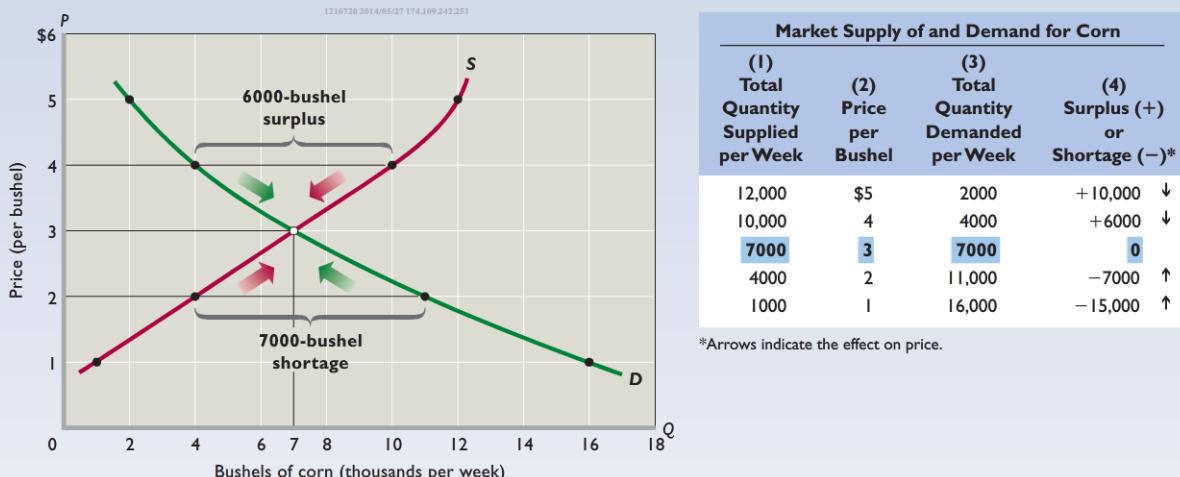


# key graph

**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.



## QUICK QUIZ FOR FIGURE 3.6

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

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

demand or supply (shifts of the curves). To better understand the 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

### 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. 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.

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.

### 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.

### 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. If they didn’t, their costs would be too high relative to the market price, and they would 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 iPods and MP4 players, not cassette players and tapes. Moreover, society does not want to devote all its resources to corn, diamonds, and portable digital media 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 “underallocation 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, equilibrium price rises while 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 equilibrium 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.

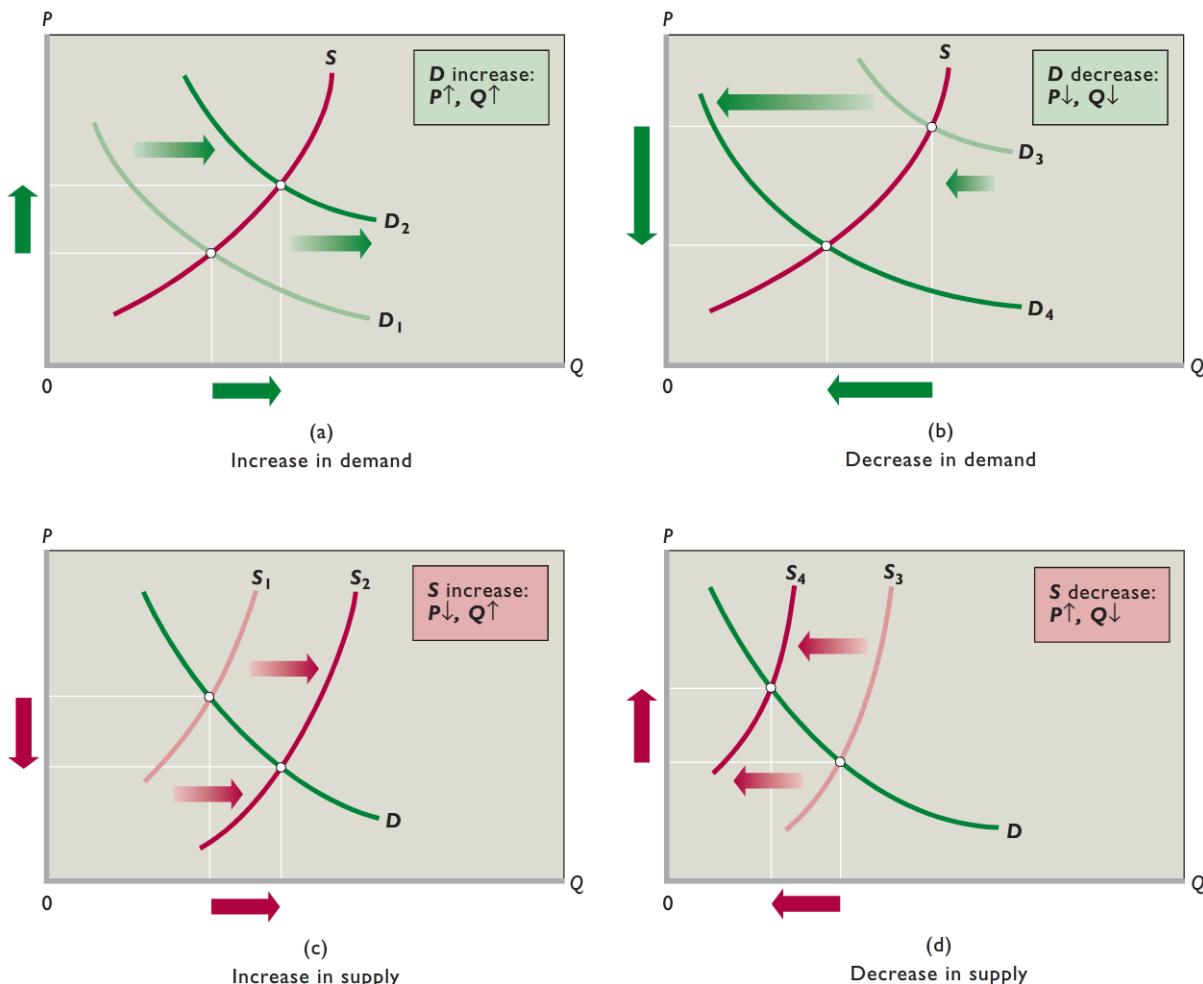
**Supply Decrease; Demand Increase** A decrease in supply and an increase in demand for some good (for example, gasoline) both increase price. Their combined effect is an increase in equilibrium price greater than that caused by either change separately. But their effect on the equilibrium quantity is 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 demand both raise the 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 the decreases in supply and demand each reduce 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.

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

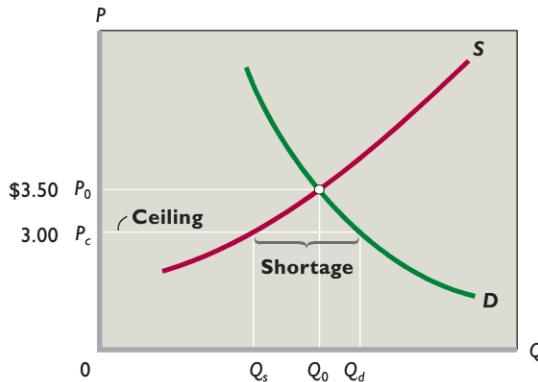
**Graphical Analysis** We can easily show the effects of price ceilings graphically. Suppose that rapidly rising world income boosts the purchase of automobiles and shifts the demand for gasoline to the right so that the market equilibrium price reaches \$3.50 per gallon, shown as  $P_0$  in Figure 3.8. The rapidly rising price of gasoline greatly burdens low- and moderate-income households, which pressure government to "do something." To keep gasoline prices down, 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 effect on the price of gasoline in the current situation.

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 normally 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 two related problems.

**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  $Q_s$ .



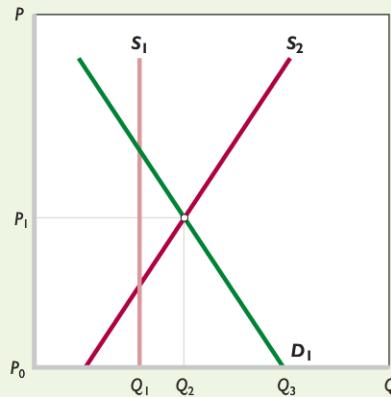
## LAST

# 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, 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 2010, there were 105,000 Americans on the waiting list for transplants. Indeed, an inadequate supply of donated organs causes an estimated 6900 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

**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 or stay in line the longest? 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, 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.

system, the supply curve of usable organs would take on the normal 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 debts. 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, the below-equilibrium rents attract a larger number of renters. Some are locals seeking to move into their own places after sharing housing with friends or family. Others are outsiders attracted into the area by the artificially lower rents. 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.

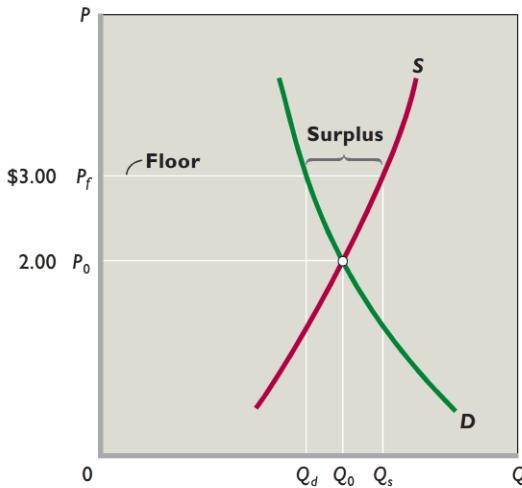
Ironically, although rent controls are often legislated to lessen the effects of perceived housing shortages, controls in fact are a primary cause of such shortages. For that reason, most American cities either have abandoned or are in the process of dismantling rent controls.

## 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 that many farmers have extremely low incomes when the price of wheat is at its equilibrium value of \$2 per bushel. 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.

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.

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

## 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 movement along a fixed demand curve, noting the cause(s) of each. **LO1**
3. 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. 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. In 2001 an outbreak of hoof-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**
9. 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**
10. 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**
11. 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 table below. 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**

Thousands of Bushels Demanded	Price per Bushel	Thousands of Bushels Supplied
85	\$3.40	72
80	3.70	73
75	4.00	75
70	4.30	77
65	4.60	79
60	4.90	81

12. What do economists mean when they say "price floors and ceilings stifle the rationing function of prices and distort resource allocation"? **LO5**
13. **LAST WORD** In some countries, such as France, every corpse is available for doctors to "harvest" for organs unless the deceased, while still alive, signed a form forbidding the organs to be harvested. In the USA, it is the opposite: No harvesting is allowed unless the deceased had signed, while still alive, an organ donor form authorizing doctors to harvest any needed organs. Use supply and demand figures to show in which country organ shortages are likely to be less severe.

## Problems

1. Suppose there are three buyers of candy in a market: Tex, Dex, and Rex. The market demand and the individual demands of Tex, Dex, and Rex are shown on the next page. **LO1**
  - a. Fill in the table for the missing values.
  - b. Which buyer demands the least at a price of \$5? The most at a price of \$7?
  - c. Which buyer's quantity demanded increases the most when the price is lowered from \$7 to \$6?