

## CHAPTER 3

# Competitive Dynamics and Government

*There is no resting place for an enterprise in a competitive economy.*

—Alfred P. Sloan, American businessman

Usually, when we wish to acquire goods and services—a fresh loaf of bread, a pair of shoes in the right size and style, a last-minute holiday package to a Caribbean island—they can be bought quickly and conveniently. In this chapter, we will analyze in more detail the ways in which competitive markets accomplish this task. In particular, we will look at the concept of elasticity and its effect on the interplay of demand and supply. We will also see how governments may choose to intervene in particular markets, by either establishing price controls or dealing with spillover effects. As these examples will show, the dynamics of competitive markets can help or hinder government policies in important ways, and government officials must understand these influences if they are to meet their goals.

### LEARNING OBJECTIVES

In this chapter, you will:

- 1 learn about the price elasticity of demand, its relation to other demand elasticities, and its impact on sellers' revenues
- 2 learn about the price elasticity of supply and the links between production periods and supply
- 3 consider how governments use price controls to override the “invisible hand” of competition
- 4 examine spillover costs and benefits and the ways that government addresses these issues

### 3.1 Price Elasticity of Demand

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

#### LO 3.1

**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

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

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** (also called demand elasticity). Price elasticity of demand is the extent to which consumers (and the quantity they demand) respond to a change in price.

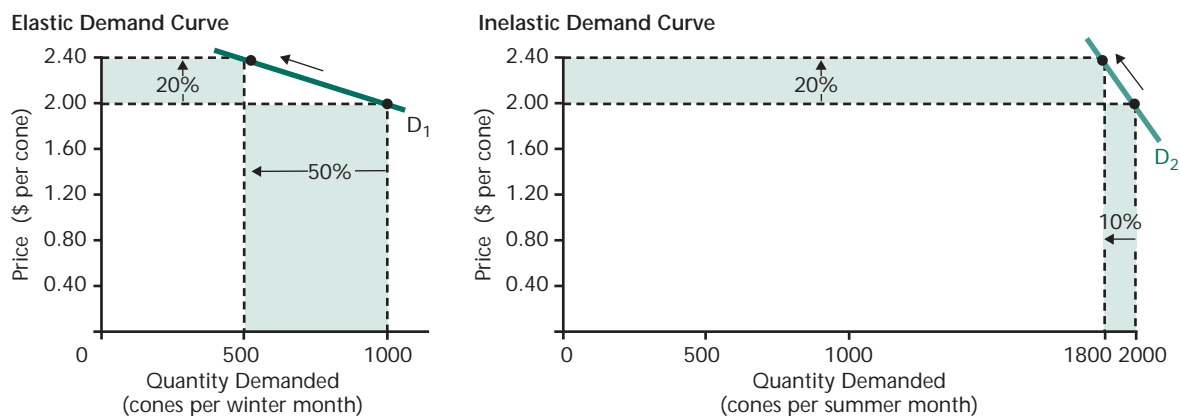
### Elastic and Inelastic Demand

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. In the summer, greater demand for ice-cream cones pushes demand to the right. In addition, 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 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.

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.

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

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

## Price Elasticity of Demand and Total Revenue

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:

$$TR = P \times Q_d$$

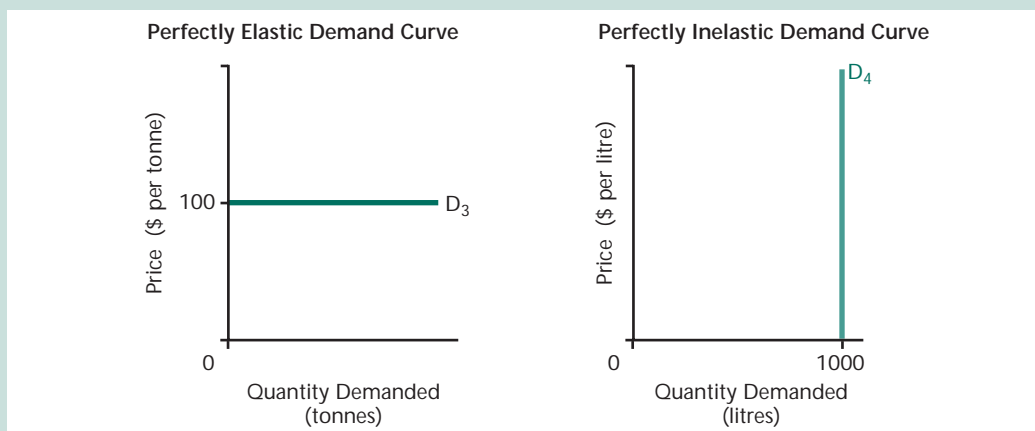
For example, if the price of a certain product is \$4 and 1000 units are purchased, then the total revenue generated is \$4000 ( $\$4 \times 1000$ ).

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.

## 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

**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.

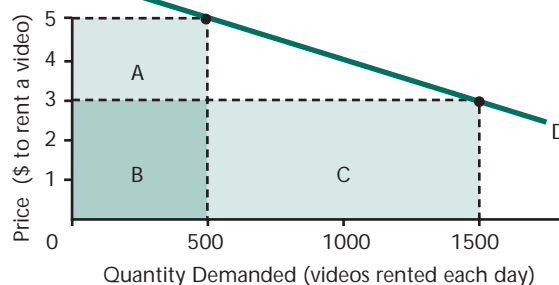
### Question

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?

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 price have an inverse relationship—total revenue changes 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 ( $\$5 \times 500$  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 ( $\$3 \times 1500$  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.

**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. (Note that area C is greater than area A.)

## 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. 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.

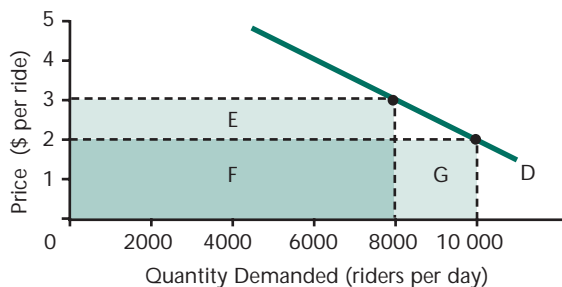
## Factors That Affect Price Elasticity of Demand

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

**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. (Note that area E is greater than area G.)

**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

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  $\Delta$  stands for change. (The symbol  $\Delta$  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 Section 3.1, we identified whether demand curves were elastic or inelastic by comparing percentage changes in quantity demanded and price. To calculate these percentage changes, we divided the absolute changes in both quantity demanded and in price by their respective initial values. While this is the simplest procedure, it is not sufficiently exact when calculating numerical values for elasticity. Instead of using the initial values for quantity demanded and price, we incorporate the average values of these two variables in our formula. Over a given range of a demand curve, these average values are the same no matter whether we are moving up or down the demand curve. This useful property does not apply to the initial values of either quantity demanded or price, which are different depending on where we start on the demand curve.

So, 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 the value at the midpoint between the old and new quantities demanded, and 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 value at the midpoint between the old and new prices, and 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. Also, it always has a negative sign, because its formula's numerator and denominator necessarily have different signs. Because it is customary to define the numerical value of the price elasticity of demand in terms of the number's absolute value, this negative sign is usually cancelled out of the final answer. The negative sign is ignored, so the number is always considered to be positive.

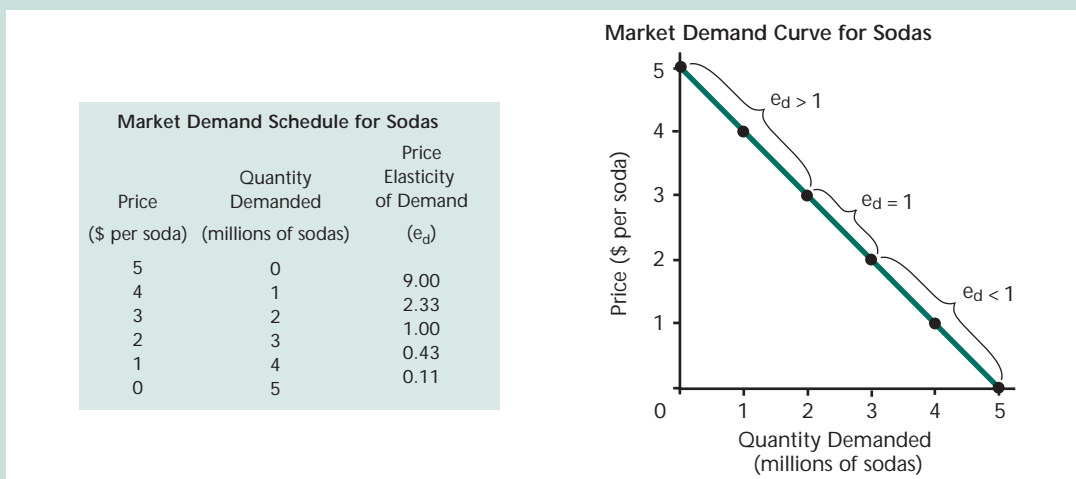
## Elasticity and Linear Demand Curves

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 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).

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.

**Figure 3.6** Elasticity and a Linear Demand Curve



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.

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

**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 ( $\Delta Q_d$ ) divided by its average value, over the change in consumer income ( $\Delta I$ ) divided by its average value.

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

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 ( $\Delta Q_d$ ) and the price of product y ( $\Delta P_y$ ) 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 DVDs, for example, might be caused by a fall in the price of DVD players.

## 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.

## 3.1 Practice Questions

1. Annual purchases of laptop computers in a certain market are 10 000 at a price of \$3000, 20 000 at a price of \$2000, and 30 000 at a price of \$1000.
  - a. Find producers' total revenue at each price.
  - b. On the basis of your answer to part a., is the market demand curve for laptops elastic or inelastic in the price range \$3000 to \$2000? in the price range \$2000 to \$1000?
  - c. Calculate the numerical values of demand elasticity in the two relevant price ranges.
  - d. Are your answers to parts b. and c. consistent?
  - e. Using EconGraphKit (at <http://www.mcgrawhill.ca/college/lovewell>), draw the demand curve for laptops and highlight the rectangles showing total revenue at each of the three prices. Are the changes in these areas consistent with your answers to parts b. and c.? Explain.
2. Calculate the appropriate elasticity coefficient in each of the following cases.
  - a. A drop in the price of electric-powered cars from \$25 000 to \$20 000 causes purchases of gasoline-powered cars to fall from 1 million to 750 000 per year.
  - b. Monthly purchases of cellphones rise from 15 000 to 17 500 when the average price of cellphones decreases from \$120 to \$90.
  - c. A fall in average consumer incomes from \$80 000 to \$50 000 raises weekly purchases of canned sardines from 2000 to 3000 cans.

## 3.2 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

LO 3.2

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

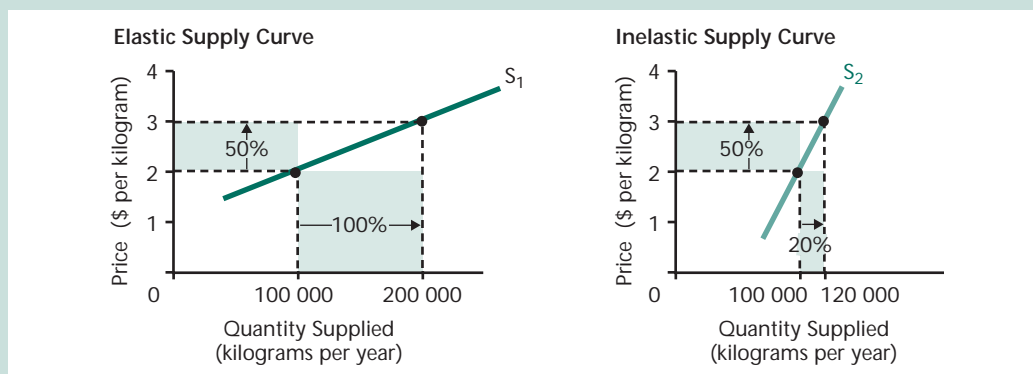
In the case of **elastic supply**, a certain percentage change in the product's price leads to a larger percentage change in its quantity supplied. In other words, the quantity that producers are willing to offer for sale is very responsive to price changes. Consider the example of a tomato producer, 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 ( $S_2$ ).

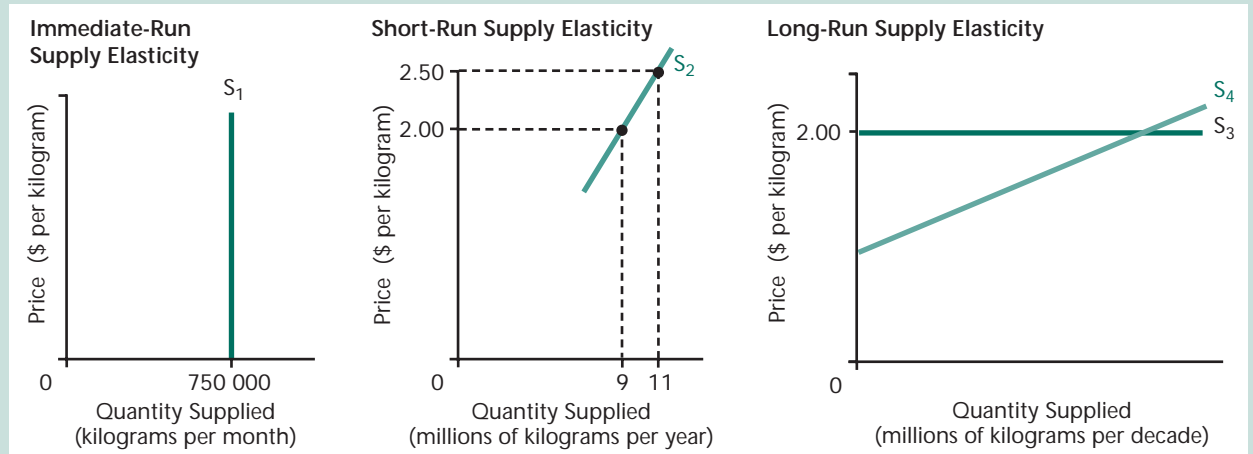
### Factors That Affect Price Elasticity of Supply

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 expands.

## 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, a period of less than a single growing season is bound to be short run. 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 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.

**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

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.

### 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 per cent, 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?

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

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.

## 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.

## 3.2 Practice Questions

In a certain lettuce market, the price rises from \$1 to \$1.20 per head. For each case below, determine the value of  $e_s$  and describe the shape of the supply curve.

- a. In the immediate run, monthly quantity supplied remains constant at 80 000 heads.
- b. In the short run, annual quantity supplied rises from 1 million to 1.2 million heads.
- c. In the long run, the price of lettuce returns to \$1 as quantity supplied continues to expand.
- d. Based on your answer to part c., is this a constant-cost or increasing-cost industry?
- e. Using EconGraphKit (at <http://www.mcgrawhill.ca/college/lovewell>), draw the three supply curves.

### 3.3 Price Controls

**price floor:** a minimum price set above equilibrium

**price ceiling:** a maximum price set below equilibrium

LO 3.3

Sometimes, governments see fit to control prices, thus overriding the forces of demand and supply and the “invisible hand” of competition. There are two types of price controls. A **price floor** is a minimum price set *above* the level that would exist in equilibrium. An example is agricultural price supports. A **price ceiling** is a maximum price set *below* the equilibrium level. An example is rent controls. Notice that “floor” and “ceiling” have special meanings in economics. A price floor must be higher than equilibrium. Otherwise the floor would have no effect on the price prevailing in the market. Similarly, a price ceiling must be lower than equilibrium. Otherwise, it would be irrelevant.

Demand and supply can be used to analyze the effects of government programs to control prices. Because analyzing price controls also involves weighing one goal against another, the analysis depends on value judgements and so is part of normative economics.

### Agricultural Price Supports

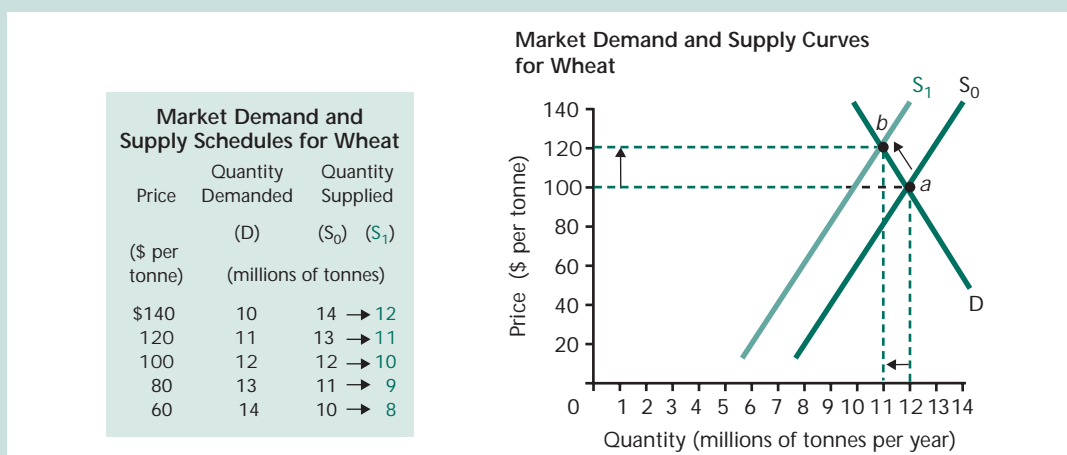
Agricultural markets, with their many independent buyers and sellers, are among the most competitive in the Canadian economy. These markets, therefore, provide a useful example of the potential difficulties encountered by competitive producers.

Given the nature of demand and supply for most agricultural products, farmers face product prices that can fluctuate widely. Such products as milk and wheat are viewed as necessities by consumers, so demand curves for these items are inelastic, especially in the short run. Similarly, the short-run supply curves for most agricultural products are inelastic because farmers find it difficult to vary quantity supplied over brief time periods.

Inelastic demand and supply in agricultural markets mean that changes in either demand or supply lead to relatively large price changes. This is illustrated in Figure 3.9, using a hypothetical market for wheat. A decrease in the supply of wheat, due to unfavourable weather, leads to a fairly small decrease in the equilibrium quantity but a considerable rise in price.

Unstable prices, therefore, can cause large fluctuations in farmers’ incomes. In the years when prices are high, farmers can make substantial revenues, but low prices cause revenues

**Figure 3.9** Price Fluctuations in Agriculture



Because both the demand and the supply for wheat are inelastic in the short run, a decrease in supply caused by such a factor as unfavourable weather has a relatively large effect on price, with its equilibrium value rising 20 percent. At the same time, equilibrium quantity adjusts by a smaller percentage.

to plummet. Over the long term, farmers also face pressures from the introduction of more sophisticated and expensive production techniques, which make small producers less able to compete with large agribusinesses. Consequently, many Canadian farmers have decided that the returns from agriculture are no longer worth the effort. The total number of Canadian farms is undergoing a gradual but persistent decline, as shown in Figure 3.10.

To counter these difficulties, farmers often request that governments intervene in markets to stabilize prices at favourable levels. In the past, federal and provincial governments have usually responded positively to these demands, not only out of a desire to stabilize prices and farm incomes but also because the family farm represents a traditional institution that many Canadians wish to see maintained through government intervention.

One type of government program is price supports, illustrated by a hypothetical market for milk in Figure 3.11. Without government intervention, this market would reach an equilibrium price of \$1.10 per litre and an associated quantity of 60 million litres sold per year. A government agency pays a minimum or floor price, such as \$1.30, which is above the equilibrium level. The floor price has two effects: quantity demanded decreases from 60 to 59 million litres, and quantity supplied increases from 60 to 62 million litres. Both effects lead to a surplus of the commodity of 3 million litres per year (62 million – 59 million), which the government agency purchases.

### WINNERS AND LOSERS

Farmers are the obvious winners from price supports. The program causes both price and quantity supplied to increase and also raises farmers' revenues. Consumers lose because of the higher prices they pay, while taxpayers lose because they must foot the bill for the government agency's purchases of surplus products. Finally, by causing economic resources to be devoted to the production of unneeded agricultural surpluses, this program also works to the disadvantage of society as a whole. Are the benefits to

**Figure 3.10** Total Number of Farms in Canada (thousands)

Year	Canada	Nfld	PEI	NS	NB	Que	Ont	Man	Sask	Alta	BC
1931	728.6	n.a.	12.9	39.4	34.0	136.0	192.2	54.2	136.5	97.4	26.1
1941	732.8	n.a.	12.2	33.0	31.9	154.7	178.2	58.0	138.7	99.7	26.4
1951	623.1	3.6	10.1	23.5	26.4	134.3	150.0	52.4	112.0	84.3	26.4
1956	575.0	2.4	9.4	21.1	22.1	122.6	140.6	49.2	103.4	79.4	24.8
1961	480.9	1.8	7.3	12.5	11.8	95.8	121.3	43.3	94.0	73.2	20.0
1966	430.5	1.7	6.4	9.6	8.7	80.3	109.9	39.7	85.6	69.4	19.1
1971	366.1	1.0	4.5	6.0	5.5	61.3	94.7	35.0	77.0	62.7	18.4
1976	338.6	0.9	3.7	5.4	4.6	51.6	88.8	32.1	71.0	61.1	19.4
1981	318.4	0.7	3.2	5.1	4.1	48.1	82.4	29.4	67.3	58.1	20.0
1986	293.1	0.7	2.8	4.2	3.5	41.5	72.7	27.3	63.4	57.8	19.1
1991	280.1	0.7	2.4	3.9	3.2	38.1	68.6	25.7	60.8	57.2	19.2
1996	276.6	0.7	2.2	4.5	3.4	36.0	67.5	24.4	57.0	59.0	21.9
2001	246.9	0.6	1.8	3.9	3.0	32.1	59.7	21.1	50.6	53.7	20.3

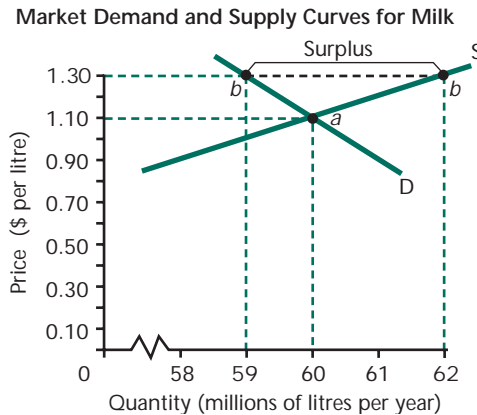
The total number of Canadian farms has fallen consistently since 1931. This trend is also reflected in each of the provinces, although there have been several periods during which farm population in some provinces has stayed constant or even increased.

Source: Statistics Canada "Total Number of Farms in Canada (thousands)," adapted from the Statistics Canada publication "Historical Overview of Canadian Agriculture (data and analytical products: 1996 Census of Agriculture)," Catalogue 93-358, August 1997, pp. 2–43 and "Farm Data for the 2001 Census of Agriculture (Initial release)," Catalogue 95F0301, May 15, 2003, Table 3.

**Figure 3.11** Effects of Price Supports

**Market Demand and Supply Schedules for Milk**

Price (\$ per litre)	Quantity Demanded (D) (millions of litres)	Quantity Supplied (S) (millions of litres)
\$1.30	59	62
1.10	60	60
0.90	61	58



Because the equilibrium price for milk (point *a*) is considered too low, the government agency imposes a price floor. This creates a milk surplus, at points *b*. As long as the demand and supply curves remain the same, this surplus will recur each year, and the government agency's stock of milk will increase.

farmers worth the costs to consumers, taxpayers, and the rest of society? The answer to this question depends on how important you consider the stability and health of the farming sector to be in relation to the costs of supporting the agricultural sector.

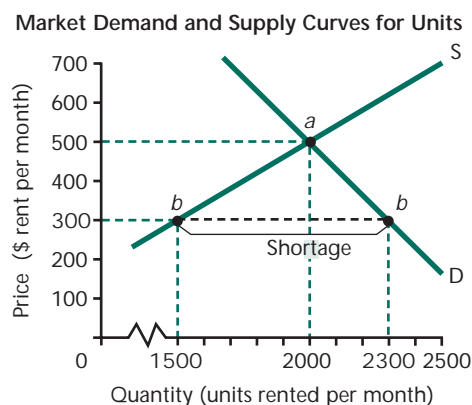
### Rent Controls

Another way that governments override the “invisible hand” of competition is with price ceilings, which are upper limits to a price, such as rent. For example, a rent-control program was imposed on rental housing in Ontario in the 1970s due to pressure from tenant lobby groups, with capped rent increases kept below the rate of inflation. The effect of rent controls in a hypothetical large community with a competitive rental market is shown in Figure 3.12, assuming that all rental units in this market are identical. Without a rent-control program, equilibrium in the market would occur at a monthly

**Figure 3.12** Effects of Rent Controls

**Market Demand and Supply Schedules for Units**

Price (\$ rent per month)	Quantity Demanded (D) (units rented per month)	Quantity Supplied (S) (units rented per month)
\$700	1700	2500
500	2000	2000
300	2300	1500



Rent controls force price below the equilibrium level, from point *a* to points *b*. Quantity demanded rises at the new price, while quantity supplied falls. The price ceiling thus causes a shortage.

rent per unit of \$500 and a total of 2000 units rented per month. Controls push rents below the equilibrium level, to a value of \$300. Consequently, quantity demanded increases from 2000 to 2300 units as more consumers enter the market. At the same time, quantity supplied falls from 2000 to 1500 units as landlords find it profitable to provide fewer units than before.

Quantity supplied is reduced in two ways: new rental construction is cut back, and some existing buildings are demolished or converted to other uses. The result of this artificially low rent is a shortage of 800 (2300 – 1500) rental units. This shortage makes itself felt through a low vacancy rate for units. This means an unusually small percentage of units are available for rent at any given time.

As a rule, shortages foster underground markets. In the case of rental housing, some landlords and tenants who are subletting their apartments to other tenants charge a fee for preference among people on waiting lists. These fees, or bribes, are known as “key money” and are illegal. To get around the law, key money often takes imaginative forms, such as forced purchases of furnishings at exorbitant prices.

### WINNERS AND LOSERS

According to critics, rent controls harm society as a whole by driving economic resources away from an important housing market and creating a shortage. Because of the restraints placed on landlords in setting their own price, they are particularly hurt by such controls. Some tenants gain from controls, especially middle-class tenants who have the connections and credentials to acquire the most desirable units. However, the shortage caused by controls pushes many poorer tenants into unregulated units, such as basement flats and rooming houses, with rents that are often higher than for units in the controlled market. Therefore, not only do rent controls lower the stock of rental housing, but they can affect different income groups unfairly.

## 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.

## 3.3 Practice Questions

For each of the following price controls, outline the costs and benefits for consumers and producers.

- a. A rent ceiling of \$500 per month is imposed in a market where equilibrium rent would otherwise be \$650.
- b. A price floor of \$2 per kg is set in a market for cheddar cheese. Without this program, the equilibrium price for cheddar cheese would be \$1.50.
- c. A rent ceiling of \$700 per month is imposed in a market where the equilibrium rent would otherwise be \$600.

### 3.4 Spillover Effects

**spillover effects:** external effects of economic activity, which have an impact on outsiders who are not producing or consuming a product

**LO 3.4**

**spillover costs:** negative external effects of producing or consuming a product

Besides intervening in particular markets with price controls, governments also play a part in dealing with the external effects of economic activity. These spillover effects arise whenever outsiders are affected by the production or consumption of a particular product. **Spillover effects** occur in even the ideal case of a competitive market, simply because no market exists in isolation. Governments often step in to see that all costs and benefits—private and public—are accounted for. Rather than employing price controls in these cases of market failure, governments usually apply regulations, taxes, or subsidies instead.

### Spillover Costs and Benefits

Spillover effects may take the form of either costs or benefits.

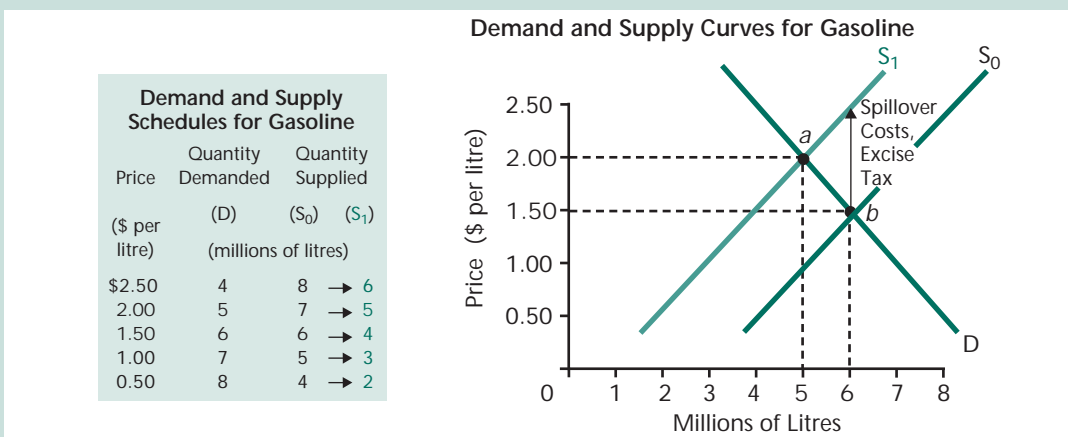
#### SPILLOVER COSTS

**Spillover costs** are the negative effects of producing or consuming a product that fall on outsiders, not market participants. Environmental pollution is the most common example. Recall that some resources called *free goods*, such as air, can be used free of charge. Still other resources, such as water, have prices that do not reflect the resource's value. Any damage caused to these resources through market activity creates substantial costs for society as a whole.

Producers making products that have negative external effects focus only on their private costs as they make supply decisions. Consequently, the prices of these products are insufficient to cover both private and spillover costs. Figure 3.13 illustrates spillover effects with the example of gasoline used by motor vehicles. Assuming that the market for gasoline is competitive and free of government intervention, equilibrium occurs at point *b*, the intersection of the demand and supply curves  $D$  and  $S_0$ , with a price per litre of \$1.50 and a quantity of 6 million litres.

Because of the environmental damage created by both the production and the consumption of gasoline, spillover costs are associated with this product. If these spillover costs are an extra \$1 for each litre of gas, a new supply curve ( $S_1$ ) can be drawn that incorporates the additional cost per litre. Whereas the old supply curve ( $S_0$ ) reflects the

**Figure 3.13** The Impact of Spillover Costs



Without government intervention, equilibrium occurs at point *b*. To account for spillover costs, the government may impose an excise tax of \$1 per litre. As a result, the supply curve shifts from  $S_0$  to  $S_1$ , moving equilibrium to point *a*.

private costs of producing one more litre of gasoline, the new supply curve ( $S_1$ ) reflects the *private* and *public* costs of each new litre.

Where should the market operate? Price in this market should equal the height of the supply curve, once both private and spillover costs are accounted for. In other words, equilibrium should occur at point *a*, the intersection of  $D$  and  $S_1$ , at a price of \$2 and a quantity of 5 million litres. Without government intervention, 1 million too many litres of gasoline is produced and consumed, given the environmental damage associated with both the production and consumption of gasoline. To achieve the preferred outcome, government can impose regulations on the use of gasoline or use its taxing powers. For example, it can levy an excise tax on gasoline equalling \$1 per litre. This succeeds in shifting the supply curve from  $S_0$  to  $S_1$  and ensures that the oversupply of gasoline is corrected.

### SPILLOVER BENEFITS

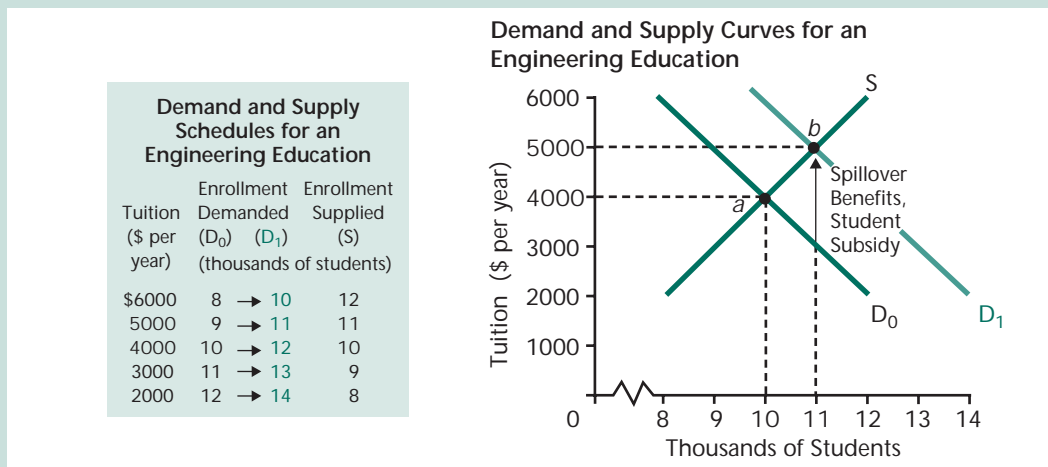
**spillover benefits:** positive external effects of producing or consuming a product

**Spillover benefits** are positive external effects of producing or consuming a product. Education is an important example, since society as a whole gains from this service. From an economic perspective alone, education is considered beneficial because of the increased work and income-earning opportunities it affords each individual and because it enriches the nation's human resources. More generally, education is seen as a social good because it helps Canadians to lead more informed, fulfilled, and productive lives.

Suppose that some students are considering an education in engineering. Figure 3.14 gives a hypothetical example. As in any education and career choice, the students would weigh the costs and benefits of obtaining an engineering degree. With the private market for an engineering education being competitive, the demand and supply curves  $D_0$  and  $S$  have equilibrium point *a*, with a yearly tuition of \$4000 per student and an enrolment of 10 000 students.

Society as a whole benefits from having more trained engineers, due to a faster pace of technological change. Hence there are spillover benefits. To see how much

**Figure 3.14** The Impact of Spillover Benefits



Without government intervention in the market for engineering education, equilibrium occurs at point *a*. If spillover benefits are determined to be \$2000 per student, government can create a subsidy for students pursuing a career in engineering. As a result, the demand curve shifts from  $D_0$  to  $D_1$ , and the new equilibrium is at point *b*, with \$2000 of each student's tuition paid by government.

engineering education should be undertaken from society's perspective, we must estimate the spillover benefits of this education. Suppose the result is \$2000 per student per year. As a result, a new demand curve ( $D_1$ ) that incorporates the private and public benefits can be drawn.

Price in this market should equal the height of the demand curve, once both private and spillover benefits are accounted for. In other words, equilibrium should occur at point *b*, at the intersection of *S* and  $D_1$ , with an annual tuition of \$5000 and an enrolment of 11 000 students. However, if private benefits alone were accounted for, only 10 000 students (point *a*) would be enrolled, thereby creating a shortfall of 1000 students. To increase enrolment to the desired level, government itself could provide engineering education, or it could subsidize engineering education by giving prospective students vouchers to be turned in to the engineering school. The school would then turn in these vouchers to the government for \$2000 per voucher. As a result, the demand curve for engineering education would shift to the right, thereby ensuring that society produces more engineers than would a fully private and competitive market.

## PUBLIC GOODS

At the extreme, there are some products for which private benefits and spillover benefits cannot be separated. A **public good** is a product whose benefits cannot be restricted to certain individuals. In other words, while some consumers pay for the product, others get a “free ride.” Lighthouses are an example, since any ship that is navigated using a lighthouse benefits whether or not the ship's owners help pay for the lighthouse's upkeep. In this situation, one option is to dispense with markets and have government provide these products. This happens in the case of national defence. Since it is impossible to restrict the benefits of this service only to those citizens who are willing to pay for it, national defence must be financed through compulsory taxation. In other cases, governments can help turn public goods into private goods. For example, increasing elephant populations in African countries can be viewed as a public good. One option is to have governments finance policing measures to stop indiscriminate hunting. Another option that has been tried with some success in several African countries is to make elephants private property so that the owners have an economic interest in maintaining a viable population for commercial hunting. In such cases, a government can prompt the formation of workable private markets.

**public good:** a product whose benefits cannot be restricted to certain individuals

## THINKING ABOUT ECONOMICS

Is the Internet a public good?

For most businesses involved in e-commerce, the cost of accessing the Internet is so small as to be virtually negligible. And for many consumers—especially those who access the Internet from their place of work—the effective price is similar. This is because no one owns the Internet. Instead, its operation is

overseen by various nonprofit organizations, such as the National Science Foundation. The Internet, therefore, does have the features of a classic public good. As the price of access continues to fall, these features will become more prominent.

### Question

Given the ease of access to the Internet, how do the governing bodies that oversee it make sufficient revenues to cover their costs?

## 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.

## 3.4 Practice Questions

In each case below, identify the spillover effect and cite one government policy that could deal with this effect.

- a. A late-night dance club in a suburban neighbourhood disturbs nearby residents.
- b. A new subway line reduces a city's traffic congestion.
- c. The use of throw-away batteries adds to soil pollution.

## 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

constant-cost industry 62	long run 61	price elasticity of supply 60
cross-price elasticity 58	perfectly elastic demand 51	price floor 64
elastic demand 51	perfectly elastic supply 62	public good 70
elastic supply 60	perfectly inelastic demand 52	short run 61
immediate run 61	perfectly inelastic supply 61	spillover benefits 69
income elasticity 58	price ceiling 64	spillover costs 68
increasing-cost industry 62	price elasticity of demand 51	spillover effects 68
inelastic demand 51		total revenue 52
inelastic supply 60		unit-elastic demand 54

## Questions

1. 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.
  - a. Milk
  - b. A particular computer model
  - c. Yachts
2. In each case below, determine the effect on the sellers' total revenue and identify whether the demand curve is elastic, inelastic, or unit-elastic:
  - a. Price falls from \$2 to \$1.50 along the market demand curve for strawberries ( $D_m$ ) shown in Figure 2.2 in Chapter 2.
  - b. Price rises from \$150 to \$200 along the original demand for skis ( $D_0$ ) shown in Figure 2.4 in Chapter 2.
  - c. Price drops from \$12 to \$8 along the demand curve for CDs shown on p. xxv 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 displayed above to draw a graph showing the market demand curve and supply curve ( $D_0$  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:
- Annual purchases of computers rise from 200 000 to 300 000 when average consumer incomes increase from \$50 000 to \$70 000.
  - Consumer A's monthly magazine purchases fall from 4 to 3 magazines when the price she pays each month for unlimited access to the Internet decreases from \$20 to \$10.
  - 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.
  - A fall in the average price of DVDs from \$30 to \$25 increases purchases of DVD players from 10 000 to 15 000 per month.
  - 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.
- 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.
  - 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.
  - 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.
- Is the supply elastic, inelastic, or unit-elastic between prices \$1.50 and \$2.50?
  - Must a supply curve with a constant slope have a constant numerical elasticity? Explain.

#### Market Demand and Supply Schedules for Cream Cheese

Price (\$ per kilogram)	Quantity Demanded (thousands of kilograms per year)	Quantity Supplied (thousands of kilograms per year)
	$D_0$	$S_0$ $S_1$
\$4.50	560	1350      →      1890
4.00	590	1130      →      1420
3.50	630	890      →      960
3.00	670	670      →      670
2.50	700	440      →      380

8. a. Using the table above, draw a graph showing the demand curve ( $D_0$ ) and the short-run supply curve ( $S_0$ ) for cream cheese. Identify the equilibrium price and quantity in the absence of government intervention and calculate the consumers' total expenditure and the total revenue received by producers.
- b. After lobbying by the dairy industry, government imposes a price support for cream cheese of \$4 per kilogram and agrees to purchase any unsold portion of the product at the \$4 price. Outline the short-run effect of this program on consumers and producers.

- c. In the long run, the annual supply curve for cream cheese becomes  $S_1$ . How do the long-run effects of the \$4 price support differ from the short-run effects on consumers and producers?
- d. Is the price-support program more costly to taxpayers in the short run or in the long run? Explain.

#### Market Demand and Supply Schedules for Apartments

Price (\$ per month)	Quantity Demanded (thousands of units rented per month)		Quantity Supplied (thousands of units rented per month)
	$D_0$	$D_1$	$S_0$
\$800	14.5	→ 18.4	18.4
700	17.3	→ 21.2	17.3
600	19.5	→ 23.4	16.4
500	22.0	→ 25.9	15.6
400	23.7	→ 27.6	14.2

9. For the schedules above, draw a graph showing the original demand curve ( $D_0$ ) and supply curve ( $S_0$ ) for apartments in a particular community.
  - a. Identify the equilibrium price and quantity in the absence of government intervention.
  - b. Using your graph, outline how a \$500 price ceiling imposed by government affects this market. In your answer, make sure to distinguish between tenants who are able to find apartments at the ceiling price and those who are unable to do so.
  - c. An increase in the price of single-family dwellings in the community causes the demand for apartments to shift from  $D_0$  to  $D_1$ . Draw this demand curve on your graph and explain how it influences the impact of the \$500 ceiling price on tenants.

#### Market Demand and Supply Schedules for Cigarettes

Price (\$ per pack)	Quantity Demanded (millions of packs per year)	Quantity Supplied (millions of packs per year)
	$(D_0)$	$(S_0)$ $(S_1)$
\$5	7	11      —
4	8	10      —
3	9	9      —
2	10	8      —
1	11	7      —

10. The table above shows hypothetical demand and supply schedules for cigarettes in the absence of government intervention.
  - a. Draw a diagram showing demand ( $D_0$ ), supply ( $S_0$ ), and equilibrium price and quantity in the market before government intervention.
  - b. Government policy-makers estimate that the spillover costs associated with cigarette smoking are an extra \$2 for each pack sold. Outline the nature of these spillover costs in the case of cigarette smoking.
  - c. On the basis of the estimate in part b., draw a new supply curve ( $S_1$ ) on your graph that incorporates both private and public costs of producing and consuming cigarettes. Then, using your graph, copy and complete the table accompanying this

- question. With the aid of your graph and table, identify the preferred equilibrium in this market.
- d. Outline the various ways in which government can intervene to achieve the preferred outcome in this market.
11. Identify the spillover effect in each of the following cases and outline a government policy to deal with this effect.
    - a. Impaired driving causes numerous accidents on Canadian roads.
    - b. Some Canadians get a new vaccine for measles.
    - c. Heroin use by pregnant women is hazardous to the health of their offspring.
    - d. A mosquito abatement program is established in a particular community.
  12. (Advanced Question)  
The total annual revenue for producers of a given product called widgets is always \$10 million, regardless of the price.
    - a. On the basis of this information, plot the market demand curve for widgets.
    - b. How would you describe the elasticity of this demand curve? Explain.
  13. (Policy Discussion Question)  
Access the online article *How Rent Control Drives Out Affordable Housing* (at <http://www.cato.org/pubs/pas/pa-274.html>).
    - a. Using the arguments in the article, explain how low-income tenants are often hurt by rent controls.
    - b. Outline why rent controls become more difficult to eliminate the longer they have been in existence in a particular community.
    - c. Though the article makes a case against rent controls, can you think of any arguments that can be made against abolishing rent controls that are already in place?



<http://www.cato.org/pubs/pas/pa-274.html>

## Internet Application Questions



<http://www.globalink.org/tobacco/wb/wb04.shtml>

<http://www.statcan.ca/english/Estat/licence.htm>

1. Use the information in *Measures to Reduce the Demand for Tobacco* (at <http://www.globalink.org/tobacco/wb/wb04.shtml>) to answer the following questions:
  - a. What is the range of estimates for the price elasticity of demand for cigarettes in various countries?
  - b. Why are demand elasticities for cigarettes higher in low-income countries than in high-income countries?
  - c. According to the sources cited in the reading, how many smoking-related deaths would be avoided if there were a worldwide 10 percent price increase for cigarettes? What elasticity assumptions is this estimate based on?
2. Access Statistics Canada's web site (at <http://www.statcan.ca/english/Estat/licence.htm>).
  - a. On the basis of the information found in "Business Enterprises," generate a map showing the average age of farmers in each Canadian province at the time of the last census.
  - b. In which province(s) is the average age of farmers the lowest? the highest?

## ADVANCING ECONOMIC THOUGHT



**Alfred Marshall**

Source: By permission of the Master and Fellows of St. John's College Cambridge

## GETTING MORE THAN YOU BARGAINED FOR

### Alfred Marshall and Consumer Surplus

#### Marshall and His Influence

The Englishman Alfred Marshall (1842–1924) contributed more to the study of microeconomics and the way it is taught today than any other economist. He was the first to establish the use of demand and supply graphs, for example, and the way we conceive of such tricky notions as equilibrium and elasticity owes much to his clear-headed, logical approach.

Marshall was a student at Cambridge University and went on to spend most of his life there as a professor. Trained as a mathematician, he later switched to economics. Marshall became a model for 20th century economists and taught some of the most famous ones.

#### Consumer Surplus

One of Marshall's most useful contributions related to the interpretation of demand curves. He realized that an individual's demand for a certain item can be seen in two ways. Figure A shows the demand for pizza by an individual pizza consumer. Recall that an individual's demand curve tells us how much a person is willing to spend on each unit of the product—in other words, what her quantity demanded is at each price. The curve shows that this consumer will buy one pizza at a price of \$12, two pizzas at a price of \$9 each, and three pizzas at a price of \$6 each. According to Marshall, the demand curve can also be viewed in the opposite way. The height of the demand curve at each quantity is the maximum price the consumer is willing to pay for that unit. Therefore, in this example, the consumer is willing to pay up to \$12 for her first pizza of the week, \$9 for her second, and \$6 for her third.

#### Marginal Benefit

The maximum price a consumer will pay for a certain unit of a product indicates the extra satisfaction, expressed in dollar terms, that he or she receives from consuming that unit. This marginal benefit is closely associated with marginal utility—Jevons' notion of extra satisfaction gained—but is measured in dollars instead of imaginary "utils." While our pizza consumer gains \$12 worth of marginal benefit from her first pizza of the week, the second pizza gives her \$9 in marginal benefit, and the third only \$6, regardless of the actual price.

#### Total Benefit

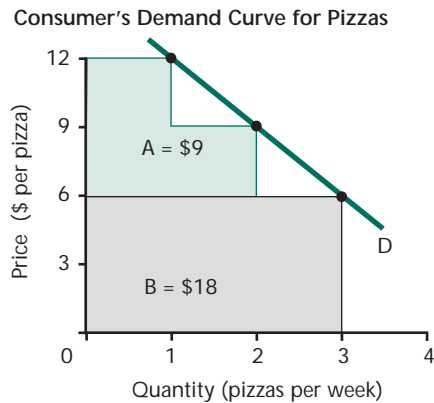
Since any total value is simply the sum of all possible marginal values, it is possible to use marginal benefits to find the consumer's total benefit—in this case, the total amount of satisfaction derived from eating pizzas during the entire week. Our consumer receives marginal benefits of \$12, \$9, and \$6 for the first three pizzas she eats each week. The sum of these three numbers—\$27—gives the total benefit gained weekly from pizza consumption. This total benefit is shown as area AB under the demand curve, between 0 and 3 pizzas.

#### Consumer Expenditure

A consumer's expenditure on a product is simply the market price multiplied by the number of units purchased. With a price of \$6 and her consumption of three pizzas per week, our consumer faces a weekly bill of \$18. This dollar amount, which represents revenue to the seller, is shown as area B on the graph.

**Figure A** Consumer Surplus for an Individual

Consumer's Demand Schedule for Pizzas		
Price (\$ per pizza)	Quantity Demanded (pizzas)	Total Benefit (\$)
	(D)	
\$12	1	12
9	2	21 (12 + 9)
6	3	27 (12 + 9 + 6)



The consumer pays \$6 for each of the 3 pizzas but gets more marginal benefit from the first 2 pizzas. At 2 pizzas, for example, the \$9 marginal benefit can be split into the \$6 market price and the \$3 surplus for that pizza. The consumer's total benefit from eating pizzas is area AB, and the total expenditure is area B. So, consumer surplus is area A.

## Consumer Surplus

Marshall realized that individuals usually receive more satisfaction from consuming a product than they actually pay for it. This consumer surplus is defined as the net benefit to the consumer from buying a product at its market price and is found by subtracting the consumer's expenditure from the total received benefit. In the case of our pizza-lover, her consumer surplus from pizzas is \$9 (\$27 – \$18). On the graph, consumer surplus is the difference between total benefit (area AB) and expenditure (area B), giving area A.

With the help of the market demand curve, the notion of consumer surplus can be extended to an entire market, as illustrated for the pizza market in Figure B. The market demand curve shows that at a price of \$6, consumers buy 100 000 pizzas per week. By adding together the marginal benefits for each consumer, total benefit appears as the entire area AB beneath the demand curve, up to a quantity demanded of 100 000 pizzas. In contrast, total expenditure equals the rectangular area B. Because 100 000 pizzas are purchased at \$6, this area equals \$600 000 ( $\$6 \times 100\,000$ ). The consumer surplus for the entire market is the difference between total benefit (area AB) and total expenditure (area B), or the triangular area A. Because this triangle has a height of \$10 ( $\$16 - \$6$ ) and a width of 100 000, its area equals \$500 000 [ $(\$10 \times 100\,000) \div 2$ ].

## Relevance for Today

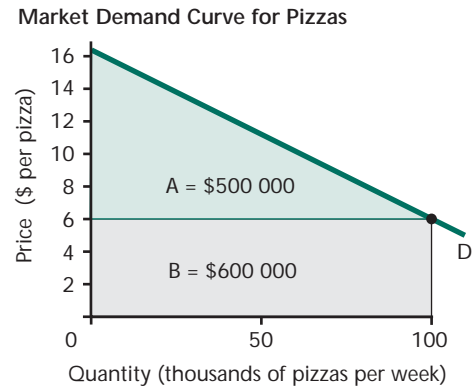
Marshall's concept of consumer surplus for an entire market has a wide range of applications.<sup>1</sup> In evaluating a government policy, such as rent controls or price supports, economists often try to calculate the policy's effect on consumer surplus in the affected market. If the consumer surplus is larger with the policy than without it, then the policy is worthwhile, since it increases the net benefit to consumers. Using the notion of consumer surplus in this way assumes that people's satisfaction can be added together in dollar terms, a simplification that is not always appropriate. However, as a rough guide to how different policies affect consumer welfare, the concept is extremely useful.

<sup>1</sup> Marshall's notion of consumer surplus was anticipated by the pathbreaking theoretical work of a French engineer, Jules Dupuit. Marshall claimed to have developed his own ideas independently of Dupuit.

## ADVANCING ECONOMIC THOUGHT

**Figure B** Consumer Surplus for a Market

Market Demand Schedule for Pizzas	
Price	Quantity Demanded
(\$ per pizza)	(thousands of pizzas)
\$16	0
11	50
6	100



When consumers in the pizza market are charged a price of \$6, they consume 100 000 pizzas. Adding up consumers' marginal benefits for all these pizzas gives a total benefit in the market equal to area AB. At the same time, consumers' total expenditure on pizzas is area B. The total consumer surplus in the market is found by subtracting area B from area AB, so it is equal to area A.

Market Demand Schedule for Water		Market Demand Schedule for Diamonds	
Price (\$ per litre)	Quantity Demanded (millions of litres per year)	Price (\$ per carat)	Quantity Demanded (thousands of carats per year)
\$1000	0	\$500	0
800	0.2	400	50
600	0.4	300	100
400	0.6	200	150
200	0.8	100	200
0	1.0	0	250

- Early economists, including Adam Smith, argued that utility could not be the main determinant of a product's price. To prove this point, they cited a puzzling fact known as the paradox of value. Some of the most useful items, such as water, are very inexpensive, while other items that have little real usefulness, such as diamonds, are very expensive.
  - Define consumer surplus and use the hypothetical demand schedules for water and diamonds in the table above to calculate the consumer surplus for each of these products if water is freely available while diamonds have a price of \$100 per carat.
  - On the basis of your answer to part a., outline how the concept of consumer surplus can be used to explain the paradox of value.
- A market for economics textbooks in a certain country exhibits a linear demand curve, with an annual quantity demanded of 80 000 books at a price of \$40, 40 000 at a price of \$60, and 0 at \$80.
  - Graph the demand curve and calculate the consumer surplus in the market if the price is \$40.
  - The government now imposes a tax of \$20 per economics textbook sold in the country, which increases the price to \$60. What happens to the consumer surplus?
  - The revenues from this tax are used to reduce the price of economics textbooks sold in a distant low-income country. As a result, the consumer surplus for economics students in the foreign country rises by \$1 million. Is the loss to domestic students outweighed by the gain for foreign students? Explain.
  - What assumption is this analysis based on?

## For the Public Good

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# The Economic Role of Government

So far, we have looked at some of the ways government intervenes in private markets. But in mixed economies, such as Canada's, government also has an independent economic role. In Canada, this role is a relatively recent creation. Before the 1930s, federal and provincial governments maintained the legal system and provided education up to the secondary school level. But health care and universities were left largely in the hands of the private sector, and unemployment insurance was not available. In comparison to the present, a *laissez faire* attitude characterized the relationship between the public sector and the business sector.

Change began with the Great Depression of the 1930s. Faced with widespread unemployment and deprivation, government officials were forced to attend to the economic welfare of Canadian citizens. From the 1930s to the 1990s, the role of Canadian governments continued to expand. Now, the public sector in Canada provides a host of programs: payments to adults with children, retirement funds for the elderly, insurance for unemployed workers, welfare payments for those who cannot work, subsidies for higher education, free health care, free schooling, and subsidized public housing for low-income families. These programs are provided by all three levels of government, though the federal and provincial governments take the leading role.

### Federal Spending Programs

There are four main federal spending programs for households. These are known as transfer payments, since funds are transferred as a way of increasing households' economic welfare rather than in exchange for products or the supply of resources. The Seniors Benefit provides monthly payments to Canadian residents 65 years and over, with higher dollar amounts for those with the lowest incomes. The Child Tax Credit provides payments to low-income parents of children under 18 years old. Employment Insurance (EI) is a federally run insurance program, funded by compulsory contributions from employees and their employers, to aid people unemployed

because of layoffs, temporary sickness, or the birth or adoption of a child. Finally, the Quebec and Canada Pension Plans (QPP and CPP) provide workers in Quebec and the rest of Canada with payments after retirement, financed by compulsory contributions from employees and their employers.

### Other Spending Programs

Provincial and territorial governments finance the costs of health care, provide subsidies for post-secondary education that translate into reduced tuition fees for students, and (with the help of municipalities) offer welfare services to single-parent families with low incomes, individuals who are unable to find work due to disabilities, and families in crisis. Under the Canada Health and Social Transfer (CHST), the federal government pays for a portion of these costs by providing cash grants and personal income tax revenues to provincial and territorial governments.

Figure A shows the expenditures of the three levels of government. For the federal government, the most important category of expenditure is debt charges, which are interest payments on the government's own debt, followed by transfer payments to persons. The expenditures of provincial and local governments are more heavily weighted towards purchases of goods and services, although transfers to persons are also an important component of total provincial spending.

### Taxation

To pay for their spending, Canadian governments use five main types of taxation: personal income taxes, sales taxes, excise taxes, property taxes, and corporate income taxes.

#### Personal Income Taxes

Personal income taxes are collected by the federal government, proceeds being shared with the provinces and territories (except in Quebec and Alberta, where federal and provincial income taxes are collected separately). Households pay taxes not only on their income from supplying resources but also on any transfer payments they receive. Households also pay income tax on capital gains, which are earnings from selling an asset, such as a bond or a piece of land at a higher price than it was purchased for.

**Figure A** Government Expenditures

Federal (2002–2003) (\$ billions)		Provincial (2002) (\$ billions)		Local (2002) (\$ billions)	
Transfers to persons		Goods and services	133.0	Goods and services	71.0
Benefits to the elderly	25.8	Transfers to		Transfers to	
Employment insurance		Persons	28.7	Persons	3.6
benefits	15.1	Businesses	8.1	Businesses	1.1
Transfers to other levels		Governments	32.4	Provinces	0.9
of government	32.8	Debt charges	26.9	Debt charges	3.1
Direct program			229.1		78.9
spending	65.0				
Debt charges	37.2				
	<u>175.8</u>				

Federal government spending for the budgetary year of 2002–2003 was dominated by transfer payments to persons and debt charges, which together make up almost half of federal spending. The main components of provincial spending are expenditures on goods and services, and transfers to persons and municipalities. Expenditures on goods and services dominate local government spending.

Source: Statistics Canada “Government Expenditures,” adapted in part from the Statistics Canada publication “National Income and Expenditures Accounts,” Catalogue 13-001, April 2003, pp. 53, 54, 55.

Households may be allowed a variety of deductions (such as contributions to registered retirement savings plans) that reduce the dollar amount on which they are taxed. This amount, known as taxable income, is the basis on which income tax is determined. The tax a household pays rises with taxable income, with tax rates also gradually rising as a household’s taxable income increases. These rates are called marginal tax rates, meaning they are calculated as percentages of each extra dollar of taxable income. There are four marginal tax rates in the federal income tax system—16 percent on income up to approximately \$30 000, 22 percent on income between \$30 000 and approximately \$60 000, 26 percent on income between \$60 000 and approximately \$100 000, and 29 percent on income in excess of \$100 000. Once total tax owing has been calculated, households may also claim a variety of tax credits, which directly reduce their tax bill.

Before 2000, all provinces except Quebec levied provincial income taxes as a percentage of the federal tax bill added onto the taxpayer’s tax bill. But by 2001, this setup ended, as all provinces moved to levy their own income taxes independently of those set by the federal government. Newfoundland has the highest taxes for high-income earners, with these households paying a combined federal and provincial tax rate of 48.64 percent in 2002. In contrast, residents of Nunavut

enjoy the lowest rate for high-income earners, with these households paying a combined rate of 40.5 percent in 2002.

As shown in Figure B, personal income taxes are the most important tax in terms of overall revenue.

### Sales and Excise Taxes

Sales and excise taxes are levied by both federal and provincial governments on goods and services. Sales taxes are usually charged on a wide range of goods and services and are calculated as a percentage of the prices of these products. In contrast, excise taxes are charged on particular products, such as gasoline, liquor, and tobacco, and are often expressed as a dollar amount per unit of quantity, rather than in terms of percentages of product price.

### Property Taxes

Property taxes are charged by local governments on buildings and land. For taxation purposes, these assets are assigned a value—often not their potential price in the real estate market, but some arbitrary dollar amount set in the past. Then, each year, the local government establishes a tax rate in terms of mills (or thousands) of property value. For example, a mill rate of 80 means that property owners are charged \$80 for each \$1000 in property value.

**Figure B** Tax Revenues for All Levels of Government (2002)

	Percent of Gross Domestic Product	Percent of Total Taxes
Personal income taxes	12.7	41.6
Sales and excise taxes	7.8	25.4
Property taxes	3.6	11.7
Corporate income taxes	3.5	11.0
Miscellaneous taxes	3.2	10.3
	<u>30.8</u>	<u>100.0</u>

Personal income taxes are the most important single source of revenue for the state, followed by sales and excise taxes, property taxes, and corporate taxes.

Source: Karin Treff and David B. Perry, *Finances of the Nation 2002* (Toronto: Canadian Tax Foundation, 2002) A: 4.

### Corporate Income Taxes

Corporate income taxes are paid by corporations to governments as a percentage of their annual profits. As with personal income taxes, corporations are allowed to make deductions from their total income in calculating taxable profit. The resulting dollar amount is then taxed at a constant marginal rate by the federal government (27 percent in 2001), with most provincial governments “piggybacking” on this rate.

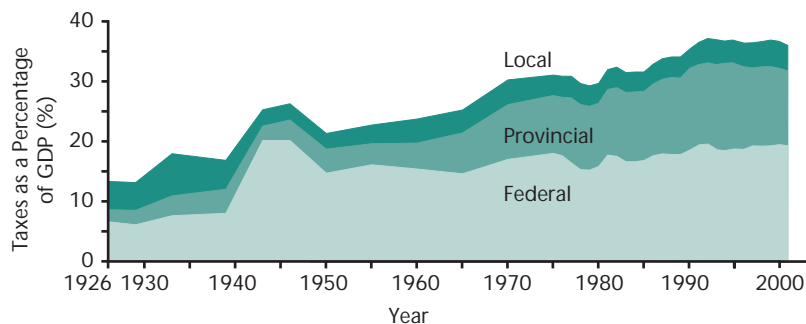
### Debates over Government's Economic Role

As shown in Figure C, taxes by all three levels of government in Canada have increased considerably over the past decades in relation to the size of the entire economy.

Are the amounts we pay in taxes well spent?

This is a question subject to perennial debate, not just in Canada but in other countries as well.

Critics of government argue that its economic role suffers from a variety of serious problems. Most importantly, the supply of economic resources can be reduced by government's economic involvement. By reducing the income gained from productive activity, taxes can sometimes discourage employment and business investment. Moreover, spending programs, such as welfare and employment insurance, can have their own effect on the economic decisions we make. For example, welfare recipients may receive more income from welfare than they would upon initially entering the workforce, while habitual claimants of employment insurance may be reluctant to move from occupations and regions of

**Figure C** Government Taxes and the Canadian Economy

Since the 1920s, the increasing importance of the public sector in the Canadian economy has led to increased taxes (including contributions for such programs as Employment Insurance and CPP/QPP) in relation to the size of the economy. While taxes represented just over 10 percent of Gross Domestic Product (GDP) in 1926, they represented just under 40 percent by 2002.

Sources: Statistics Canada “Government Taxes and the Canadian Economy,” data adapted from the Statistics Canada publication “National Income and Expenditure Accounts: Annual Estimates,” 1926–1986, Catalogue 13-531, April 1989 and from the Statistics Canada CANSIM II database <http://cansim2.statcan.ca>, Table 380-0007.

the country where there is considerable risk of unemployment.

Government spending is criticized for other reasons as well. Some programs, such as employment insurance, are paid both to well-off individuals as well as those in need, making the programs more expensive than necessary. Government programs can also be hampered by overlapping bureaucracies, high administrative costs, and a lack of focus. Critics contend that these inefficiencies mean that government spending is often wasteful and badly managed.

Other observers are willing to admit that Canada's mix of public spending and taxation is not as effective as it could be. But they also argue that we need to see these problems in perspective, especially when we realize that private markets, too, are subject to a variety of flaws. When viewed in this light, government's economic role is something that must be improved rather than necessarily reduced. Regardless of these arguments, there is no doubt that government's role in the economy will continue to be a vital one in the foreseeable future.

1. Which form of taxation do you think has the greatest disincentive effect of productive activity in the economy? Which form of taxation do you think has the least disincentive effect?
2. Provincial tax levels have grown rapidly in the past few decades, as shown in Figure C. Can you make any argument for why provincial governments have needed to increase their spending so rapidly during this period?