

## 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.

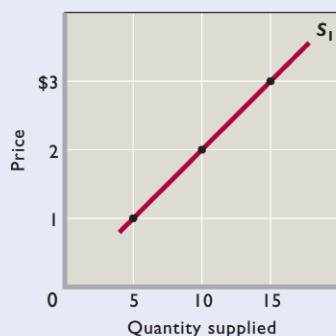
## Problems

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?

- d. Which direction would the market demand curve shift if Tex withdrew from the market? What if Dex doubled his purchases at each possible price?
- e. Suppose that at a price of \$6, the total quantity demanded increases from 19 to 38. Is this a "change in the quantity demanded" or a "change in demand"?

Price per Candy	Individual Quantities Demanded			Total Quantity Demanded
	Tex	Dex	Rex	
\$8	3	1	0	—
7	8	2	—	12
6	—	3	4	19
5	17	—	6	27
4	23	5	8	—

- 2. The figure below shows the supply curve for tennis balls,  $S_1$ , for Drop Volley Tennis, a producer of tennis equipment. Use the figure and the table below to give your answers to the following questions. **LO2**



- a. Use the figure to fill in the quantity supplied on supply curve  $S_1$  for each price in the table below.

Price	$S_1$ Quantity Supplied	$S_2$ Quantity Supplied	Change in Quantity Supplied
\$3	—	4	—
2	—	2	—
1	—	0	—

- b. If production costs were to increase, the quantities supplied at each price would be as shown by the third column of the table (" $S_2$  Quantity Supplied"). Use that data to draw supply curve  $S_2$  on the same graph as supply curve  $S_1$ .
- c. In the fourth column of the table, enter the amount by which the quantity supplied at each price changes due to

- the increase in product costs. (Use positive numbers for increases and negative numbers for decreases.)
- d. Did the increase in production costs cause a "decrease in supply" or a "decrease in quantity supplied"?
- 3. Refer to the expanded table below from question 11. **LO3**
  - a. What is the equilibrium price? At what price is there neither a shortage nor a surplus? Fill in the surplus-shortage column and use it to confirm your answers.
  - 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. How big is the surplus or shortage at \$3.40? At \$4.90? How big a surplus or shortage results if the price is 60 cents higher than the equilibrium price? 30 cents lower than the equilibrium price?

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	—

- 4. 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 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.
- 5. 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**
- 6. **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. **LO4**

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Price, Quantity, and Efficiency

7. Suppose that the demand and supply schedules for rental apartments in the city of Gotham are as given in the table below. [LO5](#)

Monthly Rent	Apartments Demanded	Apartments Supplied
\$2500	10,000	15,000
2000	12,500	12,500
1500	15,000	10,000
1000	17,500	7500
500	20,000	5000

- a. What is the market equilibrium rental price per month and the market equilibrium number of apartments demanded and supplied?

- b. If the local government can enforce a rent-control law that sets the maximum monthly rent at \$1500, will there be a surplus or a shortage? Of how many units? And how many units will actually be rented each month?
- c. Suppose that a new government is elected that wants to keep out the poor. It declares that the minimum rent that can be charged is \$2500 per month. If the government can enforce that price floor, will there be a surplus or a shortage? Of how many units? And how many units will actually be rented each month?
- d. Suppose that the government wishes to decrease the market equilibrium monthly rent by increasing the supply of housing. Assuming that demand remains unchanged, by how many units of housing would the government have to increase the supply of housing in order to get the market equilibrium rental price to fall to \$1500 per month? To \$1000 per month? To \$500 per month?

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# 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 in the main body of this chapter 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 preference.

## Changes in Supply and Demand

As Figure 3.7 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.

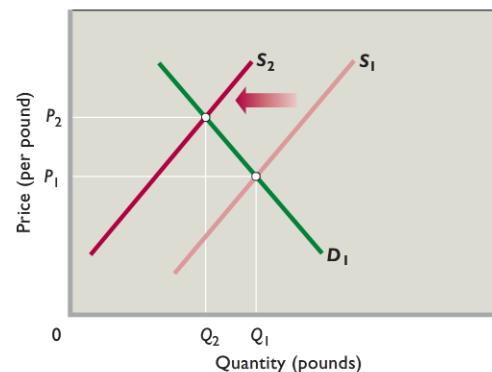
### Lettuce

Every now and then we hear on the news that extreme weather has severely reduced the size of some crop. 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 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 is restored 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

**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  $Q_2$ .



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. (Because of our other-things-equal assumption, the prices of other products have not changed.)

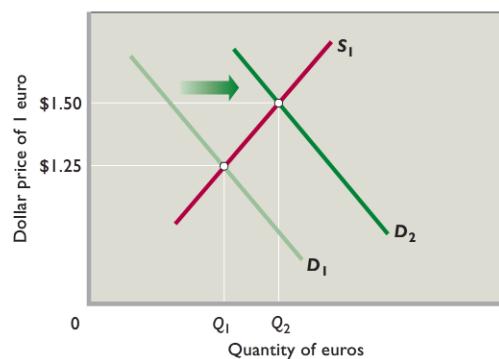
### Exchange Rates

*Exchange rates* are the prices at which one currency can be traded (exchanged) for another. Exchange rates are normally determined in foreign exchange markets. One of the largest foreign exchange markets is the euro-dollar market in which the currency used in most of Europe, the *euro*, is exchanged for U.S. dollars. In the United States, this market is set up so that euros are priced in dollars—that is, the “product” being traded is euros and the “price” to buy that product is quoted in dollars. Thus, the market equilibrium price one day might be \$1.25 to buy 1 euro, while on another day it might be \$1.50 to buy 1 euro.

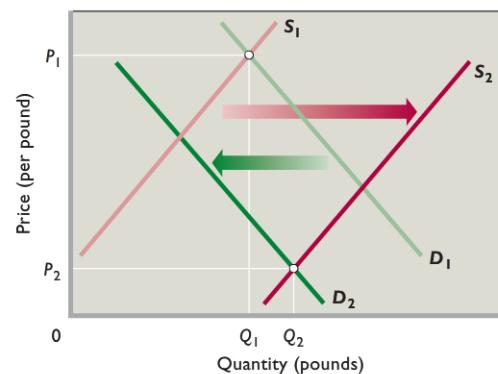
Foreign exchange markets are used by individuals and companies that need to make purchases or payments in a different currency. U.S. companies exporting goods to Germany, for instance, wish to be paid in U.S. dollars.

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**FIGURE 2 The market for euros.** The increase in the demand for euros, shown here by the shift from  $D_1$  to  $D_2$ , increases the equilibrium price of one euro from \$1.25 to \$1.50 and increases the equilibrium quantity of euros that are exchanged from  $Q_1$  to  $Q_2$ . The dollar has depreciated.



**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  $Q_2$ .



Thus, their German customers will need to convert euros into dollars. The euros that they bring to the euro-dollar market will become part of the overall market supply of euros. Conversely, an American mutual fund may wish to purchase some French real estate outside of Paris. But to purchase that real estate, it will need to pay in euros because the current French owners will only accept payment in euros. Thus, the American mutual fund has a demand to purchase euros that will form part of the overall market demand for euros. The fund will bring dollars to the euro-dollar foreign exchange market in order to purchase the euros it desires.

Sometimes, the demand for euros increases. This might be because a European product surges in popularity in foreign countries. For example, if a new German-made automobile is a big hit in the United States, American car dealers will demand more euros with which to pay for more units of that new model. This will shift the demand curve for euros to the right, as from  $D_1$  to  $D_2$  in Figure 2. Given the fixed euro supply curve  $S_1$ , the increase in demand raises the equilibrium exchange rate (the equilibrium number of dollars needed to purchase 1 euro) from \$1.25 to \$1.50. The equilibrium quantity of euros purchased increases from  $Q_1$  to  $Q_2$ . Because a higher dollar amount is now needed to purchase one euro, economists say that the dollar has *depreciated*—gone down in value—relative to the euro. Alternatively, the euro has *appreciated*—gone up in value—relative to the dollar, because one euro now buys \$1.50 rather than \$1.25.

### 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 of salmon most commonly used for canning. 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.

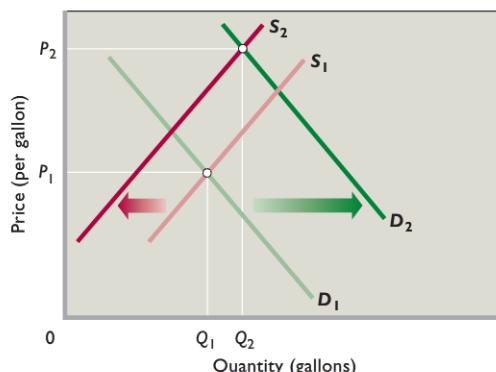
The altered supply and demand reduced the price of pink salmon to as low as \$.10 per pound, as represented by the drop in price from  $P_1$  to  $P_2$  in Figure 3. Both the supply increase and the demand decrease helped reduce the equilibrium price. However, in this particular case the equilibrium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

## Gasoline

The price of gasoline in the United States has increased rapidly several times during the past several years. For example, the average price of a gallon of gasoline rose from around \$2.25 in January 2007 to about \$4.10 in July 2008. What caused this 80 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 \$2.25 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 \$50 per barrel in January 2007 to \$145 per barrel in July 2008. 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

**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.



$S_1$  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 January 2007 and July 2008, 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 this period 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 \$2.25 to \$4.10, 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 sushi, the raw-fish delicacy from Japan, has soared in the United States in recent years. Nevertheless, the price of sushi has remained relatively constant.

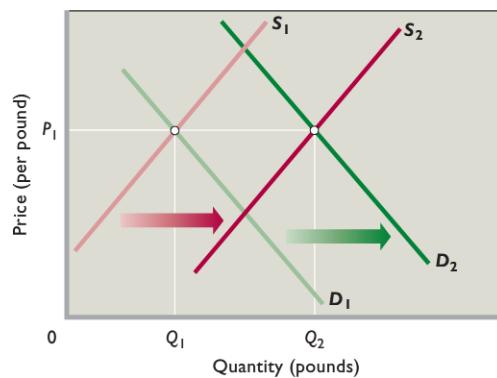
Supply and demand analysis helps explain this circumstance of increased quantity and constant price. A change in tastes has increased the U.S. demand for sushi. Many consumers of sushi find it highly tasty when they try it. And, as implied by the growing number of sushi bars in the United States, the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

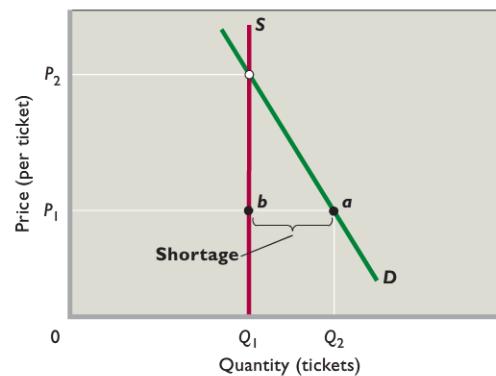
Simultaneous increases in demand and supply can cause price to either rise, fall, or remain constant, depending on the relative magnitudes of the supply and demand increases. In this case, price remained constant.

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**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  $P_1$ .



**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  $ab$  ( $= Q_2 - Q_1$ ) gives rise to a legal or illegal secondary market.



### 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 original 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.

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 original price. Wherever there are shortages and secondary markets, it is safe to assume the original 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  $S$ .

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  $ba$  ( $= Q_1 - Q_2$ ) 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 arenas 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

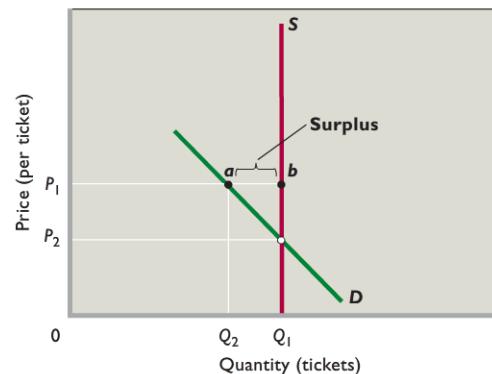
1. A decrease in the supply of a product increases its equilibrium price and reduces its equilibrium quantity. In contrast, an increase in the demand for a product boosts both its equilibrium price and its equilibrium quantity.
2. Simultaneous changes in supply and demand affect equilibrium price and 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 Questions



1. Why are shortages or surpluses more likely with preset prices, such as those on tickets, than flexible prices, such as those on gasoline? **LO6**
2. 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**
3. Go to the Web site of the Energy Information Administration, [www.eia.doe.gov](http://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**
4. 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**
5. 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**
6. 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**

**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  $ba$  ( $= Q_1 - Q_2$ ) means the event is not sold out.



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7. 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](#)

## Appendix Problems

1. Demand and supply often shift in the retail market for gasoline. Here are two demand curves and two supply curves for gallons of gasoline in the month of May in a small town in Maine. Some of the data are missing. [LO6](#)

Price	Quantities Demanded		Quantities Supplied	
	$D_1$	$D_2$	$S_1$	$S_2$
\$4.00	5000	7500	9000	9500
—	6000	8000	8000	9000
2.00	—	8500	—	8500
—	—	9000	5000	—

- a. Use the following facts to fill in the missing data in the table. If demand is  $D_1$  and supply is  $S_1$ , the equilibrium quantity is 7000 gallons per month. When demand is  $D_2$  and supply is  $S_1$ , the equilibrium price is \$3.00 per gallon. When demand is  $D_2$  and supply is  $S_1$ , there is an excess demand of 4000 gallons per month at a price of \$1.00 per gallon. If demand is  $D_1$  and supply is  $S_2$ , the equilibrium quantity is 8000 gallons per month.
  - b. Compare two equilibriums. In the first, demand is  $D_1$  and supply is  $S_1$ . In the second, demand is  $D_1$  and supply is  $S_2$ . By how much does the equilibrium quantity change? By how much does the equilibrium price change?
  - c. If supply falls from  $S_2$  to  $S_1$  while demand declines from  $D_2$  to  $D_1$ , does the equilibrium price rise, fall, or stay the same? What if only supply falls? What if only demand falls?
  - d. Suppose that supply is fixed at  $S_1$  and that demand starts at  $D_1$ . By how many gallons per month would demand have to increase at each price level such that the equilibrium price per gallon would be \$3.00? \$4.00?
2. The table below shows two demand schedules for a given style of men's shoe—that is, how many pairs per month will be demanded at various prices at a men's clothing store in Seattle called Stromnord.

Price	$D_1$ Quantity Demanded	$D_2$ Quantity Demanded
\$75	53	13
70	60	15
65	68	18
60	77	22
55	87	27

Suppose that Stromnord has exactly 65 pairs of this style of shoe in inventory at the start of the month of July and will not receive any more pairs of this style until at least August 1. [LO6](#)

- a. If demand is  $D_1$ , what is the lowest price that Stromnord can charge so that it will not run out of this model of shoe in the month of July? What if demand is  $D_2$ ?
  - b. If the price of shoes is set at \$75 for both July and August and demand will be  $D_2$  in July and  $D_1$  in August, how many pairs of shoes should Stromnord order if it wants to end the month of August with exactly zero pairs of shoes in its inventory? What if the price is set at \$55 for both months?
  - 3. 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? 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 quantity of tickets demanded is 20,000 lower at each ticket price than shown in the table. If the ticket price remains \$45, would the event be a sellout?

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

**AFTER READING THIS CHAPTER, YOU SHOULD BE ABLE TO:**

- 1 Discuss price elasticity of demand and how it can be applied.**
- 2 Explain the usefulness of the total revenue test for price elasticity of demand.**
- 3 Describe price elasticity of supply and how it can be applied.**
- 4 Apply cross elasticity of demand and income elasticity of demand.**

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## Elasticity

In this chapter we extend Chapter 3's discussion of demand and supply by explaining *elasticity*, an extremely important concept that helps us answer such questions as: Why do buyers of some products (for example, ocean cruises) respond to price increases by substantially reducing their purchases while buyers of other products (say, gasoline) respond by only slightly cutting back their purchases? Why do higher market prices for some products (for example, chicken) cause producers to greatly increase their output while price rises for other products (say, gold) cause only limited increases in output? Why does the demand for some products (for example, books) rise a great deal when household income increases while the demand for other products (say, milk) rises just a little?

Elasticity extends our understanding of markets by letting us know the degree to which changes in prices and incomes affect supply and demand. Sometimes the responses are substantial, other times minimal or even nonexistent. But by knowing what to expect, businesses and the government can do a better job in deciding what to produce, how much to charge, and, surprisingly, what items to tax.