

Unit 3 The Market

Lesson 9 The Magic of Markets

Markets do not arise spontaneously in nature. Markets only arise atop certain legal, institutional and cultural foundations. To illustrate, for most of human history, to walk up to a large group of people who you didn't know with valuable items would have been a recipe for robbery and perhaps murder. In many parts of the world today, this is still the case. Therefore, wherever there are functioning markets, there also exist laws and cultural norms respecting property rights and contracts. With these in place, and with confidence that they will be enforced by institutions like courts of law, people can trust one another enough to engage in trade and lending. Really, the genius of a modern market economy is that it does not require that we trust other people. What we trust instead are the laws and the institutions and what gives us the confidence to trade and to invest is the knowledge that if people do not respect our property rights (ie if they try to steal from us) that the state will enforce such respect on our behalf.

This legal/institutional foundation took a long time to develop, but the benefits have been immense, because free (uncontrolled by buyers, sellers or government) markets are unequalled at allocating scarce resources efficiently between competing uses. While we can also rely on tradition or upon the government to do this job, history has shown that neither is as effective as markets can be.

So, what is it about markets that make them so effective? In a word, prices. The real function of a market is to generate accurate price information. With accurate prices, millions of individual households and firms can make decisions as to which items to buy and which to produce. These decisions will in turn further influence prices in a rather neat feedback loop. The genius of a market economy is that it does not require any omniscient authority to decide the three basic economic questions. Instead, a market economy, by letting individuals make their own decisions, generates the prices that in turn further inform individual decision making (ie it is guided by an 'invisible hand').

As an example, let's take water. Water can be used for irrigation and for drinking, among other things. Now, some places allocate water according to government decree, and the results are usually that agriculture is allocated a lot of water and that a lot of this water is wasted by inefficient irrigation systems. In a market economy, though, it would be clear that people are willing to pay more for drinking water than farmers can afford to pay for irrigation water. So, the price of water will rise, and people who really need the

water the most for drinking will get it. This higher price for water will now act as a **signal** to farmers of water's relative scarcity, which should cause them to improve their irrigation systems so they don't waste this now-valuable resource. As well, the higher price may also act as an **incentive** for water utility companies to develop more aqueducts and canals to increase the quantity of water available to both households and farms

Generally, then, if the price for a good rises, those consumers who don't really need it or who can satisfy their need with a substitute will stop buying it, leaving it for those people who really do need it. At the same time, producers will notice the increase in price and devote more of their scarce resources to producing the good. Overall, the effect is that scarce resources are directed where they are needed most, as expressed by the prices that people demonstrate they are willing to pay.

The other great thing about markets is that everyone who uses them is made happier. The reason is that a price set by a market is always less than or equal to what the purchasers of the good were willing to pay. On the other side, the market price is always greater than or

equal to the price the producers were willing to accept. For instance, consider a drinks seller at the beach. Most of the people who buy drinks from him would probably be willing to pay more than the \$2 per drink that he charges as the drink gives them more than \$2 of satisfaction. This extra satisfaction that people enjoy and would be willing to pay for over and above the market price is called **consumer surplus**. Those who are not thirsty and therefore not willing to pay \$2 simply do not buy drinks. For the drinks seller as well, the \$2 per drink is probably more than the minimum he would require to stay in business. This extra money over and above the minimum he would require to stay in business is called **producer surplus**. If he needed more than \$2, he would simply go out of business. Generally, as transactions in markets occur without coercion, almost by definition they must make both parties happy, other

wise why would they deal with one another?

Following on from this is the idea of allocative efficiency. **Allocative efficiency** occurs when resources are sent where they are most needed, as indicated by prices. If markets are allowed to operate freely, prices accurately reflect the relative scarcity of resources and desirability of goods. These accurate prices in turn permit buyers and sellers to maximize their overall satisfaction (ie the sum of producer and consumer surplus or what economists call **welfare**). If for whatever reason markets are manipulated and not allowed to operate freely (whether by government intervention or other manipulation), then some potential consumer and/or producer happiness will be lost, thus limiting total welfare and resulting in allocative inefficiency.

Exercise 9

1. Define:

a) SIGNALLING FUNCTION OF PRICES

b) INCENTIVE FUNCTION OF PRICES

c) CONSUMER SURPLUS

d) PRODUCER SURPLUS

e) ALLOCATIVE EFFICIENCY

f) WELFARE

The Role of Demand

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

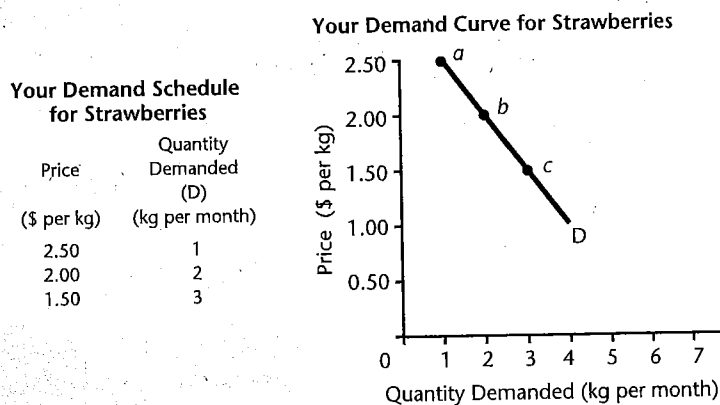
Because households are buyers in product markets, their behaviour can be analyzed using the concept of **demand**, which is the relationship between the various possible prices of a product and the quantities consumers will purchase at each price. In this relationship, price is the independent variable. **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



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).

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 Demand Curve

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 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 kilogram 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 such products as luxury perfumes and watches, is known as the "Veblen effect." It is named after a famous American economist, Thorstein Veblen (1857–1929), who criticized such purchases and coined the memorable term "conspicuous consumption" to describe them.

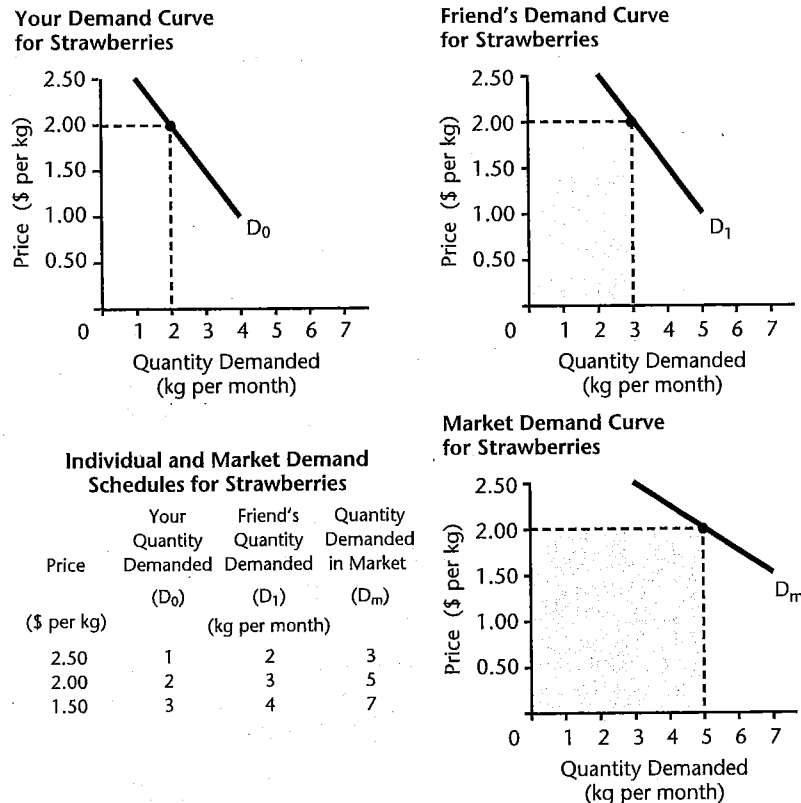
Question

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

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

Market Demand

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 at a \$2 price, your strawberry-loving friend purchases three kilograms at this same price. 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

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 kg 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 determinants:

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

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

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 determinants**. Demand determinants are factors that can cause the entire market demand curve to shift. The five main demand determinants 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 determinant, it must be assumed that all other factors remain constant.

NUMBER OF BUYERS

When the number of buyers for a certain product increases, more purchases are made. Thus, the product's quantity 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, quantity 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**.

Both cases are illustrated in Figure 2.3 using a hypothetical market for strawberries. The initial quantities demanded in the market are shown in the demand schedule under D_0 . When demand increases, quantity demanded increases at every possible price. For example, at a price of \$2, quantity 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, quantity demanded decreases at every price. For example, at a price of \$2, quantity 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. Purchases of more basic items, such as milk and shoes, also rise, but by a smaller proportion. 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

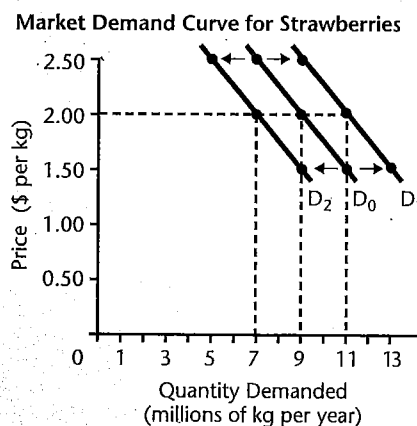
PRICES OF OTHER PRODUCTS

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. 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 butter falls, however, there will be a decrease in the demand for margarine.

Figure 2.3 Changes in Demand

Price (\$ per kg)	Quantity Demanded (D_2) (D_0) (D_1) (millions of kg)
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 quantity demanded of strawberries 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 quantity demanded at every price, shifting the demand curve to the left, from D_0 to D_2 .

complementary products: products that are consumed together

Complementary products are products that are consumed together, such as cars and gasoline, or compact discs and compact disc players. 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 compact discs leads to a rise in demand for compact disc players.

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 Doc Martens shoes, which increases their demand and shifts this product's demand curve to the right.

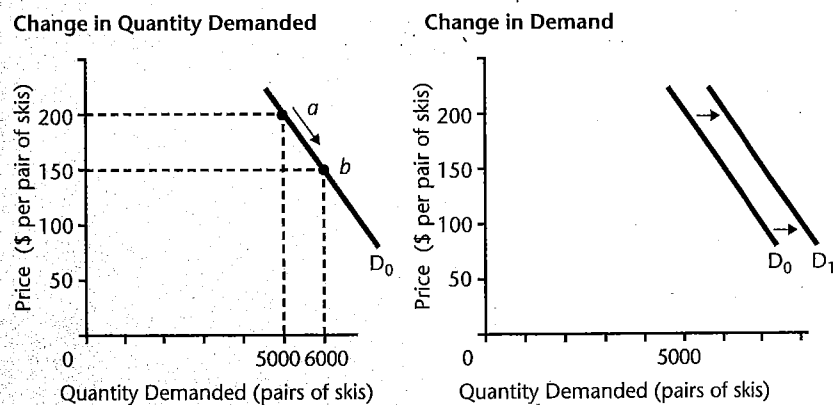
CONSUMER EXPECTATIONS

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 will increase when the price of skis decreases, as shown on

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 determinant, such as consumer incomes.

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 determinant. For example, a change in consumer preferences or in consumer incomes can cause the entire demand curve to shift. This is because the quantity demanded of the product 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 .

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 determinant: the number of buyers, their average income, the prices of other products, consumer preferences, or consumer expectations about future prices and incomes.

The Role of 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

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

What Is Supply?

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

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**.

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

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

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

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

The Supply Curve

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 drops from 13 to 9 million kilograms. The positive (upward) slope of the supply curve illustrates the direct relationship between price and quantity supplied.

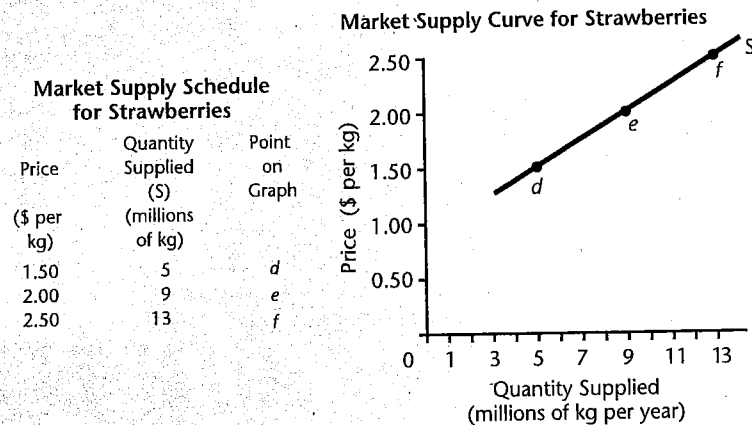
Changes in Supply

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 determinants**. The six main supply determinants 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 determinant, we must assume that all other factors remain constant.

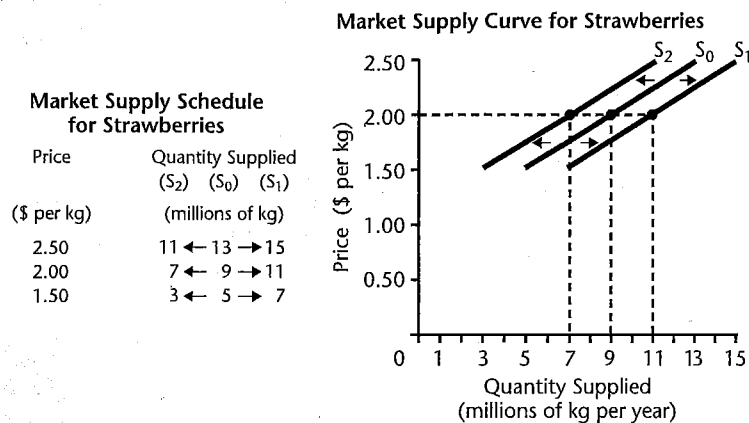
NUMBER OF PRODUCERS

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 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 at a price of \$2.

Figure 2.5 The Market Supply Schedule and Curve



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.

Figure 2.6 Changes in Supply

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 .

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, from 9 to 7 million kilograms 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

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 bookselling

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.chapters.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?

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.

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

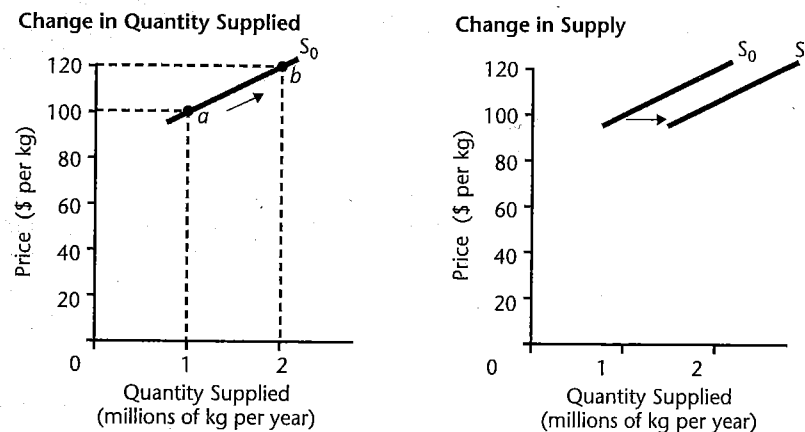
A product's supply can be influenced by changes in the prices of other products. For example, declines in the price of tobacco during the early 1990s caused some Ontario farmers to switch to ginseng, a medicinal root that is popular in east Asia. As a result, the supply for ginseng increased, resulting 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 to 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 determinant, such as a resource price or a technological innovation. Because the quantity supplied of the product is altered at every possible price for the product, change in supply shifts the *entire* supply curve. As shown on the graph on the right, a decrease in the price of tobacco increases the supply of ginseng, causing a shift in the entire supply curve to the right.

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 determinant—for example, a drop in the price of a related product, such as tobacco.

Brief Review

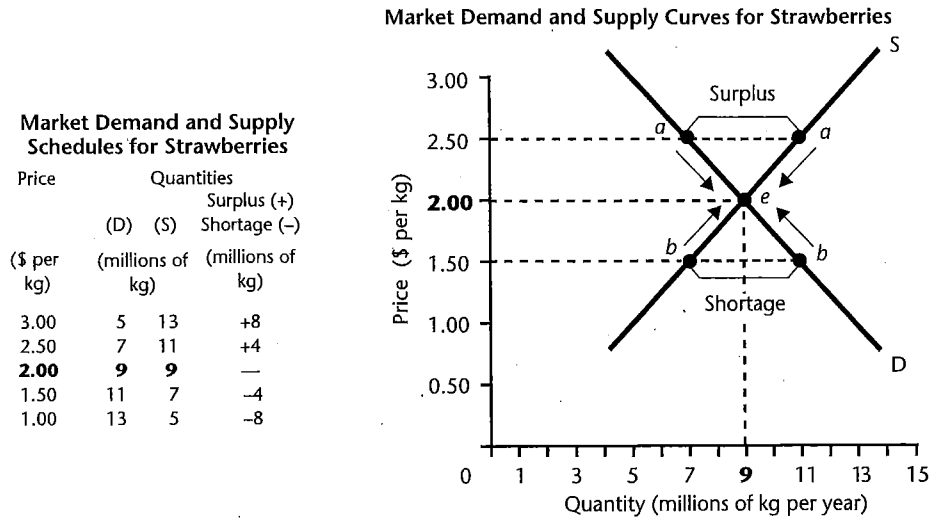
1. In product markets, supply is the relationship between the various possible prices of a consumer item and the quantities of the item that businesses are willing to put on the market.
2. The law of supply states that there is a direct relationship between the two variables of price and quantity supplied.
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 determinant and is shown as a shift of the *entire* supply curve. The six supply determinants 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.

How Competitive Markets Operate

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

Market Equilibrium

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 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 achieved, consider the example of the strawberry market that appears in Figure 2.8.

Figure 2.8 Movement of Price towards Equilibrium

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.

EFFECTS OF A SURPLUS

At a price of \$2.50 per kilogram, the quantities demanded and supplied of strawberries 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.

surplus: an excess of quantity supplied over quantity demanded

The pressures produced by a surplus in a competitive market cause the price to fall. 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. 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. 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

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 in the strawberry market are 11 and 7 million kilograms, respectively, giving a shortage of 4 million kilograms.

shortage: an excess of quantity demanded over quantity supplied

A shortage in a competitive market pushes price higher. Both consumers and producers respond to the price increase. Consumers purchase less, decreasing quantity demanded. At the same time, producers provide more for sale, raising quantity supplied. 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 determinant 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

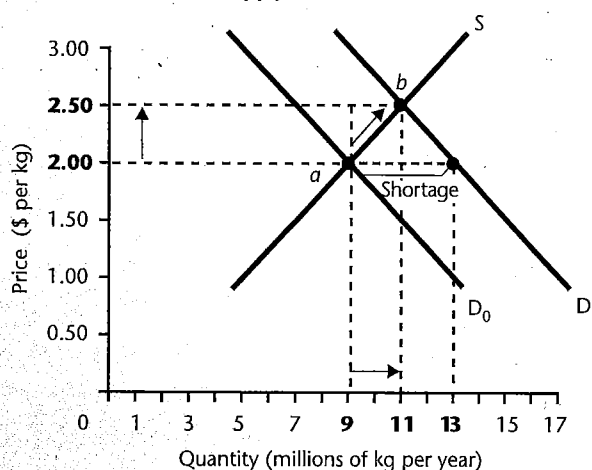
Consider the case in which the demand for strawberries increases because of a price increase for a substitute product, such as cherries. As a result, as shown in Figure 2.9, the demand curve shifts to the right, from D_0 to D_1 . From an equilibrium price of \$2 and a quantity of 9 million kilograms, quantity demanded shifts to 13 million kilograms. Quantity supplied lags behind, at 9 million kilograms, thus creating a shortage of 4 million kilograms 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.

Figure 2.9 Effects of Changes in Demand on Equilibrium

Market Demand and Supply Schedules for Strawberries

Price	Quantity Demanded	Quantity Supplied
(\$ per kg)	(D_0) (D_1)	(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

Market Demand and Supply Curves for Strawberries

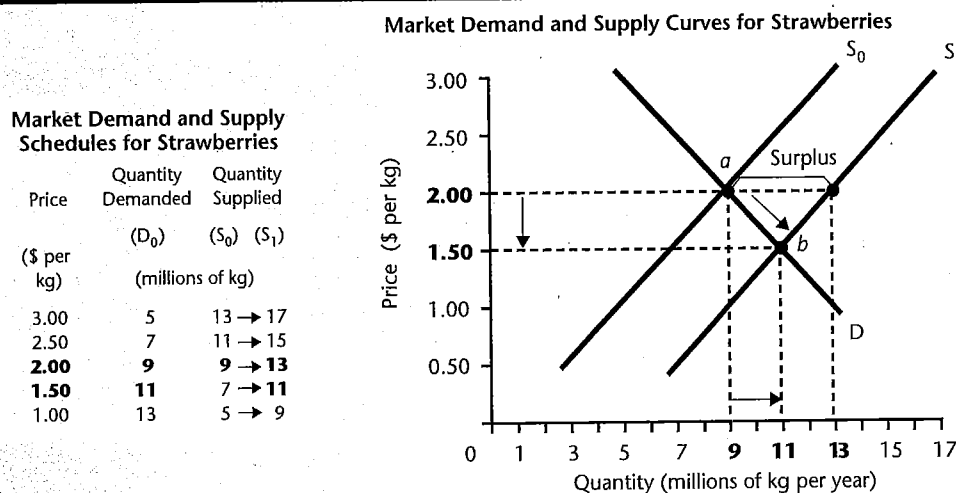


When the demand curve shifts to the right, from D_0 to D_1 , there is a shortage of 4 million kg at the original equilibrium price (point a). As a result, price rises until a new equilibrium point of demand and supply is reached, at point b. Both equilibrium price and equilibrium quantity rise from their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

Changes in 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 shifts to 13 million kilograms. Quantity demanded lags behind at 9 million kilograms, thus causing a surplus of 4 million kilograms 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.

Figure 2.10 Effects of Changes in Supply on Equilibrium



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.

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 movement upwards 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 movement downwards 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?

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.

LASTWORD

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

demand 29	decrease in demand 31	supply schedule 35
quantity demanded 29	normal products 32	supply curve 35
law of demand 29	inferior products 32	change in quantity supplied 35
demand schedule 30	substitute products 32	supply determinants 35
demand curve 30	complementary products 33	increase in supply 35
change in quantity demanded 30	supply 34	decrease in supply 35
market demand 30	quantity supplied 34	market equilibrium 38
demand determinants 31	market supply 34	surplus 39
increase in demand 31	law of supply 34	shortage 39

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.)

Demand Determinants (Change in Market Demand = Shifting Curves)

1. Number of Buyers
2. Income Level
3. Prices of other products (either Substitute or Complementary goods)
4. Consumer Preferences (a.k.a. Tastes & Preferences)
5. Consumer Expectations (e.g., future expectations of price)

Supply Determinants (Change in Market Supply = Shifting Curves)

1. Number of Producers
2. Resource Prices (a.k.a. Production Costs)
3. State of Technology
4. Changes in Nature
5. Prices of Related Products
6. Producer Expectations (e.g., future expectations of price)
7. Political Factors (e.g., government restrictions, illegal markets, conflicts, economic sanctions)

Factors that Affect Price Elasticity of Demand

1. Portion of Consumer Incomes
2. Access to Substitutes
3. Addiction, Degree of Necessity, or Habit
4. Time
5. Branding and Advertising

Factors that Affect Price Elasticity of Supply

1. The Immediate Run
2. The Short Run
3. The Long Run

UNIT 2: Microeconomics: Understanding the Canadian Market Economy

Check Your

Understanding

1. What effect will each of the following factors have on the demand for product X? Will demand increase or decrease in each case?
 - a) As a result of an imaginative advertising campaign, product X becomes more fashionable.
 - b) The people who buy product X find their incomes falling.
 - c) A new product Y is invented and is marketed as a cheaper substitute for product X.
 - d) Consumers of product X hear that its price will rise over the following month.
2. What effect will each of the following factors have on the supply of product X? Will supply increase or decrease in each case?
 - a) Makers of product X introduce a labour-saving technology in their factory.
 - b) As the result of a protracted strike, makers of product X find they have to pay higher wages to their workers.
 - c) The market price that makers receive for product X rises.
 - d) The federal government reduces business taxes.
 - e) Several makers of product X go bankrupt, leaving fewer companies to manufacture this product.
3. Which of the four possibilities—a change in quantity demanded, a change in quantity supplied, a shift in demand, or a shift in supply—do each of the following market situations illustrate?
 - a) The price of DVDs falls, and consumers buy more of them.
 - b) New techniques in steel manufacturing lower the costs of producing steel.
 - c) A recession lowers the disposable incomes of North American consumers, affecting consumption of high-end consumer goods.
 - d) Gold mining companies try to extract more gold from their mines as world gold prices rise.

Check Your**Understanding**

1. Does the equilibrium price for a particular product rise or fall with each of the following changes? Draw small freehand graphs to illustrate your answers.
 - a) Demand increases and supply stays the same.
 - b) Supply decreases and demand stays the same.
 - c) Supply increases and demand stays the same.
 - d) Demand decreases and supply stays the same.
 - e) Demand increases and supply decreases.
 - f) Demand decreases and supply increases.
2. Consider each of the following scenarios in the North American gasoline and oil market. Draw freehand demand and supply graphs to determine the changes in quantities demanded and supplied, and in market prices, in response to these scenarios.
 - a) The North American economy is prosperous, and automobile sales, particularly those of fuel-inefficient SUVs and vans, rise.
 - b) After 11 September 2001, the North American economy slips into a recession, and automobile sales plummet.
 - c) War in the Middle East results in a sharp fall in oil exports to North America.
 - d) Automobile manufacturers develop new engines that significantly improve the fuel efficiency of all models.

Changes in Demand and Changes in Supply Questions

For each market highlighted in italics, sketch a graph showing the change in either demand or supply. Be sure to identify the MOA and the NPF at play in each scenario. Explain your answers.

- a. Medical researchers discover that consumption of *blueberries* reduces the risk of cancer.
- b. Cutting-edge automated technology is introduced in the production of *silicon chips*.
- c. A significant rise in the price of smartphones affects the market for *music downloads*.
- d. Higher prices for grazing land have an impact on the production of *wool*.
- e. An influx of new residents into a small town influences *housing* purchases.
- f. A fall in average consumer incomes affects purchases of *vintage wine*.
- g. A drop in the price of large screen smartphones influences the consumption of *notebook computers*.
- h. Unusually cold weather in Central America harms the *coffee* harvest.
- i. A rise in the price of tobacco affects the production of *ginseng*.
- j. A widespread expectation of higher future incomes affects sales of *autos*.

Shifts of or Movements Along Demand or Supply Questions

Identify one possible cause for each change in the market. Be sure to identify the MOA and the NPF at play in each scenario. Explain your answers.

- a. The demand for *hybrid autos* decreases.
- b. The quantity supplied of *e-cigarettes* decreases.
- c. The supply of cold-water *Northern shrimp* increases.
- d. The quantity demanded of *iWatches* increases.

Price Elasticity of Demand

price elasticity of demand: the responsiveness of a product's quantity demanded to a change in its price

How can we refine our analysis of the role of demand and its impact in particular markets? One of the most important ways is by studying further the relationship between changes in price and quantity demanded. For example, from Chapter 2 we know that if the price of a video game falls, then the number of games purchased rises. But by how much? If price is reduced by half, will quantity demanded double or triple, or will it rise by a smaller proportion, such as 10 percent or 20 percent? To answer these questions, we need to understand the **price elasticity of demand**. Price elasticity of demand is the extent to which consumers (and the quantity they demand) respond to a change in price.

Elastic and Inelastic Demand

elastic demand: demand for which a percentage change in a product's price causes a larger percentage change in quantity demanded

inelastic demand: demand for which a percentage change in a product's price causes a smaller percentage change in quantity demanded

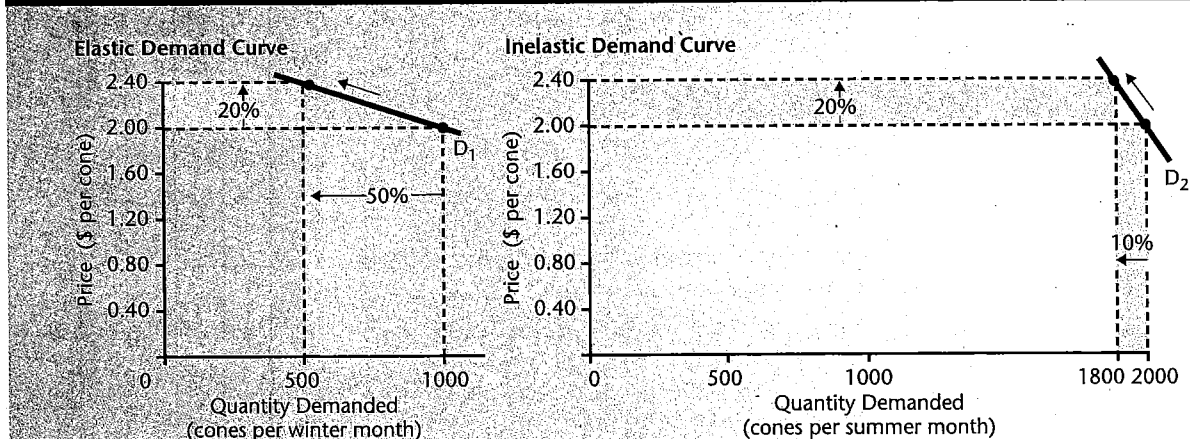
Consumers can be very responsive or very unresponsive to price changes. Consider Figure 3.1, which shows the demand curves for a sidewalk vendor selling ice-cream cones in two seasons. During the winter, the vendor raises her price by 20 percent, from \$2 to \$2.40. The result is that monthly quantity demanded decreases by 50 percent, from 1000 to 500 cones. If a given percentage change in price causes a *larger* percentage change in a product's quantity demanded, the product has **elastic demand**. Thus, the vendor faces elastic demand in the winter, as shown on the graph on the left. When the vendor increases her price in the summer by 20 percent, from \$2 to \$2.40, monthly quantity demanded decreases only from 2000 to 1800 cones, or by 10 percent. If a given percentage change in price causes a *smaller* percentage change in quantity demanded, the product has **inelastic demand**. An inelastic demand for ice-cream cones is shown on the graph on the right.

perfectly elastic demand: demand for which a product's price remains constant regardless of quantity demanded

Perfectly Elastic and Perfectly Inelastic Demand

There are two extreme cases of demand elasticity. When a product has **perfectly elastic demand**, its price remains constant whatever quantities are demanded. Because price never varies, the demand curve is horizontal, as shown in Figure 3.2,

Figure 3.1 Elastic and Inelastic Demand Curves



For the elastic demand curve (D_1) shown on the left graph, a 20 percent increase in price leads to a greater 50 percent decrease in quantity demanded. The graph on the right shows an inelastic demand curve (D_2). The same 20 percent increase in price now leads to a smaller 10 percent decrease in quantity demanded.

perfectly inelastic demand: demand for which a product's quantity demanded remains constant regardless of price

on the left. Consider the example of an individual producer, a soybean farmer, who is a *price-taker*. This means that the farmer has no influence over the market price of soybeans, since the farmer's operations are too insignificant to affect the market. This farmer would face demand as illustrated by the demand curve D_3 . Because the same price of \$100 per tonne of soybeans applies at all possible amounts demanded, the farmer faces a perfectly elastic demand curve. In contrast, when a product has **perfectly inelastic demand**, its quantity demanded is completely unaffected by price. This situation creates a vertical demand curve, as shown in Figure 3.2, on the right. An example is the demand for insulin: since this product is essential to people who have diabetes, they are willing to pay any price for a certain quantity of insulin. This means that the market demand curve for insulin (D_4) is vertical at a given quantity demanded, such as 1000 L.

Price Elasticity of Demand and Total Revenue

total revenue: the total income earned from a product, calculated by multiplying the product's price by its quantity demanded

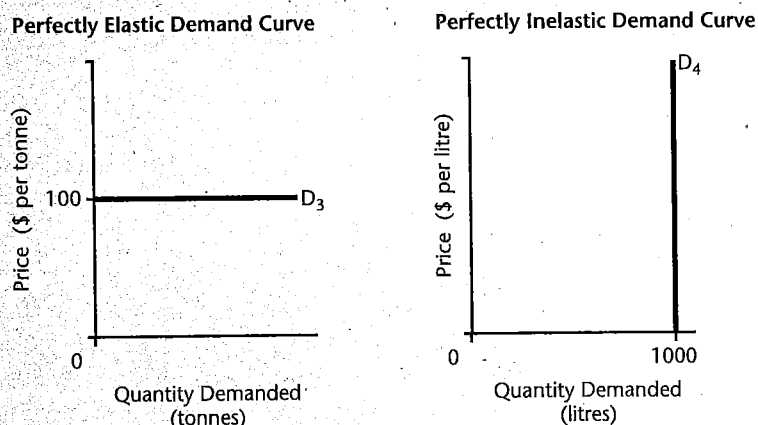
Demand elasticity plays a role in determining what effect a price change has on **total revenue** (TR). Total revenue is defined, either for an individual business or for all businesses producing the same product, as the price of a product multiplied by its quantity demanded:

$$TR = P \times Q_d$$

For example, if the price of a certain product is \$4 and 1000 units are purchased, then the total revenue generated is \$4000 ($\4×1000).

Consider how a rise in a product's price affects the total revenue of businesses selling the product. The higher price, by itself, increases the revenue pocketed by the sellers, but the accompanying decrease in quantity demanded has the opposite effect. It is the price elasticity of demand that determines which of these two effects—the increase in price or the decrease in quantity demanded—has the greater influence on the sellers' total revenue.

Figure 3.2 Perfectly Elastic and Perfectly Inelastic Demand



A single soybean farmer might face a perfectly elastic demand curve, as shown on the left graph, with a constant price. In contrast, a producer of insulin might face a vertical or perfectly inelastic demand curve, as shown on the right graph, with the quantity demanded constant.

THINKING ABOUT ECONOMICS

Is the slope of the demand curve related to the price elasticity of demand?

There is no automatic connection between the slope of the demand curve and a product's price elasticity of demand. This is because the slope of the demand curve reflects the change in price divided by the change in quantity demanded, while elasticity is expressed in terms of *percentage* changes in price and quantity demanded. There is a loose connection between the two concepts, however, as shown in

Figure 3.1. When two demand curves—one fairly flat and one more steep—are drawn on the same set of axes, the flatter curve (D_1) is more elastic than the steeper curve (D_2) over a given price range. This is because the flatter curve (D_1) is associated with a greater adjustment in quantity demanded and hence a more elastic demand.

Question

Is there an automatic connection between the slope of the demand curve and the price elasticity of demand in the case of perfectly elastic and perfectly inelastic demand curves?

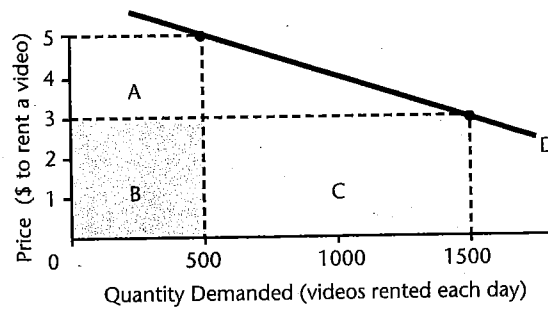
ELASTIC DEMAND

If demand for a product is elastic, price changes cause large variations in quantity demanded. Since a price increase of a certain percentage causes an even bigger percentage decrease in quantity demanded, the sellers' total revenue is reduced. Likewise, a price decrease of a certain percentage causes an even bigger percentage increase in quantity demanded, thus raising total revenue for the sellers. So, when demand is elastic, total revenue and the change in price have an inverse relationship—total revenue shifts in the opposite direction to the change in price.

Let us take a look at an example. All-U-Want Videos faces an elastic demand for video rentals, as shown in Figure 3.3. At a price of \$5 per video, 500 videos are rented each day. The store's total revenue at this point on the demand curve is \$2500 ($\5×500 videos). This total revenue is represented by the area of the shaded rectangle AB. At a price of \$3 per video, 1500 videos are rented each day, pushing up total revenue to \$4500 ($\3×1500 videos), which is represented by the shaded area BC. Therefore, a decrease in price raises the store's total revenue because the effect of the price decrease is outweighed by the effect of the increased quantity demanded.

INELASTIC DEMAND

When the demand for a product is inelastic, changes in price have little effect on quantity demanded. Since an increase in price leads to a smaller percentage decrease in quantity demanded, the sellers' total revenue increases. Similarly, a decrease in price causes a smaller percentage increase in quantity demanded, thus causing total revenue to fall. Therefore, when demand is inelastic, price and total revenue have a direct relationship—total revenue shifts in the same direction as the change in price. Take, for example, a ride at an amusement park that has inelastic demand, as shown in Figure 3.4.

Figure 3.3 Revenue Changes with Elastic Demand

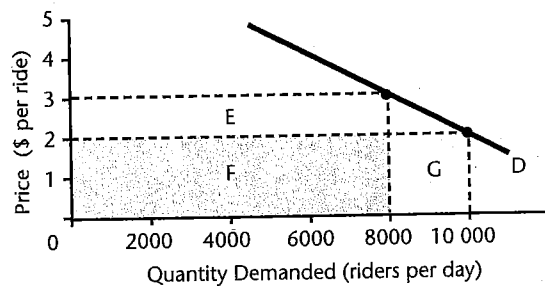
With elastic demand, a 40 percent decrease in the rental price from \$5 to \$3 causes a larger 200 percent increase in daily rentals. Total revenue for the business increases from the area AB to the area BC. Thus, the changes in price and total revenue are in opposite directions.

With a price of \$2, there are 10 000 riders a day. Total revenue for the ride's operator, therefore, is \$20 000, as shown by the shaded area FG. If price increases to \$3, there are 8000 riders a day and a total revenue of \$24 000, as shown by the shaded area EF. Therefore, an increase in price adds to the total revenue because the price increase more than compensates for the reduced quantity demanded.

UNIT-ELASTIC DEMAND

unit-elastic demand: demand for which a percentage change in price causes an equal change in quantity demanded

In the case of **unit-elastic demand**, a percentage change in price causes an *equal* percentage change in quantity demanded. Thus, when demand is unit-elastic, a price change leaves total revenue unchanged. This is because the revenue gain caused by a price increase is precisely offset by the lost revenue due to the decrease in quantity demanded. The effect of a price change on total revenue in this case is summarized, along with all other possible cases, in Figure 3.5.

Figure 3.4 Revenue Changes with Inelastic Demand

Because demand is inelastic, a 50 percent rise in the price of the ride causes a smaller 20 percent drop in daily ridership. As a result, total revenue for the ride's operator grows from area FG to area EF. The changes in price and total revenue are, therefore, in the same direction.

Figure 3.5 Demand Elasticity and Changes in Total Revenue

	Price Change	Change in Total Revenue
Elastic Demand	up	down
	down	up
Inelastic Demand	up	up
	down	down
Unit-Elastic Demand	up	unchanged
	down	unchanged

Factors That Affect Price Elasticity of Demand

Four factors affect a product's price elasticity of demand: the portion of consumer incomes devoted to buying the product, consumer access to substitutes, whether the product is a necessity or a luxury, and the time consumers have to adjust to price changes.

PORTION OF CONSUMER INCOMES

If the price of a product represents a hefty portion of consumer incomes, consumers will be more responsive to price changes. For those consumers who are deciding whether or not to buy a stereo, for example, a price change can determine whether or not they make the purchase. If stereo prices are cut in half, quantity demanded will rise by a considerably higher percentage. In contrast, consumers who are deciding how much sugar to buy pay little attention to price; a 50 percent drop in the price will cause a much smaller percentage increase in the amount of sugar purchased. The demand for big purchases, therefore, tends to be more elastic than the demand for smaller purchases.

ACCESS TO SUBSTITUTES

If there are many close substitutes for a product, consumers will be more responsive to changes in the product's price because they have more options and can easily change their buying patterns. The demand for a particular brand of athletic shoes, for example, will be more elastic than the demand for athletic shoes in general. If only one brand becomes more expensive, its quantity demanded will plummet as consumers substitute cheaper brands. A rise in the price of all athletic shoes, however, will not radically affect quantities purchased. As this example illustrates, the more narrowly a product is defined, the more elastic its demand will be.

NECESSITIES VERSUS LUXURIES

Recall that necessities are essential items—such as bread and milk—that satisfy basic needs rather than wants. Consumers tend to buy similar amounts of necessities, regardless of their price; thus, necessities tend to have inelastic demand. In contrast, such products as tourist travel, expensive sports cars, and yachts are luxuries that buyers can easily live without. Because these items are expendable, their demand tends to be elastic.

TIME

Demand tends to become elastic over time. In the short run, consumers do not generally respond greatly to price. For example, immediately after a price increase, consumers of nachos will not modify their buying habits significantly, and users of furnace oil will

continue to purchase furnace oil, regardless of price. Over time, however, consumers change their habits and needs: nacho-eaters might reduce their consumption, and home-owners might change their furnaces so as to use less fuel.

Calculating Price Elasticity of Demand

It is possible to quantify elasticity—that is, give it a numerical value. The larger this numerical value (e_d), the greater the price sensitivity—or price elasticity—of the product's demand. If e_d is greater than 1, then quantity demanded is sensitive to price changes, and demand is elastic. If e_d is less than 1, the quantity demanded is unresponsive to price changes, and demand is inelastic. If e_d is 1, then the product is unit-elastic.

Recall the case of All-U-Want Videos (Figure 3.3), which rents out 500 videos a day at a price of \$5 each and 1500 videos when the price drops to \$3. All-U-Want Videos can use the following formula to calculate the price elasticity of demand. In the formula, Q_d stands for quantity demanded, and Δ stands for change. (The symbol Δ is the Greek capital letter “delta,” which signifies a change in some variable.)

$$\begin{aligned} e_d &= \frac{\Delta Q_d \div \text{average } Q_d}{\Delta \text{ price} \div \text{average price}} \\ &= \frac{(1500 - 500) \div [(1500 + 500) \div 2]}{(\$3 - \$5) \div [(\$3 + \$5) \div 2]} \\ &= \frac{1000 \div 1000}{-\$2 \div \$4} \\ &= \frac{1}{-1/2} \\ &= (-)2 \end{aligned}$$

In the numerator and denominator of this formula, the changes in quantity demanded and price, respectively, are divided by each variable's average value. The average quantity demanded is found by adding together the new and old quantities demanded and then dividing by 2. The same method is used to derive the average price, which is the sum of the new and the old prices divided by 2. Therefore, in the example of All-U-Want Videos, e_d is 2, which means that a certain percentage change in price (calculated using average price) causes twice that percentage change in quantity demanded (calculated using average quantity demanded). Note that the answer is a pure number with no units attached. Its negative sign is also ignored, so the number is always considered to be positive.

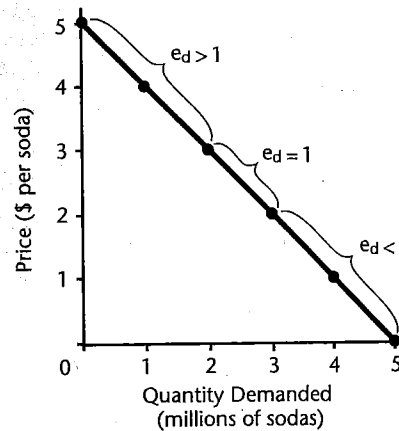
Elasticity and Linear Demand Curves

It is possible to calculate the price elasticity for various ranges along a linear demand curve. A linear demand curve's slope is constant, given the definition of slope as the change in price over change in quantity demanded—the “rise” over the “run.” We can see this in Figure 3.6, which shows a hypothetical market demand curve for cream sodas. Anywhere along this curve, quantity demanded rises by 1 million sodas for each \$1 drop in price, giving a slope of -1 millionth. But the curve's elasticity coefficient, which is the ratio of the relative changes in quantity demanded and price, varies as we move along the curve. Between prices \$5 and \$4, the coefficient has a value of $(-)9$. Then, for each new lower pair of prices, the coefficient drops—to 2.33 (between \$4 and \$3), 1 (between \$3 and \$2), 0.43 (between \$2 and \$1), and finally 0.11 (between \$1 and \$0).

Figure 3.6 Elasticity and a Linear Demand Curve

Price (\$ per soda)	Quantity Demanded (millions of sodas)	Price Elasticity of Demand (e_d)
5	0	9.00
4	1	2.33
3	2	1.00
2	3	0.43
1	4	0.11
0	5	

Market Demand for Cream Sodas



The slope of this linear demand curve is always -1 millionth. But at any price range above \$3, this linear demand curve is elastic, with a price elasticity (e_d) greater than 1. Between prices \$3 and \$2, the curve is unit-elastic, given an e_d equal to 1. Finally, at any price range below \$2, the curve is inelastic, and e_d is less than 1.

The reason for the varying values of price elasticity is that at high prices (such as \$5 and \$4), the \$1 price change is made smaller when dividing by average price (\$4.50). At the same time, the change in quantity demanded (1 million sodas) is made larger when compared with average quantity demanded (500 000). The result is an elasticity coefficient greater than 1, with the curve being elastic in its upper range. But further down the demand curve, the relationship between price and quantity is reversed. At low values of price (such as \$1 and \$0), the same \$1 price change is made larger when compared with average price (\$0.50), while the high values for quantity demanded (4 million and 5 million sodas) mean the change in quantity demanded of 1 million sodas is made smaller relative to the average quantity (4.5 million sodas). The elasticity coefficient is, therefore, less than 1, and the curve is inelastic in its lower range. Finally, in the curve's middle range, the relative changes in price and quantity demanded just balance one another so that the curve in this range is unit-elastic.

The implication of this illustration is clear: it is best to be careful when referring to a linear demand curve as either elastic or inelastic.

Income and Cross-Price Elasticities

The price elasticity of demand is not the only elasticity concept relating to demand. One can also measure the extent to which a product's quantity demanded varies with changes in consumer income or the price of another product.

Income elasticity (e_i) is defined as the responsiveness of a product's quantity demanded to an adjustment in consumer income and is calculated as the ratio of the changes in quantity demanded and consumer income, with each change divided by its respective average value. The formula for income elasticity is, therefore, similar to the mathematical expression for the price elasticity of demand. It is the ratio of the change in quantity demanded (ΔQ_d) divided by its average value, over the change in consumer income (ΔI) divided by its average value.

$$e_i = \frac{\Delta Q_d \div \text{average } Q_d}{\Delta I \div \text{average } I}$$

income elasticity: the responsiveness of a product's quantity demanded to a change in average consumer income

Unlike the case of the price elasticity of demand, the income elasticity's sign is important. For an inferior product, this elasticity is negative because changes in consumer incomes and quantity demanded are in opposite directions. To illustrate, lower consumer incomes increase purchases of canned meat, giving a negative denominator and positive numerator in the formula. In contrast, income elasticity is positive for a normal product because changes in consumer income and the product's quantity demanded are in the same direction. For example, higher consumer incomes mean more purchases of normal products, such as television sets, giving both a positive numerator and a positive denominator. While the income elasticity of normal products that are necessities, such as milk and bread, is positive but relatively low (between 0 and 1), for luxuries, such as caviar or expensive jewellery, the income elasticity is high (greater than 1).

cross-price elasticity:
the responsiveness of a product's quantity demanded to a change in the price of another product

Another demand-related elasticity is **cross-price elasticity** (e_{xy}), defined as the responsiveness of quantity demanded of one product (x) to a change in price of another (y). In mathematical terms, the formula for cross-price elasticity is the ratio of the changes in quantity demanded of product x (ΔQ_d) and the price of product y (ΔP_y) with each change divided by the respective average value.

$$e_{xy} = \frac{\Delta Q_d \div \text{average } Q_d}{\Delta P_y \div \text{average } P_y}$$

The cross-price elasticity's sign differs, depending on whether products x and y are substitutes or complementary. When one product is a substitute for the other, the cross-price elasticity is positive. This is because the changes in both x's quantity demanded and y's price are in the same direction—as in the case of a fall in the quantity demanded of cassette tapes caused by a drop in the price of CDs. On the other hand, the cross-price elasticity for complementary products is negative. An increase in the quantity demanded of videotapes, for example, might be caused by a fall in the price of video cassette recorders.

Brief Review

1. Price elasticity of demand is the responsiveness of a product's quantity demanded to changes in the product's price. When demand is elastic, a given percentage change in price causes a larger percentage change in quantity demanded. When demand is inelastic, a given percentage change in price causes a smaller percentage change in quantity demanded.
2. Demand is perfectly elastic when the price of a product is constant at all quantities demanded. Demand is perfectly inelastic when the quantity demanded of a product is constant at all prices. Demand is unit-elastic when a percentage change in price causes an equal percentage change in quantity demanded.
3. Price and total revenue have an inverse relationship when demand is elastic but a direct relationship when demand is inelastic. When demand is unit-elastic, total revenue is constant, regardless of price.
4. Four factors affect the price elasticity of demand of a product: the portion of consumer incomes the product accounts for, access to substitute products, whether the product is a luxury or a necessity, and the amount of time that elapses after a price change.
5. Other demand-related elasticity concepts include income elasticity, which measures the sensitivity of a product's quantity demanded to a change in consumer income, and cross-price elasticity, which measures the sensitivity of a product's quantity demanded to a change in another product's price.

Price Elasticity of Supply

price elasticity of supply:

the responsiveness of a product's quantity supplied to a change in price

elastic supply: supply for which a percentage change in a product's price causes a larger percentage change in quantity supplied

inelastic supply: supply for which the percentage change in a product's price causes a smaller percentage change in quantity supplied

Just as the price elasticity of demand measures the responsiveness of consumers to a change in a product's price, the **price elasticity of supply** (also called supply elasticity) measures the responsiveness of producers (and the quantities they supply) to changes in the product's own price.

Elastic and Inelastic Supply

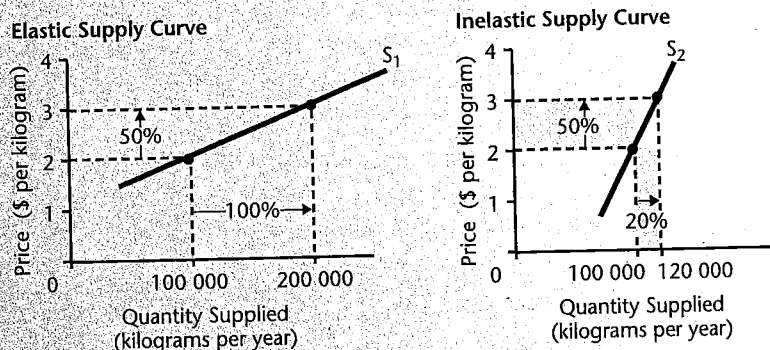
In the case of **elastic supply**, a certain percentage change in the product's price leads to a larger percentage change in its quantity supplied. In other words, the quantity that producers are willing to offer for sale is very responsive to price changes. Consider the example of a tomato producer, as in Figure 3.7. As shown on the graph on the left, if the price of tomatoes increases by 50 percent, from \$2 to \$3 per kilogram, the quantity of tomatoes supplied annually increases from 100 000 to 200 000 kg—a 100 percent increase. If, as shown on the graph on the right, the identical 50 percent price increase for tomatoes causes a much smaller 20 percent increase in quantity supplied—from 100 000 to 120 000 kg—then we have **inelastic supply**. In other words, if a product has inelastic supply, a given percentage change in price results in a smaller percentage change in quantity supplied.

As in the case of the price elasticity of demand, the price elasticity of supply is not the same as the slope of the supply curve. However, when two supply curves are drawn on the same set of axes, as in Figure 3.6, then—over a certain price range—the flatter curve (S_1) is more likely to be elastic than the steeper curve (S_2).

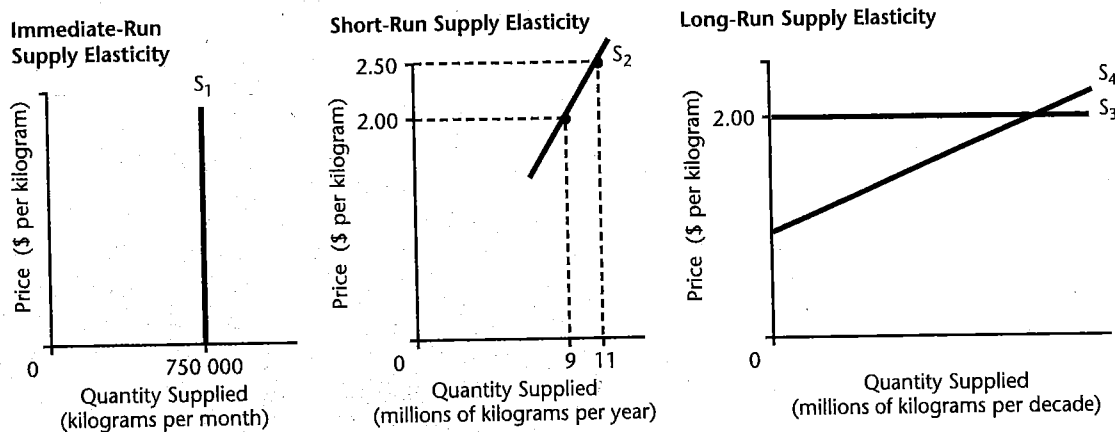
Factors That Affect Price Elasticity of Supply

The main factor that affects the price elasticity of supply is the passage of time. In competitive markets, three production periods can be distinguished: the immediate run, the short run, and the long run. The price elasticity of supply differs in each period. In Figure 3.8, we illustrate elasticity for each of the three production periods in the market for strawberries.

Figure 3.7 Elastic and Inelastic Supply



An elastic supply curve (S_1) is shown on the left. A 50 percent increase in price leads to a greater 100 percent increase in quantity supplied. The graph on the right shows an inelastic demand curve (S_2). The same 50 percent increase in price now leads to a smaller 20 percent increase in quantity supplied.

Figure 3.8 Time and Price Elasticity of Supply

The immediate-run supply curve S_1 is perfectly inelastic, since a price change does not affect quantity supplied. The short-run supply curve S_2 is either elastic or inelastic, with quantity supplied varying in the same direction as price. The long-run supply curve S_3 shows the case of a constant-cost industry, where supply is perfectly elastic, since price is constant for every possible quantity supplied. The long-run supply curve S_4 shows the case of an increasing-cost industry, where price rises as quantity supplied rises.

THE IMMEDIATE RUN

immediate run: the production period during which none of the resources required to make a product can be varied

perfectly inelastic supply: supply for which a product's quantity supplied remains constant regardless of price

short run: the production period during which at least one of the resources required to make a product cannot be varied

The **immediate run** is the period during which businesses in a certain industry can make no changes in the quantities of resources they use. In the case of strawberry farming, the immediate run may be a month. For example, if the price of strawberries suddenly jumps as a result of an increase in demand, then, during the immediate run, farmers are unable to increase their production. Because quantity supplied is constant, the supply curve (S_1), shown on the left, is vertical at a quantity, such as 750 000 kg. Thus, for the immediate run, the supply is said to be **perfectly inelastic**.

THE SHORT RUN

The **short run** is the period during which the quantity of at least one of the resources used by businesses in an industry cannot be varied. In the case of strawberry farming, the short run is less than a year. If there is a rise in the price of strawberries from \$2 to \$2.50, then during the short run, farmers can increase their production by, for example, using more labour and maximizing the crop with mulch or fertilizers, but they cannot bring more land into production until the next growing season. In this case, illustrated on the middle graph, the price rise causes an increase in quantity supplied from 9 to 11 million kilograms. The supply curve (S_2) for the short run may be either elastic or inelastic. This depends on whether a given percentage change in price causes a bigger or smaller percentage variation in quantity supplied.

THE LONG RUN

long run: the production period during which all resources required to make a product can be varied, and businesses may either enter or leave the industry

In the **long run**, the quantities of all resources used in an industry can be varied. Also, businesses may enter or leave the industry. In the case of strawberry farming, the long run is a period longer than a single growing season—perhaps as long as a decade. Over this period, a rise in the price of strawberries will cause a temporary increase in strawberry farmers' profits beyond what they have been in the past. The lure of these greater

constant-cost industry:

an industry that is not a major user of any single resource

perfectly elastic

supply: supply for which a product's price remains constant, regardless of quantity supplied

increasing-cost

industry: an industry that is a major user of at least one resource

profits leads to more resources being devoted to strawberry production. Not only will existing farmers expand their operations, but new farmers will enter the market. Both these changes increase the quantity supplied of strawberries. Two results are then possible, depending on what happens to price in the long run at the new, higher production levels.

If strawberry farming is a **constant-cost industry**, the increase in quantity supplied following a short-run rise in the price of strawberries has no effect on resource prices, since strawberry farmers are not major users of any single resource. The lure of extra profits keeps production expanding, and the price of strawberries falling, until this price is finally driven back to its original level. Thus, the price of strawberries always returns to the same level in the long run, regardless of quantity supplied. This means that a constant-cost industry, as shown on the right in Figure 3.8, exhibits a horizontal long-run supply curve (S_3). For the long run, then, supply is said to be **perfectly elastic**.

If strawberry farming is an **increasing-cost industry**, a greater quantity supplied leads to an increase in the price of a single resource, such as land or farm machinery. This increase results because the industry is a major user of this resource. Again, a short-run rise in the price of strawberries causes production to grow as farmers take advantage of extra profits. As long as the lure of profits remains, price is driven down in the long run to its lowest possible level, but price is now above its initial level, since farmers face higher per-unit costs. Hence, the long-run supply curve (S_4) has a positive (upward) slope but is very elastic, showing how quantities supplied are highly sensitive to price changes.

Calculating the Price Elasticity of Supply

The numerical value of the price elasticity of supply (e_s) is calculated in a similar way to the price elasticity of demand. When e_s has a value greater than 1, quantity supplied is sensitive to price changes, and supply is elastic. If e_s is less than 1, quantity supplied is unresponsive to price changes, and supply is inelastic.

Consider the case of the tomato industry with an elastic supply curve (Figure 3.7). When the price of tomatoes rises from \$2 to \$3 a kilogram, the quantity supplied by farmers increases from 100 000 to 200 000 kg. The value of the price elasticity of supply for this industry can be found using the following formula, in which Q_s stands for quantity supplied.

$$\begin{aligned}
 e_s &= \frac{\Delta Q_s \div \text{average } Q_s}{\Delta \text{ price} \div \text{average price}} \\
 &= \frac{(200\,000 - 100\,000) \div [(200\,000 + 100\,000) \div 2]}{(\$3 - \$2) \div [(\$3 + \$2) \div 2]} \\
 &= \frac{100\,000 \div 150\,000}{\$1 \div \$2.50} \\
 &= \frac{0.667}{0.4} \\
 &= 1.67
 \end{aligned}$$

Therefore, the tomato suppliers face a price elasticity of supply of 1.67, which means that a certain percentage change in price causes a percentage change in quantity supplied that is 1.67 times as large (when both percentage changes are calculated using average values). Because there is a direct relationship between price and quantity supplied, the changes in these two variables are always in the same direction. Thus, the numerator and the denominator of the supply elasticity formula are either both positive or both negative, giving a final answer that is always positive. Like the numerical value of demand elasticity, this is a pure number with no units attached.

1. The existence of close substitutes.

If close substitutes exist, generally the quantity response to a price change is greater, so the absolute value of PED is greater.

2. The passage of time.

It takes time for people to change their habits in response to a price change. So, the longer the time since the price change, the greater the absolute value for PED.

3. The proportion of income spent on the good.

If the proportion is great, generally the absolute value of PED is greater than if the proportion is small. For instance, if producers doubled the price of matches, it would be unlikely to affect the quantity

of matches sold, but a doubling in car prices would likely have a big effect on the number of cars sold.

4. Addiction, degree of necessity, or habit.

Things like a morning coffee, cigarettes, medicine or a daily paper may be so much a part of a person's needs and daily routine that they will not respond to a change in price, so the absolute value of PED will be small.

5. Branding and advertising.

The point of advertising and brandings is to render the advertised product unique, ie to make us think that it does not have any close substitutes. Thus, advertising generally reduces the absolute value of a good's PED.

THINKING ABOUT ECONOMICS

Do decreasing-cost industries exist?

Yes, they do. For example, some industries in the information technology sector have witnessed a marked decrease in product costs as the industries have expanded. The case of the computer chips is particularly telling. According to Moore's Law, developed in 1965 by one of the founders of chipmaker Intel, the processing power of computer chips doubles every six months. So far, Moore's Law has been correct, reducing the real

price of processing power since the 1960s by 99.9999 percent, and there is no reason why this pace of growth cannot continue. But the problem in extending the analysis of long-run supply elasticity to this scenario is that industries with a pattern of decreasing costs will probably not be perfectly competitive: the advantages of "bigness" for the leading businesses in the industry are simply too large to be ignored.

Question

Presuming a decreasing-cost industry is perfectly competitive, what would the slope of its long-run supply curve be?

Brief Review

1. Price elasticity of supply is the responsiveness of a product's quantity supplied to changes in the product's price.
2. When supply is elastic, a given percentage change in price causes a larger percentage change in quantity supplied. When supply is inelastic, a given percentage change in price causes a smaller percentage change in quantity supplied.
3. Price elasticity of supply is dependent mainly on the production period. In the immediate run, supply is perfectly inelastic, meaning, a change in price has no effect on quantity supplied. In the short run, supply may be elastic or inelastic.
4. In the long run, price elasticity of supply depends on the industry's use of resources. In a constant-cost industry (not a major user of any one resource), supply in the long run is perfectly elastic, with a constant price at all possible quantities supplied. In an increasing-cost industry (a major user of at least one resource), the long-run supply is very elastic, with price rising gradually at higher quantities supplied.

LASTWORD

This chapter has extended the basics of demand and supply studied in Chapter 2 to examine in more detail how buyers and sellers interact in private markets. The concept of elasticity has allowed us to see how consumer decisions affect the sellers' total revenue and how supply factors affect price and quantity in various production periods. We then looked at some of the ways that government chooses to intervene in private markets—either for reasons of equity (in the case of price controls) or efficiency (in the case of spillover effects). In the following chapters, we will further explore the ways in which businesses and consumers interact in particular markets and how governments focus on the issue of equity to redistribute incomes.

Key Concepts

price elasticity of demand 56	cross-price elasticity 63	perfectly elastic supply 66
elastic demand 56	price elasticity of supply 64	increasing-cost industry 66
inelastic demand 56	elastic supply 64	price floor 67
perfectly elastic demand 56	inelastic supply 64	price ceiling 67
perfectly inelastic demand 57	immediate run 65	spillover effects 71
total revenue 57	perfectly inelastic supply 65	spillover costs 71
unit-elastic demand 59	short run 65	spillover benefits 72
income elasticity 62	long run 65	public good 73
	constant-cost industry 66	

Questions

- Explain whether demand for each of the following is likely to be inelastic, elastic, or unit-elastic. Given your answers, outline whether the sellers' total revenue will increase, decrease, or stay constant if each item's price increases.
 - Milk
 - A particular computer model
 - Yachts
- In each case below, determine the effect on the sellers' total revenue and identify whether the demand curve is elastic, inelastic, or unit-elastic:
 - Price falls from \$2 to \$1.50 along the market demand curve for strawberries (D_m) shown in Figure 2.2 in Chapter 2.
 - Price rises from \$150 to \$200 along the original demand for skis (D_o) shown in Figure 2.4 in Chapter 2.
 - Price drops from \$12 to \$8 along the demand curve for CDs shown on p. xxviii of the Skills Resource.

Market Demand and Supply Schedules for Leather Jackets

Price (\$ per jacket)	Quantity Demanded (jackets per year)	Quantity Supplied (jackets per year)
\$300	69 000	108 000
250	77 000	77 000
200	86 000	53 000
150	94 000	31 000
100	103 000	19 000

3. a. Use the table on the previous page to draw a graph showing the market demand curve and supply curves (D_0 and S_0) for a hypothetical market for leather jackets. On your graph, indicate the equilibrium price and quantity.
- b. Due to an increase in the number of producers in this market, the annual quantity supplied in this market increases by 33 000 jackets at every price. On the same graph you have drawn in part a., show the new market supply curve (S_1) and indicate the new equilibrium price and quantity.
- c. Calculate the change in total revenue for producers in this market due to the shift from S_0 to S_1 . Is the demand for leather jackets between the old and new equilibrium points inelastic or elastic? Explain.

Market Demand Schedule for Canoes

Price (\$ per canoe)	Quantity Demanded (canoes per month)
\$800	400
600	800
400	1200
200	1600

4. a. Use the market demand schedule for canoes shown above to find the total revenue at each given price.
 - b. On the basis of your answer to part a., state whether the market demand for canoes is elastic, inelastic, or unit-elastic in the three price ranges \$800 to \$600, \$600 to \$400, and \$400 to \$200.
 - c. Compute the numerical values of demand elasticity in the three relevant price ranges.
 - d. Are your answers to parts b. and c. consistent? Explain.
 - e. Graph the market demand curve for canoes (D) and calculate the numerical value of its slope. Does a demand curve with a constant slope have a constant numerical elasticity? Explain.
5. Calculate the appropriate elasticity coefficient in each of the following cases:
 - a. Annual purchases of computers rise from 200 000 to 300 000 when average consumer incomes increase from \$50 000 to \$70 000.
 - b. Consumer A's monthly magazine purchases falls from 4 to 3 magazines when the price she pays each month for unlimited access to the Internet decreases from \$20 to \$10.
 - c. Weekly purchases of packs of chewing gum rise from 1.2 million to 1.7 million packs when their price declines from \$1 to 85 cents.
 - d. A fall in the average price of DVDs from \$40 to \$35 increases purchases of DVD players from 10 000 to 15 000 per month.
 - e. A rise in the price of wheat from \$110 to \$135 per tonne increases the amount supplied by wheat farmers from 8 million to 9 million tonnes.
 6. In the silver market, 1 million ounces are offered for sale each month by producers at the initial price of \$6 per ounce. The price then rises to \$8.
 - a. What happens to the quantity supplied of silver in the immediate run at the new \$8 price? Sketch the immediate-run supply curve to explain your answer.

- b. In what direction will the quantity supplied of silver change in the short run at the new \$8 price? Sketch the short-run supply curve to explain your answer.
 - c. How will the price of silver change in the long run if this is a constant-cost industry? an increasing-cost industry? Sketch long-run supply curves to explain your answers.
7. a. Compute the numerical values of supply elasticity for the market supply curve for strawberries (S) shown in Figure 2.5 in the two price ranges \$1.50 to \$2, and \$2 to \$2.50.
- b. Is the supply elastic, inelastic, or unit-elastic between prices \$1.50 and \$2.50?
 - c. Must a supply curve with a constant slope have a constant numerical elasticity? Explain.

Brief Review

1. Price elasticity of demand is the responsiveness of a product's quantity demanded to changes in the product's price. When demand is elastic, a given percentage change in price causes a larger percentage change in quantity demanded. When demand is inelastic, a given percentage change in price causes a smaller percentage change in quantity demanded.
2. Demand is perfectly elastic when the price of a product is constant at all quantities demanded. Demand is perfectly inelastic when the quantity demanded of a product is constant at all prices. Demand is unit-elastic when a percentage change in price causes an equal percentage change in quantity demanded.
3. Price and total revenue have an inverse relationship when demand is elastic but a direct relationship when demand is inelastic. When demand is unit-elastic, total revenue is constant, regardless of price.
4. Four factors affect the price elasticity of demand of a product: the portion of consumer incomes the product accounts for, access to substitute products, whether the product is a luxury or a necessity, and the amount of time that elapses after a price change.
5. Other demand-related elasticity concepts include income elasticity, which measures the sensitivity of a product's quantity demanded to a change in consumer income, and cross-price elasticity, which measures the sensitivity of a product's quantity demanded to a change in another product's price.

Brief Review

1. Price elasticity of supply is the responsiveness of a product's quantity supplied to changes in the product's price.
2. When supply is elastic, a given percentage change in price causes a larger percentage change in quantity supplied. When supply is inelastic, a given percentage change in price causes a smaller percentage change in quantity supplied.
3. Price elasticity of supply is dependent mainly on the production period. In the immediate run, supply is perfectly inelastic, meaning, a change in price has no effect on quantity supplied. In the short run, supply may be elastic or inelastic.
4. In the long run, price elasticity of supply depends on the industry's use of resources. In a constant-cost industry (not a major user of any one resource), supply in the long run is perfectly elastic, with a constant price at all possible quantities supplied. In an increasing-cost industry (a major user of at least one resource), the long-run supply is very elastic, with price rising gradually at higher quantities supplied.

Brief Review

1. For various reasons, governments sometimes choose to intervene in markets to override the "invisible hand" of competition. Price controls are one form of intervention and take the form of price floors and price ceilings.
2. Setting a price floor, or a minimum allowable price, in a competitive market tends to cause surpluses.
3. Setting a price ceiling, or a maximum allowable price, in a competitive market tends to cause shortages.

Brief Review

1. Spillover effects are the external effects of economic activity that arise because no market exists in isolation.
2. Spillover effects can be negative or positive. Spillover costs, such as pollution, are the harmful effects of producing or consuming a product. Spillover benefits, such as those associated with education, are the positive effects of producing or consuming a product.
3. Governments often step in to see that public as well as private costs and benefits are accounted for. Governments might, for example, intervene with taxes to correct an oversupply in the case of spillover costs or with subsidies to correct a shortfall in the case of spillover benefits.
4. Public goods are products whose benefits cannot be restricted to certain individuals. Governments often step in to provide these goods rather than leave them to private markets. Governments can also attempt to turn such goods into private goods by defining new types of property.

13. What would happen to the price of a product if there were a simultaneous increase in both the demand and the supply? Explain, using a graph in your answer.
14. Why do sellers lower the price when there is a surplus? Why do buyers bid up the price when there is a shortage?
15. Using demand and supply curves in your answer, show the impact of the following:
 - a) an increase in wood prices on the market for new houses;
 - b) a decrease in the incomes of consumers on the market for new clothes;
 - c) an increase in printers' salaries on the market for textbooks;
 - d) an increase in the price of butter on the market for margarine;
 - e) a hot dry summer on the market for corn;
 - f) a new advertising campaign by the Turkey Marketing Board on the market for turkeys;
 - g) an increase in the price of new cars on the market for used cars; and
 - h) an increase in interest rates on the market for new cars.
16. In the 1970s a severe frost hit Brazil and damaged much of the country's coffee crop. Since Brazil is one of the world's leading coffee producers, what impact might this frost have had on world coffee prices? Use demand and supply curves in your answer.
17. Using your knowledge of demand and supply, explain why parking garages in the downtown core of Canadian cities have several levels, whereas in the suburbs parking lots tend to be only one level.
18. The disappearance of anchovies off the coast of Peru in 1972 caused a scramble for protein-rich substitutes, notably soybeans. Because soybeans are used in cattle feed, higher soybean prices eventually were translated into higher cattle prices. Use demand and supply diagrams to illustrate what happened in the anchovy, soybean, and cattle markets. Indicate which curves shifted in each instance and show the effects on the equilibrium price and quantity in each market.
19. In July 1993, an explosion destroyed the Japanese plant that was the world's largest supplier of memory-chip resin. The day before the explosion, memory chips for computers could be purchased for \$40. Shortly after the explosion, the price had increased to \$90. Using demand and supply curves, show the impact of this explosion on the memory-chip market as well as on the market for computers.
20. If the demand for many farm products is inelastic, why would a bad crop be to the advantage of farmers? Use demand and supply curves in your answer.
21. In the discussion of price elasticity of demand, it was shown that changes in total revenue could shed some more light on the question of demand elasticity. Why will a review of total revenue, similar to that used for demand, not work with the concept of elasticity of supply?
22. For each of the following goods and services, state whether the demand would be elastic or inelastic:
 - a) postal service
 - b) soft drinks
 - c) theatre tickets
 - d) textbooks
 - e) houses
 - f) home computers
23. Fire destroyed one-half of the trees on a certain tract of land in New Brunswick. The remaining lumber was worth more than the value of the trees before the fire. What does this say about the elasticity of demand for lumber?
24. In order to reduce the cost of medicare to the public, it has been suggested that individuals pay one dollar for each visit to the doctor. Discuss the impact of this user fee on the demand for medical services. Refer to the price elasticity of demand in your answer.
25. The cost of mailing a letter is constantly increasing. Postage is now subject to the GST. In your opinion, is the demand for stamps elastic or inelastic? Explain.
26. In March 1990, McDonald's Restaurants announced a reduction of up to 30 percent in the price of hamburgers and other items. A McDonald's spokesperson stated that although the lower prices will pinch profits, the increase in customers will ultimately compensate for the decline in earnings. What is McDonald's view of the price elasticity of demand for its food? Do you think that this view is correct? Explain.
27. A study on the advertising elasticity of demand for eggs for the period 1985 to 1997 determined the value to be 0.034. Interpret this value.
28. Provide examples of products with the following characteristics:
 - a) positive cross-elasticities (two products); and,
 - b) negative income elasticity.
29. Scalpers hawk their tickets outside theatres, sporting events, and concerts. Using demand and supply curves, discuss the market scalpers participate in. Address the following issues in your answer:
 - The price elasticity of demand.
 - The price elasticity of supply.
 - What happens to the price of concert tickets as the start of the concert nears?
 - Do scalpers exist only in markets where the supply is limited? Explain.

9. (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?