to illustrate the law of supply. The curve relating price and quantity supplied is called the **supply curve**. The supply curve slopes upward because, other things equal, a higher price means a greater quantity supplied.

supply curve
a graph of the relationship between the price of a good and the quantity supplied

Market Supply versus Individual Supply

Just as market demand is the sum of the demands of all buyers, market supply is the sum of the supplies of all sellers. The table in Figure 6 shows the supply schedules for the two ice-cream producers in the market—Ben and Jerry. At any price, Ben's supply schedule tells us the quantity of ice cream Ben supplies, and Jerry's supply schedule tells us the quantity of ice cream Jerry supplies. The market supply is the sum of the two individual supplies.

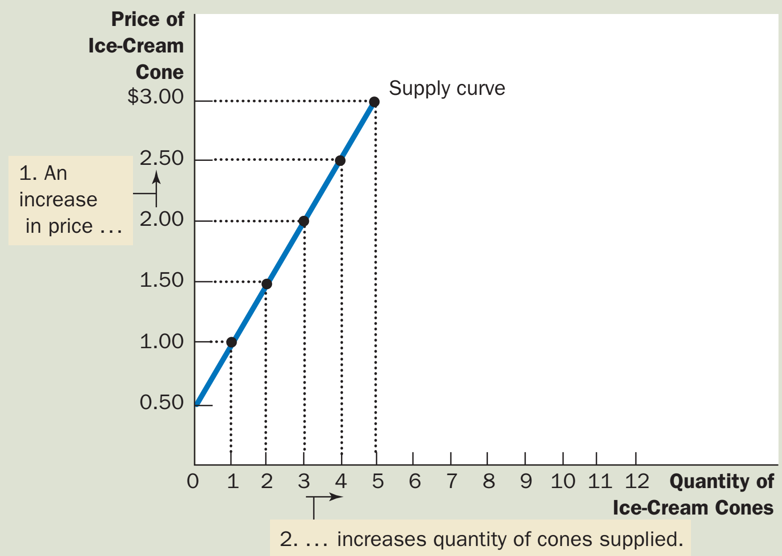
The graph in Figure 6 shows the supply curves that correspond to the supply schedules. As with demand curves, we sum the individual supply curves *horizontally* to obtain the market supply curve. That is, to find the total quantity supplied at any price, we add the individual quantities, which are found on the horizontal axis of the individual supply curves. The market supply curve shows how the total quantity supplied varies as the price of the good varies, holding constant

5 FIGURE

Ben's Supply Schedule and Supply Curve

The supply schedule is a table that shows the quantity supplied at each price. This supply curve, which graphs the supply schedule, illustrates how the quantity supplied of the good changes as its price varies. Because a higher price increases the quantity supplied, the supply curve slopes upward.

Price of Ice-Cream Cone	Quantity of Cones Supplied
$0.00	0 cones
0.50	0
1.00	1
1.50	2
2.00	3
2.50	4
3.00	5



all the other factors beyond price that influence producers' decisions about how much to sell.

Shifts in the Supply Curve

Because the market supply curve holds other things constant, the curve shifts when one of the factors changes. For example, suppose the price of sugar falls. Sugar is an input into producing ice cream, so the fall in the price of sugar makes selling ice cream more profitable. This raises the supply of ice cream: At any given price, sellers are now willing to produce a larger quantity. The supply curve for ice cream shifts to the right.

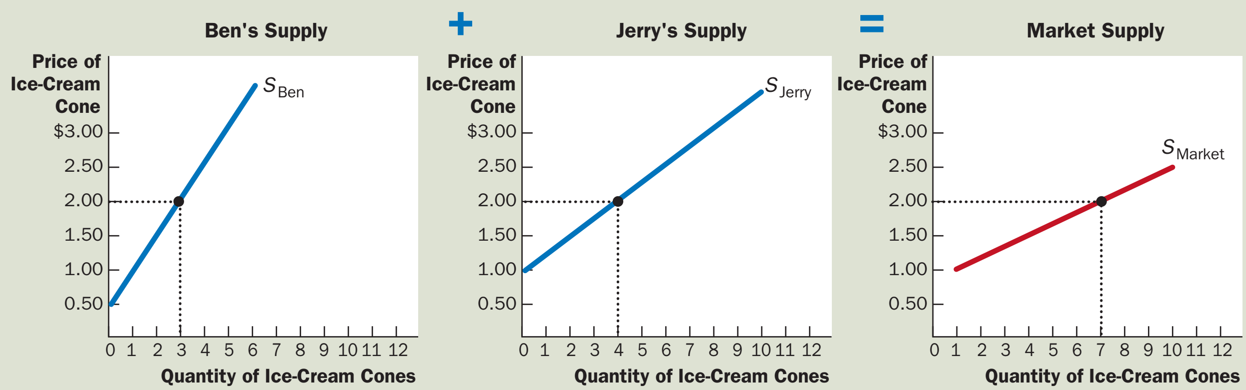
Figure 7 illustrates shifts in supply. Any change that raises quantity supplied at every price, such as a fall in the price of sugar, shifts the supply curve to the right and is called an *increase in supply*. Similarly, any change that reduces the quantity supplied at every price shifts the supply curve to the left and is called a *decrease in supply*.

There are many variables that can shift the supply curve. Here are some of the most important.

Input Prices To produce their output of ice cream, sellers use various inputs: cream, sugar, flavoring, ice-cream machines, the buildings in which the ice cream is made, and the labor of workers to mix the ingredients and operate the machines.

FIGURE 6

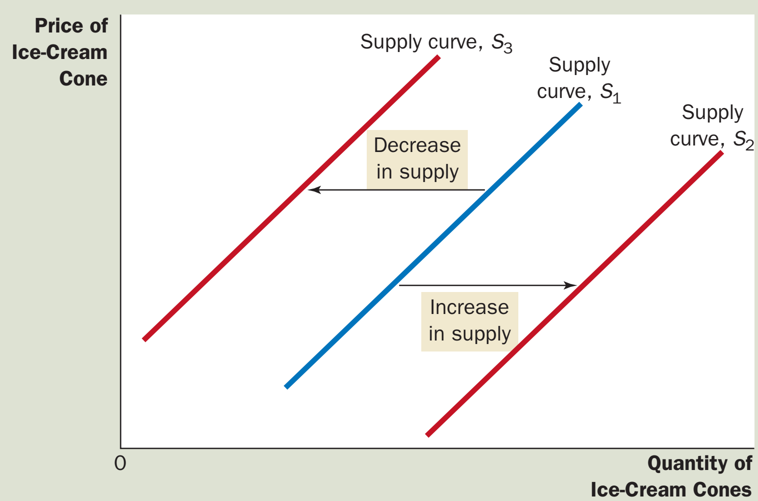
Price of Ice-Cream Cone	Ben		Jerry		Market
$0.00	0	+	0	=	0 cones
0.50	0		0		0
1.00	1		0		1
1.50	2		2		4
2.00	3		4		7
2.50	4		6		10
3.00	5		8		13



Market Supply as the Sum of Individual Supplies

The quantity supplied in a market is the sum of the quantities supplied by all the sellers at each price. Thus, the market supply curve is found by adding horizontally the individual supply curves. At a price of $2.00, Ben supplies 3 ice-cream cones, and Jerry supplies 4 ice-cream cones. The quantity supplied in the market at this price is 7 cones.

FIGURE 7



Shifts in the Supply Curve

Any change that raises the quantity that sellers wish to produce at any given price shifts the supply curve to the right. Any change that lowers the quantity that sellers wish to produce at any given price shifts the supply curve to the left.

When the price of one or more of these inputs rises, producing ice cream is less profitable, and firms supply less ice cream. If input prices rise substantially, a firm might shut down and supply no ice cream at all. Thus, the supply of a good is negatively related to the price of the inputs used to make the good.

Technology The technology for turning inputs into ice cream is another determinant of supply. The invention of the mechanized ice-cream machine, for example, reduced the amount of labor necessary to make ice cream. By reducing firms' costs, the advance in technology raised the supply of ice cream.

Expectations The amount of ice cream a firm supplies today may depend on its expectations about the future. For example, if a firm expects the price of ice cream to rise in the future, it will put some of its current production into storage and supply less to the market today.

Number of Sellers In addition to the preceding factors, which influence the behavior of individual sellers, market supply depends on the number of these sellers. If Ben or Jerry were to retire from the ice-cream business, the supply in the market would fall.

Summary The supply curve shows what happens to the quantity supplied of a good when its price varies, holding constant all the other variables that influence sellers. When one of these other variables changes, the supply curve shifts. Table 2 lists the variables that influence how much producers choose to sell of a good.

Once again, to remember whether you need to shift or move along the supply curve, keep in mind that a curve shifts only when there is a change in a relevant variable that is not named on either axis. The price is on the vertical axis, so a change in price represents a movement along the supply curve. By contrast, because input prices, technology, expectations, and the number of sellers are not measured on either axis, a change in one of these variables shifts the supply curve.

QUICK QUIZ Make up an example of a monthly supply schedule for pizza and graph the implied supply curve. • Give an example of something that would shift this supply curve, and briefly explain your reasoning. • Would a change in the price of pizza shift this supply curve?

2 TABLE

Variables That Influence Sellers

This table lists the variables that affect how much producers choose to sell of any good. Notice the special role that the price of the good plays: A change in the good's price represents a movement along the supply curve, whereas a change in one of the other variables shifts the supply curve.

Variable	A Change in This Variable . . .
Price of the good itself	Represents a movement along the supply curve
Input prices	Shifts the supply curve
Technology	Shifts the supply curve
Expectations	Shifts the supply curve
Number of sellers	Shifts the supply curve

SUPPLY AND DEMAND TOGETHER

Having analyzed supply and demand separately, we now combine them to see how they determine the price and quantity of a good sold in a market.

Equilibrium

Figure 8 shows the market supply curve and market demand curve together. Notice that there is one point at which the supply and demand curves intersect. This point is called the market's **equilibrium**. The price at this intersection is called the **equilibrium price**, and the quantity is called the **equilibrium quantity**. Here the equilibrium price is $2.00 per cone, and the equilibrium quantity is 7 ice-cream cones.

The dictionary defines the word *equilibrium* as a situation in which various forces are in balance—and this also describes a market's equilibrium. *At the equilibrium price, the quantity of the good that buyers are willing and able to buy exactly balances the quantity that sellers are willing and able to sell*. The equilibrium price is sometimes called the market-clearing price because, at this price, everyone in the market has been satisfied: Buyers have bought all they want to buy, and sellers have sold all they want to sell.

The actions of buyers and sellers naturally move markets toward the equilibrium of supply and demand. To see why, consider what happens when the market price is not equal to the equilibrium price.

Suppose first that the market price is above the equilibrium price, as in panel (a) of Figure 9. At a price of $2.50 per cone, the quantity of the good supplied (10 cones) exceeds the quantity demanded (4 cones). There is a **surplus** of the good: Suppliers are unable to sell all they want at the going price. A surplus is sometimes called a situation of *excess supply*. When there is a surplus in the ice-cream market,

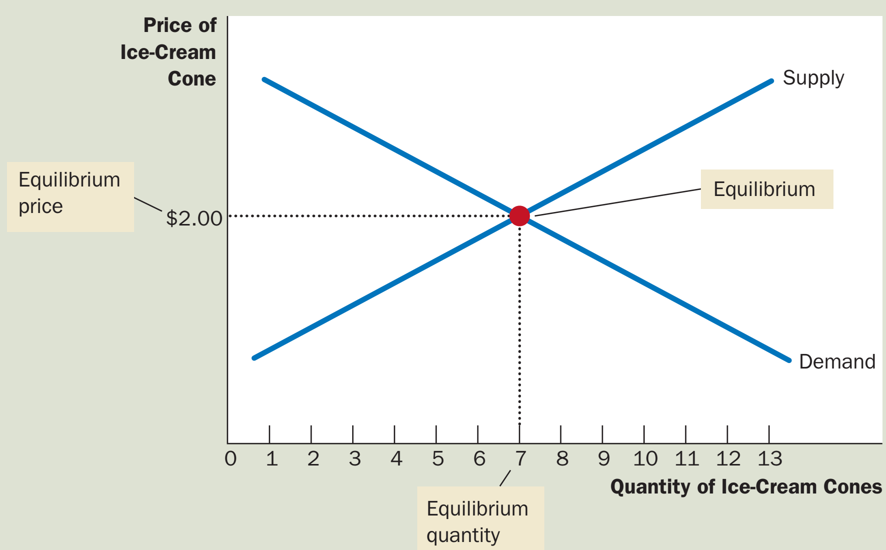
equilibrium
a situation in which the market price has reached the level at which quantity supplied equals quantity demanded

equilibrium price
the price that balances quantity supplied and quantity demanded

equilibrium quantity
the quantity supplied and the quantity demanded at the equilibrium price

surplus
a situation in which quantity supplied is greater than quantity demanded

FIGURE 8

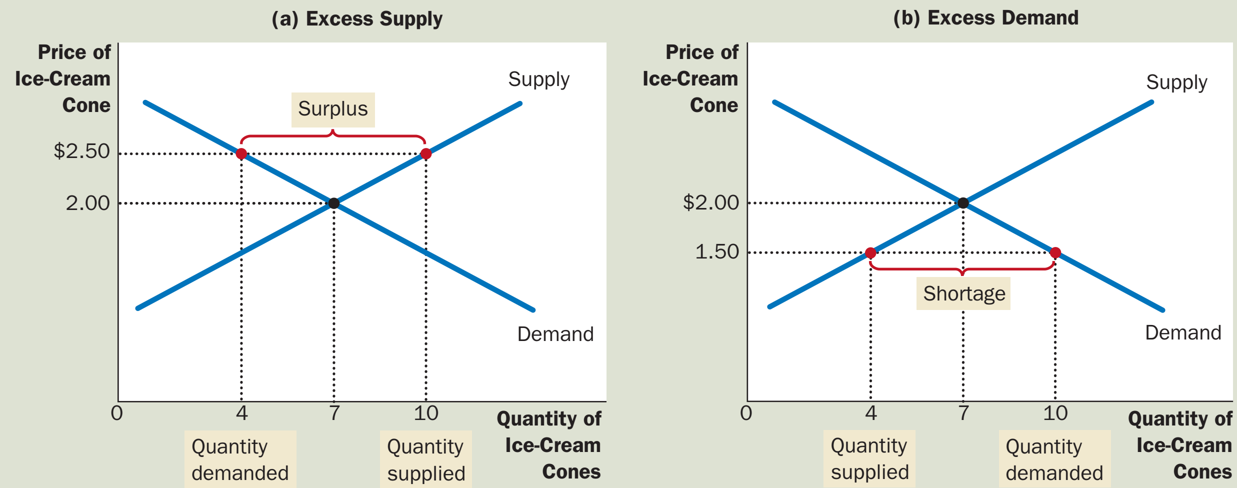


The Equilibrium of Supply and Demand
The equilibrium is found where the supply and demand curves intersect. At the equilibrium price, the quantity supplied equals the quantity demanded. Here the equilibrium price is $2.00: At this price, 7 ice-cream cones are supplied, and 7 ice-cream cones are demanded.

9 FIGURE

Markets Not in Equilibrium

In panel (a), there is a surplus. Because the market price of $2.50 is above the equilibrium price, the quantity supplied (10 cones) exceeds the quantity demanded (4 cones). Suppliers try to increase sales by cutting the price of a cone, and this moves the price toward its equilibrium level. In panel (b), there is a shortage. Because the market price of $1.50 is below the equilibrium price, the quantity demanded (10 cones) exceeds the quantity supplied (4 cones). With too many buyers chasing too few goods, suppliers can take advantage of the shortage by raising the price. Hence, in both cases, the price adjustment moves the market toward the equilibrium of supply and demand.



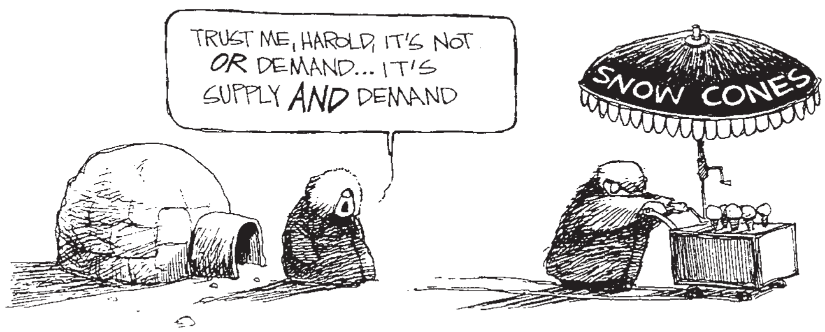
sellers of ice cream find their freezers increasingly full of ice cream they would like to sell but cannot. They respond to the surplus by cutting their prices. Falling prices, in turn, increase the quantity demanded and decrease the quantity supplied. Prices continue to fall until the market reaches the equilibrium.

shortage
a situation in which quantity demanded is greater than quantity supplied

Suppose now that the market price is below the equilibrium price, as in panel (b) of Figure 9. In this case, the price is $1.50 per cone, and the quantity of the good demanded exceeds the quantity supplied. There is a **shortage** of the good: Demanders are unable to buy all they want at the going price. A shortage is sometimes called a situation of *excess demand.* When a shortage occurs in the ice-cream market, buyers have to wait in long lines for a chance to buy one of the few cones available. With too many buyers chasing too few goods, sellers can respond to the shortage by raising their prices without losing sales. As the price rises, the quantity demanded falls, the quantity supplied rises, and the market once again moves toward the equilibrium.

law of supply and demand
the claim that the price of any good adjusts to bring the quantity supplied and the quantity demanded for that good into balance

Thus, the activities of the many buyers and sellers automatically push the market price toward the equilibrium price. Once the market reaches its equilibrium, all buyers and sellers are satisfied, and there is no upward or downward pressure on the price. How quickly equilibrium is reached varies from market to market depending on how quickly prices adjust. In most free markets, surpluses and shortages are only temporary because prices eventually move toward their equilibrium levels. Indeed, this phenomenon is so pervasive that it is called the **law of supply and demand**: The price of any good adjusts to bring the quantity supplied and quantity demanded for that good into balance.



Three Steps to Analyzing Changes in Equilibrium

So far, we have seen how supply and demand together determine a market's equilibrium, which in turn determines the price and quantity of the good that buyers purchase and sellers produce. The equilibrium price and quantity depend on the position of the supply and demand curves. When some event shifts one of these curves, the equilibrium in the market changes, resulting in a new price and a new quantity exchanged between buyers and sellers.

When analyzing how some event affects the equilibrium in a market, we proceed in three steps. First, we decide whether the event shifts the supply curve, the demand curve, or, in some cases, both curves. Second, we decide whether the curve shifts to the right or to the left. Third, we use the supply-and-demand diagram to compare the initial and the new equilibrium, which shows how the shift affects the equilibrium price and quantity. Table 3 summarizes these three steps. To see how this recipe is used, let's consider various events that might affect the market for ice cream.

Example: A Change in Market Equilibrium Due to a Shift in Demand Suppose that one summer the weather is very hot. How does this event affect the market for ice cream? To answer this question, let's follow our three steps.

1. The hot weather affects the demand curve by changing people's taste for ice cream. That is, the weather changes the amount of ice cream that people want to buy at any given price. The supply curve is unchanged because the weather does not directly affect the firms that sell ice cream.
2. Because hot weather makes people want to eat more ice cream, the demand curve shifts to the right. Figure 10 shows this increase in demand as the shift in the demand curve from D_1 to D_2. This shift indicates that the quantity of ice cream demanded is higher at every price.
3. As Figure 10 shows, the increase in demand raises the equilibrium price from \$2.00 to \$2.50 and the equilibrium quantity from 7 to 10 cones. In other words, the hot weather increases the price of ice cream and the quantity of ice cream sold.

Shifts in Curves versus Movements along Curves Notice that when hot weather increases the demand for ice cream and drives up the price, the quantity of ice cream that firms supply rises, even though the supply curve remains the same. In this case, economists say there has been an increase in "quantity supplied" but no change in "supply."

3 TABLE

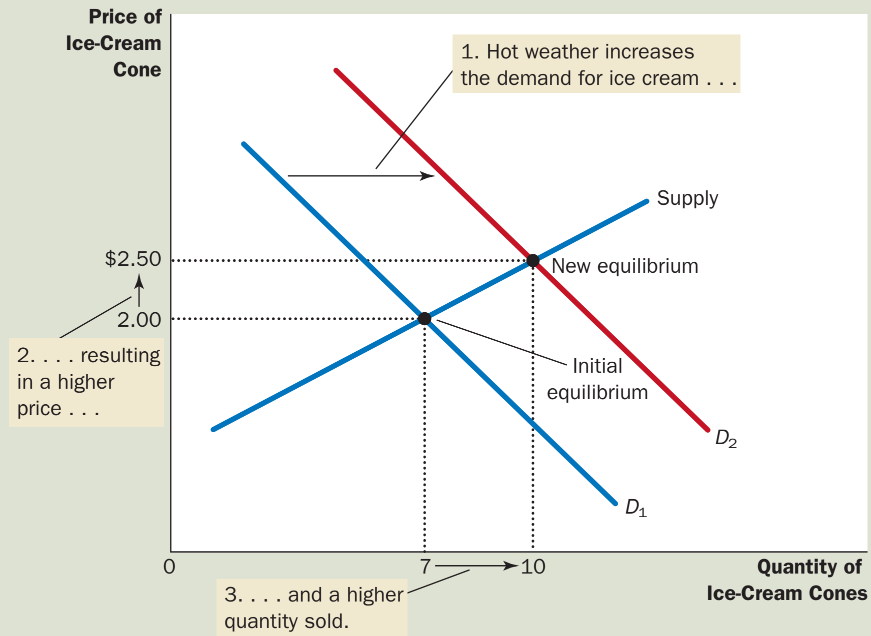
Three Steps for Analyzing Changes in Equilibrium

1. Decide whether the event shifts the supply or demand curve (or perhaps both).
2. Decide in which direction the curve shifts.
3. Use the supply-and-demand diagram to see how the shift changes the equilibrium price and quantity.

10 FIGURE

How an Increase in Demand Affects the Equilibrium

An event that raises quantity demanded at any given price shifts the demand curve to the right. The equilibrium price and the equilibrium quantity both rise. Here an abnormally hot summer causes buyers to demand more ice cream. The demand curve shifts from D_1 to D_2, which causes the equilibrium price to rise from $2.00 to $2.50 and the equilibrium quantity to rise from 7 to 10 cones.



Supply refers to the position of the supply curve, whereas the *quantity supplied* refers to the amount suppliers wish to sell. In this example, supply does not change because the weather does not alter firms' desire to sell at any given price. Instead, the hot weather alters consumers' desire to buy at any given price and thereby shifts the demand curve to the right. The increase in demand causes the equilibrium price to rise. When the price rises, the quantity supplied rises. This increase in quantity supplied is represented by the movement along the supply curve.

To summarize, a shift *in* the supply curve is called a "change in supply," and a shift *in* the demand curve is called a "change in demand." A movement *along* a fixed supply curve is called a "change in the quantity supplied," and a movement *along* a fixed demand curve is called a "change in the quantity demanded."

Example: A Change in Market Equilibrium Due to a Shift in Supply Suppose that during another summer, a hurricane destroys part of the sugarcane crop and drives up the price of sugar. How does this event affect the market for ice cream? Once again, to answer this question, we follow our three steps.

1. The change in the price of sugar, an input into making ice cream, affects the supply curve. By raising the costs of production, it reduces the amount of ice cream that firms produce and sell at any given price. The demand curve does not change because the higher cost of inputs does not directly affect the amount of ice cream households wish to buy.
2. The supply curve shifts to the left because, at every price, the total amount that firms are willing and able to sell is reduced. Figure 11 illustrates this decrease in supply as a shift in the supply curve from S_1 to S_2.

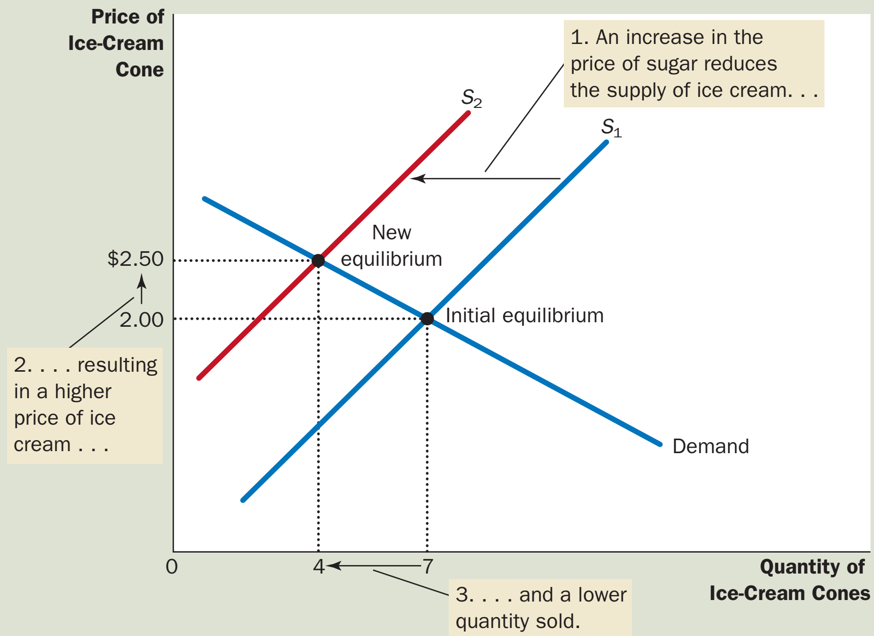


FIGURE 11

How a Decrease in Supply Affects the Equilibrium

An event that reduces quantity supplied at any given price shifts the supply curve to the left. The equilibrium price rises, and the equilibrium quantity falls. Here an increase in the price of sugar (an input) causes sellers to supply less ice cream. The supply curve shifts from S_1 to S_2, which causes the equilibrium price of ice cream to rise from $2.00 to $2.50 and the equilibrium quantity to fall from 7 to 4 cones.

3. As Figure 11 shows, the shift in the supply curve raises the equilibrium price from $2.00 to $2.50 and lowers the equilibrium quantity from 7 to 4 cones. As a result of the sugar price increase, the price of ice cream rises, and the quantity of ice cream sold falls.

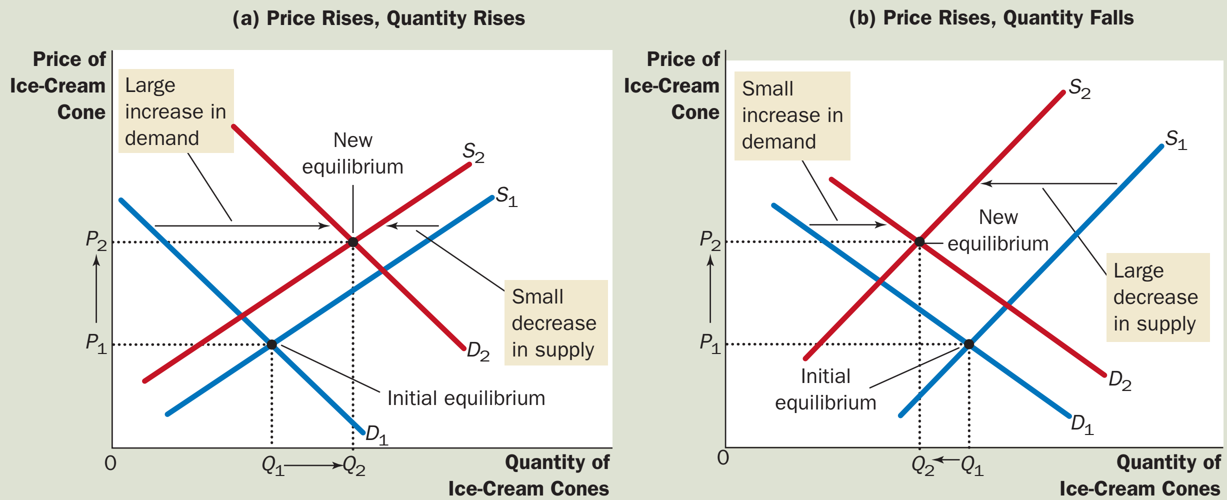
Example: Shifts in Both Supply and Demand Now suppose that a heat wave and a hurricane occur during the same summer. To analyze this combination of events, we again follow our three steps.

1. We determine that both curves must shift. The hot weather affects the demand curve because it alters the amount of ice cream that households want to buy at any given price. At the same time, when the hurricane drives up sugar prices, it alters the supply curve for ice cream because it changes the amount of ice cream that firms want to sell at any given price.
2. The curves shift in the same directions as they did in our previous analysis: The demand curve shifts to the right, and the supply curve shifts to the left. Figure 12 illustrates these shifts.
3. As Figure 12 shows, two possible outcomes might result depending on the relative size of the demand and supply shifts. In both cases, the equilibrium price rises. In panel (a), where demand increases substantially while supply falls just a little, the equilibrium quantity also rises. By contrast, in panel (b), where supply falls substantially while demand rises just a little, the equilibrium quantity falls. Thus, these events certainly raise the price of ice cream, but their impact on the amount of ice cream sold is ambiguous (that is, it could go either way).

12 FIGURE

A Shift in Both Supply and Demand

Here we observe a simultaneous increase in demand and decrease in supply. Two outcomes are possible. In panel (a), the equilibrium price rises from P_1 to P_2, and the equilibrium quantity rises from Q_1 to Q_2. In panel (b), the equilibrium price again rises from P_1 to P_2, but the equilibrium quantity falls from Q_1 to Q_2.



Summary We have just seen three examples of how to use supply and demand curves to analyze a change in equilibrium. Whenever an event shifts the supply curve, the demand curve, or perhaps both curves, you can use these tools to predict how the event will alter the amount sold in equilibrium and the price at which the good is sold. Table 4 shows the predicted outcome for any combination of shifts in the two curves. To make sure you understand how to use the tools of supply and demand, pick a few entries in this table and make sure you can explain to yourself why the table contains the prediction it does.

QUICK QUIZ On the appropriate diagram, show what happens to the market for pizza if the price of tomatoes rises. • On a separate diagram, show what happens to the market for pizza if the price of hamburgers falls.

4 TABLE

What Happens to Price and Quantity When Supply or Demand Shifts?

As a quick quiz, make sure you can explain at least a few of the entries in this table using a supply-and-demand diagram.

	No Change in Supply	An Increase in Supply	A Decrease in Supply
No Change in Demand	*P* same *Q* same	*P* down *Q* up	*P* up *Q* down
An Increase in Demand	*P* up *Q* up	*P* ambiguous *Q* up	*P* up *Q* ambiguous
A Decrease in Demand	*P* down *Q* down	*P* down *Q* ambiguous	*P* ambiguous *Q* down

In The News

The Helium Market

This analysis illustrates how supply and demand interact.

As Demand Balloons, Helium Is in Short Supply

By Ana Campoy

Syracuse University physicist Gianfranco Vidali spends most of his time studying how molecules are made in outer space, but a couple of months ago he abruptly dropped his interstellar research to address an earthly issue: the global shortage of helium.

The airy element best known for floating party balloons and the Goodyear blimp is also the lifeblood of a widening world of scientific research. Mr. Vidali uses the gas, which becomes the coldest liquid on earth when pressurized, to recreate conditions similar to outer space. Without it, he can't work. So when his helium supplier informed him it was cutting deliveries to his lab, Mr. Vidali said, "it sent us into a panic mode."

Helium is found in varying concentrations in the world's natural-gas deposits, and is separated out in a special refining process. As with oil and natural gas, the easiest-to-get helium supplies have been tapped and are declining. [*A leftward shift in the supply curve.*] Meanwhile, scientific research has rapidly multiplied the uses of helium in the past 50 years. [*A rightward shift in the demand curve.*] It is needed to make computer microchips, flat-panel displays, fiber optics and to operate magnetic resonance imaging, or MRI, scans and welding machines. . . .

Glitches at some of the world's biggest helium-producing plants have put a further pinch on supplies in the past year. [*Another leftward shift in the supply curve.*] As supplies have tightened, prices have surged in recent months. For one New York laboratory, prices have increased to $8 a liquid liter, from close to $4 at the end of the summer. [*An increase in the equilibrium price.*]

The upshot: Helium users—from party planners to welding shops—are having to do with less. [*A movement along the demand curve.*] Large industrial manufacturers are better able to weather the helium shortage, taking steps like installing equipment that can recycle the gas. So it is the nation's cash-strapped scientific community that is getting the worst of the crunch.

Soaring helium expenses could shut the doors of some independent labs, many [of] which have produced important research over the years, and slow down work at bigger research centers. Helium is used in research to find cures to deadly diseases, create new sources of energy and answer questions about how the universe was formed. . . .

Experts predict this situation will eventually price out many helium users, who will find substitutes or modify their technology. Some party balloon businesses are filling balloons with mixtures that contain less helium. Some welders are using argon. Industrial users are installing recovery systems. . . .

Reem Jaafar, a researcher at CUNY, says she will go into another area of physics if helium prices stay at their current levels. "If you have a fixed amount in a grant, and you have to spend it all on helium, you don't have anything left over," she says.

Source: *The Wall Street Journal*, December 5, 2007.

CONCLUSION: HOW PRICES ALLOCATE RESOURCES

This chapter has analyzed supply and demand in a single market. Although our discussion has centered on the market for ice cream, the lessons learned here apply in most other markets as well. Whenever you go to a store to buy something,

In The News

Price Increases after Natural Disasters

When a natural disaster such as a hurricane hits a region, basic commodities such as gasoline and bottled water experience increasing demand and shrinking supply. These shifts in demand and supply curves cause prices to rise, leading some people to complain about "price gouging." But, as journalist John Stossel argues in this opinion piece, there is an upside to higher prices after a disaster strikes.

In Praise of Price Gouging

By John Stossel

Politicians and the media are furious about price increases in the wake of Hurricane Katrina. They want gas stations and water sellers punished.

If you want to score points cracking down on mean, greedy profiteers, pushing anti-"gouging" rules is a very good thing. But if you're one of the people the law "protects" from "price gouging," you won't fare as well.

Consider this scenario: You are thirsty—worried that your baby is going to become dehydrated. You find a store that's open, and the storeowner thinks it's immoral to take advantage of your distress, so he won't charge you a dime more than he charged last week. But you can't buy water from him. It's sold out.

You continue on your quest, and finally find that dreaded monster, the price gouger. He offers a bottle of water that cost $1 last week at an "outrageous" price—say $20. You pay it to survive the disaster.

You resent the price gouger. But if he hadn't demanded $20, he'd have been out of water. It was the price gouger's "exploitation" that saved your child.

It saved her because people look out for their own interests. Before you got to the water seller, other people did. At $1 a bottle, they stocked up. At $20 a bottle, they bought more cautiously. By charging $20, the price gouger makes sure his water goes to those who really need it.

The people the softheaded politicians think are cruelest are doing the most to help. Assuming the demand for bottled water was going to go up, they bought a lot of it, planning to resell it at a steep profit. If they hadn't done that, that water would not have been available for the people who need it the most.

Might the water have been provided by volunteers? Certainly some people help others out of benevolence. But we can't count on benevolence. As Adam Smith wrote, "It is not from the benevolence of the butcher, the brewer or the baker, that we can expect our dinner, but from their regard to their own interest."

Consider the store owner's perspective: If he's not going to make a big profit, why open up the store at all? Staying in a disaster area is dangerous and means giving up the opportunity to be with family in order to take care of the needs of strangers. Why take the risk?

Any number of services—roofing, for example, carpentry, or tree removal—are in overwhelming demand after a disaster. When the time comes to rebuild New Orleans, it's safe to predict a shortage of local carpenters: The city's own population of carpenters won't be enough.

If this were a totalitarian country, the government might just order a bunch of tradesmen to go to New Orleans. But in a free society, those tradesmen must be persuaded to leave their homes and families, leave their employers and customers, and drive from say, Wisconsin, to take work in New Orleans. If they can't make more money in Louisiana than Wisconsin, why would they make the trip?

Some may be motivated by a desire to be heroic, but we can't expect enough heroes to fill the need, week after week; most will travel there for the same reason most Americans go to work: to make money. Any tradesman who treks to a disaster area must get higher pay than he would get in his hometown, or he won't do the trek. Limit him to what his New Orleans colleagues charged before the storm, and even a would-be hero may say, "the heck with it."

If he charges enough to justify his venture, he's likely to be condemned morally or legally by the very people he's trying to help. But they just don't understand basic economics. Force prices down, and you keep suppliers out. Let the market work, suppliers come—and competition brings prices as low as the challenges of the disaster allow. Goods that were in short supply become available, even to the poor.

It's the price "gougers" who bring the water, ship the gasoline, fix the roof, and rebuild the cities. The price "gougers" save lives.

Source: Townhall.com, September 7, 2005.

you are contributing to the demand for that item. Whenever you look for a job, you are contributing to the supply of labor services. Because supply and demand are such pervasive economic phenomena, the model of supply and demand is a powerful tool for analysis. We will be using this model repeatedly in the following chapters.

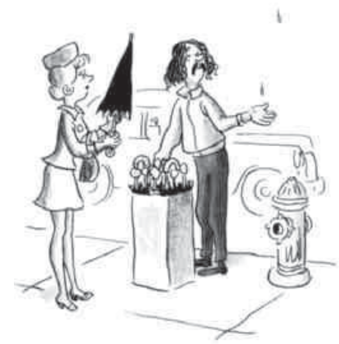
One of the *Ten Principles of Economics* discussed in Chapter 1 is that markets are usually a good way to organize economic activity. Although it is still too early to judge whether market outcomes are good or bad, in this chapter we have begun to see how markets work. In any economic system, scarce resources have to be allocated among competing uses. Market economies harness the forces of supply and demand to serve that end. Supply and demand together determine the prices of the economy's many different goods and services; prices in turn are the signals that guide the allocation of resources.

For example, consider the allocation of beachfront land. Because the amount of this land is limited, not everyone can enjoy the luxury of living by the beach. Who gets this resource? The answer is whoever is willing and able to pay the price. The price of beachfront land adjusts until the quantity of land demanded exactly balances the quantity supplied. Thus, in market economies, prices are the mechanism for rationing scarce resources.

Similarly, prices determine who produces each good and how much is produced. For instance, consider farming. Because we need food to survive, it is crucial that some people work on farms. What determines who is a farmer and who is not? In a free society, there is no government planning agency making this decision and ensuring an adequate supply of food. Instead, the allocation of workers to farms is based on the job decisions of millions of workers. This decentralized system works well because these decisions depend on prices. The prices of food and the wages of farmworkers (the price of their labor) adjust to ensure that enough people choose to be farmers.

If a person had never seen a market economy in action, the whole idea might seem preposterous. Economies are enormous groups of people engaged in a multitude of interdependent activities. What prevents decentralized decision making from degenerating into chaos? What coordinates the actions of the millions of people with their varying abilities and desires? What ensures that what needs to be done is in fact done? The answer, in a word, is *prices.* If an invisible hand guides market economies, as Adam Smith famously suggested, then the price system is the baton that the invisible hand uses to conduct the economic orchestra.

"Two dollars"



"—and seventy-five cents."

SUMMARY

- Economists use the model of supply and demand to analyze competitive markets. In a competitive market, there are many buyers and sellers, each of whom has little or no influence on the market price.
- The demand curve shows how the quantity of a good demanded depends on the price. According to the law of demand, as the price of a good falls, the quantity demanded rises. Therefore, the demand curve slopes downward.
- In addition to price, other determinants of how much consumers want to buy include income, the prices of substitutes and complements, tastes, expectations, and the number of buyers. If one of these factors changes, the demand curve shifts.

- The supply curve shows how the quantity of a good supplied depends on the price. According to the law of supply, as the price of a good rises, the quantity supplied rises. Therefore, the supply curve slopes upward.
- In addition to price, other determinants of how much producers want to sell include input prices, technology, expectations, and the number of sellers. If one of these factors changes, the supply curve shifts.
- The intersection of the supply and demand curves determines the market equilibrium. At the equilibrium price, the quantity demanded equals the quantity supplied.
- The behavior of buyers and sellers naturally drives markets toward their equilibrium. When the market price is above the equilibrium price, there is a surplus of the good, which causes the market price to fall. When the market price is below the equilibrium price, there is a shortage, which causes the market price to rise.
- To analyze how any event influences a market, we use the supply-and-demand diagram to examine how the event affects the equilibrium price and quantity. To do this, we follow three steps. First, we decide whether the event shifts the supply curve or the demand curve (or both). Second, we decide in which direction the curve shifts. Third, we compare the new equilibrium with the initial equilibrium.
- In market economies, prices are the signals that guide economic decisions and thereby allocate scarce resources. For every good in the economy, the price ensures that supply and demand are in balance. The equilibrium price then determines how much of the good buyers choose to consume and how much sellers choose to produce.

KEY CONCEPTS

market, *p. 66*
competitive market, *p. 66*
quantity demanded, *p. 67*
law of demand, *p. 67*
demand schedule, *p. 67*
demand curve, *p. 68*
normal good, *p. 70*
inferior good, *p. 70*
substitutes, *p. 70*
complements, *p. 70*
quantity supplied, *p. 73*
law of supply, *p. 73*
supply schedule, *p. 73*
supply curve, *p. 73*
equilibrium, *p. 77*
equilibrium price, *p. 77*
equilibrium quantity, *p. 77*
surplus, *p. 77*
shortage, *p. 78*
law of supply and demand, *p. 78*

QUESTIONS FOR REVIEW

1. What is a competitive market? Briefly describe a type of market that is not perfectly competitive.
2. What are the demand schedule and the demand curve and how are they related? Why does the demand curve slope downward?
3. Does a change in consumers' tastes lead to a movement along the demand curve or a shift in the demand curve? Does a change in price lead to a movement along the demand curve or a shift in the demand curve?
4. Popeye's income declines, and as a result, he buys more spinach. Is spinach an inferior or a normal good? What happens to Popeye's demand curve for spinach?
5. What are the supply schedule and the supply curve and how are they related? Why does the supply curve slope upward?
6. Does a change in producers' technology lead to a movement along the supply curve or a shift in the supply curve? Does a change in price lead to a movement along the supply curve or a shift in the supply curve?
7. Define the equilibrium of a market. Describe the forces that move a market toward its equilibrium.

8. Beer and pizza are complements because they are often enjoyed together. When the price of beer rises, what happens to the supply, demand, quantity supplied, quantity demanded, and the price in the market for pizza?
9. Describe the role of prices in market economies.

PROBLEMS AND APPLICATIONS

1. Explain each of the following statements using supply-and-demand diagrams.
   a. "When a cold snap hits Florida, the price of orange juice rises in supermarkets throughout the country."
   b. "When the weather turns warm in New England every summer, the price of hotel rooms in Caribbean resorts plummets."
   c. "When a war breaks out in the Middle East, the price of gasoline rises, and the price of a used Cadillac falls."
2. "An increase in the demand for notebooks raises the quantity of notebooks demanded but not the quantity supplied." Is this statement true or false? Explain.
3. Consider the market for minivans. For each of the events listed here, identify which of the determinants of demand or supply are affected. Also indicate whether demand or supply increases or decreases. Then draw a diagram to show the effect on the price and quantity of minivans.
   a. People decide to have more children.
   b. A strike by steelworkers raises steel prices.
   c. Engineers develop new automated machinery for the production of minivans.
   d. The price of sports utility vehicles rises.
   e. A stock-market crash lowers people's wealth.
4. Identify the flaw in this analysis: "If more Americans go on a low-carb diet, the demand for bread will fall. The decrease in the demand for bread will cause the price of bread to fall. The lower price, however, will then increase the demand. In the new equilibrium, Americans might end up consuming more bread than they did initially."
5. Consider the markets for DVD movies, TV screens, and tickets at movie theaters.
   a. For each pair, identify whether they are complements or substitutes:
      - DVDs and TV screens
      - DVDs and movie tickets
      - TV screens and movie tickets
   b. Suppose a technological advance reduces the cost of manufacturing TV screens. Draw a diagram to show what happens in the market for TV screens.
   c. Draw two more diagrams to show how the change in the market for TV screens affects the markets for DVDs and movie tickets.
6. Over the past 20 years, technological advances have reduced the cost of computer chips. How do you think this affected the market for computers? For computer software? For typewriters?
7. Using supply-and-demand diagrams, show the effect of the following events on the market for sweatshirts.
   a. A hurricane in South Carolina damages the cotton crop.
   b. The price of leather jackets falls.
   c. All colleges require morning exercise in appropriate attire.
   d. New knitting machines are invented.
8. A survey shows an increase in drug use by young people. In the ensuing debate, two hypotheses are proposed:
   - Reduced police efforts have increased the availability of drugs on the street.
   - Cutbacks in education efforts have decreased awareness of the dangers of drug addiction.
   a. Use supply-and-demand diagrams to show how each of these hypotheses could lead to an increase in quantity of drugs consumed.
   b. How could information on what has happened to the price of drugs help us to distinguish between these explanations?
9. Suppose that in the year 2010 the number of births is temporarily high. How does this baby boom affect the price of babysitting services in 2015 and 2025? (Hint: 5-year-olds need babysitters, whereas 15-year-olds can be babysitters.)
10. Ketchup is a complement (as well as a condiment) for hot dogs. If the price of hot dogs rises, what happens to the market for ketchup? For tomatoes? For tomato juice? For orange juice?

11. The market for pizza has the following demand and supply schedules:

Price	Quantity Demanded	Quantity Supplied
$4	135 pizzas	26 pizzas
5	104	53
6	81	81
7	68	98
8	53	110
9	39	121

   a. Graph the demand and supply curves. What is the equilibrium price and quantity in this market?
   b. If the actual price in this market were *above* the equilibrium price, what would drive the market toward the equilibrium?
   c. If the actual price in this market were *below* the equilibrium price, what would drive the market toward the equilibrium?
12. Consider the following events: Scientists reveal that consumption of oranges decreases the risk of diabetes and, at the same time, farmers use a new fertilizer that makes orange trees more productive. Illustrate and explain what effect these changes have on the equilibrium price and quantity of oranges.
13. Because bagels and cream cheese are often eaten together, they are complements.
   a. We observe that both the equilibrium price of cream cheese and the equilibrium quantity of bagels have risen. What could be responsible for this pattern—a fall in the price of flour or a fall in the price of milk? Illustrate and explain your answer.
   b. Suppose instead that the equilibrium price of cream cheese has risen but the equilibrium quantity of bagels has fallen. What could be responsible for this pattern—a rise in the price of flour or a rise in the price of milk? Illustrate and explain your answer.
14. Suppose that the price of basketball tickets at your college is determined by market forces. Currently, the demand and supply schedules are as follows:

Price	Quantity Demanded	Quantity Supplied
$ 4	10,000 tickets	8,000 tickets
8	8,000	8,000
12	6,000	8,000
16	4,000	8,000
20	2,000	8,000

   a. Draw the demand and supply curves. What is unusual about this supply curve? Why might this be true?
   b. What are the equilibrium price and quantity of tickets?
   c. Your college plans to increase total enrollment next year by 5,000 students. The additional students will have the following demand schedule:

Price	Quantity Demanded
$ 4	4,000 tickets
8	3,000
12	2,000
16	1,000
20	0

   Now add the old demand schedule and the demand schedule for the new students to calculate the new demand schedule for the entire college. What will be the new equilibrium price and quantity?
15. Market research has revealed the following information about the market for chocolate bars: The demand schedule can be represented by the equation $Q^D = 1{,}600 - 300P$, where Q^D is the quantity demanded and P is the price. The supply schedule can be represented by the equation $Q^S = 1{,}400 + 700P$, where Q^S is the quantity supplied. Calculate the equilibrium price and quantity in the market for chocolate bars.