CHAPTER 2

Demand and Supply

Teach a parrot to say demand and supply, and you've created an economist.

—An old joke

Each day, we buy an assortment of goods and services—a meal, a snack, maybe a magazine. What determines the price of the french fries we buy at lunchtime? the selection of chocolate bars we find at our local variety store? the types of articles we see in the magazines we read? The answer to all these questions is demand and supply. These two powerful forces are the economic equivalents of gravity—never seen, but always exerting their influence in the most visible ways. In this chapter, we will study the impact of these two forces on our daily lives by seeing how they operate in individual markets. We will also gain a better appreciation of how the "invisible hand" of competition coordinates the plans of buyers and sellers, nudged along by the interaction of demand and supply.

LEARNING OBJECTIVES

After this chapter, you will be able to:

1. comprehend the nature of demand, changes in quantity demanded, changes in demand, and the factors that affect demand
2. understand the nature of supply, changes in quantity supplied, changes in supply, and the factors that affect supply
3. explain how markets reach equilibrium—the point at which demand and supply meet

2.1 THE ROLE OF DEMAND

LO 2.1

A product market exists wherever households and businesses buy and sell consumer products—either face-to-face, or indirectly by mail, telephone, or online. Some markets, such as the market for crude oil, are global in scope. Others, such as the market for hot dogs at a local baseball game, are tiny by comparison.

What Is Demand?

demand: the relationship between the various possible prices of a product and the quantities of that product consumers are willing to purchase

quantity demanded: the amount of a product consumers are willing to purchase at each price

Because households are buyers in product markets, their behaviour can be analyzed using the concept of **demand**, which is the relationship between the various possible prices of a product and the quantities consumers will purchase at each price. In this relationship, price is the independent variable. **Quantity demanded**—the amount of the product that consumers are willing to purchase at each price—is the dependent variable. To isolate the relationship between these two variables, all other factors affecting price and quantity demanded are assumed to remain constant. Recall that this is the assumption of *ceteris paribus*—"all other things remaining the same."

The Law of Demand

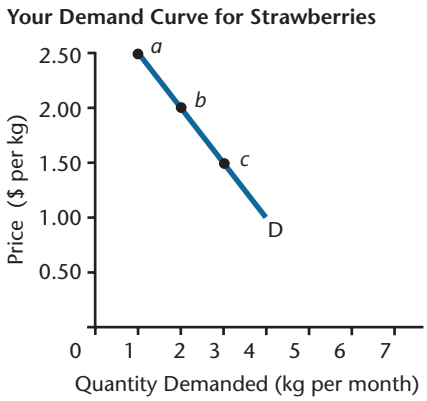
law of demand: states that there is an inverse relationship between a product's quantity demanded and its price

Is the relationship between price and quantity demanded direct or inverse? To answer this question, consider the example of strawberries you might eat during a month. As shown in the table in Figure 2.1, you might buy two kilograms per month when each kilogram is priced at $2. If the price rises to $2.50, you will likely purchase fewer strawberries, perhaps one kilogram per month at this new price. Conversely, if the price falls to $1.50, you will probably buy more strawberries per month. At this lower price, strawberries become a better deal in terms of the satisfaction you get from each dollar spent. Thus, you may decide to increase your purchases to three kilograms per month. This inverse relationship between price and quantity demanded, when all other factors are kept constant, is known as the **law of demand**.

FIGURE 2.1 An Individual's Demand Schedule and Curve

Your Demand Schedule for Strawberries

Price ($ per kg)	Quantity Demanded (D) (kg per month)
$2.50	1
2.00	2
1.50	3



The demand schedule shows that as the price of strawberries falls, you are willing to purchase more strawberries. The demand curve D depicts this same inverse relationship between price and quantity demanded. For example, a fall in price from $2 to $1.50 causes quantity demanded to rise from 2 kg (point *b*) to 3 kg (point *c*).

The Demand Curve

demand schedule: a table that shows possible combinations of prices and quantities demanded of a product

demand curve: a graph that expresses possible combinations of prices and quantities demanded of a product

change in quantity demanded: the effect of a price change on quantity demanded

The quantities demanded of a product at various prices can be expressed in a **demand schedule** like the one in Figure 2.1. Expressing the schedule on a graph, as shown on the right in Figure 2.1, gives us the consumer's demand curve (D) for strawberries. The **demand curve** is drawn by placing the price of strawberries on the vertical axis and the quantity demanded per month on the horizontal axis. Note that the independent variable (price) is on the vertical axis, while the dependent variable (quantity demanded) is on the horizontal axis. This is a choice economists have made that differs from the convention in mathematics, in which the independent variable (x) is on the horizontal axis and the dependent variable (y) is on the vertical axis.

The demand curve's negative (downward) slope reflects the law of demand: an increase in the product's price decreases the quantity demanded, and vice versa. Changes such as these are examples of a **change in quantity demanded** and produce a movement *along* the demand curve. For example, an increase in the price of strawberries from \$1.50 to \$2 decreases the quantity demanded per month from three kilograms (point c on the demand curve) to two kilograms (point b).

thinking about ECONOMICS

Is the law of demand ever broken?

While extremely rare, the relationship between a product's price and quantity demanded can be direct, in which case the demand curve for the product has a positive (upward) slope. This may happen when a product's high price is seen as a status symbol. For example, the quantity demanded of a designer-shirt may rise when its price rises. Consumers who can afford the shirt are attracted to the item because its high price makes it more fashionable than before. This situation, which can also apply to products like luxury perfumes and watches, is known as the "Veblen effect." It is named after the American economist, Thorstein Veblen (1857–1929), whose wittily phrased critique of such purchases led him to coin the memorable term "conspicuous consumption" to describe them.

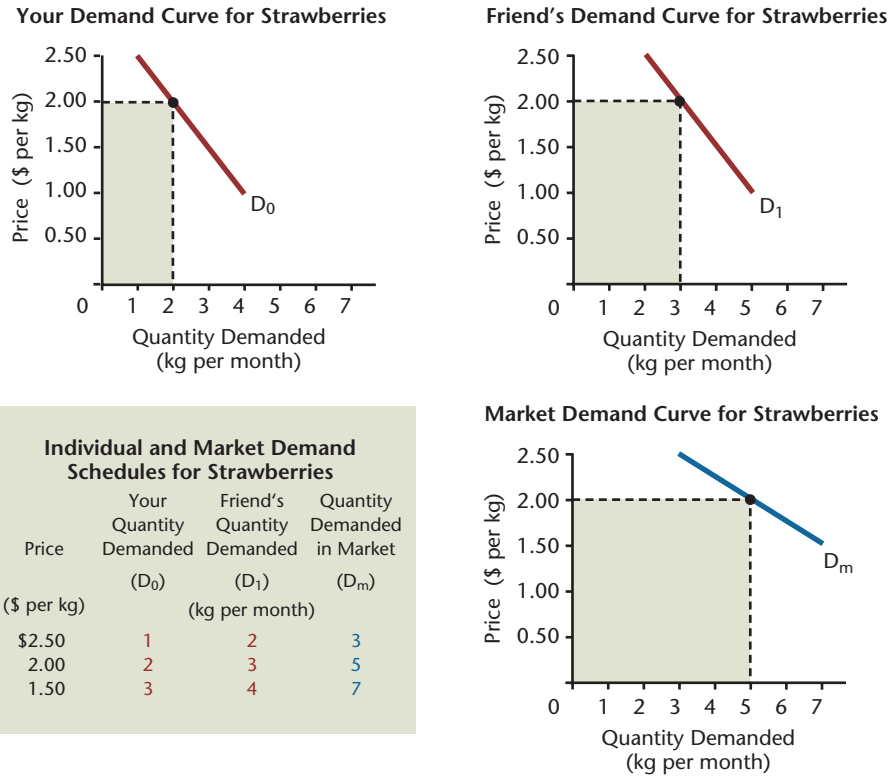
Question *What is a specific example of a product that exhibits the "Veblen effect?"*

Market Demand

market demand: the sum of all consumers' quantity demanded for a product at each price

Market demand, which can again be shown as a schedule or a curve, is the sum of all consumers' purchases, or quantity demanded, at each price. This is illustrated in Figure 2.2 in the unlikely case that there are just two consumers in the strawberry market—you and a friend—with individual demand curves D_0 (yours) and D_1 (your friend's). While you purchase two kilograms per month at a \$2 price, your strawberry-loving friend purchases three kilograms per month at this same price. These amounts are based on what each of you is able and willing to pay for strawberries. The total quantity demanded in the market is, therefore, five kilograms. Repeating this procedure at every possible price gives the market demand curve (D_m) on the lower right in Figure 2.2.

FIGURE 2.2 The Market Demand Schedule and Curve



Individual and Market Demand Schedules for Strawberries

Price ($ per kg)	Your Quantity Demanded (D_0) (kg per month)	Friend's Quantity Demanded (D_1) (kg per month)	Quantity Demanded in Market (D_m) (kg per month)
$2.50	1	2	3
2.00	2	3	5
1.50	3	4	7

There are only two consumers in the strawberry market: you and a friend, with demand curves D_0 and D_1. The market demand curve (D_m) is found by adding the number of kilograms purchased by both consumers at each possible price. For example, at a price of $2, you buy 2 kg and your friend buys 3 kg, giving a quantity demanded in the market of 5 kg at this price.

Changes in Demand

demand factors: factors that can cause an increase or a decrease in a product's demand

Earlier, we stated that to study the relationship between price and quantity demanded, all other factors affecting these variables must be assumed constant. Now, let us examine these other factors, which are known as **demand factors**. Demand factors are factors that can cause the entire market demand curve to shift. The five main demand factors are the number of buyers in a market, their average income, the prices of other products, consumer preferences, and consumer expectations about future prices and incomes. With each factor, it must be assumed that all other factors remain constant.

NUMBER OF BUYERS

increase in demand: an increase in the quantity demanded of a product at all prices

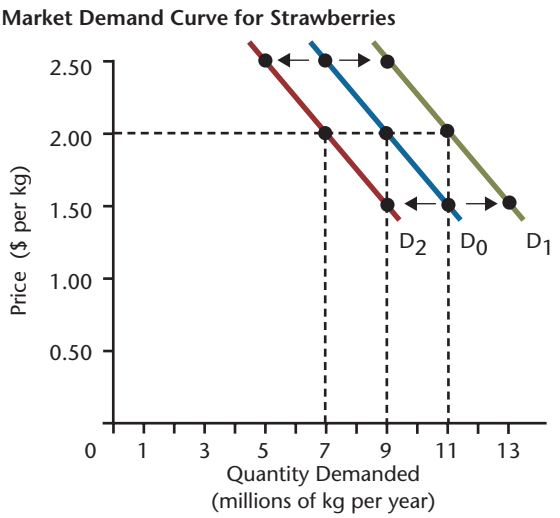
decrease in demand: a decrease in the quantity demanded of a product at all prices

When the number of buyers for a certain product increases, more purchases are made. Thus, the amount of the product demanded increases, whatever its price. The result is called an **increase in demand**. On a graph, an increase in demand is shown as a shift of the *entire* demand curve to the right. When the number of buyers in a market decreases, the amount of the product demanded also decreases at every price, thus causing the entire demand curve to shift to the left. This result is called a **decrease in demand**.

FIGURE 2.3 Changes in Demand

Market Demand Schedule for Strawberries

Price ($ per kg)	Quantity Demanded (millions of kg) (D_2)	(D_0)	(D_1)
$2.50	5 ←	7 →	9
2.00	7 ←	9 →	11
1.50	9 ←	11 →	13



When the number of buyers in a market increases, the amount of strawberries demanded increases at every possible price. Each point on the demand curve, therefore, shifts to the right, from D_0 to D_1. Similarly, a decrease in the number of buyers pushes down the amount demanded at every price, shifting the demand curve to the left, from D_0 to D_2.

Both cases are illustrated in Figure 2.3 using a hypothetical market for strawberries. The initial amounts demanded per year in the market are shown in the demand schedule under D_0. When demand increases, the amount demanded increases at every possible price. For example, at a price of $2, the amount demanded increases from 9 to 11 million kilograms. Thus, on the graph, the original demand curve (D_0) shifts to the right, giving a new demand curve (D_1). When demand decreases, the amount demanded decreases at every price. For example, at a price of $2, the amount demanded decreases from 9 to 7 million kilograms. Thus, the demand curve shifts to the left, from D_0 to D_2.

INCOME

When consumers' incomes increase, they purchase more luxury products, such as expensive jewellery and caviar, with their luxury purchases rising more rapidly than the increase in income. Purchases of necessities, such as milk and shoes, also rise, but by a smaller proportion than the increase in income. But, whether for luxury products or for necessities, demand increases, thus shifting the entire demand curve to the right. Products whose demand changes directly with income are known as **normal products**. There are a few products, known as **inferior products**, for which incomes have the opposite effect. Turnips and second-hand suits are examples. As incomes rise, consumption of these products falls, as buyers switch from turnips to more expensive vegetables and from second-hand suits to new ones. The result is a decrease in demand for these products, reflected in a shift of the entire demand curve to the left.

normal products: products whose demand changes directly with income

inferior products: products whose demand changes inversely with income

PRICES OF OTHER PRODUCTS

substitute products: products that can be consumed in place of one another

Substitute products are products that can be consumed in place of one another, such as butter and margarine, or cell phones and landline-based phones. When the price of a product rises, consumers choose to purchase more of any reasonable substitute available, thus shifting the substitute product's demand curve to the right. For example, a higher price for butter causes some consumers to switch to margarine, increasing the demand for margarine. If the price of cell phones falls, however, there will be a decrease in the demand for landline-based phones.

complementary products: products that are consumed together

Complementary products are products that are consumed together, such as cars and gasoline, or video games and video game consoles. In the case of complementary products, an increase in the price of one product causes a decrease in demand for its complement. For example, if the prices of cars rise, the demand for gasoline falls. The reverse is also true: a fall in the price of video games leads to a rise in demand for video game consoles.

CONSUMER PREFERENCES

People's preferences also affect buying patterns. A significant shift in consumer concerns over nutrition, for example, causes an increase in the demand for nutritious foods. Consumer preferences are also influenced by current fashion or advertising, as in the case of clothing. This is illustrated by a sudden fad for a particular brand of running shoes, which increases their demand and shifts this product's demand curve to the right.

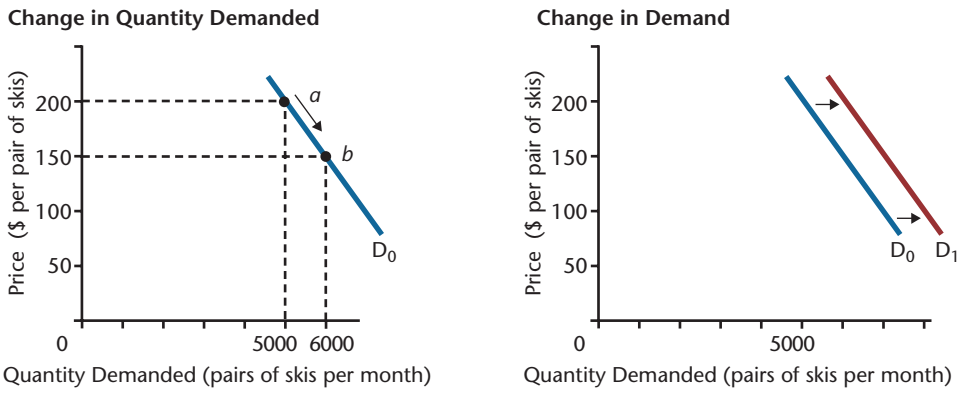
CONSUMER EXPECTATIONS

The expectations that consumers have about future changes in prices and their own incomes affect their current purchases. For example, if a majority of consumers expect the price of laptop computers to fall, the current demand for laptops decreases. This is because consumers will delay their purchases of laptops until the expected drop in price occurs. Alternatively, if consumers expect their incomes to grow and the prices of products they buy to remain constant—in other words, if they expect their standard of living to rise—their current demand for normal products will increase, and their current demand for inferior products will decrease.

Change in Quantity Demanded versus Change in Demand

The terms *change in quantity demanded* and *change in demand*, have special meanings in economics. Both types of change are shown in Figure 2.4. As we have seen, a change in quantity demanded results from a change in the product's own price. For example, the number of skis purchased per month will increase when the price of skis decreases, as shown on the graph on the left in Figure 2.4. Here a movement (from point *a* to point *b*) occurs along demand curve D_0, since varying the product's own price does not alter the position of the curve. An increase or decrease in demand, however, results from a change in a demand factor. For example, a change in consumer preferences or in consumer incomes can cause the entire demand curve to shift. This is because the amount of the product demanded changes at every possible price for the product. The graph on the right shows how an increase in incomes increases the demand for skis, which are a normal product, causing a shift of the entire demand curve for skis from D_0 to D_1.

FIGURE 2.4 Change in Quantity Demanded and Change in Demand



A change in quantity demanded is shown on the left graph as a movement along a single demand curve (D_0) that results from a change in the product's own price. There is a rise in quantity demanded when the price of skis drops, causing a movement from point *a* to point *b*. A change in demand is shown on the right graph as a shift in the entire demand curve to the right, from D_0 to D_1. This shift results from a change in a demand factor, such as consumer incomes.

Brief REVIEW

1. In product markets, demand represents the decisions of households purchasing consumer items.
2. The demand curve for a particular product shows the relationship between its price and the quantity demanded, either by an individual consumer or in the market as a whole. According to the law of demand, price and quantity demanded are inversely related.
3. A change in quantity demanded is shown by a movement along a product's demand curve and is caused by a change in the product's own price.
4. A change in demand is shown by a shift of the entire demand curve and is caused by a change in a demand factor: the number of buyers, their average income, the prices of other products, consumer preferences, or consumer expectations about future prices and incomes.

2.1 *Practice Questions*

1. Kate buys 3 milkshakes per week at a price of $1.50, 5 at a price of $1, and 7 at a price of 50 cents. Her friend Carlo buys 5 milkshakes at a price of $1.50, 8 at a price of $1, and 11 at a price of 50 cents.
   a. If these two friends are the only consumers in the market for milkshakes, what are three points on the market demand curve?
   b. Does this market demand curve satisfy the law of demand? Why?
   c. Using EconGraphKit (at http://www.mcgrawhill.ca/olc/lovewell), draw the market demand curve for milkshakes.

2. How will the demand for DVDs shift in each of the following situations?
   a. consumer incomes rise
   b. the price of DVD players decreases
   c. there is a sudden expectation by consumers that the price of DVDs will soon drop
   d. the price of movie theatre tickets rises
3. A decrease in the price of DVDs affects both the market for DVDs and the market for videotapes.
   a. Is the change in the DVD market a change in quantity demanded or in demand? Explain.
   b. Is the change in the videotape market a change in quantity demanded or in demand? Explain.

2.2 THE ROLE OF SUPPLY

LO 2.2

What Is Supply?

supply: the relationship between the various possible prices of a product and the quantities of the product that businesses are willing to supply

quantity supplied: the amount of a product businesses are willing to supply at each price

market supply: the sum of all producers' quantities supplied at each price

In product markets, supply is related to the selling activity of businesses. The role of supply is most easily analyzed in competitive markets, where the "invisible hand" of competition, identified by Adam Smith, operates. Because the actions of sellers are independent from those of buyers in these markets, the role of supply can be studied separately. In any competitive market, **supply** is the relationship between the various possible prices of a product and the quantities of the product that businesses are willing to put on the market. While the independent variable is again price, the dependent variable is now **quantity supplied**—the amount of the product that businesses are willing to supply at each price. Once again, we can consider both individuals (in this case, individual businesses) and groups (in this case, all businesses producing the same product). **Market supply** is the sum of all producers' quantities supplied at each price. As before, all other factors that affect supply are assumed to be constant.

The Law of Supply

law of supply: states that there is a direct relationship between a product's quantity supplied and its price

supply schedule: a table that shows possible combinations of prices and quantities supplied of a product

When price changes, quantity supplied changes in the same direction. If the price of strawberries rises, for example, farmers find it desirable to increase the quantity of strawberries they supply because the higher price provides the lure of increased revenue for every unit produced. This direct relationship between price and quantity supplied, when all other factors are kept constant, is called the **law of supply**.

The Supply Curve

supply curve: a graph that expresses possible combinations of prices and quantities supplied of a product

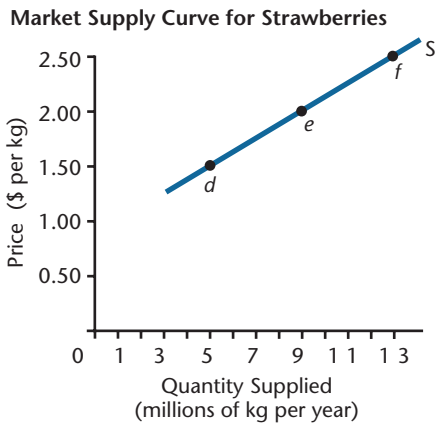
change in quantity supplied: the effect of a price change on quantity supplied

The law of supply can be illustrated in a **supply schedule**, such as that for the strawberry market in Figure 2.5. Expressing the schedule on a graph gives us the **supply curve** for the strawberry market. As with the demand curve, a change in a product's price causes a movement *along* the supply curve, thus a **change in quantity supplied**. This is illustrated in Figure 2.5 by the movement from point *f* to point *e* on the supply curve. Because of a drop in the price of strawberries from $2.50 to $2 per kilogram, the quantity supplied by farmers per year drops from 13 to 9 million kilograms. The positive (upward) slope of the supply curve illustrates the direct relationship between price and quantity supplied.

FIGURE 2.5 The Market Supply Schedule and Curve

Market Supply Schedule for Strawberries

Price ($ per kg)	Quantity Supplied (S) (millions of kg)	Point on Graph
$2.50	5	*d*
2.00	9	*e*
1.50	13	*f*



The supply schedule shows that when the price of strawberries falls, as from $2 to $1.50 per kg, then quantity supplied also falls, from 9 million (point *e*) to 5 million kg (point *d*), as farmers find it profitable to produce fewer units. The positively sloped supply curve S indicates a direct relationship between price and quantity supplied.

Changes in Supply

supply factors: factors that can cause an increase or a decrease in a product's supply

While price changes will cause changes in quantity supplied, other factors cause supply to change. These factors, which cause the entire supply curve to shift, are known as **supply factors**. The six main supply factors are the number of producers, resource prices, the state of technology, changes in nature, the prices of related products, and producer expectations. Once again, with each factor, we must assume that all other factors remain constant.

NUMBER OF PRODUCERS

increase in supply: an increase in the quantity supplied of a product at all prices

decrease in supply: a decrease in the quantity supplied of a product at all prices

An increase in the number of businesses in an industry causes an **increase in supply**, thus giving a higher quantity supplied at each price and shifting the supply curve to the right. In contrast, a decrease in the number of businesses in the industry creates a **decrease in supply** and a corresponding shift of the supply curve to the left. Both cases are illustrated in Figure 2.6 for the strawberry market. The column marked S_0 in the supply schedule gives the quantity supplied per year by the original number of producers. When the number of producers increases, so does the quantity supplied (indicated by column S_1) at every possible price—for example, from 9 to 11 million kilograms per year at a price of $2. Thus, the supply curve shifts to the right, from S_0 to S_1. Conversely, a decrease in the supply of the product causes the quantities supplied (indicated by column S_2) to decrease at each possible price, for example, from 9 to 7 million kilograms per year at a price of $2. The supply curve, therefore, shifts to the left, from S_0 to S_2.

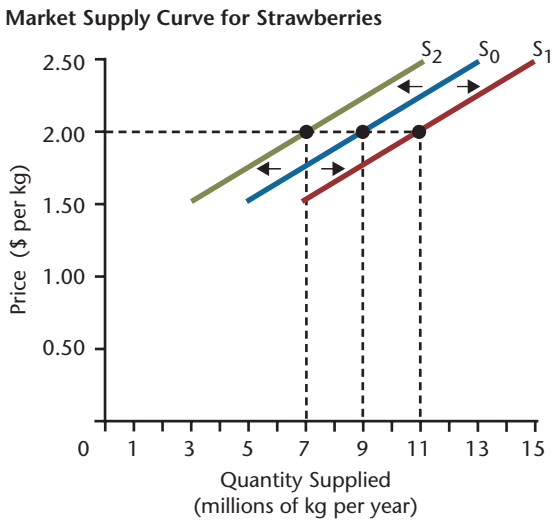
RESOURCE PRICES

As discussed in the previous chapter, businesses buy various resources, such as capital resources and natural resources, to produce goods. If there is a price increase for a resource used in a particular industry, costs for businesses in that industry increase. As a result, fewer units of the product can be produced for the same expenditure. Thus, businesses will tend to cut back on production, causing the supply curve to shift to the left. For example, an increase in the wages of workers in the apple industry causes a decrease in the supply of apples.

FIGURE 2.6 Changes in Supply

Market Supply Schedule for Strawberries

Price ($ per kg)	Quantity Supplied (millions of kg) (S_2)	(S_0)	(S_1)
$2.50	11 ←	13 →	15
2.00	7 ←	9 →	11
1.50	3 ←	5 →	7



When the number of strawberry producers increases in a market, the quantity supplied of strawberries increases at every possible price. Each point on the supply curve shifts to the right from S_0 to S_1. In contrast, a decrease in the number of producers decreases the quantity supplied of strawberries at every price, shifting the supply curve to the left from S_0 to S_2.

***thinking about* ECONOMICS**

Is the expanded use of the Internet for business-to-business (B2B) and business-to-consumer (B2C) commerce having an impact on the levels of competition in national markets?

Yes, e-commerce is making at least some markets more competitive. For example, in B2C commerce, it is the supply of computer software, telecommunication services, music, financial services, newspapers, magazines, and information databases that are being most affected, since consumers are able to buy and directly consume these services in digital form over the Internet. Meanwhile, in other B2C markets, such as the book-selling industry, the Internet is being used to order and purchase products, which are then shipped through traditional delivery methods. The basic result in both cases is the same: consumers can access businesses globally rather than just locally, increasing competition.

http://www.amazon.ca/

Question *As e-commerce becomes more common, what should happen to the large price spreads currently found for many products when bought in a common currency (i.e., the American dollar) in various national markets?*

STATE OF TECHNOLOGY

Technological progress affects the supply curve by allowing businesses to use more efficient production methods. With increased efficiency, more units can be produced at every price, so supply will increase. Use of a better grain fertilizer, for instance, causes the supply of barley to increase, shifting the supply curve to the right.

CHANGES IN NATURE

Changes in nature—for example, an early frost, record high temperatures, a flood, or an earthquake—can affect the supply of many products, especially agricultural products. A cold, rainy summer in Canada's prairies, for example, will decrease the supply of grains, such as wheat. The market supply curve for wheat will, therefore, shift to the left.

PRICES OF RELATED PRODUCTS

A product's supply can be influenced by changes in the prices of other products. For example, declines in the price of tobacco have caused many Ontario farmers to switch to ginseng, a medicinal root that is popular in East Asia. As a result, the supply for ginseng has increased, resulting in a shift to the right of the supply curve.

PRODUCER EXPECTATIONS

If producers expect the price of the item they sell to change in the near future, this affects the product's current supply. For example, barley farmers may anticipate barley prices will soon fall. In this case, they provide the product as much as possible now, raising its current supply. In contrast, an expected rise in the price of beef means beef producers hold back on the amounts they make available to the market, immediately reducing the supply of beef.

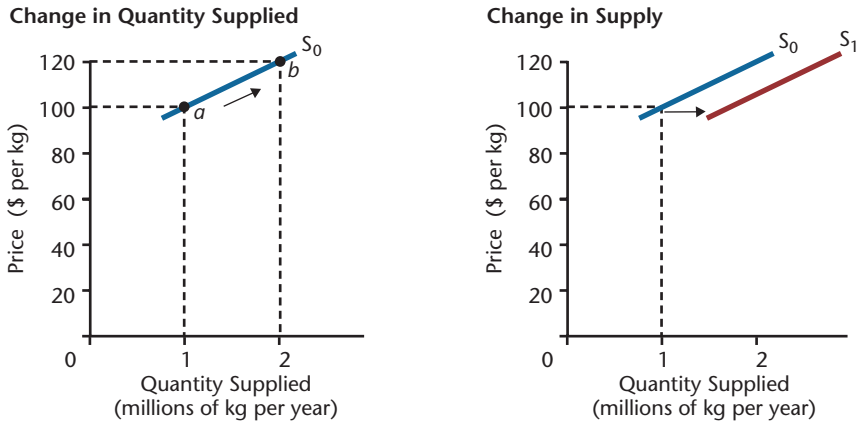
Change in Quantity Supplied versus Change in Supply

As in the case of demand, it is important to distinguish between a *change in quantity supplied* and a change in supply, both of which are shown in Figure 2.7. An increase or decrease in quantity supplied is the effect of a change in a product's price and is illustrated by a movement along the supply curve. As shown on the graph on the left, a rise in the price of ginseng, which raises the quantity of ginseng produced, is a change in quantity supplied. In contrast, a change in supply is caused by a change in a supply factor, such as a resource price or a technological innovation. Because the amount of the product supplied is altered at every possible price for the product, a change in supply shifts the *entire* supply curve. As shown on the graph on the right, a decrease in the price of corn increases the supply of ginseng, causing a shift in the entire supply curve to the right.

Brief REVIEW

1. In product markets, supply is the relationship between the various possible prices of a consumer item and the quantities of the item that businesses are willing to put on the market.
2. The law of supply states that there is a direct relationship between the two variables of price and quantity supplied.
3. A change in quantity supplied is caused by a change in price and is shown as a movement along the supply curve.
4. A change in supply is caused by a change in a supply factor and is shown as a shift of the *entire* supply curve. The six supply factors are the number of producers in a market, resource prices, the state of technology, changes in nature, the prices of related products, and producer expectations.

FIGURE 2.7 Change in Quantity Supplied and Change in Supply



A change in quantity supplied is shown on the left graph as a movement along a single supply curve (S_0) that results from a change in the product's own price. There is a rise in quantity supplied when the price of ginseng rises, causing a movement from point *a* to point *b*. A change in supply is shown on the right graph as a shift in the entire supply curve to the right, from S_0 to S_1. This shift results from a change in a supply factor—for example, a drop in the price of a related product, such as corn.

2.2 *Practice Questions*

1. In a certain tomato market, 5 million kg are supplied annually at a price per kg of $3, 6 million kg at a price of $3.50, and 7 million kg at a price of $4.
   a. Does this supply curve satisfy the law of supply? Explain.
   b. What will happen to the supply of tomatoes if (i) wages paid to farm workers rise; (ii) there is a drop in the price of corn, which can be cultivated instead of tomatoes; (iii) there is a sudden early autumn frost before the tomatoes are harvested; (iv) a new mechanized tomato-picker is introduced that raises efficiency; or (v) producers anticipate that the price of tomatoes will soon fall.
   c. Using EconGraphKit (at http://www.mcgrawhill.ca/olc/lovewell), draw the market supply curve for tomatoes.
2. A drop in the price of corn affects both the market for tomatoes and for corn.
   a. Is the change in the corn market a change in quantity supplied or in supply? Explain.
   b. Is the change in the tomato market a change in quantity supplied or in supply? Explain.

2.3 HOW COMPETITIVE MARKETS OPERATE

LO 2.3

Market Equilibrium

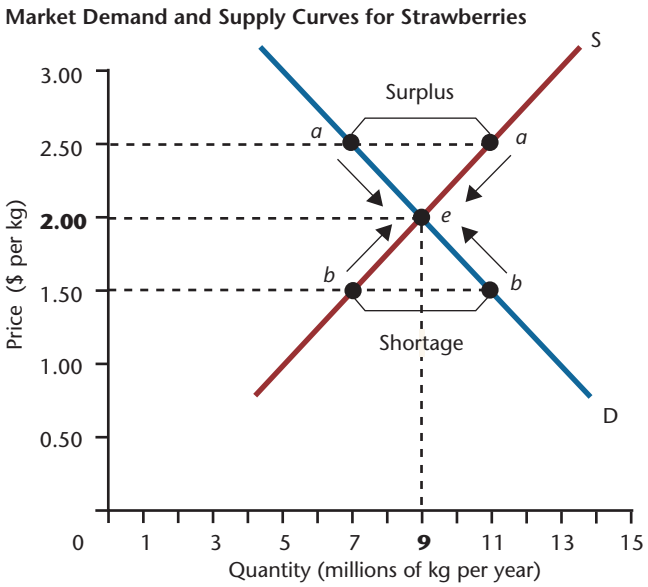
market equilibrium: the stable point at which demand and supply curves intersect

In competitive markets, demand and supply play a key role in co-ordinating the decisions of consumers and producers. Changes in price drive quantities demanded and supplied to a point of stability, known as **market equilibrium**, where the demand and supply

FIGURE 2.8 Movement of Price towards Equilibrium

Market Demand and Supply Schedules for Strawberries

Price ($ per kg)	Quantities (D) (millions of kg)	(S) (millions of kg)	Surplus (+) Shortage (–) (millions of kg)
$3.00	5	13	+8
2.50	7	11	+4
2.00	**9**	**9**	—
1.50	11	7	–4
1.00	13	5	–8



As shown both in the schedule and on the graph, when price (at points *a*) is above its equilibrium level of $2, the quantity of strawberries supplied exceeds the quantity demanded, creating a surplus. This causes price to fall until both quantities demanded and supplied are equal at the equilibrium point (point *e*). If price (at points *b*) is below equilibrium, a shortage results. Price is forced higher until its equilibrium level (point *e*) is again reached.

curves intersect. Whenever the market is out of equilibrium—quantity supplied cannot keep up with quantity demanded, for example—the market tries to right itself and achieve equilibrium. To see how equilibrium is reached, consider the example of the strawberry market that appears in Figure 2.8.

EFFECTS OF A SURPLUS

surplus: an excess of quantity supplied over quantity demanded

At a price of $2.50 per kilogram, the quantities demanded and supplied of strawberries per year are 7 and 11 million kilograms, respectively. The quantity supplied exceeds the quantity demanded, so there are 4 million more kilograms of strawberries for sale than consumers wish to purchase. This excess is called a **surplus**. As a result of this surplus, producers are holding unwanted inventories.

The pressures produced by a surplus in a competitive market cause the price to fall. As the surplus appears and inventories rise, some producers respond by reducing their prices, and all others soon follow. As the price falls, two adjustments take place. First, consumers buy more at the lower price so that the quantity demanded rises. This increase in quantity demanded is shown as a move down the demand curve in Figure 2.8 (from point *a* to *e*). Second, producers offer less for sale so that the quantity supplied drops. This decrease in quantity supplied is shown as a move down the supply curve in Figure 2.8 (from point *a* to *e*). Both responses reduce the surplus until price comes to rest where quantity supplied matches quantity demanded. Once this happens, the market has reached a stable equilibrium point—at a price of $2 in the case of the strawberry market. At this point, the amount of the product exchanged (9 million kilograms) is simply called "quantity" and can refer to either quantity demanded or quantity supplied.

EFFECTS OF A SHORTAGE

shortage: an excess of quantity demanded over quantity supplied

When price is below equilibrium, the quantity of strawberries that consumers wish to purchase exceeds the quantity supplied. This excess of quantity demanded over quantity supplied is called a **shortage**. Because of this shortage, some consumers are unable to purchase strawberries. For example, at a price of $1.50, the quantities demanded and supplied per year in the strawberry market are 11 and 7 million kilograms, respectively, giving a shortage of 4 million kilograms.

A shortage in a competitive market pushes price higher. Once it becomes apparent that producers do not have enough to satisfy the prevailing quantity demanded, the demand of consumers who are determined to purchase strawberries causes some producers to raise their prices, and soon all others do the same. Both consumers and producers respond to the price increase. Consumers purchase less, decreasing quantity demanded from point *b* to *e* on the demand curve. At the same time, producers provide more for sale, raising quantity supplied from point *b* to *e* on the supply curve. As a result of these movements up the demand and supply curves in Figure 2.8, the shortage shrinks until the quantities demanded and supplied are again equal at the equilibrium point.

The Role of Price

Notice that if there is either a shortage or a surplus, the price in a competitive market changes until equilibrium is attained. Only at this point is the pressure for further adjustments eliminated. The market then remains at equilibrium until changes in some demand or supply factor cause demand or supply to change. Whenever this happens, the shortage or surplus that results will force the market to a new equilibrium point.

Changes in Demand

Consider the case in which the demand for strawberries increases because of a price increase for a substitute product, such as cherries. As a result, as shown in Figure 2.9, the demand curve shifts to the right, from D_0 to D_1. From an equilibrium price of $2 and a quantity of 9 million kilograms, quantity demanded shifts to 13 million kilograms. Quantity supplied lags behind, at 9 million kilograms, thus creating a shortage of 4 million kilograms per year in the market (13 million to 9 million). For the market to right itself, price and quantity supplied both push up to a new equilibrium price of $2.50 and quantity of 11 million kilograms. So, with an increase in demand, the equilibrium values of both price and quantity rise. A decrease in demand would have the opposite effect, causing the equilibrium values of both price and quantity to fall.

Changes in Supply

The effects of a change in supply can be outlined in a similar fashion. For example, the supply of strawberries may increase because new producers enter the industry. As a result, as shown in Figure 2.10, the supply curve shifts to the right, from S_0 to S_1. From an equilibrium price of $2 and quantity of 9 million kilograms, quantity supplied becomes 13 million kilograms. Quantity demanded lags behind at 9 million kilograms, thus causing a surplus of 4 million kilograms per year in the market (13 million to 9 million). For the market to right itself, price is driven down until it reaches a new equilibrium value of $1.50, and quantity demanded is driven up to a new equilibrium value of 11 million kilograms. So, with an increase in supply, the equilibrium values of price and quantity move in opposite directions, with price falling and quantity rising. A decrease in supply would have the opposite effects: price would rise and quantity would fall to reach a new equilibrium point.

thinking about ECONOMICS

Does a change in demand affect quantity supplied, or does a change in supply affect quantity demanded?

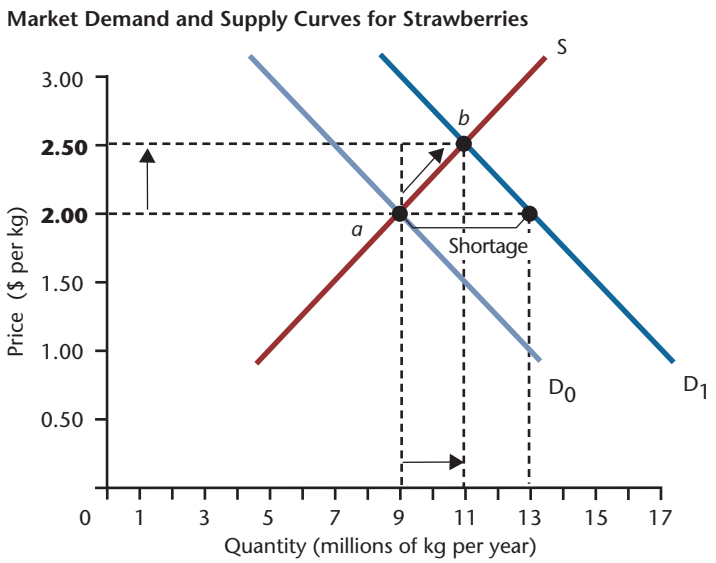
Both situations apply. A shift in the demand curve has an impact on quantity supplied. Notice in Figure 2.9, for example, that an increase in demand causes a rightward movement along the supply curve, meaning that quantity supplied rises as well. Thus, a change in demand pushes quantity supplied in the same direction. With an increase in supply, as depicted in Figure 2.10, there is a rightward movement along the demand curve, which causes an increase in quantity demanded. A change in supply, therefore, drives quantity demanded in the same direction.

Question *How does a decrease in supply affect quantity demanded?*

FIGURE 2.9 Effects of Changes in Demand on Equilibrium

Market Demand and Supply Schedules for Strawberries

Price ($ per kg)	Quantity Demanded (D_0) (millions of kg)	Quantity Demanded (D_1) (millions of kg)	Quantity Supplied (S) (millions of kg)
$3.00	5	9	13
2.50	7	**11**	**11**
2.00	9	**13**	**9**
1.50	11	15	7
1.00	13	17	5



When the demand curve shifts to the right, from D_0 to D_1, there is a shortage of 4 million kg at the original equilibrium price (point *a*). As a result, price rises until a new equilibrium point of demand and supply is reached, at point *b*. Both equilibrium price and equilibrium quantity rise from their original values.

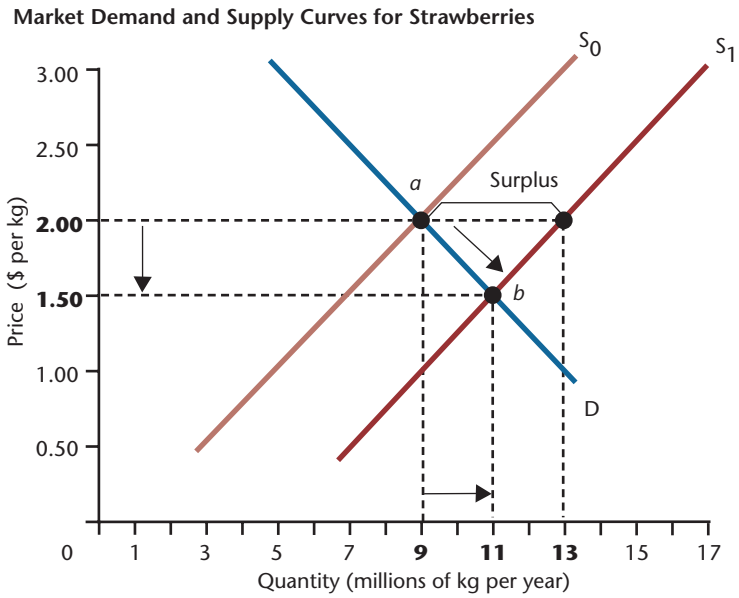
Changes in Both Demand and Supply

When both demand and supply shift simultaneously, a range of possibilities can occur. When both demand and supply move in a given direction, so too does equilibrium quantity, but the direction and extent of the change in equilibrium price depend on how large the shift in the demand curve is in relation to the shift in the supply curve. For example, Figure 2.11 shows the case where both demand and supply in the strawberry market increase—demand shifting rightward from D_0 to D_1 and the supply curve

FIGURE 2.10 Effects of Changes in Supply on Equilibrium

Market Demand and Supply Schedules for Strawberries

Price ($ per kg)	Quantity Demanded (D_0) (millions of kg)	Quantity Supplied (S_0) (S_1) (millions of kg)
$3.00	5	13 → 17
2.50	7	11 → 15
2.00	**9**	**9 → 13**
1.50	**11**	7 → **11**
1.00	13	5 → 9



When the supply curve shifts to the right, from S_0 to S_1, there is a surplus of 4 million kg at the original equilibrium price (point *a*). As a result, price falls until a new equilibrium point of demand and supply is reached at point *b*. In this case, the equilibrium values for price and quantity move in opposite directions, with price falling and quantity rising.

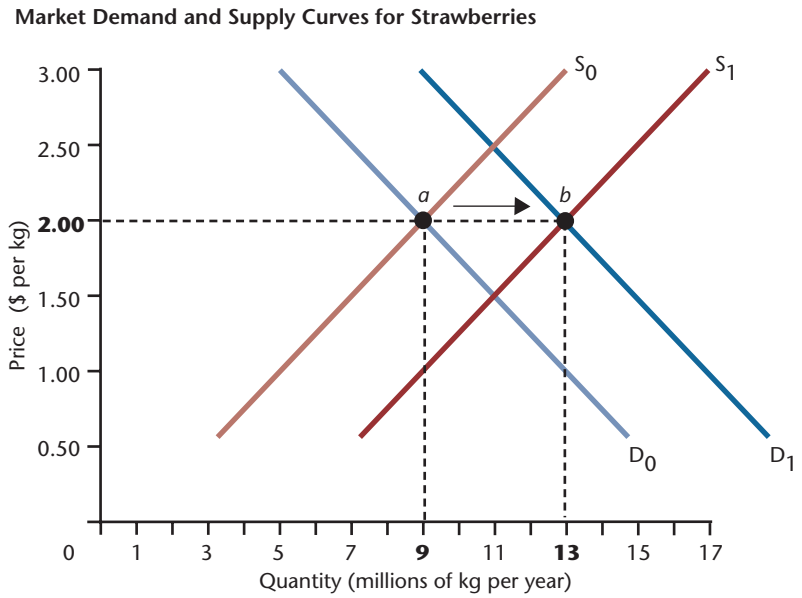
shifting right from S_0 to S_1. From the initial equilibrium price and quantity of $2 and 9 million kilograms at point *a*, the market moves without any intermediate surplus or shortage to point *b*. Quantity is pushed upwards by the movement in both demand and supply, to a new equilibrium value of 13 million kilograms. But in this case, the shifts in demand and supply curves counteract each other's influence on price, so that equilibrium price stays the same at $2. If the demand curve had shifted by less than the supply curve—to anywhere between D_0 to D_1—then equilibrium price would have fallen instead. Alternatively, if the demand curve shifted more than supply, to anywhere to the right of D_1—then equilibrium price would have risen.

Demand and supply can also move in opposite directions. Then the change in equilibrium price becomes definite, while the direction and extent of the change in equilibrium quantity depend on how large the shifts in demand and supply are in relation to one another. Figure 2.12 depicts the case where demand increases and supply decreases. When the demand curve shifts right from D_0 to D_1 and the supply curve shifts left from S_0 to S_1, equilibrium immediately moves from point *a* to *b*. The equilibrium value for price necessarily increases, but identical counteracting shifts in the demand and supply curves mean that equilibrium quantity stays constant. In contrast, if the shift in the demand curve (to anywhere between D_0 and D_1) is less than the shift in supply, then equilibrium quantity falls. Alternatively, when the demand curve shifts more than supply (to anywhere to the right of D_1), then equilibrium quantity rises.

FIGURE 2.11 Effects of Increases in Demand and Supply on Equilibrium

Market Demand and Supply Schedules for Strawberries

Price ($ per kg)	Quantity Demanded (millions of kg) (D_0)	(D_1)	Quantity Supplied (millions of kg) (S_0)	(S_1)
$3.00	5	9	13	17
2.50	7	11	11	15
2.00	**9**	**13**	**9**	**13**
1.50	11	15	7	11
1.00	13	17	5	9



When the demand curve shifts right from D_0 to D_1 and the supply curve shifts right from S_0 to S_1, equilibrium immediately moves from point *a* to *b*. The equilibrium value for quantity necessarily increases, but given the identical counteracting shifts in the demand and supply curves, equilibrium price stays constant. On the other hand, if the shift in the demand curve (to anywhere between D_0 and D_1) is less than the shift in supply, then equilibrium price falls. Alternatively, if the demand curve shifts more than supply (to anywhere to the right of D_1), then equilibrium price rises.

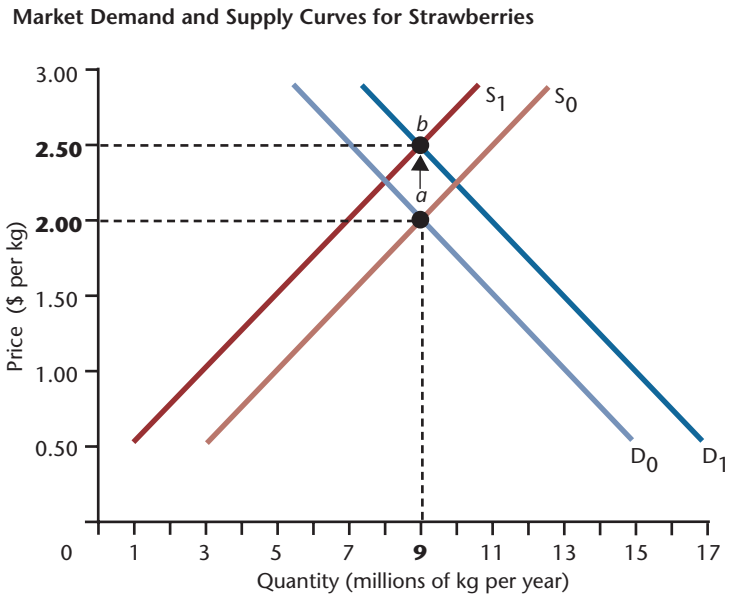
Brief REVIEW

1. In a competitive market, the appearance of either surpluses or shortages forces price and quantity towards the intersection of the demand and supply curves. This point represents market equilibrium.
2. An increase in demand—with the demand curve shifting to the right—causes the equilibrium values for both price and quantity to rise. A decrease in demand—with the demand curve shifting to the left—causes the equilibrium values for both price and quantity to fall.
3. An increase in supply—with the supply curve shifting to the right—causes the equilibrium price to decrease and the equilibrium quantity to increase. A decrease in supply—with the supply curve shifting to the left—causes the equilibrium price to increase and the equilibrium quantity to decrease.
4. Changes in both demand and supply affect both equilibrium price and equilibrium quantity. Increases in both demand and supply cause equilibrium quantity to rise, with the change in equilibrium price dependant on the relative sizes of the two shifts. An increase in demand and a decrease in supply, on the other hand, cause a rise in equilibrium price, with the change in equilibrium quantity dependant on the two shifts' relative sizes.

FIGURE 2.12 Effects of a Demand Increase and Supply Decrease on Equilibrium

Market Demand and Supply Schedules for Strawberries

Price ($ per kg)	Quantity Demanded (millions of kg) (D_0)	(D_1)	Quantity Supplied (millions of kg) (S_0)	(S_1)
$3.00	5	7	13	11
2.50	7	**9**	11	**9**
2.00	**9**	11	**9**	7
1.50	11	13	7	5
1.00	13	15	5	3



When the demand curve shifts right from D_0 to D_1 and the supply curve shifts left from S_0 to S_1, equilibrium immediately moves from point *a* to *b*. The equilibrium value for price necessarily increases, but identical counteracting shifts in the demand and supply curves mean that equilibrium quantity stays constant. In contrast, if the shift in the demand curve (to anywhere between D_0 and D_1) is less than the shift in supply, then equilibrium quantity falls. Alternatively, when the demand curve shifts more than supply (to anywhere to the right of D_1), then equilibrium quantity rises.

2.3 *Practice Questions*

1. In a particular competitive market, initial equilibrium occurs at a price of $3 and a quantity of 4 million units, until a shift in supply causes equilibrium price to rise.
   a. Which way has supply shifted? Explain.
   b. Will equilibrium quantity increase or decrease?
   c. Will the changes in equilibrium price and quantity be driven by a temporary shortage or temporary surplus?
   d. Using EconGraphKit (at http://www.mcgrawhill.ca/olc/lovewell), draw possible demand and supply curves illustrating this change in equilibrium price.
2. In the same competitive market as in question 1, initial equilibrium occurs at a price of $3 and a quantity of 4 million units. Now a shift in demand causes equilibrium price to rise.
   a. Which way has demand shifted? Explain.
   b. Will equilibrium quantity increase or decrease?
   c. Will the changes in equilibrium price and quantity be driven by a temporary shortage or temporary surplus?
   d. Using EconGraphKit (at http://www.mcgrawhill.ca/olc/lovewell), draw possible demand and supply curves illustrating this change in equilibrium price.

LAST WORD

In this chapter, we have seen how the forces of demand and supply can influence competitive markets and how these markets find an equilibrium through the interplay of buyers and sellers. But our examination of demand and supply is far from over. In the next chapter, we will use what we have learned so far to examine how it is possible to quantify responses of both buyers and sellers to changes in price and the ways in which government policies can influence private markets. Then, repeatedly throughout the rest of the book, demand and supply will reappear, making it clear that they are two of the most basic tools of economic thinking.

Key Concepts

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law of demand 33
law of supply 39
market demand 34
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normal products 36
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shortage 45
substitute products 37
supply 39
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Questions

1. During a given week, Student 1 demands 5 milkshakes at a price per milkshake of $2, 7 at $1.80, 9 at $1.60, and 11 at $1.40. Student 2 demands 4 milkshakes at a price of $2, 5 at $1.80, 6 at $1.60, and 7 at $1.40.
   a. In side-by-side diagrams, graph the demand curves D_1 and D_2 for each student, putting the price of a milkshake on both the vertical axes and the number of milkshakes demanded by one of the students on each horizontal axis. (Make sure that the scales you choose for each axis are sufficient to plot all points on the curves.)
   b. In your own words, explain why the amount of milkshakes demanded by each student rises as the price of milkshakes falls.
   c. Assuming that the two students are the only consumers in the market, construct a table showing the market demand schedule. Draw the market demand curve D_m and explain how it can be derived from the individual students' demand curves.

2. In a certain apple market, 80 000 kilograms are offered for sale each week at a price per kilogram of $2, 160 000 at $3, and 240 000 at $4.
   a. Construct a table showing the market supply schedule for apples, then graph the market supply curve for apples (S_0).
   b. In your own words, explain why the amount of apples offered for sale rises as the price of apples increases.
   c. Using both your table and graph, outline what happens if the amount of apples offered for sale each week increases by 40 000 kilograms at each possible price.

3. For each market whose product is highlighted in italics, sketch a graph (without numbers on the axes) showing the change in either demand or supply. In each case, identify the demand or supply factor causing the shift.

a. Medical researchers discover that consumption of *blueberries* reduces the risk of cancer.
b. New automated equipment is introduced in the production of *silicon chips*.
c. A significant rise in the price of video game consoles affects the market for *video games*.
d. Higher prices for grazing land have an impact on the production of *wool*.
e. A widespread expectation of higher prices by *potato* farmers affects current quantities supplied of this item.
f. An influx of new residents into a small town influences *housing* purchases.
g. A fall in average consumer incomes affects purchases of *bologna*.
h. A drop in the price of laptop computers influences the consumption of *desktop computers*.
i. Unusually cold weather in Central America harms the *coffee* harvest.
j. A rise in the price of wheat affects the production of *barley*.
k. A widespread expectation by consumers of higher future incomes affects current sales of *automobiles*.
l. A widespread expectation by consumers of lower prices for *computer games* affects current purchases of this item.
m. Widespread computer piracy using file-sharing programs affects the market for *pre-recorded DVDs*.
n. The drop in prices of MP3 players influences the market for *portable CD players*.

4. Identify whether each of the following trends causes a change in demand or a change in quantity demanded for cable TV. In each case, explain your answer.
   a. The monthly rate paid by cable TV subscribers falls.
   b The price of satellite TV increases.
   c. Because of growing Internet use, people are choosing to watch less TV.
   d. Cable TV providers choose to make more channels available to their subscribers.

5. Identify whether each of the following trends causes a change in supply or a change in quantity supplied for Pacific salmon.
   a. More sophisticated equipment makes it possible for salmon fishers to increase their catch.
   b. Rising temperatures in the Pacific Ocean radically reduce the salmon stock.
   c. The price of another commonly caught Pacific fish species increases.
   d. The price of Pacific salmon increases.

6. Identify one possible cause for each event below:
   a. The demand for electric-powered cars decreases.
   b. The quantity supplied of milk decreases.
   c. The supply of Atlantic cod increases.
   d. The quantity demanded of CDs increases.

Market Demand and Supply Schedules for Baseball Caps

Price ($ per cap)	Quantity Demanded (caps per week)	Quantity Supplied (caps per week)	Surplus (+) or Shortage (–)	Effect on Price (up or down)
$20.00	9 000	15 000	_____	_____
17.50	10 000	13 000	_____	_____
15.00	11 000	11 000	_____	_____
12.50	12 000	9 000	_____	_____
10.00	13 000	7 000	_____	_____

7. a. Copy the table above, which shows demand and supply schedules in a hypothetical competitive market for baseball caps. Fill in the appropriate numerical values for the surplus or shortage of caps in the fourth column and the effect on price in the fifth column.
   b. Identify the equilibrium quantity and price. Explain why no other price could represent the equilibrium value.
   c. Suppose the demand schedule in this market changes so that 12 000 caps are demanded at a price of $20, 13 000 are demanded at $17.50, 14 000 at $15, 15 000 at $12.50, and 16 000 at $10. Is this an increase or decrease in demand? Explain.
   d. Create a new table like the one you copied in part a to show the demand and supply schedules in this market after the change in demand. Identify the new equilibrium price and quantity. Why is the equilibrium price found in part b no longer applicable?
   e. Describe the process that causes the market to move from its initial equilibrium to its new one.

Market Demand and Supply Schedules for Inline Skates

Price ($ per pair)	Quantity Demanded (thousands of pairs per week)			Quantity Supplied (thousands of pairs per week)		
	D_0		D_1	S_0		S_1
$200	45	→	20	95	→	70
175	55	→	30	80	→	55
150	65	→	40	65	→	40
125	75	→	50	50	→	25
100	85	→	60	35	→	10

8. a. For the schedules above, draw a graph showing the initial demand and supply curves (D_0 and S_0) for inline skates. Identify the original equilibrium price and quantity.
   b. Because of heightened concerns over injuries, the demand for inline skates changes from D_0 to D_1. On the same graph used in part a, draw the new demand curve and indicate the new equilibrium price and quantity associated with D_1 and S_0. How do these equilibrium values compare with those in part a?
   c. Now, due to a rise in wages, the supply of inline skates changes from S_0 to S_1. On the same graph used in parts a and b, draw the new supply curve and indicate the new equilibrium price and quantity associated with D_1 and S_1. How do these equilibrium values compare with those found in part b?

9. How will the following events affect equilibrium price and quantity in a competitive market? In each case, sketch a graph to help explain your answer.
   a. A drop in consumer incomes influences the demand for dry-cleaning.
   b. Declining numbers of law school graduates affect the supply of legal services.
   c. An expanding proportion of elderly people in the population has an impact on the demand for chiropractors.
   d. A cost-saving technological innovation influences the supply of computer modems.

10. (Advanced Question)
    Each of the following events affects the demand or supply of the product highlighted in italics. Does the relevant curve shift right, left, or possibly in either direction?
    a. Computer prices fall and at the same time consumer incomes rise, affecting the demand for *software programs*.

b. The price of coal-mining equipment rises at the same time as the wages paid to coal-miners fall, affecting the supply of coal.
c. The price of frozen dinners drops at the same time as consumer incomes fall, affecting the demand for *instant macaroni-and-cheese dinners*.
d. Prices of building materials fall at the same time as the prices of residential housing rise, affecting the supply of *commercial buildings*.
e. A widespread expectation by farmers of a lower price for barley occurs at the same time as the price of wheat falls, affecting the supply of *barley*.

11. (Policy Discussion Question)
In an attempt to curb the use of illegal drugs, such as marijuana or cocaine, or the use of harmful legal substances, such as tobacco, governments can use two basic options: decreasing demand through public education and decreasing supply through legal restrictions or taxes.
a. With the aid of two graphs, explain how each type of policy reduces quantity in affected markets. What is the result on the price as seen by consumers for each type of policy?
b. Which of these two types of policies is likely to have more long-term success? Why?

INTERNET APPLICATION QUESTIONS

http://www.canoe.ca
http://www.statcan.ca/english/Estat/licence.htm

1. Access Canoe-Canada's Internet network (at http://canoe.ca). Using the link to "Stock Quotes," find the closing price and total volume for the stock Royal Bank (RBC) on the Toronto Stock Exchange for the two latest days of trading. What do your results suggest? Has there been a recent dominant trend—an increase or decrease—in the demand or in the supply of RBC shares in the market?

2. Access Statistics Canada's E-STAT site (at http://www.statcan.ca/english/Estat/licence.htm).
a. Using the information found in "Prices and Price Indexes," generate a table showing the percentage changes from the previous period in the farm input price index for Canada since this index was established in 1998.
b. Based on your table in part a, in which year did supply curves for Canadian agricultural goods likely shift the most? the least?

ADVANCING ECONOMIC THOUGHT

William Stanley Jevons

Source: Stock Montage

SPOILT FOR CHOICE

William Stanley Jevons and Utility Maximization

Jevons and His Influence

Demand can be related to human psychology, if you think of people making purchases to maximize their utility on the basis of their limited budgets. Remember that utility is the satisfaction each individual gains from consuming a variety of goods and services.

William Stanley Jevons (1835–1882), a 19th century English economist, is best known for applying the concept of utility to economics and developing a model of consumption. Jevons found his life turned upside down when, in his teens, his rich family went bankrupt. He was forced to break off his studies to find a job. After working for five years in Australia—during which time Jevons taught himself economics—he had earned enough to return to England and complete his formal education. He went on to become a university professor, a shy man who established his reputation primarily through his writings.

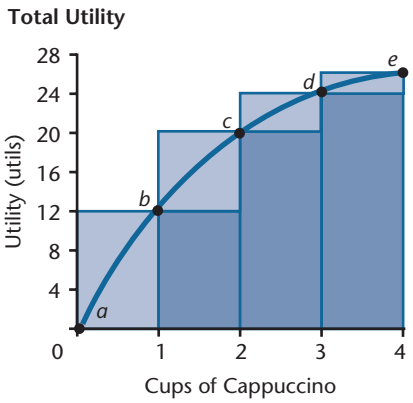
The Law of Diminishing Marginal Utility

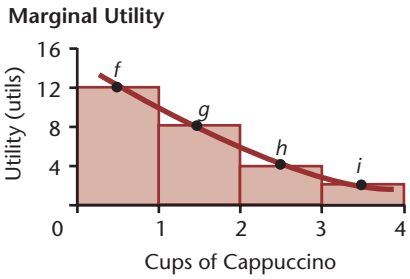
Jevons based his model of consumption on the utilitarian views of the British philosophers Jeremy Bentham and James Mill. These philosophers assumed that utility can be measured in units, which they called "utils." According to Jevons, a consumer's total utility—or overall satisfaction gained from consuming a particular product—depends on the number of units he or she purchases. Consider the example of a student drinking cups of cappuccino at a sidewalk café on a summer afternoon. As shown in Figure A, the

FIGURE A Total and Marginal Utility

Consumer's Total and Marginal Utility from Cappuccino

Quantity Consumed (cups)	Total Utility (utils)	Marginal Utility (utils)
0	0 (*a*)	
1	12 (*b*)	12 (*f*)
2	20 (*c*)	8 (*g*)
3	24 (*d*)	4 (*h*)
4	26 (*e*)	2 (*i*)





As illustrated on the top graph, as the student drinks more cups of cappuccino, his total utility continues to rise, but at a decreasing rate. Each new cup provides less added satisfaction than the one before. That each additional cup provides less marginal utility is also illustrated on the lower graph.

www.mcgrawhill.ca/olc/lovewell

student's total utility increases with every additional cup he drinks, but each new cup gives him less extra pleasure than the one before. This is illustrated on the top graph by the increases in total utility between *ab* and *bc*, and then *cd* and *de*: the shaded areas get steadily smaller. These shrinking areas are highlighted on the marginal utility graph. For each extra cup he drinks, the student's marginal—or extra—satisfaction is less.

The fall in marginal utility at higher consumption levels led Jevons to state what has become a general rule in economics. The *law of diminishing marginal utility* states that as a consumer purchases more units of a particular product in a given time period, that consumer's extra satisfaction from each additional unit falls. According to Jevons, common sense suggests that this law applies to the consumption of virtually all products. Other economists developed their own versions of the law of diminishing marginal utility, but Jevons' version has remained the most influential.

Choosing One Product over Another

One of the most important uses of the law of diminishing marginal utility is in helping to understand how much consumers choose to spend on various products. Consider again the student visiting a sidewalk café one afternoon. He arrives with $4 in his pocket and plans to spend it all on $1 cappuccinos and $2 Danish pastries. To get the most out of his $4, the student should use it in a way that gives him the greatest added satisfaction from each new dollar. In other words, he should make each purchase on the basis of which item gives him the highest marginal utility per dollar. These figures can be found by dividing the student's marginal utilities for cappuccinos and pastries by their prices.

When making his first purchase, the student can choose either 12 utils in extra satisfaction from a cappuccino or 16 utils from a pastry, as shown in columns 2 and 5 of the schedule in Figure B. His marginal utilities per dollar are shown in columns 3 and 6, and on the graphs. Because the 12 utils (= 12 ÷ $1) per dollar spent on cappuccinos exceeds the 8 utils (= 16 ÷ $2) per dollar spent on pastries, the student buys a cappuccino. For his second purchase, the student compares the 8 utils (= 8 ÷ $1) per dollar he could spend on the second cappuccino with the 8 utils per dollar he could spend on his first pastry. Since these marginal utilities per dollar are equal, he buys both items, exhausting his $4.

The Utility-Maximizing Rule

According to the utility-maximizing rule, the student keeps buying both products until the marginal utility per dollar from both cappuccinos and pastries is the same ($MU_1 \div P_1 = MU_2 \div P_2$). This economic law, which Jevons developed, applies no matter how many items are being bought. By following the rule, consumers maximize their overall satisfaction, or total utility, from a whole range of products.

Relevance for Today

Jevons' model rests on the assumption that utility is measurable in set units. While his critics suggested that this assumption is unrealistic, others argued that it is a legitimate way to simplify reality. By assuming that utility could be measured, Jevons made a verifiable conclusion concerning the relationship between two observable variables—the quantity of a product that individuals wish to consume and the price they pay—and the result is unaffected by how this satisfaction is measured. More recently, as shown in the article "Through the Ranks" available at the book's Online Learning Centre, economists have used the utility theory without assuming measurable units of satisfaction. As long as consumers can say they prefer one set of products to another (without having to state exactly how much more they prefer it), conclusions like those drawn from the law of diminishing marginal utility and the utility-maximizing rule can still be reached.

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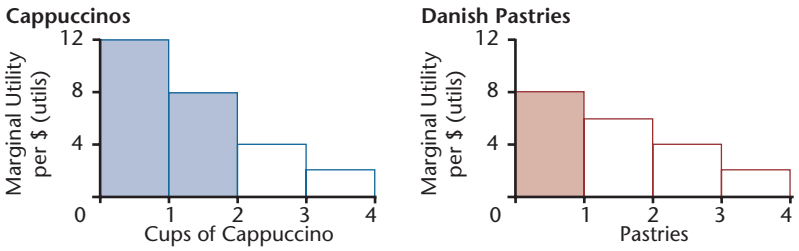
FIGURE B The Utility Maximizing Rule

Cups of Cappuccino (price = $1)			Danish Pastries (price = $2)		
(1) Quantity	(2) Marginal Utility (MU_1) (utils)	(3) Marginal Utility per $ ($MU_1/P_1=MU_1/\$1$) (utils per $)	(4) Quantity	(5) Marginal Utility (MU_2) (utils)	(6) Marginal Utility per $ ($MU_2/P_2=MU_2/\$2$) (utils per $)
0			0		
1	12	12	**1**	16	**8**
2	8	**8**	2	12	6
3	4	4	3	8	4
4	2	2	4	4	2



This student buys cappuccinos and pastries until his marginal utility per dollar (MU ÷ P) is the same for both items. Given his $4 budget, he buys 2 cappuccinos and 1 pastry (the highlighted figures in the table and shaded bars on the two graphs). With these purchases, the student's marginal utility per dollar for each product equals 8 utils. The utility-maximizing rule ($MU_1 \div P_1 = MU_2 \div P_2$) is, therefore, satisfied.

Consumer X's Utility Maximization Table

	Consumption of A (price = $2)				Consumption of B (price = $4)			
Units of A	Total Utility (utils)	Marginal Utility (utils)	Marginal Utility per $ (utils per $)		Units of B	Total Utility (utils)	Marginal Utility (utils)	Marginal Utility per $ (utils per $)
0	0				0	0		
1	11	____	____		1	10	____	____
2	20	____	____		2	18	____	____
3	27	____	____		3	24	____	____
4	32	____	____		4	28	____	____
5	35	____	____		5	30	____	____

1. a. Copy and complete the table, showing the utility Consumer X gains from products A and B.

b. Find the combination of A and B that maximizes Consumer X's utility if her total expenditure on these two products is $22. Explain your answer using the utility-maximizing rule.

c. If Consumer X's total expenditure on products A and B falls to $12 while the prices of A and B remain unchanged, what is her new utility-maximizing combination of A and B? Again, explain your answer.

2. As a guest at a party, you perceive the price of root beer provided by your host as being very close to zero. How will your consumption of root beer at the party differ from consumption of your own root beer at home? Use the utility-maximizing rule and the law of diminishing utility to explain your answer.