IN THIS CHAPTER YOU WILL LEARN:

1 What demand is and what affects it.

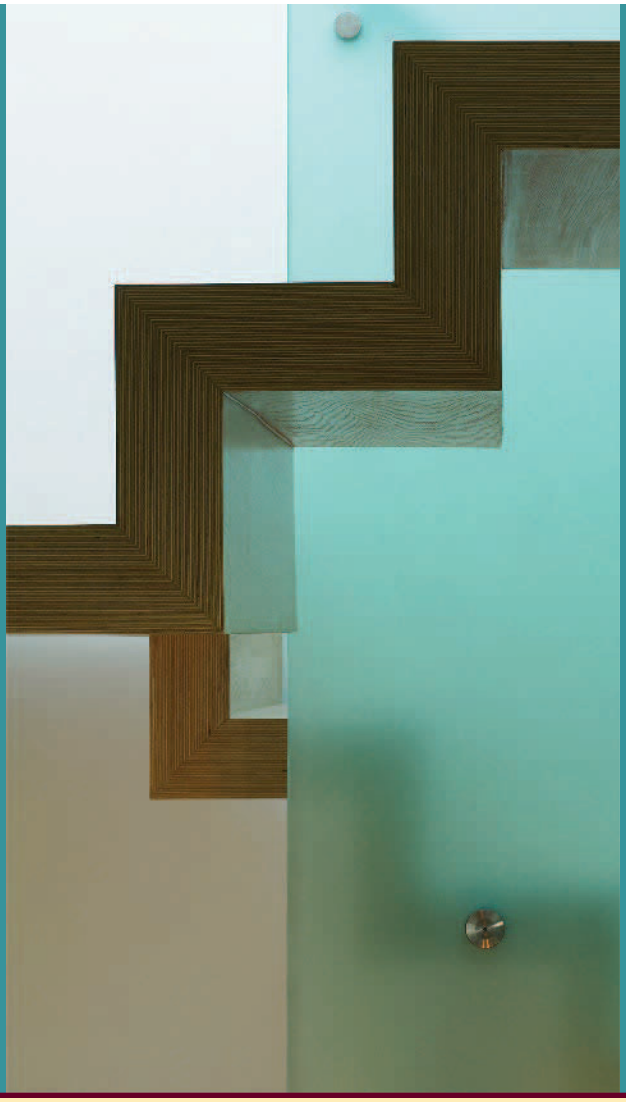
2 What supply is and what affects it.

3 How supply and demand together determine market equilibrium.

4 How changes in supply and demand affect equilibrium prices and quantities.

5 What government-set prices are and how they can cause product surpluses and shortages.

6 (Appendix) How supply and demand analysis can add insights on actual-economy situations.



3

Demand, Supply, and Market Equilibrium

ORIGIN OF THE IDEA

O 3.1

Demand and supply

According to an old joke, if you teach a parrot to say "demand and supply," you have an economist. There is an element of truth in this quip. The tools of demand and supply can take us far in understanding how individual markets work.

Markets

Markets bring together buyers ("demanders") and sellers ("suppliers"), and they exist in many forms. The corner gas station, an e-commerce site, the local music store, a farmer's roadside stand—all are familiar markets. The New York Stock Exchange and the Chicago Board of Trade are markets where buyers and sellers of stocks and bonds and farm commodities from all over the world communicate with one another to buy and sell. Auctioneers bring together potential buyers and sellers of art, livestock, used farm equipment, and, sometimes, real estate. In labor markets, new college graduates "sell" and employers "buy" specific labor services.

Some markets are local; others are national or international. Some are highly personal, involving face-to-face contact between demander and supplier; others are faceless, with buyer and seller never seeing or knowing each other.

To keep things simple, we will focus in this chapter on markets consisting of large numbers of independently acting buyers and sellers of standardized products. These are the highly competitive markets such as a central grain exchange, a stock market, or a market for foreign currencies in which the price is "discovered" through the interacting decisions of buyers and sellers. All such markets involve demand, supply, price, and quantity.

Demand

Demand is a schedule or a curve that shows the various amounts of a product that consumers are willing and able to purchase at each of a series of possible prices during a specified period of time.[1] Demand shows the quantities of a product that will be purchased at various possible prices, *other things equal*. Demand can easily be shown in table form. The table in Figure 3.1 is a hypothetical **demand schedule** for a *single consumer* purchasing bushels of corn.

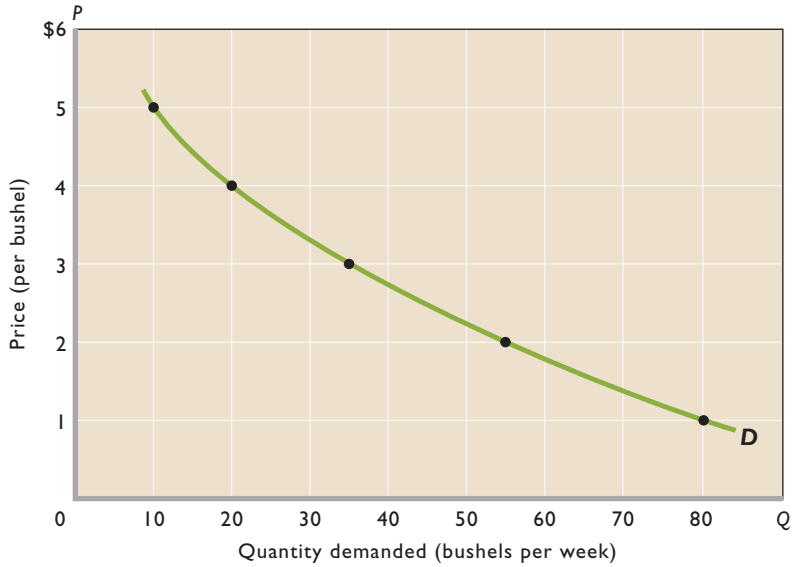
The table reveals the relationship between the various prices of corn and the quantity of corn a particular consumer would be willing and able to purchase at each of these prices. We say "willing and able" because willingness alone is not effective in the market. You may be willing to buy a plasma television set, but if that willingness is not backed by the necessary dollars, it will not be effective and, therefore, will not be reflected in the market. In the table in Figure 3.1, if the price of corn were $5 per bushel, our consumer would be willing and able to buy 10 bushels per week; if it were $4, the consumer would be willing and able to buy 20 bushels per week; and so forth.

The table does not tell us which of the five possible prices will actually exist in the corn market. That depends

[1]This definition obviously is worded to apply to product markets. To adjust it to apply to resource markets, substitute the word "resource" for "product" and the word "businesses" for "consumers."

FIGURE 3.1 An individual buyer's demand for corn. Because price and quantity demanded are inversely related, an individual's demand schedule graphs as a downsloping curve such as *D*. Other things equal, consumers will buy more of a product as its price declines and less of the product as its price rises. (Here and in later figures, *P* stands for price and *Q* stands for quantity demanded or supplied.)

Demand for Corn	
Price per Bushel	Quantity Demanded per Week
$5	10
4	20
3	35
2	55
1	80



on the interaction between demand and supply. Demand is simply a statement of a buyer's plans, or intentions, with respect to the purchase of a product.

To be meaningful, the quantities demanded at each price must relate to a specific period—a day, a week, a month. Saying "A consumer will buy 10 bushels of corn at $5 per bushel" is meaningless. Saying "A consumer will buy 10 bushels of corn per week at $5 per bushel" is meaningful. Unless a specific time period is stated, we do not know whether the demand for a product is large or small.

Law of Demand

A fundamental characteristic of demand is this: Other things equal, as price falls, the quantity demanded rises, and as price rises, the quantity demanded falls. In short, there is a negative or *inverse* relationship between price and quantity demanded. Economists call this inverse relationship the **law of demand.**

ORIGIN OF THE IDEA
O 3.2
Law of demand

The other-things-equal assumption is critical here. Many factors other than the price of the product being considered affect the amount purchased. For example, the quantity of Nikes purchased will depend not only on the price of Nikes but also on the prices of such substitutes as Reeboks, Adidas, and New Balances. The law of demand in this case says that fewer Nikes will be purchased if the price of Nikes rises and if the prices of Reeboks, Adidas, and New Balances all remain constant. In short, if the *relative price* of Nikes rises, fewer Nikes will be bought. However, if the price of Nikes and the prices of all other competing shoes increase by some amount—say, $5—consumers might buy more, less, or the same number of Nikes.

Why the inverse relationship between price and quantity demanded? Let's look at three explanations, beginning with the simplest one:

- The law of demand is consistent with common sense. People ordinarily *do* buy more of a product at a low price than at a high price. Price is an obstacle that deters consumers from buying. The higher that obstacle, the less of a product they will buy; the lower the price obstacle, the more they will buy. The fact that businesses have "sales" is evidence of their belief in the law of demand.
- In any specific time period, each buyer of a product will derive less satisfaction (or benefit, or utility) from each successive unit of the product consumed. The second Big Mac will yield less satisfaction to the consumer than the first, and the third still less than the second. That is, consumption is subject to **diminishing marginal utility.** And because successive units of a particular product yield less and less marginal utility, consumers will buy additional units only if the price of those units is progressively reduced.

ORIGIN OF THE IDEA
O 3.3
Diminishing marginal utility

- We can also explain the law of demand in terms of income and substitution effects. The **income effect** indicates that a lower price increases the purchasing power of a buyer's money income, enabling the buyer to purchase more of the product than before. A higher price has the opposite effect. The **substitution effect** suggests that at a lower price buyers have the incentive to substitute what is now a less expensive product for similar products that are now *relatively* more expensive. The product whose price has fallen is now "a better deal" relative to the other products.

For example, a decline in the price of chicken will increase the purchasing power of consumer incomes, enabling people to buy more chicken (the income effect). At a lower price, chicken is relatively more attractive and consumers tend to substitute it for pork, lamb, beef, and fish (the substitution effect). The income and substitution effects combine to make consumers able and willing to buy more of a product at a low price than at a high price.

ORIGIN OF THE IDEA
O 3.4
Income and substitution effects

The Demand Curve

The inverse relationship between price and quantity demanded for any product can be represented on a simple graph, in which, by convention, we measure *quantity demanded* on the horizontal axis and *price* on the vertical axis. In the graph in Figure 3.1 we have plotted the five price-quantity data points listed in the accompanying table and connected the points with a smooth curve, labeled *D*. Such a curve is called a **demand curve.** Its downward slope reflects the law of demand—people buy more of a product, service, or resource as its price falls. The relationship between price and quantity demanded is inverse (or negative).

The table and graph in Figure 3.1 contain exactly the same data and reflect the same relationship between price and quantity demanded. But the graph shows that relationship much more simply and clearly than a table or a description in words.

Market Demand

So far, we have concentrated on just one consumer. But competition requires that more than one buyer be present in each market. By adding the quantities demanded by all consumers at each of the various possible prices, we can get from *individual* demand to *market* demand. If there are just three buyers in the market, as represented in the table in Figure 3.2, it is relatively easy to determine the total quantity demanded at each price. Figure 3.2 shows the graphical summing procedure: At each price we sum horizontally the quantities demanded by Joe, Jen, and Jay to obtain the total quantity demanded at that price; we then plot the price and the total quantity demanded as one point on the market demand curve.

Competition, of course, ordinarily entails many more than three buyers of a product. To avoid hundreds or thousands or millions of additions, we suppose that all the buyers in a market are willing and able to buy the same amounts at each of the possible prices. Then we just multiply those amounts by the number of buyers to obtain the market demand. That is how we arrived at the demand schedule and demand curve D_1 in Figure 3.3 for a market of 200 corn buyers, each with a demand as shown in the table in Figure 3.1.

In constructing a demand curve such as D_1 in Figure 3.3, economists assume that price is the most important influence on the amount of any product purchased. But economists know that other factors can and do affect purchases. These factors, called **determinants of demand,** are assumed to be constant when a demand curve like D_1 is drawn. They are the "other things equal" in the relationship between price and quantity demanded. When any of these determinants changes, the demand curve will shift to the right or left. For this reason, determinants of demand are sometimes referred to as *demand shifters*.

The basic determinants of demand are (1) consumers' tastes (preferences), (2) the number of buyers in the market, (3) consumers' incomes, (4) the prices of related goods, and (5) consumer expectations.

Change in Demand

A change in one or more of the determinants of demand will change the demand data (the demand schedule) in the table accompanying Figure 3.3 and therefore the location of the demand curve there. A change in the demand schedule or, graphically, a shift in the demand curve is called a *change in demand*.

If consumers desire to buy more corn at each possible price than is reflected in column 2 in the table in Figure 3.3, that *increase in demand* is shown as a shift of the demand curve to the right, say, from D_1 to D_2. Conversely, a *decrease in demand* occurs when consumers buy less corn

FIGURE 3.2 Market demand for corn, three buyers. The market demand curve D is the horizontal summation of the individual demand curves (D_1, D_2, and D_3) of all the consumers in the market. At the price of $3, for example, the three individual curves yield a total quantity demanded of 100 bushels.

Market Demand for Corn, Three Buyers

Price per Bushel	Quantity Demanded: Joe		Jen		Jay		Total Quantity Demanded per Week
$5	10	+	12	+	8	=	30
4	20	+	23	+	17	=	60
3	35	+	39	+	26	=	100
2	55	+	60	+	39	=	154
1	80	+	87	+	54	=	221

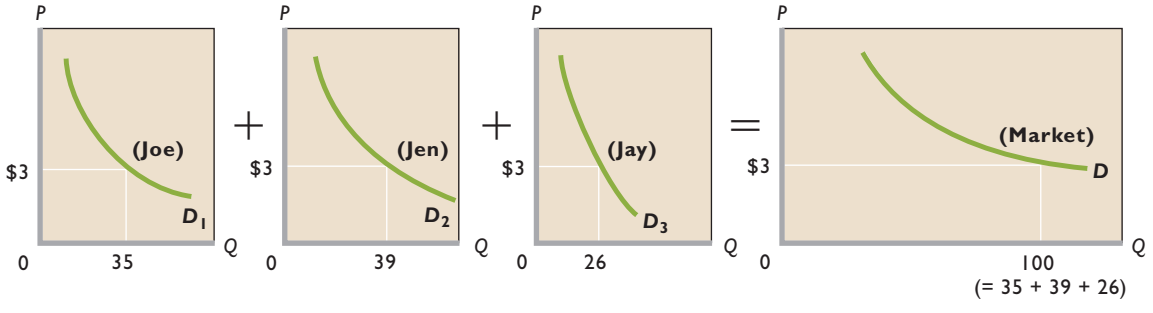
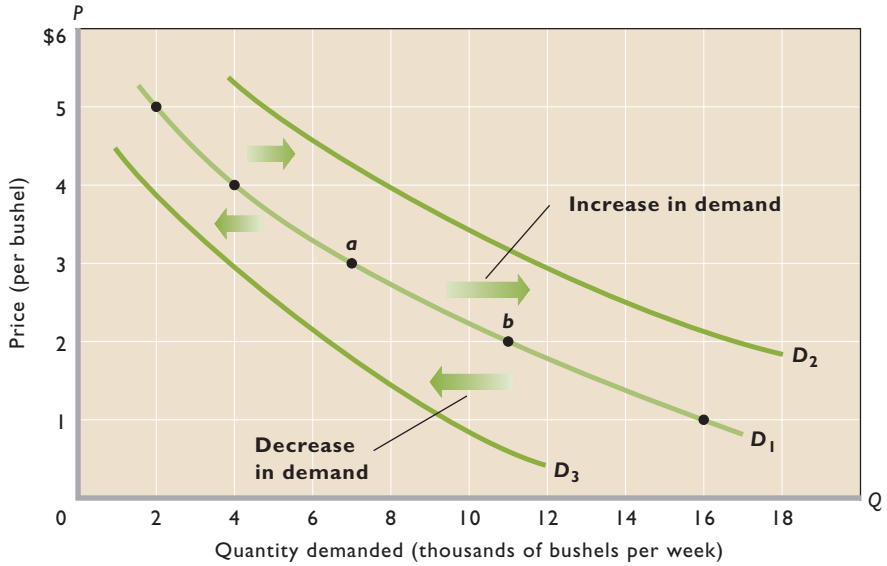


FIGURE 3.3 Changes in the demand for corn. A change in one or more of the determinants of demand causes a change in demand. An increase in demand is shown as a shift of the demand curve to the right, as from D_1 to D_2. A decrease in demand is shown as a shift of the demand curve to the left, as from D_1 to D_3. These changes in demand are to be distinguished from a change in quantity demanded, which is caused by a change in the price of the product, as shown by a movement from, say, point *a* to point *b* on fixed demand curve D_1.



Market Demand for Corn, 200 Buyers, (D_1)

(1) Price per Bushel	(2) Total Quantity Demanded per Week
$5	2,000
4	4,000
3	7,000
2	11,000
1	16,000

at each possible price than is indicated in column 2. The leftward shift of the demand curve from D_1 to D_3 in Figure 3.3 shows that situation.

Now let's see how changes in each determinant affect demand.

Tastes A favorable change in consumer tastes (preferences) for a product—a change that makes the product more desirable—means that more of it will be demanded at each price. Demand will increase; the demand curve will shift rightward. An unfavorable change in consumer preferences will decrease demand, shifting the demand curve to the left.

New products may affect consumer tastes; for example, the introduction of digital cameras greatly decreased the demand for film cameras. Consumers' concern over the health hazards of cholesterol and obesity have increased the demand for broccoli, low-calorie beverages, and fresh fruit while decreasing the demand for beef, veal, eggs, and whole milk. Over the past several years, the demand for coffee drinks and table wine has greatly increased, driven by a change in tastes. So, too, has the demand for DVDs and iPhones.

Number of Buyers An increase in the number of buyers in a market is likely to increase product demand; a decrease in the number of buyers will probably decrease demand. For example, the rising number of older persons in the United States in recent years has increased the demand for motor homes, medical care, and retirement communities. Large-scale immigration from Mexico has greatly increased the demand for a range of goods and services in the Southwest, including Mexican food products in local grocery stores. Improvements in communications have given financial markets international range and have thus increased the demand for stocks and bonds. International trade agreements have reduced foreign trade barriers to American farm commodities, increasing the number of buyers and therefore the demand for those products.

In contrast, emigration (out-migration) from many small rural communities has reduced the population and thus the demand for housing, home appliances, and auto repair in those towns.

Income How changes in income affect demand is a more complex matter. For most products, a rise in income causes an increase in demand. Consumers typically buy more steaks, furniture, and electronic equipment as their incomes increase. Conversely, the demand for such products declines as their incomes fall. Products whose demand varies *directly* with money income are called *superior goods*, or **normal goods.**

Although most products are normal goods, there are some exceptions. As incomes increase beyond some point, the demand for used clothing, retread tires, and third-hand automobiles may decrease, because the higher incomes

enable consumers to buy new versions of those products. Rising incomes may also decrease the demand for soy-enhanced hamburger. Similarly, rising incomes may cause the demand for charcoal grills to decline as wealthier consumers switch to gas grills. Goods whose demand varies *inversely* with money income are called **inferior goods.**

Prices of Related Goods A change in the price of a related good may either increase or decrease the demand for a product, depending on whether the related good is a substitute or a complement:

- A **substitute good** is one that can be used in place of another good.
- A **complementary good** is one that is used together with another good.

Substitutes Häagen-Dazs ice cream and Ben & Jerry's ice cream are substitute goods or, simply, *substitutes*. When two products are substitutes, an increase in the price of one will increase the demand for the other. Conversely, a decrease in the price of one will decrease the demand for the other. For example, when the price of Häagen-Dazs ice cream rises, consumers will buy less of it and increase their demand for Ben & Jerry's ice cream. When the price of Colgate toothpaste declines, the demand for Crest decreases. So it is with other product pairs such as Nikes and Reeboks, Budweiser and Miller beer, or Chevrolets and Fords. They are *substitutes in consumption*.

Complements Because complementary goods (or, simply, *complements*) are used together, they are typically demanded jointly. Examples include computers and software, cell phones and cellular service, and snowboards and lift tickets. If the price of a complement (for example, lettuce) goes up, the demand for the related good (salad dressing) will decline. Conversely, if the price of a complement (for example, tuition) falls, the demand for a related good (textbooks) will increase.

Unrelated Goods The vast majority of goods are not related to one another and are called *independent goods*. Examples are butter and golf balls, potatoes and automobiles, and bananas and wristwatches. A change in the price of one has little or no effect on the demand for the other.

Consumer Expectations Changes in consumer expectations may shift demand. A newly formed expectation of higher future prices may cause consumers to buy now in order to "beat" the anticipated price rises, thus increasing current demand. That is often what happens in so-called hot real estate markets. Buyers rush in because they think the price of new homes will continue to escalate rapidly. Some buyers fear being "priced out of the market" and therefore not obtaining the home they desire. Other buyers—speculators—believe they will be able to sell the houses later at a higher price. Whichever their motivation, these buyers increase the current demand for houses.

Similarly, a change in expectations concerning future income may prompt consumers to change their current spending. For example, first-round NFL draft choices may splurge on new luxury cars in anticipation of a lucrative professional football contract. Or workers who become fearful of losing their jobs may reduce their demand for, say, vacation travel.

In summary, an *increase* in demand—the decision by consumers to buy larger quantities of a product at each possible price—may be caused by

- A favorable change in consumer tastes.
- An increase in the number of buyers.
- Rising incomes if the product is a normal good.
- Falling incomes if the product is an inferior good.
- An increase in the price of a substitute good.
- A decrease in the price of a complementary good.
- A new consumer expectation that either prices or income will be higher in the future.

You should "reverse" these generalizations to explain a *decrease* in demand. Table 3.1 provides additional illustrations of the determinants of demand. **(Key Question 3)**

TABLE 3.1 Determinants of Demand: Factors That Shift the Demand Curve

Determinant	Examples
Change in buyer tastes	Physical fitness rises in popularity, increasing the demand for jogging shoes and bicycles; cell phone popularity rises, reducing the demand for traditional land phones.
Change in number of buyers	A decline in the birthrate reduces the demand for children's toys.
Change in income	A rise in incomes increases the demand for normal goods such as restaurant meals, sports tickets, and necklaces while reducing the demand for inferior goods such as cabbage, turnips, and inexpensive wine.
Change in the prices of related goods	A reduction in airfares reduces the demand for bus transportation (substitute goods); a decline in the price of DVD players increases the demand for DVD movies (complementary goods).
Change in consumer expectations	Inclement weather in South America creates an expectation of higher future prices of coffee beans, thereby increasing today's demand for coffee beans.

Changes in Quantity Demanded

A *change in demand* must not be confused with a *change in quantity demanded.* A **change in demand** is a shift of the demand curve to the right (an increase in demand) or to the left (a decrease in demand). It occurs because the consumer's state of mind about purchasing the product has been altered in response to a change in one or more of the determinants of demand. Recall that "demand" is a schedule or a curve; therefore, a "change in demand" means a change in the schedule and a shift of the curve.

In contrast, a **change in quantity demanded** is a movement from one point to another point—from one price-quantity combination to another—on a fixed demand schedule or demand curve. The cause of such a change is an increase or decrease in the price of the product under consideration. In the table in Figure 3.3, for example, a decline in the price of corn from $5 to $4 will increase the quantity of corn demanded from 2000 to 4000 bushels.

In Figure 3.3 the shift of the demand curve D_1 to either D_2 or D_3 is a change in demand. But the movement from point *a* to point *b* on curve D_1 represents a change in quantity demanded: Demand has not changed; it is the entire curve, and it remains fixed in place.

QUICK REVIEW 3.1

- Demand is a schedule or a curve showing the amount of a product that buyers are willing and able to purchase, in a particular time period, at each possible price in a series of prices.
- The law of demand states that, other things equal, the quantity of a good purchased varies inversely with its price.
- The demand curve shifts because of changes in (a) consumer tastes, (b) the number of buyers in the market, (c) consumer income, (d) the prices of substitute or complementary goods, and (e) consumer expectations.
- A change in demand is a shift of the demand curve; a change in quantity demanded is a movement from one point to another on a fixed demand curve.

Supply

Supply is a schedule or curve showing the various amounts of a product that producers are willing and able to make available for sale at each of a series of possible prices during a specific period.[2] The table in Figure 3.4 is a hypothetical **supply schedule** for a single producer of corn. It shows the quantities of corn that will be supplied at various prices, other things equal.

[2]This definition is worded to apply to product markets. To adjust it to apply to resource markets, substitute "resource" for "product" and "owners" for "producers."

Law of Supply

The table in Figure 3.4 shows a positive or direct relationship that prevails between price and quantity supplied. As price rises, the quantity supplied rises; as price falls, the quantity supplied falls. This relationship is called the **law of supply.** A supply schedule tells us that, other things equal, firms will produce and offer for sale more of their product at a high price than at a low price. This, again, is basically common sense.

Price is an obstacle from the standpoint of the consumer, who is on the paying end. The higher the price, the less the consumer will buy. But the supplier is on the receiving end of the product's price. To a supplier, price represents *revenue*, which serves as an incentive to produce and sell a product. The higher the price, the greater this incentive and the greater the quantity supplied.

Consider a farmer who is deciding on how much corn to plant. As corn prices rise, as shown in the table in Figure 3.4, the farmer finds it profitable to plant more corn. And the higher corn prices enable the farmer to cover the increased costs associated with more intensive cultivation and the use of more seed, fertilizer, and pesticides. The overall result is more corn.

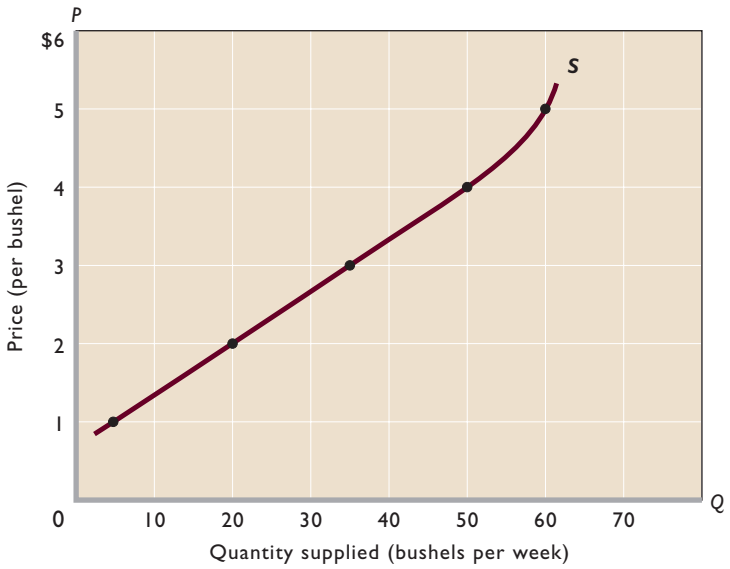
Now consider a manufacturer. Beyond some quantity of production, manufacturers usually encounter increases in *marginal cost*—the added cost of producing one more unit of output. Certain productive resources—in particular, the firm's plant and machinery—cannot be expanded quickly, so the firm uses more of other resources such as labor to produce more output. But as labor becomes more abundant relative to the fixed plant and equipment, the additional workers have relatively less space and access to equipment. For example, the added workers may have to wait to gain access to machines. As a result, each added worker produces less added output, and the marginal cost of successive units of output rises accordingly. The firm will not produce the more costly units unless it receives a higher price for them. Again, price and quantity supplied are directly related.

The Supply Curve

As with demand, it is convenient to represent individual supply graphically. In Figure 3.4, curve *S* is the **supply curve** that corresponds with the price–quantity supplied data in the accompanying table. The upward slope of the curve reflects the law of supply—producers offer more of

FIGURE 3.4 An individual producer's supply of corn. Because price and quantity supplied are directly related, the supply curve for an individual producer graphs as an upsloping curve. Other things equal, producers will offer more of a product for sale as its price rises and less of the product for sale as its price falls.

Supply of Corn	
Price per Bushel	Quantity Supplied per Week
$5	60
4	50
3	35
2	20
1	5



a good, service, or resource for sale as its price rises. The relationship between price and quantity supplied is positive, or direct.

Market Supply

Market supply is derived from individual supply in exactly the same way that market demand is derived from individual demand. We sum the quantities supplied by each producer at each price. That is, we obtain the market supply curve by "horizontally adding" the supply curves of the individual producers. The price–quantity supplied data in the table accompanying Figure 3.5 are for an assumed 200 identical producers in the market, each willing to supply corn according to the supply schedule shown in Figure 3.4. Curve S_1 in Figure 3.5 is a graph of the market supply data. Note that the values of the axes in Figure 3.5 are the same as those used in our graph of market demand (Figure 3.3). The only difference is that we change the label on the horizontal axis from "quantity demanded" to "quantity supplied."

Determinants of Supply

In constructing a supply curve, we assume that price is the most significant influence on the quantity supplied of any product. But other factors (the "other things equal") can and do affect supply. The supply curve is drawn on the assumption that these other things are fixed and do not change. If one of them does change, a *change in supply* will occur, meaning that the entire supply curve will shift.

The basic **determinants of supply** are (1) resource prices, (2) technology, (3) taxes and subsidies, (4) prices of other goods, (5) producer expectations, and (6) the number of sellers in the market. A change in any one or more of these determinants of supply, or *supply shifters*, will move the supply curve for a product either right or left. A shift to the *right*, as from S_1 to S_2 in Figure 3.5, signifies an *increase* in supply: Producers supply larger quantities of the product at each possible price. A shift to the *left*, as from S_1 to S_3, indicates a *decrease* in supply: Producers offer less output at each price.

Changes in Supply

Let's consider how changes in each of the determinants affect supply. The key idea is that costs are a major factor underlying supply curves; anything that affects costs (other than changes in output itself) usually shifts the supply curve.

Resource Prices

The prices of the resources used in the production process help determine the costs of production incurred by firms. Higher *resource* prices raise production costs and, assuming a particular *product* price, squeeze profits. That reduction in profits reduces the incentive for firms to supply output at each product price. For example, an increase in the prices of sand, crushed rock, and Portland cement will increase the cost of producing concrete and reduce its supply.

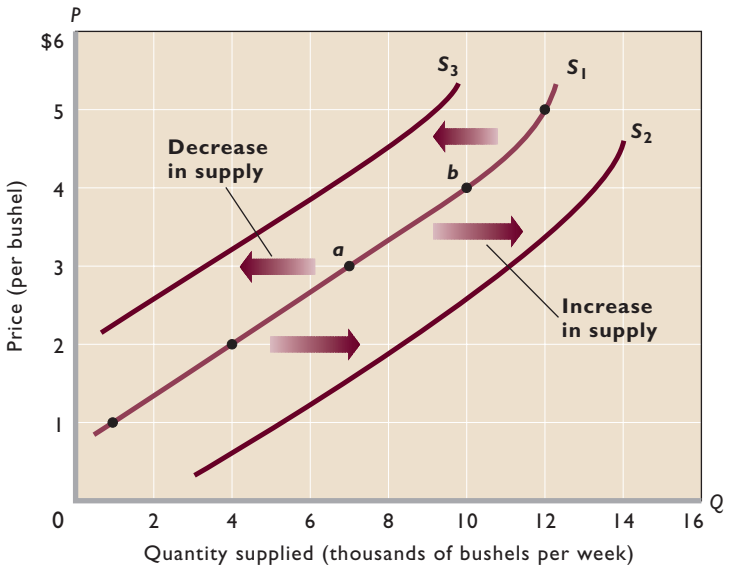


FIGURE 3.5 Changes in the supply of corn. A change in one or more of the determinants of supply causes a change in supply. An increase in supply is shown as a rightward shift of the supply curve, as from S_1 to S_2. A decrease in supply is depicted as a leftward shift of the curve, as from S_1 to S_3. In contrast, a change in the *quantity supplied* is caused by a change in the product's price and is shown by a movement from one point to another, as from *b* to *a* on fixed supply curve S_1.

Market Supply of Corn, 200 Producers, (S_1)

(1) Price per Bushel	(2) Total Quantity Supplied per Week
$5	12,000
4	10,000
3	7,000
2	4,000
1	1,000

In contrast, lower *resource* prices reduce production costs and increase profits. So when resource prices fall, firms supply greater output at each product price. For example, a decrease in the price of flat-panel glass will increase the supply of big-screen television sets.

Technology Improvements in technology (techniques of production) enable firms to produce units of output with fewer resources. Because resources are costly, using fewer of them lowers production costs and increases supply. Example: Technological advances in producing flat-panel computer monitors have greatly reduced their cost. Thus, manufacturers will now offer more such monitors than previously at the various prices; the supply of flat-panel monitors has increased.

Taxes and Subsidies Businesses treat most taxes as costs. An increase in sales or property taxes will increase production costs and reduce supply. In contrast, subsidies are "taxes in reverse." If the government subsidizes the production of a good, it in effect lowers the producers' costs and increases supply.

Prices of Other Goods Firms that produce a particular product, say, soccer balls, can sometimes use their plant and equipment to produce alternative goods, say, basketballs and volleyballs. The higher prices of these "other goods" may entice soccer ball producers to switch production to those other goods in order to increase profits. This *substitution in production* results in a decline in the supply of soccer balls. Alternatively, when the prices of basketballs and volleyballs decline relative to the price of soccer balls, producers of those goods may decide to produce more soccer balls instead, increasing their supply.

Producer Expectations Changes in expectations about the future price of a product may affect the producer's current willingness to supply that product. It is difficult, however, to generalize about how a new expectation of higher prices affects the present supply of a product. Farmers anticipating a higher wheat price in the future might withhold some of their current wheat harvest from the market, thereby causing a decrease in the current supply of wheat. In contrast, in many types of manufacturing industries, newly formed expectations that price will increase may induce firms to add another shift of workers or to expand their production facilities, causing current supply to increase.

Number of Sellers Other things equal, the larger the number of suppliers, the greater the market supply. As more firms enter an industry, the supply curve shifts to the right. Conversely, the smaller the number of firms in the industry, the less the market supply. This means that as firms leave an industry, the supply curve shifts to the left. Example: The United States and Canada have imposed restrictions on haddock fishing to replenish dwindling stocks. As part of that policy, the Federal government has bought the boats of some of the haddock fishers as a way of putting

TABLE 3.2 Determinants of Supply: Factors That Shift the Supply Curve

Determinant	Examples
Change in resource prices	A decrease in the price of microchips increases the supply of computers; an increase in the price of crude oil reduces the supply of gasoline.
Change in technology	The development of more effective wireless technology increases the supply of cell phones.
Changes in taxes and subsidies	An increase in the excise tax on cigarettes reduces the supply of cigarettes; a decline in subsidies to state universities reduces the supply of higher education.
Change in prices of other goods	An increase in the price of cucumbers decreases the supply of watermelons.
Change in producer expectations	An expectation of a substantial rise in future log prices decreases the supply of logs today.
Change in number of suppliers	An increase in the number of tatoo parlors increases the supply of tatoos; the formation of women's professional basketball leagues increases the supply of women's professional basketball games.

them out of business and decreasing the catch. The result has been a decline in the market supply of haddock.

Table 3.2 is a checklist of the determinants of supply, along with further illustrations. **(Key Question 6)**

Changes in Quantity Supplied

The distinction between a *change in supply* and a *change in quantity supplied* parallels the distinction between a change in demand and a change in quantity demanded. Because supply is a schedule or curve, a **change in supply** means a change in the schedule and a shift of the curve. An increase in supply shifts the curve to the right; a decrease in supply shifts it to the left. The cause of a change in supply is a change in one or more of the determinants of supply.

In contrast, a **change in quantity supplied** is a movement from one point to another on a fixed supply curve. The cause of such a movement is a change in the price of the specific product being considered.

Consider supply curve S_1 in Figure 3.5. A decline in the price of corn from \$4 to \$3 decreases the quantity of corn supplied per week from 10,000 to 7000 bushels. This movement from point *b* to point *a* along S_1 is a change in quantity supplied, not a change in supply. Supply is the full schedule of prices and quantities shown, and this schedule does not change when the price of corn changes.

QUICK REVIEW 3.2

- A supply schedule or curve shows that, other things equal, the quantity of a good supplied varies directly with its price.
- The supply curve shifts because of changes in (a) resource prices, (b) technology, (c) taxes or subsidies, (d) prices of other goods, (e) expectations of future prices, and (f) the number of suppliers.
- A change in supply is a shift of the supply curve; a change in quantity supplied is a movement from one point to another on a fixed supply curve.

Market Equilibrium

With our understanding of demand and supply, we can now show how the decisions of buyers of corn interact with the decisions of sellers to determine the equilibrium price and quantity of corn. In the table in Figure 3.6, columns 1 and 2 repeat the market supply of corn (from the table in Figure 3.5), and columns 2 and 3 repeat the market demand for corn (from the table in Figure 3.3). We assume this is a competitive market so that neither buyers nor sellers can set the price.

Equilibrium Price and Quantity

We are looking for the equilibrium price and equilibrium quantity. The **equilibrium price** (or *market-clearing price*) is the price where the intentions of buyers and sellers match. It is the price where quantity demanded equals quantity supplied. The table in Figure 3.6 reveals that at \$3, *and only at that price*, the number of bushels of corn that sellers wish to sell (7000) is identical to the number consumers want to buy (also 7000). At \$3 and 7000 bushels of corn, there is neither a shortage nor a surplus of corn. So 7000 bushels of corn is the **equilibrium quantity:** the quantity demanded and quantity supplied at the equilibrium price in a competitive market.

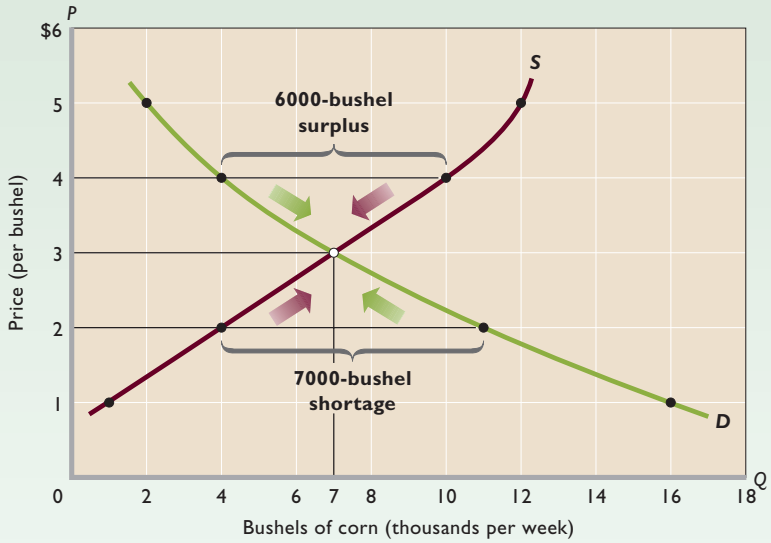
INTERACTIVE GRAPHS
G 3.1
Supply and demand

Graphically, the equilibrium price is indicated by the intersection of the supply curve and the demand curve in **Figure 3.6 (Key Graph).** (The horizontal axis now measures both quantity demanded and quantity supplied.) With neither a shortage nor a surplus at \$3, the market is in equilibrium, meaning "in balance" or "at rest."

Competition among buyers and among sellers drives the price to the equilibrium price; once there, it remains unless it is subsequently disturbed by changes in demand or supply (shifts of the curves). To better understand the

keygraph

FIGURE 3.6 Equilibrium price and quantity. The intersection of the downsloping demand curve *D* and the upsloping supply curve *S* indicates the equilibrium price and quantity, here $3 and 7000 bushels of corn. The shortages of corn at below-equilibrium prices (for example, 7000 bushels at $2) drive up price. The higher prices increase the quantity supplied and reduce the quantity demanded until equilibrium is achieved. The surpluses caused by above-equilibrium prices (for example, 6000 bushels at $4) push price down. As price drops, the quantity demanded rises and the quantity supplied falls until equilibrium is established. At the equilibrium price and quantity, there are neither shortages nor surpluses of corn.



Market Supply of and Demand for Corn

(1) Total Quantity Supplied per Week	(2) Price per Bushel	(3) Total Quantity Demanded per Week	(4) Surplus (+) or Shortage (−)*
12,000	$5	2,000	+10,000 ↓
10,000	4	4,000	+6,000 ↓
7,000	***3***	***7,000***	***0***
4,000	2	11,000	−7,000 ↑
1,000	1	16,000	−15,000 ↑

*Arrows indicate the effect on price.

QUICK QUIZ FOR FIGURE 3.6

1. Demand curve *D* is downsloping because
   - **a.** producers offer less of a product for sale as the price of the product falls.
   - **b.** lower prices of a product create income and substitution effects that lead consumers to purchase more of it.
   - **c.** the larger the number of buyers in a market, the lower the product price.
   - **d.** price and quantity demanded are directly (positively) related.
2. Supply curve *S*
   - **a.** reflects an inverse (negative) relationship between price and quantity supplied.
   - **b.** reflects a direct (positive) relationship between price and quantity supplied.
   - **c.** depicts the collective behavior of buyers in this market.
   - **d.** shows that producers will offer more of a product for sale at a low product price than at a high product price.
3. At the $3 price:
   - **a.** quantity supplied exceeds quantity demanded.
   - **b.** quantity demanded exceeds quantity supplied.
   - **c.** the product is abundant and a surplus exists.
   - **d.** there is no pressure on price to rise or fall.
4. At price $5 in this market:
   - **a.** there will be a shortage of 10,000 units.
   - **b.** there will be a surplus of 10,000 units.
   - **c.** quantity demanded will be 12,000 units.
   - **d.** quantity demanded will equal quantity supplied.

Answers: 1. b; 2. b; 3. d; 4. b

uniqueness of the equilibrium price, let's consider other prices. At any above-equilibrium price, quantity supplied exceeds quantity demanded. For example, at the $4 price, sellers will offer 10,000 bushels of corn, but buyers will purchase only 4000. The $4 price encourages sellers to offer lots of corn but discourages many consumers from buying it. The result is a **surplus** (or *excess supply*) of 6000 bushels. If corn sellers produced them all, they would find themselves with 6000 unsold bushels of corn.

Surpluses drive prices down. Even if the $4 price existed temporarily, it could not persist. The large surplus would prompt competing sellers to lower the price to encourage buyers to take the surplus off their hands. As the price fell, the incentive to produce corn would decline and the incentive for consumers to buy corn would increase. As shown in Figure 3.6, the market would move to its equilibrium at $3.

Any price below the $3 equilibrium price would create a shortage; quantity demanded would exceed quantity

supplied. Consider a $2 price, for example. We see both from column 2 of the table and from the demand curve in Figure 3.6 that quantity demanded exceeds quantity supplied at that price. The result is a **shortage** (or *excess demand*) of 7000 bushels of corn. The $2 price discourages sellers from devoting resources to corn and encourages consumers to desire more bushels than are available. The $2 price cannot persist as the equilibrium price. Many consumers who want to buy corn at this price will not obtain it. They will express a willingness to pay more than $2 to get corn. Competition among these buyers will drive up the price, eventually to the $3 equilibrium level. Unless disrupted by changes of supply or demand, this $3 price of corn will continue to prevail.

CONSIDER THIS . . .

Ticket Scalping: A Bum Rap!

Ticket prices for athletic events and musical concerts are usually set far in advance of the events. Sometimes the original ticket price is too low to be the equilibrium price. Lines form at the ticket window and a severe shortage of tickets occurs at the printed price. What happens next? Buyers who are willing to pay more than the original price bid up the ticket price in resale ticket markets.

Tickets sometimes get resold for much greater amounts than the original price—market transactions known as "scalping." For example, an original buyer may resell a $75 ticket to a concert for $200, $250, or more. Reporters sometimes denounce scalpers for "ripping off" buyers by charging "exorbitant" prices.

But is scalping really a rip-off? We must first recognize that such ticket resales are voluntary transactions. If both buyer and seller did not expect to gain from the exchange, it would not occur! The seller must value the $200 more than seeing the event, and the buyer must value seeing the event at $200 or more. So there are no losers or victims here: Both buyer and seller benefit from the transaction. The scalping market simply redistributes assets (game or concert tickets) from those who would rather have the money (and the other things that the money can buy) to those who would rather have the tickets.

Does scalping impose losses or injury on the sponsors of the event? If the sponsors are injured, it is because they initially priced tickets below the equilibrium level. Perhaps they did this to create a long waiting line and the attendant news media publicity. Alternatively, they may have had a genuine desire to keep tickets affordable for lower-income, ardent fans. In either case, the event sponsors suffer an opportunity cost in the form of less ticket revenue than they might have otherwise received. But such losses are self-inflicted and separate and distinct from the fact that some tickets are later resold at a higher price.

So is ticket scalping undesirable? Not on economic grounds! It is an entirely voluntary activity that benefits both sellers and buyers.

Rationing Function of Prices

The ability of the competitive forces of supply and demand to establish a price at which selling and buying decisions are consistent is called the rationing function of prices. In our case, the equilibrium price of $3 clears the market, leaving no burdensome surplus for sellers and no inconvenient shortage for potential buyers. And it is the combination of freely made individual decisions that sets this market-clearing price. In effect, the market outcome says that all buyers who are willing and able to pay $3 for a bushel of corn will obtain it; all buyers who cannot or will not pay $3 will go without corn. Similarly, all producers who are willing and able to offer corn for sale at $3 a bushel will sell it; all producers who cannot or will not sell for $3 per bushel will not sell their product. **(Key Question 8)**

Efficient Allocation

A competitive market such as that we have described not only rations goods to consumers but also allocates society's resources efficiently to the particular product. Competition among corn producers forces them to use the best technology and right mix of productive resources. Otherwise, their costs will be too high relative to the market price and they will be unprofitable. The result is **productive efficiency:** the production of any particular good in the least costly way. When society produces corn at the lowest achievable per-unit cost, it is expending the least-valued combination of resources to produce that product and therefore is making available more-valued resources to produce other desired goods. Suppose society has only $100 worth of resources available. If it can produce a bushel of corn using $3 of those resources, then it will have available $97 of resources remaining to produce other goods. This is clearly better than producing the corn for $5 and having only $95 of resources available for the alternative uses.

Competitive markets also produce **allocative efficiency:** the *particular mix* of goods and services most highly valued by society (minimum-cost production assumed). For example, society wants land suitable for growing corn used for that purpose, not to grow

dandelions. It wants diamonds to be used for jewelry, not crushed up and used as an additive to give concrete more sparkle. It wants MP3 players and iPods, not cassette players and tapes. Moreover, society does not want to devote all its resources to corn, diamonds, and portable digital music players. It wants to assign some resources to wheat, gasoline, and cell phones. Competitive markets make those allocatively efficient assignments.

The equilibrium price and quantity in competitive markets usually produce an assignment of resources that is "right" from an economic perspective. Demand essentially reflects the marginal benefit (MB) of the good, based on the utility received. Supply reflects the marginal cost (MC) of producing the good. The market ensures that firms produce all units of goods for which MB exceeds MC and no units for which MC exceeds MB. At the intersection of the demand and supply curves, MB equals MC and allocative efficiency results. As economists say, there is neither an "underallocaton of resources" nor an "overallocation of resources" to the product.

Changes in Supply, Demand, and Equilibrium

We know that demand might change because of fluctuations in consumer tastes or incomes, changes in consumer expectations, or variations in the prices of related goods. Supply might change in response to changes in resource prices, technology, or taxes. What effects will such changes in supply and demand have on equilibrium price and quantity?

Changes in Demand Suppose that the supply of some good (for example, health care) is constant and demand increases, as shown in Figure 3.7a. As a result, the new intersection of the supply and demand curves is at higher values on both the price and the quantity axes. Clearly, an increase in demand raises both equilibrium price and equilibrium quantity. Conversely, a decrease in demand such as that shown in Figure 3.7b reduces both equilibrium price and equilibrium quantity. (The value of graphical analysis is now apparent: We need not fumble with columns of figures to determine the outcomes; we need only compare the new and the old points of intersection on the graph.)

Changes in Supply What happens if the demand for some good (for example, flash drives) is constant but supply increases, as in Figure 3.7c? The new intersection of supply and demand is located at a lower equilibrium price but at a higher equilibrium quantity. An increase in supply reduces equilibrium price but increases equilibrium quantity. In contrast, if supply decreases, as in Figure 3.7d, the equilibrium price rises while the equilibrium quantity declines.

Complex Cases When both supply and demand change, the effect is a combination of the individual effects.

Supply Increase; Demand Decrease What effect will a supply increase and a demand decrease for some good (for example, apples) have on equilibrium price? Both changes decrease price, so the net result is a price drop greater than that resulting from either change alone.

What about equilibrium quantity? Here the effects of the changes in supply and demand are opposed: the increase in supply increases equilibrium quantity, but the decrease in demand reduces it. The direction of the change in quantity depends on the relative sizes of the changes in supply and demand. If the increase in supply is larger than the decrease in demand, the equilibrium quantity will increase. But if the decrease in demand is greater than the increase in supply, the equilibrium quantity will decrease.

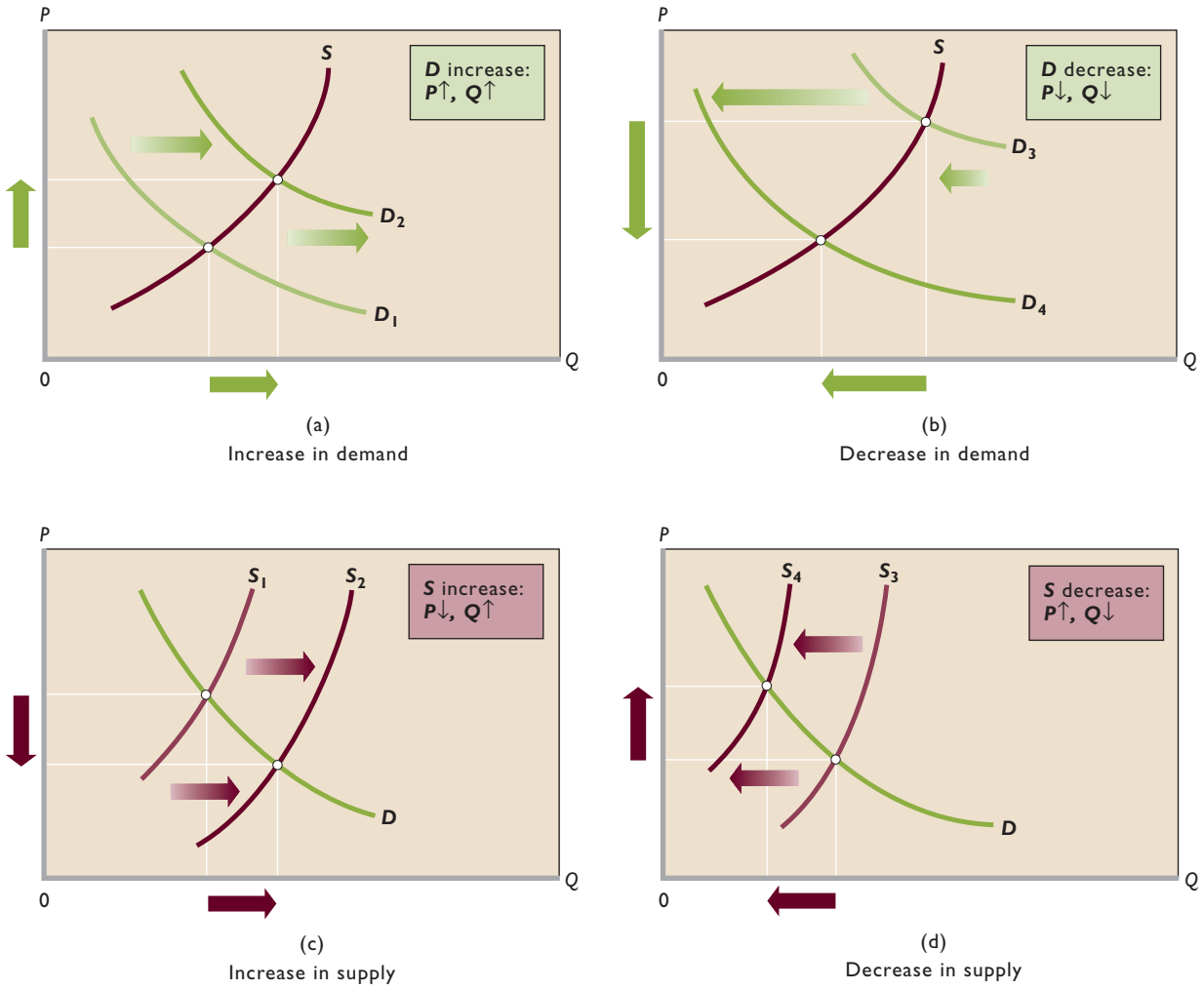
Supply Decrease; Demand Increase A decrease in supply and an increase in demand for some good (for example, gasoline) both increase price. Their combined effect is an increase in equilibrium price greater than that caused by either change separately. But their effect on equilibrium quantity is again indeterminate, depending on the relative sizes of the changes in supply and demand. If the decrease in supply is larger than the increase in demand, the equilibrium quantity will decrease. In contrast, if the increase in demand is greater than the decrease in supply, the equilibrium quantity will increase.

Supply Increase; Demand Increase What if supply and demand both increase for some good (for example, cell phones)? A supply increase drops equilibrium price, while a demand increase boosts it. If the increase in supply is greater than the increase in demand, the equilibrium price will fall. If the opposite holds, the equilibrium price will rise.

The effect on equilibrium quantity is certain: The increases in supply and in demand each raises equilibrium quantity. Therefore, the equilibrium quantity will increase by an amount greater than that caused by either change alone.

Supply Decrease; Demand Decrease What about decreases in both supply and demand for some good (for example, new homes)? If the decrease in supply is greater

FIGURE 3.7 Changes in demand and supply and the effects on price and quantity. The increase in demand from D_1 to D_2 in (a) increases both equilibrium price and equilibrium quantity. The decrease in demand from D_3 to D_4 in (b) decreases both equilibrium price and equilibrium quantity. The increase in supply from S_1 to S_2 in (c) decreases equilibrium price and increases equilibrium quantity. The decline in supply from S_3 to S_4 in (d) increases equilibrium price and decreases equilibrium quantity. The boxes in the top right corners summarize the respective changes and outcomes. The upward arrows in the boxes signify increases in equilibrium price (P) and equilibrium quantity (Q); the downward arrows signify decreases in these items.



than the decrease in demand, equilibrium price will rise. If the reverse is true, equilibrium price will fall. Because decreases in supply and in demand each reduces equilibrium quantity, we can be sure that equilibrium quantity will fall.

Table 3.3 summarizes these four cases. To understand them fully, you should draw supply and demand diagrams for each case to confirm the effects listed in this table.

Special cases arise when a decrease in demand and a decrease in supply, or an increase in demand and an increase in supply, exactly cancel out. In both cases, the net effect on equilibrium price will be zero; price will not change. **(Key Question 9)**

The optional appendix accompanying this chapter provides examples of situations in which both supply and demand change over the same period of time.

TABLE 3.3 Effects of Changes in Both Supply and Demand

Change in Supply	Change in Demand	Effect on Equilibrium Price	Effect on Equilibrium Quantity
1. Increase	Decrease	Decrease	Indeterminate
2. Decrease	Increase	Increase	Indeterminate
3. Increase	Increase	Indeterminate	Increase
4. Decrease	Decrease	Indeterminate	Decrease

CONSIDER THIS . . .

Salsa and Coffee Beans

If you forget the other-things-equal assumption, you can encounter situations that *seem* to be in conflict with the laws of demand and supply. For example, suppose salsa manufacturers sell 1 million bottles of salsa at $4 a bottle in one year; 2 million bottles at $5 in the next year; and 3 million at $6 in the year thereafter. Price and quantity purchased vary directly, and these data seem to be at odds with the law of demand.

But there is no conflict here; the data do not refute the law of demand. The catch is that the law of demand's other-things-equal assumption has been violated over the three years in the example. Specifically, because of changing tastes and rising incomes, the demand for salsa has increased sharply, as in Figure 3.7a. The result is higher prices *and* larger quantities purchased.

Another example: The price of coffee beans occasionally shoots upward at the same time that the quantity of coffee beans harvested declines. These events seemingly contradict the direct relationship between price and quantity denoted by supply. The catch again is that the other-things-equal assumption underlying the upsloping supply curve is violated. Poor coffee harvests decrease supply, as in Figure 3.7d, increasing the equilibrium price of coffee and reducing the equilibrium quantity.

The laws of demand and supply are not refuted by observations of price and quantity made over periods of time in which either demand or supply curves shift.

Application: Government-Set Prices

Prices in most markets are free to rise or fall to their equilibrium levels, no matter how high or low those levels might be. However, government sometimes concludes that supply and demand will produce prices that are unfairly high for buyers or unfairly low for sellers. So government may place legal limits on how high or low a price or prices may go. Is that a good idea?

Price Ceilings on Gasoline

A **price ceiling** sets the maximum legal price a seller may charge for a product or service. A price at or below the ceiling is legal; a price above it is not. The rationale for establishing price ceilings (or ceiling prices) on specific products is that they purportedly enable consumers to obtain some "essential" good or service that they could not afford at the equilibrium price. Examples are rent controls and usury laws, which specify maximum "prices" in the forms of rent and interest that can be charged to borrowers.

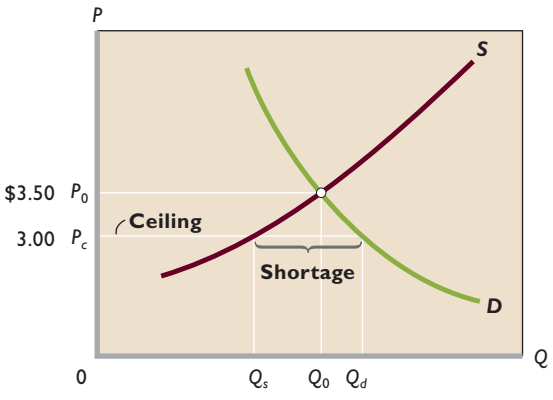
Graphical Analysis We can easily show the effects of price ceilings graphically. Suppose that rapidly rising world income boosts the purchase of automobiles and shifts the demand for gasoline to the right so that the equilibrium or market price reaches $3.50 per gallon, shown as P_0 in Figure 3.8. The rapidly rising price of gasoline greatly burdens low- and moderate-income households, which pressure government to "do something." To keep gasoline affordable for these households, the government imposes a ceiling price P_c of $3 per gallon. To impact the market, a price ceiling must be below the equilibrium price. A ceiling price of $4, for example, would have had no immediate effect on the gasoline market.

What are the effects of this $3 ceiling price? The rationing ability of the free market is rendered ineffective. Because the ceiling price P_c is below the market-clearing price P_0, there is a lasting shortage of gasoline. The quantity of gasoline demanded at P_c is Q_d and the quantity supplied is only Q_s; a persistent excess demand or shortage of amount $Q_d - Q_s$ occurs.

The price ceiling P_c prevents the usual market adjustment in which competition among buyers bids up price, inducing more production and rationing some buyers out of the market. That process would continue until the shortage disappeared at the equilibrium price and quantity, P_0 and Q_0.

By preventing these market adjustments from occurring, the price ceiling poses problems born of the market disequilibrium.

FIGURE 3.8 A price ceiling. A price ceiling is a maximum legal price such as P_c. When the ceiling price is below the equilibrium price, a persistent product shortage results. Here that shortage is shown by the horizontal distance between Q_d and Q_s.

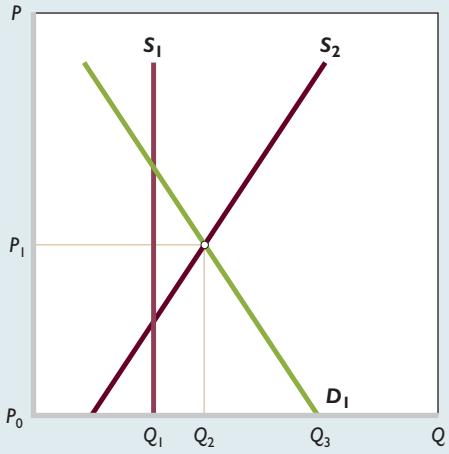


LAST Word

A Legal Market for Human Organs?

A Legal Market Might Eliminate the Present Shortage of Human Organs for Transplant. But There Are Many Serious Objections to "Turning Human Body Parts into Commodities" for Purchase and Sale.

It has become increasingly commonplace in medicine to transplant kidneys, lungs, livers, eye corneas, pancreases, and hearts from deceased individuals to those whose organs have failed or are failing. But surgeons and many of their patients face a growing problem: There are shortages of donated organs available for transplant. Not everyone who needs a transplant can get one. In 2007 there were 97,000 Americans on the waiting list for transplants. Indeed, an inadequate supply of donated organs causes an estimated 6000 deaths in the United States each year.



Why Shortages? Seldom do we hear of shortages of desired goods in market economies. What is different about organs for transplant? One difference is that no legal market exists for human organs. To understand this situation, observe the demand curve D_1 and supply curve S_1 in the accompanying figure. The downward slope of the demand curve tells us that if there were a market for human organs, the quantity of organs demanded would be greater at lower prices than at higher prices. Vertical supply curve S_1 represents the fixed quantity of human organs now donated via consent before death. Because the price of these donated organs is in effect zero, quantity demanded Q_3 exceeds quantity supplied Q_1. The shortage of $Q_3 - Q_1$ is rationed through a waiting list of those in medical need of transplants. Many people die while still on the waiting list.

Use of a Market A market for human organs would increase the incentive to donate organs. Such a market might work like this: An individual might specify in a legal document that he or she is willing to sell one or more usable human organs upon death or near-death. The person could specify where the money from the sale would go, for example, to family, a church, an educational institution, or a charity. Firms would then emerge to purchase organs and resell them where needed for profit. Under such a system, the supply curve of usable organs would take on the normal

Rationing Problem How will the available supply Q_s be apportioned among buyers who want the greater amount Q_d? Should gasoline be distributed on a first-come, first-served basis, that is, to those willing and able to get in line the soonest and stay in line? Or should gas stations distribute it on the basis of favoritism? Since an unregulated shortage does not lead to an equitable distribution of gasoline, the government must establish some formal system for rationing it to consumers. One option is to issue ration coupons, which authorize bearers to purchase a fixed amount of gasoline per month. The rationing system might entail first the printing of coupons for Q_s gallons of gasoline and then the equal distribution of the coupons among consumers so that the wealthy family of four and the poor family of four both receive the same number of coupons.

Black Markets But ration coupons would not prevent a second problem from arising. The demand curve in Figure 3.8 reveals that many buyers are willing to pay more than the ceiling price P_c. And, of course, it is more profitable for gasoline stations to sell at prices above the ceiling. Thus, despite a sizable enforcement bureaucracy that would have to accompany the price controls, *black markets* in which gasoline is illegally bought and sold at prices above the legal limits will flourish. Counterfeiting of ration coupons will also be a problem. And since the price of gasoline is now "set by government," government might face political pressure to set the price even lower.

Rent Controls

About 200 cities in the United States, including New York City, Boston, and San Francisco, have at one time or another enacted rent controls: maximum rents established by law (or, more recently, have set maximum rent increases for existing tenants). Such laws are well intended. Their goals are to protect low-income families from escalating rents caused by perceived housing shortages and to make housing more affordable to the poor.

upward slope of typical supply curves. The higher the expected price of an organ, the greater the number of people who would be willing to have their organs sold at death. Suppose that the supply curve is S_2 in the figure. At the equilibrium price P_1, the number of organs made available for transplant (Q_2) would equal the number purchased for transplant (also Q_2). In this generalized case, the shortage of organs would be eliminated and, of particular importance, the number of organs available for transplanting would rise from Q_1 to Q_2. This means more lives would be saved and enhanced than under the present donor system.

Objections In view of this positive outcome, why is there no such market for human organs? Critics of market-based solutions have two main objections. The first is a moral objection: Critics feel that turning human organs into commodities commercializes human beings and diminishes the special nature of human life. They say there is something unseemly about selling and buying body organs as if they were bushels of wheat or ounces of gold. (There is, however, a market for blood!) Moreover, critics note that the market would ration the available organs (as represented by Q_2 in the figure) to people who either can afford them (at P_1) or have health insurance for transplants. The poor and uninsured would be left out.

Second, a health-cost objection suggests that a market for body organs would greatly increase the cost of health care. Rather than obtaining freely donated (although "too few") body organs, patients or their insurance companies would have to pay market prices for them, further increasing the cost of medical care.

Rebuttal Supporters of market-based solutions to organ shortages point out that the laws against selling organs are simply driving the market underground. Worldwide, an estimated $1 billion-per-year illegal market in human organs has emerged. As in other illegal markets, the unscrupulous tend to thrive. This fact is dramatized by the accompanying photo, in which four Pakistani villagers show off their scars after they each sold a kidney to pay off debt. Supporters say that legalization of the market for human organs would increase organ supply from legal sources, drive down the price of organs, and reduce the abuses such as those now taking place in illegal markets.

What have been the actual economic effects? On the demand side, it is true that as long as rents are below equilibrium, more families are willing to consume rental housing; the quantity of rental housing demanded increases at the lower price. But a large problem occurs on the supply side. Price controls make it less attractive for landlords to offer housing on the rental market. In the short run, owners may sell their rental units or convert them to condominiums. In the long run, low rents make it unprofitable for owners to repair or renovate their rental units. (Rent controls are one cause of the many abandoned apartment buildings found in larger cities.) Also, insurance companies, pension funds, and other potential new investors in housing will find it more profitable to invest in office buildings, shopping malls, or motels, where rents are not controlled.

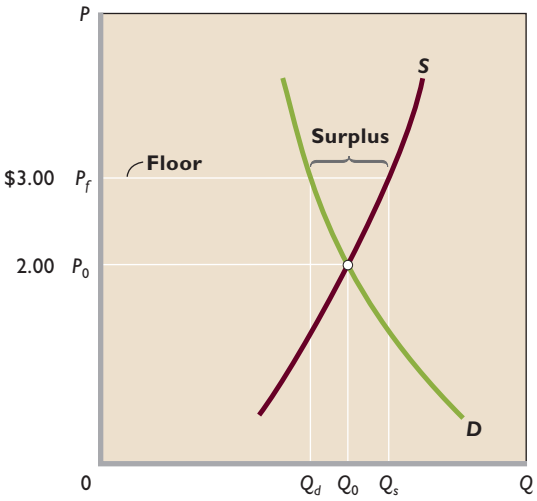
In brief, rent controls distort market signals and thus resources are misallocated: Too few resources are allocated to rental housing and too many to alternative uses. Ironically, although rent controls are often legislated to lessen the effects of perceived housing shortages, controls in fact are a primary cause of such shortages. For that reason, most American cities either have abandoned or are in the process of dismantling rent controls.

Price Floors on Wheat

A **price floor** is a minimum price fixed by the government. A price at or above the price floor is legal; a price below it is not. Price floors above equilibrium prices are usually invoked when society feels that the free functioning of the market system has not provided a sufficient income for certain groups of resource suppliers or producers. Supported prices for agricultural products and current minimum wages are two examples of price (or wage) floors. Let's look at the former.

Suppose the equilibrium price for wheat is $2 per bushel and, because of that low price, many farmers have extremely low incomes. The government decides to help out by establishing a legal price floor or price support of $3 per bushel.

FIGURE 3.9 A price floor. A price floor is a minimum legal price such as P_f. When the price floor is above the equilibrium price, a persistent product surplus results. Here that surplus is shown by the horizontal distance between Q_s and Q_d.



What will be the effects? At any price above the equilibrium price, quantity supplied will exceed quantity demanded—that is, there will be a persistent excess supply or surplus of the product. Farmers will be willing to produce and offer for sale more than private buyers are willing to purchase at the price floor. As we saw with a price ceiling, an imposed legal price disrupts the rationing ability of the free market.

Graphical Analysis

Figure 3.9 illustrates the effect of a price floor graphically. Suppose that S and D are the supply and demand curves for wheat. Equilibrium price and quantity are P_0 and Q_0, respectively. If the government imposes a price floor of P_f, farmers will produce Q_s but private buyers will purchase only Q_d. The surplus is the excess of Q_s over Q_d.

The government may cope with the surplus resulting from a price floor in two ways:

- It can restrict supply (for example, by instituting acreage allotments by which farmers agree to take a certain amount of land out of production) or increase demand (for example, by researching new uses for the product involved). These actions may reduce the difference between the equilibrium price and the price floor and that way reduce the size of the resulting surplus.
- If these efforts are not wholly successful, then the government must purchase the surplus output at the $3 price (thereby subsidizing farmers) and store or otherwise dispose of it.

Additional Consequences

Price floors such as P_f in Figure 3.9 not only disrupt the rationing ability of prices but distort resource allocation. Without the price floor, the $2 equilibrium price of wheat would cause financial losses and force high-cost wheat producers to plant other crops or abandon farming altogether. But the $3 price floor allows them to continue to grow wheat and remain farmers. So society devotes too many of its scarce resources to wheat production and too few to producing other, more valuable, goods and services. It fails to achieve allocative efficiency.

That's not all. Consumers of wheat-based products pay higher prices because of the price floor. Taxpayers pay higher taxes to finance the government's purchase of the surplus. Also, the price floor causes potential environmental damage by encouraging wheat farmers to bring hilly, erosion-prone "marginal land" into production. The higher price also prompts imports of wheat. But, since such imports would increase the quantity of wheat supplied and thus undermine the price floor, the government needs to erect tariffs (taxes on imports) to keep the foreign wheat out. Such tariffs usually prompt other countries to retaliate with their own tariffs against U.S. agricultural or manufacturing exports.

INTERACTIVE GRAPHS
G 3.2
Price floors and ceilings

So it is easy to see why economists "sound the alarm" when politicians advocate imposing price ceilings or price floors such as price controls, rent controls, interest-rate lids, or agricultural price supports. In all these cases, good intentions lead to bad economic outcomes. Government-controlled prices cause shortages or surpluses, distort resource allocation, and produce negative side effects. **(Key Question 14)**

QUICK REVIEW 3.3

- In competitive markets, prices adjust to the equilibrium level at which quantity demanded equals quantity supplied.
- The equilibrium price and quantity are those indicated by the intersection of the supply and demand curves for any product or resource.
- An increase in demand increases equilibrium price and quantity; a decrease in demand decreases equilibrium price and quantity.
- An increase in supply reduces equilibrium price but increases equilibrium quantity; a decrease in supply increases equilibrium price but reduces equilibrium quantity.
- Over time, equilibrium price and quantity may change in directions that seem at odds with the laws of demand and supply because the other-things-equal assumption is violated.
- Government-controlled prices in the form of ceilings and floors stifle the rationing function of prices, distort resource allocations, and cause negative side effects.

Summary

1. Demand is a schedule or curve representing the willingness of buyers in a specific period to purchase a particular product at each of various prices. The law of demand implies that consumers will buy more of a product at a low price than at a high price. So, other things equal, the relationship between price and quantity demanded is negative or inverse and is graphed as a downsloping curve.
2. Market demand curves are found by adding horizontally the demand curves of the many individual consumers in the market.
3. Changes in one or more of the determinants of demand (consumer tastes, the number of buyers in the market, the money incomes of consumers, the prices of related goods, and consumer expectations) shift the market demand curve. A shift to the right is an increase in demand; a shift to the left is a decrease in demand. A change in demand is different from a change in the quantity demanded, the latter being a movement from one point to another point on a fixed demand curve because of a change in the product's price.
4. Supply is a schedule or curve showing the amounts of a product that producers are willing to offer in the market at each possible price during a specific period. The law of supply states that, other things equal, producers will offer more of a product at a high price than at a low price. Thus, the relationship between price and quantity supplied is positive or direct, and supply is graphed as an upsloping curve.
5. The market supply curve is the horizontal summation of the supply curves of the individual producers of the product.
6. Changes in one or more of the determinants of supply (resource prices, production techniques, taxes or subsidies, the prices of other goods, producer expectations, or the number of sellers in the market) shift the supply curve of a product. A shift to the right is an increase in supply; a shift to the left is a decrease in supply. In contrast, a change in the price of the product being considered causes a change in the quantity supplied, which is shown as a movement from one point to another point on a fixed supply curve.
7. The equilibrium price and quantity are established at the intersection of the supply and demand curves. The interaction of market demand and market supply adjusts the price to the point at which the quantities demanded and supplied are equal. This is the equilibrium price. The corresponding quantity is the equilibrium quantity.
8. The ability of market forces to synchronize selling and buying decisions to eliminate potential surpluses and shortages is known as the rationing function of prices. The equilibrium quantity in competitive markets reflects both productive efficiency (least-cost production) and allocative efficiency (the right amount of the product relative to other products).
9. A change in either demand or supply changes the equilibrium price and quantity. Increases in demand raise both equilibrium price and equilibrium quantity; decreases in demand lower both equilibrium price and equilibrium quantity. Increases in supply lower equilibrium price and raise equilibrium quantity; decreases in supply raise equilibrium price and lower equilibrium quantity.
10. Simultaneous changes in demand and supply affect equilibrium price and quantity in various ways, depending on their direction and relative magnitudes (see Table 3.3).
11. A price ceiling is a maximum price set by government and is designed to help consumers. Effective price ceilings produce persistent product shortages, and if an equitable distribution of the product is sought, government must ration the product to consumers.
12. A price floor is a minimum price set by government and is designed to aid producers. Effective price floors lead to persistent product surpluses; the government must either purchase the product or eliminate the surplus by imposing restrictions on production or increasing private demand.
13. Legally fixed prices stifle the rationing function of prices and distort the allocation of resources.

Terms and Concepts

demand
demand schedule
law of demand
diminishing marginal utility
income effect
substitution effect
demand curve
determinants of demand
normal goods
inferior goods
substitute good
complementary good
change in demand
change in quantity demanded
supply
supply schedule
law of supply
supply curve
determinants of supply
change in supply
change in quantity supplied
equilibrium price
equilibrium quantity
surplus
shortage
productive efficiency
allocative efficiency
price ceiling
price floor

Study Questions

1. Explain the law of demand. Why does a demand curve slope downward? How is a market demand curve derived from individual demand curves? LO1
2. What are the determinants of demand? What happens to the demand curve when any of these determinants change? Distinguish between a change in demand and a change in the quantity demanded, noting the cause(s) of each. LO1
3. **KEY QUESTION** What effect will each of the following have on the demand for small automobiles such as the Mini Cooper and Smart car? LO1
   a. Small automobiles become more fashionable.
   b. The price of large automobiles rises (with the price of small autos remaining the same).
   c. Income declines and small autos are an inferior good.
   d. Consumers anticipate that the price of small autos will greatly come down in the near future.
   e. The price of gasoline substantially drops.
4. Explain the law of supply. Why does the supply curve slope upward? How is the market supply curve derived from the supply curves of individual producers? LO2
5. What are the determinants of supply? What happens to the supply curve when any of these determinants changes? Distinguish between a change in supply and a change in the quantity supplied, noting the cause(s) of each. LO2
6. **KEY QUESTION** What effect will each of the following have on the supply of *auto* tires? LO2
   a. A technological advance in the methods of producing tires.
   b. A decline in the number of firms in the tire industry.
   c. An increase in the prices of rubber used in the production of tires.
   d. The expectation that the equilibrium price of auto tires will be lower in the future than currently.
   e. A decline in the price of the large tires used for semi trucks and earth-hauling rigs (with no change in the price of auto tires).
   f. The levying of a per-unit tax on each auto tire sold.
   g. The granting of a 50-cent-per-unit subsidy for each auto tire produced.
7. "In the corn market, demand often exceeds supply and supply sometimes exceeds demand." "The price of corn rises and falls in response to changes in supply and demand." In which of these two statements are the terms "supply" and "demand" used correctly? Explain. LO2
8. **KEY QUESTION** Suppose the total demand for wheat and the total supply of wheat per month in the Kansas City grain market are as shown in the accompanying table. LO3

Thousands of Bushels Demanded	Price per Bushel	Thousands of Bushels Supplied	Surplus (+) or Shortage (−)
85	$3.40	72	_____
80	3.70	73	_____
75	4.00	75	_____
70	4.30	77	_____
65	4.60	79	_____
60	4.90	81	_____

   a. What is the equilibrium price? What is the equilibrium quantity? Fill in the surplus-shortage column and use it to explain why your answers are correct.
   b. Graph the demand for wheat and the supply of wheat. Be sure to label the axes of your graph correctly. Label equilibrium price P and equilibrium quantity Q.
   c. Why will $3.40 not be the equilibrium price in this market? Why not $4.90? "Surpluses drive prices up; shortages drive them down." Do you agree?
9. **KEY QUESTION** How will each of the following changes in demand and/or supply affect equilibrium price and equilibrium quantity in a competitive market; that is, do price and quantity rise, fall, or remain unchanged, or are the answers indeterminate because they depend on the magnitudes of the shifts? Use supply and demand diagrams to verify your answers. LO4
   a. Supply decreases and demand is constant.
   b. Demand decreases and supply is constant.
   c. Supply increases and demand is constant.
   d. Demand increases and supply increases.
   e. Demand increases and supply is constant.
   f. Supply increases and demand decreases.
   g. Demand increases and supply decreases.
   h. Demand decreases and supply decreases.
10. In 2001 an outbreak of foot-and-mouth disease in Europe led to the burning of millions of cattle carcasses. What impact do you think this had on the supply of cattle hides, hide prices, the supply of leather goods, and the price of leather goods? LO4
11. Use two market diagrams to explain how an increase in state subsidies to public colleges might affect tuition and enrollments in both public and private colleges. LO4
12. Critically evaluate: "In comparing the two equilibrium positions in Figure 3.7b, I note that a smaller amount is actually demanded at a lower price. This refutes the law of demand." LO4
13. For each stock in the stock market, the number of shares sold daily equals the number of shares purchased. That is, the quantity of each firm's shares demanded equals the quantity supplied. So, if this equality always occurs, why do the prices of stock shares ever change? LO4
14. **KEY QUESTION** Refer to the table in question 8. Suppose that the government establishes a price ceiling of $3.70 for wheat. What might prompt the government to establish this price ceiling? Explain carefully the main effects. Demonstrate your answer graphically. Next, suppose that the government establishes a price floor of $4.60 for wheat.

What will be the main effects of this price floor? Demonstrate your answer graphically. **LO5**

15. What do economists mean when they say that "price floors and ceilings stifle the rationing function of prices and distort resource allocation"? **LO5**
16. **ADVANCED ANALYSIS** Assume that demand for a commodity is represented by the equation $P = 10 - .2Q_d$ and supply by the equation $P = 2 + .2Q_s$, where Q_d and Q_s are quantity demanded and quantity supplied, respectively, and P is price. Using the equilibrium condition $Q_s = Q_d$, solve the equations to determine equilibrium price. Now determine equilibrium quantity. Graph the two equations to substantiate your answers. **LO4**
17. **LAST WORD** What is the current overall number of American candidates waiting for an organ transplant? (For the answer, visit the United Network for Organ Sharing Web site, **www.unos.org.**) For what transplant organ is the waiting list the longest? (Select Data and "At a glance.") Do you favor the establishment of a legal market for transplant organs? Why or why not?

Web-Based Questions

1. **FARM COMMODITY PRICES—SUPPLY AND DEMAND IN ACTION** The U.S. Department of Agriculture, **www.nass.usda.gov,** publishes charts on the prices of farm products. Go to the USDA home page and select Charts and Maps and then Agricultural Prices (under Economics). Choose three farm products and determine whether their prices (as measured by "prices received by farmers") have generally increased, decreased, or stayed the same over the past three years. In which of the three cases, if any, do you think that supply has increased more rapidly than demand? In which of the three cases, if any, do you think that demand has increased more rapidly than supply? Explain your reasoning.
2. **CHANGES IN DEMAND—BABY DIAPERS AND RETIREMENT VILLAGES** Other things equal, an increase in the number of buyers for a product or service will increase demand. Baby diapers and retirement villages are two products designed for different population groups. The U.S. Census Bureau Web site, **www.census.gov/ipc/www/idb,** provides population pyramids (graphs that show the distribution of population by age and sex) for countries for 2000, 2025, and 2050. View the population pyramids for Mexico, Japan, and the United States by selecting International Data Base and then Population Pyramids. Which country do you think will have the greatest percentage increase in demand for baby diapers between 2000 and 2050? For retirement villages? Which country do you think will have the greatest absolute increase in demand for baby diapers? For retirement villages?

FURTHER TEST YOUR KNOWLEDGE AT www.mcconnell18e.com

Additional Examples of Supply and Demand

Our discussion has clearly demonstrated that supply and demand analysis is a powerful tool for understanding equilibrium prices and quantities. The information provided is fully sufficient for moving forward in the book, but you may find that additional examples of supply and demand are helpful. This optional appendix provides several concrete illustrations of changes in supply and demand.

Your instructor may assign all, some, or none of this appendix, depending on time availability and personal preferences.

Changes in Supply and Demand

As Figure 3.6 of this chapter demonstrates, changes in supply and demand cause changes in price, quantity, or both. The following applications illustrate this fact in several real-world markets. The simplest situations are those in which either supply changes while demand remains constant or demand changes while supply remains constant. Let's consider two such simple cases first, before looking at more complex applications.

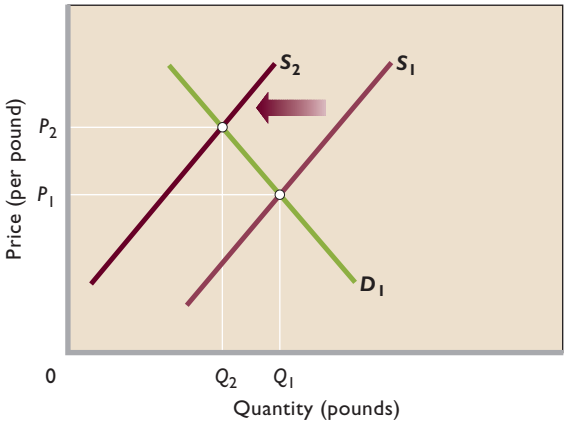
Lettuce

Every now and then we hear on the news that extreme weather has severely reduced the size of some crop such as lettuce, oranges, or cherries. Suppose, for example, that a severe freeze destroys a sizable portion of the lettuce crop. This unfortunate situation implies a significant decline in supply, which we represent as a leftward shift of the supply curve from S_1 to S_2 in Figure 1. At each price, consumers desire as much lettuce as before, so the freeze does not affect the demand for lettuce. That is, demand curve D_1 does not shift.

What are the consequences of the reduced supply of lettuce for equilibrium price and quantity? As shown in Figure 1, the leftward shift of the supply curve disrupts the previous equilibrium in the market for lettuce and drives the equilibrium price upward upward from P_1 to P_2. Consumers respond to that price hike by reducing the quantity of lettuce demanded from Q_1 to Q_2. Equilibrium in the market is restored, now at P_2 and Q_2.

Consumers who are willing and able to pay price P_2 obtain lettuce; consumers unwilling or unable to pay that price do not. Some consumers continue to buy as much lettuce as before, even at the higher price. Others buy some lettuce but not as much as before, and still others opt out of the market completely. The latter two groups use the money they would have spent on lettuce to obtain other products, say, carrots, whose price has not gone up.

FIGURE 1 The market for lettuce. The decrease in the supply of lettuce, shown here by the shift from S_1 to S_2, increases the equilibrium price of lettuce from P_1 to P_2 and reduces the equilibrium quantity from Q_1 to Q_2.



Corn and Ethanol

Between the beginning of 2006 and the middle of 2007, the price of corn doubled. Did people suddenly demand more corn flakes? Not hardly! The demand for cereals, beef, and other food products that use corn as inputs was relatively stable. Instead, the driving force was a rapid increase in the price of oil and gasoline (one of our following examples). This increase boosted the demand for ethanol, an alcohol-like substance that is blended with conventional gasoline. In the United States, producers refine ethanol mainly from corn, although ethanol can also be refined from sugar and other agricultural commodities. So the increase in the demand for ethanol drove up the demand for corn and raised its equilibrium price.

We depict this situation in Figure 2 as the rightward shift of the demand curve from D_1 to D_2. This demand increase upped the equilibrium price of corn, in this case from P_1 to P_2. Producers responded accordingly by increasing the quantity of corn supplied, as from Q_1 to Q_2. At the higher price and quantity, the market achieved a new equilibrium.

FIGURE 2 The market for corn. The increase in the demand for corn, shown here by the shift from D_1 to D_2, increases the equilibrium price of corn from P_1 to P_2 and expands the equilibrium quantity from Q_1 to Q_2.

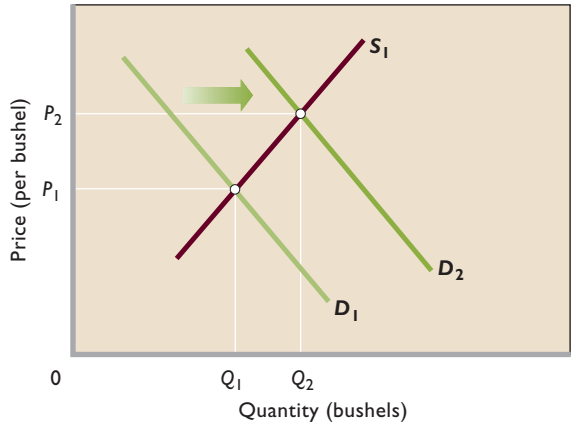
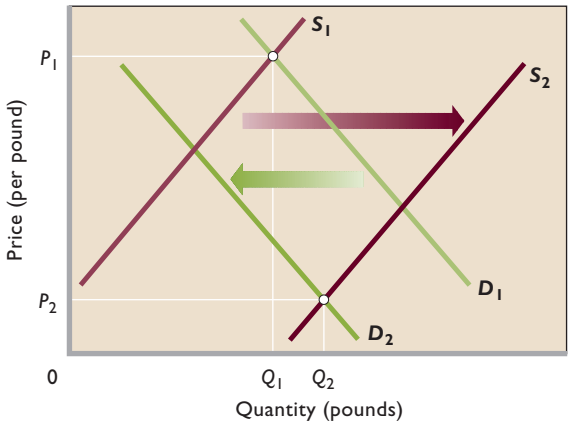


FIGURE 3 The market for pink salmon. In the last several decades, the supply of pink salmon has increased and the demand for pink salmon has decreased. As a result, the price of pink salmon has declined, as from P_1 to P_2. Because supply has increased by more than demand has decreased, the equilibrium quantity of pink salmon has increased, as from Q_1 to Q_2.



Notice that the demand for corn, the price of corn, and the quantity of corn demanded and supplied all increased. But in the period depicted, the supply of corn—the entire curve S_1—remained securely fixed in place. Eventually, of course, the potential for high profits will encourage farmers to plant more corn and therefore shift the supply curve rightward. Depending on what happens to demand, the price of corn may drop closer to P_1.

The rapid rise in the price of corn had a host of other effects that are easily understood through demand and supply analysis. The costs of producing corn-fed beef went up, which reduced the supply of beef and upped the price of hamburger and steak. The higher corn price caused a jump in the price of farm land in the Corn Belt. Further, the price of corn syrup (fructose) used in soft drinks rocketed and led some soft-drink makers to use cane sugar instead of corn syrup in the production process. In Mexico, large numbers of angry people gathered in cities to protest the higher price of tortillas, which are made from corn and consumed in large quantities by many Mexicans.

Pink Salmon

Now let's see what happens when both supply and demand change at the same time. Several decades ago, people who caught salmon earned as much as $1 for each pound of pink salmon—the type used mainly for canning—brought to the buyer. In Figure 3 that price is represented as P_1, at the intersection of supply curve S_1 and demand curve D_1. The corresponding quantity of pink salmon is shown as Q_1 pounds.

As time passed, supply and demand changed in the market for pink salmon. On the supply side, improved technology in the form of larger, more efficient fishing boats greatly increased the catch and lowered the cost of obtaining it. Also, high profits at price P_1 encouraged many new fishers to enter the industry. As a result of these changes, the supply of pink salmon greatly increased and the supply curve shifted to the right, as from S_1 to S_2 in Figure 3.

Over the same years, the demand for pink salmon declined, as represented by the leftward shift from D_1 to D_2 in Figure 3. That decrease was caused by increases in consumer income and reductions of the price of substitute products. As buyers' incomes rose, consumers shifted demand away from canned fish and toward higher-quality fresh or frozen fish, including more-valued Atlantic, Chinook, Sockeye, and Coho salmon. Moreover, the emergence of fish farming, in which salmon are raised in ocean net pens, lowered the prices of these substitute species. That, too, reduced the demand for pink salmon.

The altered supply and demand reduced the price of pink salmon to as low as $.10 per pound, as represented by the drop in price from P_1 to P_2 in Figure 3. Both the supply increase and the demand decrease helped reduce the equilibrium price. However, in this particular case the equilibrium quantity of pink salmon increased, as represented by the move from Q_1 to Q_2. Both shifts of the curves reduced the equilibrium price, but equilibrium quantity increased because the increase in supply exceeded the decrease in demand.

Gasoline

The price of gasoline has increased rapidly in the United States over the past several years. For example, the average price of a gallon of gasoline rose from around $2 in 2004 to about $3 in 2007. What caused this 50 percent rise in the price of gasoline? How would we diagram this increase?

We begin in Figure 4 with the price of a gallon of gasoline at P_1, representing the $2 price. Simultaneous supply and demand factors disturbed this equilibrium. Supply uncertainties relating to Middle East politics and warfare and expanded demand for oil by fast-growing countries such as China pushed up the price of a barrel of oil from $37 in 2004 to $80 in 2007. Oil is the main input for producing gasoline, so any sustained rise in its price boosts the per-unit cost of producing gasoline. Such cost rises decrease the supply of gasoline, as represented by the leftward shift of the supply curve from S_1 to S_2 in Figure 4. At times refinery breakdowns in the United States also contributed to this reduced supply.

While the supply of gasoline declined between 2004 and 2007, the demand for gasoline increased, as depicted by the rightward shift of the demand curve from D_1 to D_2. Incomes in general were rising over these years because the U.S. economy was rapidly expanding. Rising incomes raise demand for all normal goods, including gasoline. An increased number of low-gas-mileage SUVs and light trucks on the road also contributed to growing gas demand.

The combined decline in gasoline supply and increase in gasoline demand boosted the price of gasoline from $2 to $3, as represented by the rise from P_1 to P_2 in Figure 4. Because the demand increase outweighed the supply decrease, the equilibrium quantity expanded, here from Q_1 to Q_2.

In other periods the price of gasoline has *declined* as the demand for gasoline has increased. Test your understanding of the analysis by explaining how such a price decrease could occur.

Sushi

Sushi bars are springing up like Starbucks in American cities (well, maybe not that fast!). Consumption of this raw-fish delicacy from Japan has soared in the United States in recent years. Nevertheless, the price of sushi has remained relatively constant.

Supply and demand analysis helps explain this circumstance of increased quantity and constant price. A change in tastes has increased the U.S. demand for sushi. Many consumers of sushi find it highly tasty when they try it. And, as implied by the growing number of sushi bars in the United States, the supply of sushi has also expanded.

We represent these supply and demand changes in Figure 5 as the rightward shift of the demand curve from D_1 to D_2 and the rightward shift of the supply curve from S_1 to S_2. Observe that the equilibrium quantity of sushi increases from Q_1 to Q_2 and equilibrium price remains constant at P_1. The increase in supply, which-taken alone would reduce price, has perfectly offset the increase in demand, which taken alone would raise price. The price of sushi does not change, but the equilibrium quantity greatly

FIGURE 4 The market for gasoline. An increase in the demand for gasoline, as shown by the shift from D_1 to D_2, coupled with a decrease in supply, as shown by the shift from S_1 to S_2, boosts equilibrium price (here from P_1 to P_2). In this case, equilibrium quantity increases from Q_1 to Q_2 because the increase in demand outweighs the decrease in supply.

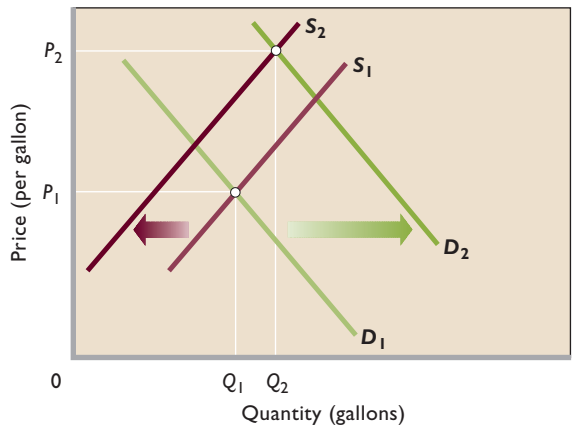
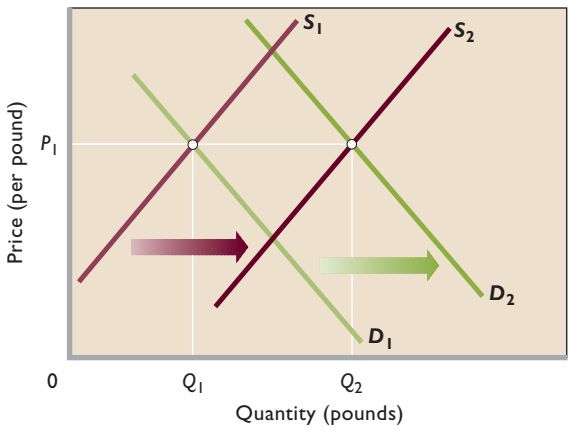


FIGURE 5 The market for sushi. Equal increases in the demand for sushi, as from D_1 to D_2, and in the supply of sushi, as from S_1 to S_2, expand the equilibrium quantity of sushi (here from Q_1 to Q_2) while leaving the price of sushi unchanged at P_1.



rises. That happens because both the increase in demand and the increase in supply expand purchases and sales.

Simultaneous increases in demand and supply can cause price to either rise, fall, or remain constant, depending on the relative magnitudes of the supply and demand increases. In this case, price remained constant.

Preset Prices

In the body of this chapter, we saw that an effective government-imposed price ceiling (legal maximum price) causes quantity demanded to exceed quantity supplied—a shortage. An effective government-imposed price floor (legal minimum price) causes quantity supplied to exceed quantity demanded—a surplus. Put simply: Shortages result when prices are set below, and surpluses result when prices are set above, equilibrium prices.

We now want to establish that shortages and surpluses can occur in markets other than those in which government imposes price floors and ceilings. Such market imbalances happen when the seller or sellers set prices in advance of sales and the prices selected turn out to be below or above equilibrium prices. Consider the following two examples.

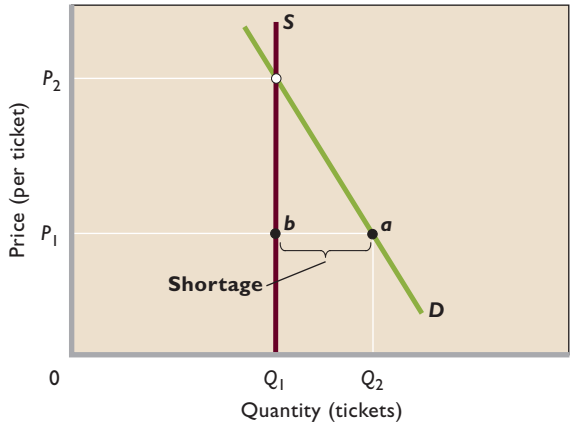
Olympic Figure Skating Finals

Tickets for the women's figure skating championship at the Olympics are among the world's "hottest tickets." The popularity of this event and the high incomes of buyers translate into tremendous ticket demand. The Olympic officials set the price for the tickets in advance. Invariably, the price, although high, is considerably below the equilibrium price that would equate quantity demanded and quantity supplied. A severe shortage of tickets therefore occurs in this *primary market*—the market involving the official ticket office.

The shortage, in turn, creates a *secondary market* in which buyers bid for tickets held by initial purchasers rather than the original seller. Scalping tickets—selling them above the ticket price—may be legal or illegal, depending on local laws.

Figure 6 shows how the shortage in the primary ticket market looks in terms of supply and demand analysis. Demand curve D represents the strong demand for tickets and supply curve S represents the supply of tickets. The supply curve is vertical because a fixed number of tickets are printed to match the capacity of the arena. At the printed ticket price of P_1, the quantity of tickets demanded, Q_2, exceeds the quantity supplied, Q_1. The result is a shortage of ab—the horizontal distance between Q_2 and Q_1 in the primary market.

FIGURE 6 The market for tickets to the Olympic women's figure skating finals. The demand curve D and supply curve S for the Olympic women's figure skating finals produce an equilibrium price that is above the P_1 price printed on the ticket. At price P_1 the quantity of tickets demanded, Q_2, greatly exceeds the quantity of tickets available (Q_1). The resulting shortage of ab ($= Q_2Q_1$) gives rise to a legal or illegal secondary market.



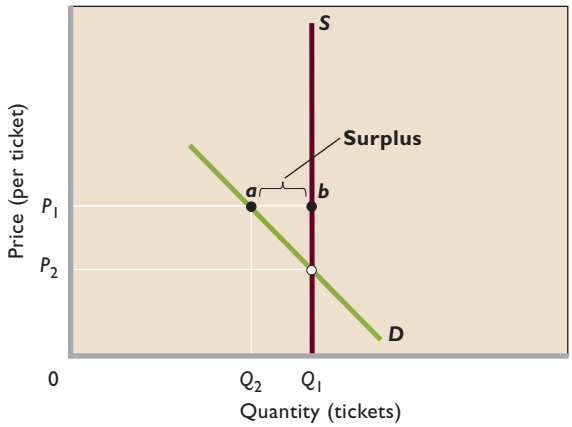
If the printed ticket price had been the higher equilibrium price P_2, no shortage of tickets would have occurred. But at the lower price P_1, a shortage and secondary ticket market will emerge among those buyers willing to pay more than the printed ticket price and those sellers willing to sell their purchased tickets for more than the printed price. Wherever there are shortages and secondary markets, it is safe to assume that price was set below the equilibrium price.

Olympic Curling Preliminaries

Contrast the shortage of tickets for the women's figure skating finals at the Olympics to the surplus of tickets for one of the preliminary curling matches. For the uninitiated, curling is a sport in which participants slide a heavy round object called a "stone" down the ice toward a target while teammates called "sweepers" use brooms to alter the course of the stone when desired.

Curling is a popular spectator sport in a few nations such as Canada, but it does not draw many fans in most countries. So the demand for tickets to most of the preliminary curling events is not very strong. We demonstrate this weak demand as D in Figure 7. As in our previous example, the supply of tickets is fixed by the size of the arena and is shown as vertical line S.

FIGURE 7 The market for tickets to the Olympic curling preliminaries. The demand curve D and supply curve S for the Olympic curling preliminaries produce an equilibrium price below the P_1 price printed on the ticket. At price P_1 the quantity of tickets demanded is less than the quantity of tickets available. The resulting surplus of ba ($= Q_1Q_2$) means the event is not sold out.



We represent the printed ticket price as P_1 in Figure 7. In this case the printed price is much higher than the equilibrium price of P_2. At the printed ticket price, quantity supplied is Q_1 and quantity demanded is Q_2. So a surplus of tickets of ba ($= Q_1Q_2$) occurs. No ticket scalping occurs and there are numerous empty seats. Only if the Olympic officials had priced the tickets at the lower price P_2 would the event have been a sellout. (Actually, the Olympic officials try to adjust to demand realities for curling contests by holding them in smaller ice arenas than used for figure skating and by charging less for tickets. Nevertheless, the stands are rarely full for the preliminary contests, which compete against final events in other winter Olympic sports.)

Appendix Summary

1. A decrease in the supply of a product increases its equilibrium price and reduces its equilibrium quantity. In contrast, an increase in the demand for a product boosts both its equilibrium price and its equilibrium quantity.
2. Simultaneous changes in supply and demand affect equilibrium price and quantity in various ways, depending on the relative magnitudes of the changes in supply and demand. Equal increases in supply and demand, for example, leave equilibrium price unchanged.
3. Sellers set prices of some items such as tickets in advance of the event. These items are sold in the primary market that involves the original seller and buyers. If preset prices turn out to be below the equilibrium prices, shortages occur and scalping in legal or illegal secondary markets arises. The prices in the secondary market then rise above the preset prices. In contrast, surpluses occur when the preset prices happen to exceed the equilibrium prices.

Appendix Study Questions

1. Suppose the supply of apples sharply increases because of perfect weather conditions throughout the growing season. Assuming no change in demand, explain the effect on the-equilibrium price and quantity of apples. Explain why quantity demanded increases even though demand does not change. LO6
2. Assume the demand for lumber suddenly rises because of a rapid growth of demand for new housing. Assume no change in supply. Why does the equilibrium price of lumber rise? What would happen if the price did not rise under the demand and supply circumstances described? LO6
3. Suppose both the demand for olives and the supply of olives decline by equal amounts over some time period. Use graphical analysis to show the effect on equilibrium price and quantity. LO6
4. Assume that both the supply of bottled water and the demand for bottled water rise during the summer but that supply increases more rapidly than demand. What can you conclude about the directions of the impacts on equilibrium price and equilibrium quantity? LO6
5. Why are shortages or surpluses more likely with preset prices, such as those on tickets, than flexible prices, such as those on gasoline? LO6

6. Use the table below to answer the questions that follow: LO6
   a. If this table reflects the supply of and demand for tickets to a particular World Cup soccer game, what is the stadium capacity?
   b. If the preset ticket price is $45, would we expect to see a secondary market for tickets? Explain why or why not. Would the price of a ticket in the secondary market be higher than, the same as, or lower than the price in the primary (original) market?
   c. Suppose for some other World Cup game the quantities of tickets demanded are 20,000 lower at each ticket price than shown in the table. If the ticket price remains $45, would the event be a sellout? Explain why or why not.

Quantity Demanded, Thousands	Price	Quantity Supplied, Thousands
80	$25	60
75	35	60
70	45	60
65	55	60
60	65	60
55	75	60
50	85	60

7. Most scalping laws make it illegal to sell—but not to buy—tickets at prices above those printed on the tickets. Assuming that is the case, use supply and demand analysis to explain why the equilibrium ticket price in an illegal secondary market tends to be higher than in a legal secondary market. LO6
8. Go to the Web site of the Energy Information Administration, **www.eia.doe.gov,** and follow the links to find the current retail price of gasoline. How does the current price of regular gasoline compare with the price a year ago? What must have happened to either supply, demand, or both to explain the observed price change? LO6