

Chapter

3

SUPPLY AND DEMAND: AN INTRODUCTION

Chapter Outline

- 3.1 Markets and Prices**
- 3.2 Markets and Social Welfare**
- 3.3 Explaining Changes in Prices and Quantities**

The stock of foodstuffs on hand at any moment in Toronto's grocery stores, restaurants, and private kitchens is sufficient to feed the city's 2.5 million residents for at most a week. Since most of these residents have nutritionally adequate and highly varied diets, and since almost no food is produced within the city, provisioning Toronto requires that millions of kilograms of food and drink be delivered to locations throughout the city each day.

No doubt many Torontonians, buying groceries at their favourite local markets or eating at their favourite Italian, Chinese, and Indian restaurants, give little or no thought to the nearly miraculous coordination of people and resources that is required to feed city residents daily. Even if the supplying of Toronto consisted only of transporting a fixed collection of foods to a given list of destinations each day, it would be quite an impressive operation, requiring at least a small army (and a well-managed one) to carry out.

The entire process is astonishingly more complex than that. For example, the system must somehow ensure that not only *enough* food is delivered to satisfy Torontonians' discriminating palates but also the *right kinds* of food. There mustn't be too much bacon and not enough eggs, or too much caviar and not enough canned tuna, and so on. Similar judgments must be made *within* each category of food and drink: There must be the right amount of Swiss cheese and the right amounts of provolone, Gorgonzola, and feta, and a different variety of herbs and seasonings for each type of cuisine.

But even this doesn't begin to describe the complexity of the decisions and actions required to provide our nation's largest city with its daily bread. Someone has to decide where each particular type of food gets produced, and how, and by whom. Someone must decide how much of each type of food gets delivered to *each* of the thousands of restaurants and grocery stores in the city. Someone must determine whether the deliveries should be made in big trucks or small ones, arrange that the trucks be in the right place at the right time, and ensure that fuel and qualified drivers are available.

Thousands of individuals must decide what role, if any, they will play in this collective effort. Some people—just the right number—must choose to drive food delivery trucks, rather than trucks that deliver lumber. Others must become the mechanics who fix these trucks, rather than carpenters who build houses. Others must become farmers, rather than architects or bricklayers. Still

others must become chefs in upscale restaurants, or flip burgers at McDonald's, instead of becoming plumbers or electricians.

Yet despite the huge number and complexity of the tasks involved, somehow the supplying of Toronto manages to get done remarkably smoothly. A grocery store will occasionally run out of flank steak, or a diner will sometimes be told that someone else has just ordered the last serving of roast duck. But if episodes like these stick in memory, it is only because they are rare. For the most part, Toronto's food delivery system—like that of every other city in the country—functions so seamlessly that it attracts virtually no notice.

In this chapter we'll explore how markets allocate food, housing, and other goods and services, usually with remarkable efficiency despite the complexity of the tasks. To be sure, markets are by no means perfect, and our stress on their virtues is to some extent an attempt to counteract what most economists view as an underappreciation by the general public of their remarkable strengths. In the course of our discussion we will see why, under fairly general circumstances, markets function so smoothly. We will also discuss the circumstances under which markets, left to themselves, cannot be expected to function well.

To convey an understanding of how markets work is a major goal of this course, and in this chapter we provide only a brief introduction and overview. As the course proceeds we will discuss the economic role of markets in considerably more detail, paying attention to some of the problems of markets as well as their strengths.

No society—regardless of how it is organized—can escape the need to answer certain basic economic questions. For example, how much of our limited time and other resources should we devote to building housing, how much to the production of food, and how much to providing other goods and services? What techniques should we use to produce each good? Who should do each specific task? And how should the resulting goods and services be distributed among people? In Canada, as elsewhere, the market plays a crucial role. Therefore, we need to understand how (and why) markets can often successfully answer these questions—and also how (and why) they may sometimes fail.

3.1 MARKETS AND PRICES

Beginning with some basic concepts and definitions, we will explore how the interactions among buyers and sellers in markets determine the prices and quantities of the various goods and services traded in those markets. We begin by defining a market: The **market** for any good consists of all the potential buyers and sellers of that good. For any good, we should specify the time and the place at which it is bought and sold. So, for example, the market for hamburgers on a given day in a given place is just the set of people (or other economic actors, like firms) potentially able to buy or sell hamburgers at that time and location.

market the market for any good consists of all potential buyers and sellers of that good

In the market for hamburgers, sellers comprise the individuals and companies that either do sell—or might, under the right circumstances, sell—hamburgers. Similarly, buyers in this market include all individuals who buy—or might buy—hamburgers.

In most parts of Canada a cooked hamburger can still be had for less than \$5. Where does the market price of hamburgers come from? Looking beyond hamburgers to the vast array of other goods that are bought and sold every day, we may ask, “Why are some goods cheap and others expensive?”

Adam Smith and other early economists (including Karl Marx) thought that the market price of a good was determined by its cost of production. But although costs surely do affect prices, they cannot explain why one of Pablo Picasso's paintings sells for so much more than one of A.J. Casson's.

Stanley Jevons and other nineteenth-century economists tried to explain price by focusing on the value people derived from consuming different goods and services. It certainly seems plausible that people will pay a lot for a good they value highly. Yet willingness to pay cannot be the whole story, either. A person deprived of water in the desert, for example, will be dead in a matter of hours, and yet water from a municipal system sells for a tiny fraction of a penny per litre. By contrast, human beings can get along perfectly well without gold, and yet gold sells for about \$500 Canadian an ounce.

Cost of production? Value to the user? Which is it? The answer is that both matter. Writing in the late nineteenth century, the British economist Alfred Marshall was among the first to show clearly how costs and value interact to determine both the prevailing market price for a good and the amount of it that is bought and sold. Our task in the pages ahead will be to explore Marshall's insights and gain some practice in applying them. As a first step, we introduce the two main components of Marshall's pathbreaking analysis: the supply curve and the demand curve. [His famous analogy was that demand and supply are like the two blades of a scissors, since each by itself can explain little, but together they can cut through to the essence of many issues.¹]

THE SUPPLY CURVE

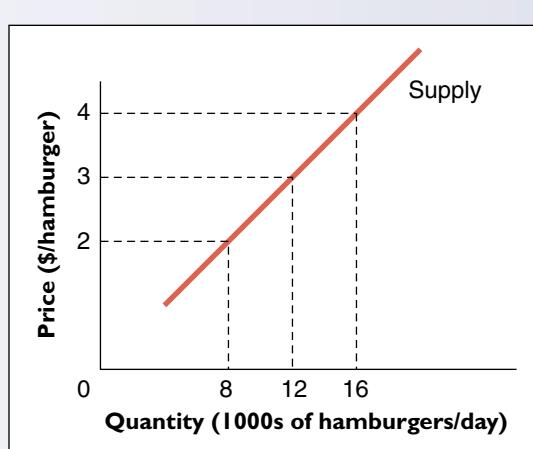
supply curve a curve or schedule showing the total quantity of a good that sellers want to sell at each price

In the market for hamburgers, the supply curve of hamburgers is a simple schedule, or graph, that tells us, for each possible price of hamburgers, how many hamburgers all hamburger sellers together would be willing to sell at that price.

What does the supply curve of hamburgers look like? The answer is based on the logical assumption that people will be willing to produce and sell hamburgers as long as the price they receive for them is sufficient to cover their opportunity costs of supplying them. Thus, if what people could earn by selling hamburgers is not sufficient to compensate them for what they could have earned if they had spent their time and invested their money in some other way, they will not sell hamburgers. Otherwise, they will.

Figure 3.1 provides a possible illustration. Note that it shows the relationship between the *price* and *quantity supplied* of the same type and quality of good. Economists know perfectly well that some hamburgers are bigger than others (and consequently sell for a higher price), but we want to focus on the role played by prices

FIGURE 3.1
The Daily Supply Curve of Hamburgers in Downtown Toronto
At higher prices, sellers generally offer more units for sale. The supply curve is upward sloping.



¹"We might as reasonably dispute whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper, as whether value is governed by utility or cost of production." Alfred Marshall, *Principles of Economics*, 8th ed., London: Macmillan & Co Ltd, 1964 (1920), p. 290.

in the market mechanism. So we will simplify by making the assumption that we can draw a supply curve for a particular type of hamburger; for example, one made with six ounces of well-done, grade A beef and garnished with relish. The most straightforward way to define “quantity supplied” in a given amount of time is “the number of units of a specific good, with given characteristics, produced and sold in a given market.” We therefore think of other, similar goods (larger or smaller hamburgers, hotdogs, etc.) as being sold in other, different markets—recognizing that because these goods cater to similar wants, the markets for them are linked.

In general, people differ with respect to their opportunity costs of producing and selling hamburgers: For those with limited education and work experience, the opportunity cost of selling hamburgers is relatively low (because such individuals typically do not have a lot of high-paying alternatives). For others, the opportunity cost of selling burgers is of moderate value, and for still others—like rock stars and professional athletes—it is prohibitively high. Because of these differences among people in the opportunity cost of selling hamburgers, the daily supply curve of hamburgers will be *upward sloping* as shown in Figure 3.1, which exhibits a hypothetical supply curve for the hamburger market in downtown Toronto on a given day. (Although economists usually refer to demand and supply “curves,” to keep things simple we often draw them as straight lines in examples.)

Why is the supply curve for hamburgers upward sloping? When the price of hamburgers is low—say, \$2 per hamburger—only those people whose opportunity cost of selling hamburgers is less than or equal to that amount will offer hamburgers for sale. For the supply curve shown in Figure 3.1, the quantity supplied at a price of \$2 will be 8000 hamburgers per day. In that example, 8000 hamburgers is the total quantity of hamburgers offered for sale by people whose opportunity cost of selling hamburgers is \$2 per hamburger or less. If the price of a hamburger were to rise above \$2, however, additional sellers would find it worthwhile to offer hamburgers for sale. For example, at a price of \$3, Figure 3.1 shows that the quantity of hamburgers supplied is 12 000 per day, while at a price of \$4, the quantity supplied is 16 000. The higher the price, the more people find it worthwhile to supply hamburgers.

The fact that the supply curve slopes upward may be seen as a consequence of the principle of increasing opportunity cost, discussed in Chapter 2. This principle tells us that as we expand the production of hamburgers, we turn first to those whose opportunity costs of producing hamburgers are lowest and only then to others with higher opportunity costs.

Stated another way, the fact that the supply curve for a good is upward sloping reflects the idea that the cost of producing an additional unit of the good rises as we produce more of it. If sellers are currently supplying 12 000 hamburgers a day in Figure 3.1, for example, the opportunity cost of the last hamburger produced (including the cost of meat, bun, etc., as well as the value of the supplier’s time) must be \$3. (If sellers could produce a 12 001st hamburger for less than that, they would have an incentive to supply it, since they can sell it for \$3, which is more than it cost them to produce it. And if the cost of producing the 12 000th hamburger were greater than \$3, it would not have been offered for sale at that price.) By similar reasoning, when the total quantity of hamburgers is 16 000, the opportunity cost of producing another hamburger must be \$4.



THE DEMAND CURVE

The supply curve, by itself, does not tell us how many hamburgers will be sold in downtown Toronto on a given day, or at what price those hamburgers will sell. To find the prevailing price and quantity, we also need the demand curve for hamburgers in this market. The **demand curve** is a graph that tells us the total quantity of hamburgers that buyers want to buy at various prices.

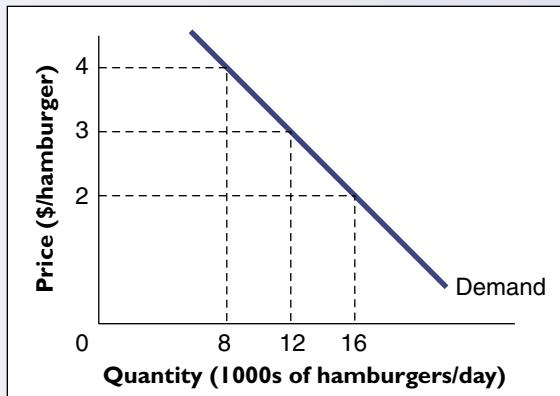
demand curve a curve or schedule showing the total quantity of a good that buyers want to buy at each price

Typically, the demand curve for a good is downward sloping with respect to the price of that good. For example, the demand curve for hamburgers tells us that the higher the price of hamburgers becomes, the fewer hamburgers buyers as a whole will want to buy. Thus the daily demand curve for hamburgers in downtown Toronto might look like the curve shown in Figure 3.2.

FIGURE 3.2

The Daily Demand Curve for Hamburgers in Downtown Toronto

The demand curve for any good is a generally downward-sloping function of its price. At lower prices, buyers generally want to purchase more units.



The demand curve in Figure 3.2 tells us that when the price of hamburgers is low—say, \$2 per hamburger—buyers will want to buy 16 000 hamburgers per day, whereas they will want to buy only 12 000 at a price of \$3 and only 8000 at a price of \$4. The demand curve for hamburgers slopes downward for two reasons. First, as hamburgers become less expensive, some people switch to hamburgers from chicken sandwiches, pizza, and other foods that substitute for hamburgers. Second, people who already consumed hamburgers simply can buy more hamburgers when prices are lower.

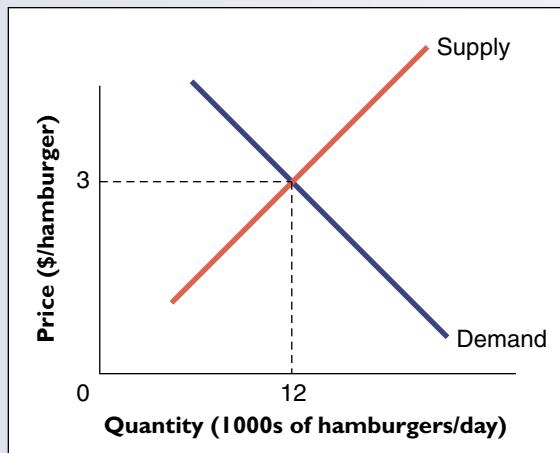
MARKET EQUILIBRIUM

equilibrium a stable, balanced, or unchanging situation in which all forces at work within a system are cancelled by others

The concept of **equilibrium** is employed in both the physical and social sciences and is of central importance in economic analysis. We use the term “equilibrium” to denote a “state of rest” of the market under analysis. In general, a system is in equilibrium when there is no tendency for the system to change further. In physics, for example, a ball hanging from a spring is said to be in equilibrium when the spring has stretched sufficiently that the upward force it exerts on the ball is exactly counterbalanced by the downward force of gravity. In economics, a market is said to be in equilibrium when no participant in the market has any reason to alter his or her behaviour so that there is no tendency for production or prices in that market to change.

If we want to determine the final position of a ball hanging from a spring, (recognizing that it may bounce for a while, but will eventually settle down) we need to find the point at which the forces of gravity and spring tension are balanced and the system is in equilibrium. Similarly, if we want to find the price at which a good will sell (which we will call the **equilibrium price**) and the quantity of it that will be sold (the **equilibrium quantity**) (when the market has settled down), we need to find the equilibrium in the market for that good. The basic tools for finding the equilibrium in a market for some good are the supply and demand curves for that good. The price and quantity at which the supply and demand curves for the good intersect is such an equilibrium. For the hypothetical supply and demand curves for hamburgers in downtown Toronto, the equilibrium price will therefore be \$3 per hamburger, and the equilibrium quantity of hamburgers sold will be 12 000 per day, as shown in Figure 3.3, which combines Figures 3.1 and 3.2.

equilibrium price and equilibrium quantity the price and quantity of a good at the intersection of the supply and demand curves for the good

**FIGURE 3.3**

The Equilibrium Price and Quantity of Hamburgers in Downtown Toronto

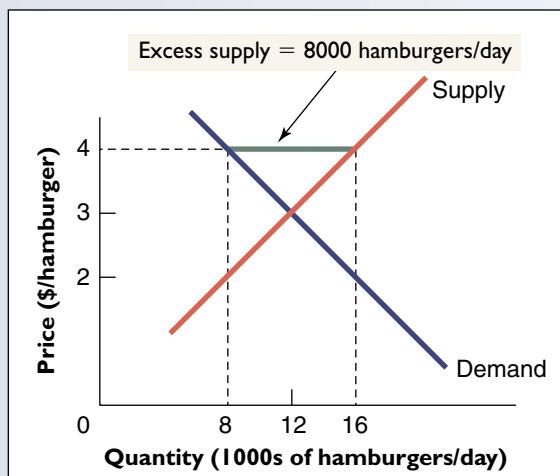
The equilibrium quantity and price of a product are the values that correspond to the intersection of the supply and demand curves for that product.

In Figure 3.3, note that at the equilibrium price of \$3 per hamburger, both sellers and buyers are “satisfied” in the following sense: Buyers are buying exactly the quantity of hamburgers they want to buy at that price (12 000 per day) and sellers are selling exactly the quantity of hamburgers they want to sell (also 12 000 per day). And since they are satisfied in this sense, neither buyers nor sellers face any incentives to change their behaviour.

Note the limited sense of the term *satisfied* in the definition of **market equilibrium**. It does not mean that sellers would not be pleased to receive a price higher than the equilibrium price. Rather, it means only that they are able to sell all they wish to sell at that price. Similarly, to say that buyers are satisfied at the equilibrium price does not mean that they would not like to have a higher income or that they would not be happy to pay less than the equilibrium price. Rather, it means only that, given their incomes, they are able to buy exactly as many units of the good as they want to at the equilibrium price.

Note also that if the price of hamburgers in our downtown Toronto market was anything other than \$3, either buyers or sellers would not be satisfied. Suppose, for example, that the price of hamburgers was \$4, as shown in Figure 3.4. At that price, buyers want to buy only 8000 hamburgers per day, but sellers want to sell 16 000. Since no one can force someone to buy a hamburger against his or her wishes, this means that buyers will buy only the 8000 hamburgers they want

market equilibrium occurs when all buyers and sellers are satisfied with their respective quantities at the market price

**FIGURE 3.4**

Excess Supply

When price exceeds the equilibrium price, there is **excess supply**, or **surplus**, that is equal to the difference between quantity supplied and quantity demanded.

excess supply, or surplus the difference between the quantity supplied and the quantity demanded when the price of a good exceeds the equilibrium price; sellers are dissatisfied when there is excess supply

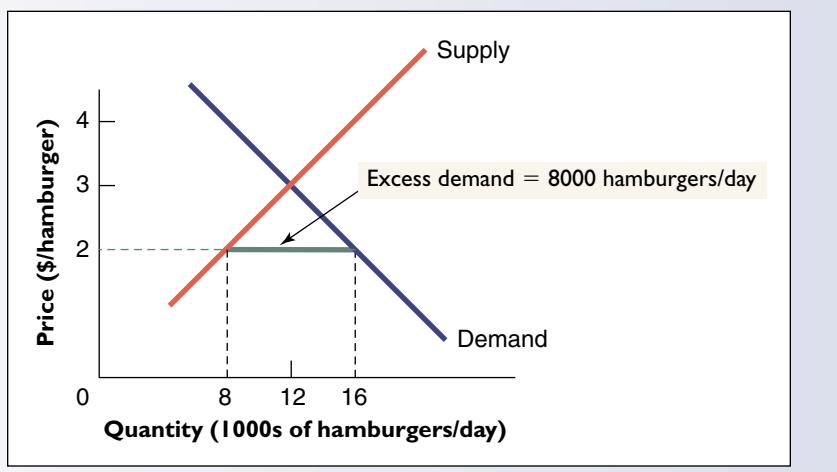
to buy. So when the price exceeds the equilibrium price, sellers will be dissatisfied. At a price of \$4 in this example, they are left with an **excess supply, or surplus**, of 8000 hamburgers per day. (Note that the term *surplus* has a different meaning when used to denote excess supply than when used to denote economic surplus.)

Conversely, suppose that the price of hamburgers in the downtown Toronto market was less than the equilibrium price, say, \$2 per hamburger. As shown in Figure 3.5, buyers want to buy 16 000 hamburgers per day at that price, whereas sellers want to sell only 8000. Since sellers cannot be forced to sell hamburgers against their wishes, this time the buyers will be dissatisfied. At a price of \$2 in this example, they experience an **excess demand, or shortage**, of 8000 hamburgers per day.

FIGURE 3.5

Excess Demand

When price lies below the equilibrium price, there is excess demand, the difference between quantity demanded and quantity supplied.



excess demand, or shortage the difference between the quantity supplied and the quantity demanded when the price of a good lies below the equilibrium price; buyers are dissatisfied when there is excess demand

Markets for goods and services often tend toward their respective equilibrium prices and quantities. The mechanisms by which this happens are implicit in our definitions of excess supply and excess demand. Suppose, for example, that the price of hamburgers in our hypothetical market was \$4, leading to excess supply as shown in Figure 3.4. Because sellers are dissatisfied—because they sell more hamburgers than buyers want to buy, they have an incentive to take whatever steps they can to increase their sales. A simple strategy is for them to cut their price slightly. Thus, if one seller reduced his price from \$4 to, say, \$3.95 per hamburger, he could attract many of the buyers who had been paying \$4 for hamburgers supplied by other sellers. Those sellers, to recover their lost business, would then have an incentive to match the price cut. But notice that if all sellers lowered their prices to \$3.95, there would still be considerable excess supply in the hamburger market. So sellers would face continuing incentives to cut their prices. This pressure to cut prices will not go away until the price falls all the way to \$3. At \$3, excess supply is zero.

Conversely, suppose that price starts out less than the equilibrium price, say, \$2 per hamburger. This time it is the buyers who are dissatisfied. A person who cannot get all the hamburgers she wants at a price of \$2 has an incentive to offer a higher price, hoping to obtain hamburgers that would otherwise have been sold to other buyers. And sellers, for their part, will be only too happy to post higher prices as long as queues of dissatisfied buyers remain.

The upshot is that price has a tendency to move to its equilibrium level under conditions of either excess supply or excess demand. And when price reaches its equilibrium level, both buyers and sellers are satisfied simultaneously since they are able to buy or sell precisely the amounts they choose, given their incomes.

We emphasize that the mere fact that buyers and sellers are satisfied in this sense does not mean that markets automatically result in the best of all possible

worlds. For example, a poor person may be satisfied with the one hamburger he chooses to buy each day at a price of \$3, but still be hungry—in this case, he is satisfied only in the sense that he cannot buy a second hamburger without sacrificing other urgent purchases.

It is also important to emphasize that the equilibrating process depends on competition among many buyers and sellers, all of whom are small relative to the size of the market. If all sellers are small, no seller has the ability to increase the price of hamburgers above the equilibrium price by restricting the quantity supplied. For example, if all sellers are small, no seller can raise the price of hamburgers to \$4 by restricting the quantity to 8000 hamburgers per day. Why? Because at \$4, other sellers will be perfectly willing to compete for buyers by increasing the quantity of hamburgers, while offering a somewhat lower price.

Similarly, if all buyers are small, no buyer can reduce price below the equilibrium price, say to \$2, by announcing that no more than \$2 will be paid for a hamburger. Why? Because at \$2 only 8000 hamburgers/day will be supplied, and other buyers will compete for hamburgers by offering a somewhat higher price.

SUPPLY AND DEMAND: AN ANALYSIS OF FOREIGN EXCHANGE MARKETS

Supply and Demand are (as Alfred Marshall put it) like the two blades of a scissors. Each, by itself, is incomplete—but together they can cut through to the essence of many economic issues. We can use the tools of Supply and Demand Analysis to explain both micro-markets where only a few thousand dollars change hands and also to understand the flow of the hundreds of billions of dollars that are traded every day in foreign exchange markets.

Every day in financial markets, people in the U.K., Norway, India, and many other countries around the world pay in pounds, kroner, and rupees to buy Canadian dollars. In the financial pages of your daily newspaper, you can read the exchange rate of one Canadian dollar that results from these trades. For example, you might read that today one Canadian dollar is worth \$0.7541 U.S. or \$1.0934 Australian or 0.7065 Euros; the financial pages provide the price of one Canadian dollar in terms of many other currencies. These prices are called **foreign exchange rates**. A *foreign exchange rate* is the price of one unit of a country's currency in terms of another country's currency and is determined in foreign exchange markets.

Analyzing the supply and demand for foreign exchange is a useful example of how competitive markets work because there are so many potential buyers and sellers, and foreign exchange markets adjust very quickly. As well, the foreign exchange rate is very important for the Canadian economy, so understanding how this market works is an important issue for any economics student. Nevertheless, there is a complication. When it comes to currencies, we can always express prices in two equivalent ways. We can either say, "Ten dimes equal a dollar" or, "One dime equals a tenth of a dollar." Saying it one way is just the flip side of the other—it is just a question of perspective—and the same is true of foreign currencies.

If you were to check the financial pages for the exchange rate of the Canadian dollar against the Euro, and find a quote of \$1.4154 per Euro, the exchange rate being expressed is the price of one Euro in terms of Canadian dollars—one Euro will cost \$1.4154. But one could equally well see this as the price of one Canadian dollar in terms of Euros (which we said in a previous paragraph was €0.7065.) If it takes \$1.4154 to buy one Euro, then:

$$1\text{€} = \$1.4154.$$

If we divide both sides of the expression by 1.4154, then:

$$\$1 = €0.7065,$$

foreign exchange rate the price of one unit of a country's currency in terms of another country's currency. Foreign exchange rates are determined in foreign exchange markets.

which simply says that it takes 0.7065 Euros to buy one Canadian dollar. Expressing the exchange rate one way answers the question: “What’s the price of one Canadian dollar? i.e., How many Euros does it take to buy one Canadian dollar?” which is just the flip side of the question: “How many dollars does it take to buy one Euro?” Whenever the exchange rate of one currency is stated in terms of another, a reciprocal exchange rate can be obtained.² A discussion that shifts from an exchange rate to its reciprocal and back again can become quite confusing. For example, one news commentator might say, “Tonight, the exchange rate is \$1.4154.” A few minutes later, the next commentator might say, “Tonight, the exchange rate is 0.7065 Euros.” It might not be clear to the viewer that both are quoting the same exchange rate. To avoid confusion on this point, in this textbook we will always be answering the question, “What is the price of one Canadian dollar?” Both commentators would agree that the price of one Canadian dollar is 0.7065 Euros. So it is important to stick to only one perspective. In this text we will look at the Canadian perspective: i.e., what is the price of one Canadian dollar?

Measured by the value of currency that is traded, the market in which U.S. and Canadian dollars are traded is the largest, whereas other markets (such as the market in which Japanese yen are exchanged for Canadian dollars) are much smaller. But the fundamental logic driving foreign exchange rates is the same around the world, so we can focus on a single market like the one in which Euros and Canadian dollars are traded.

When using supply and demand to analyze foreign exchange markets, it is important to be clear about what is being measured along each axis of our graphs. In Figure 3.6, the quantity of Canadian dollars is measured along the horizontal axis. The exchange rate, or the price of one Canadian dollar in terms of Euros, is measured along the vertical axis.

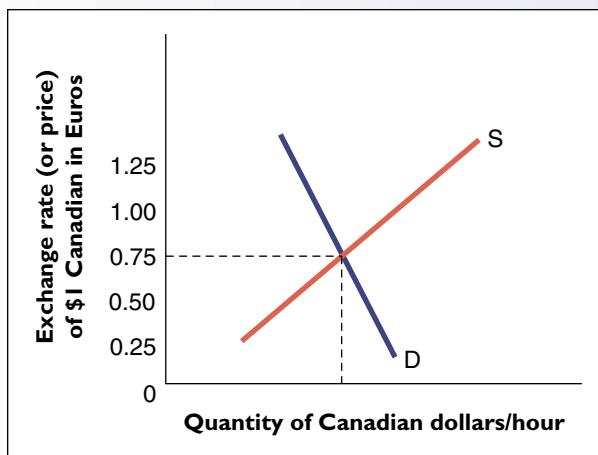
THE SUPPLY OF CANADIAN DOLLARS IN FOREIGN EXCHANGE MARKETS

First, consider the supply of Canadian dollars to the market in which Canadian dollars and Euros are traded. Who are the suppliers of Canadian dollars? Why do they want to supply Canadian dollars?

At any given time, the holders of Canadian dollars can use their dollars to buy Canadian goods and services, or Canadian financial assets. However, if they want to buy goods and services or financial assets in Europe, they must acquire Euros before they can make these purchases. Whether Canadian tourists buy their Euros before they leave or while they are cruising around France, Germany, Italy, and Spain, local people will only accept Euros. Similarly, a Canadian financial investor who wants to buy a German company’s shares or bonds will need to acquire Euros to buy these assets. To obtain Euros, they will *supply* Canadian dollars. Figure 3.6 displays a hypothetical supply curve for Canadian dollars. Notice that on the vertical axis, the price of a Canadian dollar is quoted in Euros. The supply curve is upward sloping, showing that as price rises, a larger quantity of dollars is supplied.

Why does the supply curve slope upward? As any tourist knows, a low exchange rate means it is more expensive to have a good time while you are trav-

²If you have ever purchased foreign currency, you know that a bank or currency broker charges a higher price when selling foreign currency than it offers when buying. Bankers and currency brokers want to earn a net return for the services they provide, which they get from the spread between the buying and selling price. Since the spread is typically small, we will ignore it for now.

**FIGURE 3.6****Supply and Demand for Canadian Dollars**

The equilibrium exchange rate and quantity of dollars traded are given by the intersection of supply and demand.

elling—the lower the value of a Canadian dollar, the more Canadian dollars that are required to make any given purchase. If each Canadian dollar sold for only 0.25 Euros, a European vacation would be very expensive indeed. A 100 Euro hotel room in Paris is at the low end of the local market, but in Canadian dollars, it would cost \$400—and many Canadians would look for a cheaper hotel (if they could find it). More important, many Canadians would decide that whatever the delights of Paris, it is just too expensive, and they would not go to Europe at all. When fewer Canadians travel, the quantity of Canadian dollars supplied to foreign exchange markets falls.

However, if each Canadian dollar were worth two Euros, the same 100 Euro hotel room would cost our traveller only \$50 Canadian, and souvenirs and meals would be comparable bargains. Because the foreign exchange value (i.e., the price) of the Canadian dollar is higher, the fine wine and superb food of the best restaurants would look cheap to our lucky traveller. More Canadians would travel to Europe and they would stay longer and buy more goods and services. To buy more, they would require more Euros. To obtain more Euros, they would increase the quantity of Canadian dollars supplied to the foreign exchange market. In general, the higher the price (expressed in Euros) of one Canadian dollar, the greater the flow of Canadian tourists to Europe, the more each tourist buys, and the greater the quantity of Canadian dollars supplied to the foreign exchange markets. That is why the supply curve of Figure 3.6 has a positive slope.

Tourism is one important reason for Canadians to supply Canadian dollars to foreign exchange markets but there are many others. Canadians also want European goods and financial and real assets. To purchase them, Canadians must obtain Euros by supplying Canadian dollars in a foreign exchange market. When the foreign exchange value (or price) of the dollar rises, goods like Mercedes Benz cars and villas in the south of France cost fewer Canadian dollars. Therefore, Canadians are more likely to purchase them, which means that the quantity of Canadian dollars supplied increases. Just as before, the supply curve in Figure 3.6 slopes upward.

THE DEMAND FOR CANADIAN DOLLARS IN FOREIGN EXCHANGE MARKETS

Now consider the demand for Canadian dollars. Who are the demanders of Canadian dollars? Why would they want to buy Canadian dollars, and pay for them with Euros?

Many Canadians travel abroad, but tourism is also a major industry in Canada. Whether it is skiing at Whistler, whale watching off Cape Breton or visiting Niagara Falls, many Europeans are drawn to Canada for an experience that they cannot get at home. Of course, Canadians want to be paid in Canadian dollars for car rentals, hotel rooms, and restaurant meals. German and French tourists thus have to pay with their Euros for the Canadian dollars they buy in order to purchase the goods and services they want. The quantity of Canadian dollars they demand will depend on price per dollar—and when the exchange value, or price, of the Canadian dollar is low, vacations in Canada will seem like a great bargain to them.

The demand curve for Canadian dollars thus slopes down, because a lower exchange value (or price) for the dollar means that more European tourists will travel to Canada, stay longer, and buy more goods and services. To make more purchases they will have to buy more dollars, which they will pay for with Euros. A \$150 hotel room in Toronto would only cost them 37.5 Euros if the price of the Canadian dollar were 0.25 Euros—so a Canadian vacation would be a “best buy,” and more Europeans would take advantage of the bargain. On the other hand, if the exchange rate price were to rise to two Euros to the dollar, the same hotel room would cost them the equivalent of 300 Euros, and a Canadian vacation would be much less affordable.

Of course, tourism makes up only one part of the total demand for Canadian dollars. When Europeans buy Canadian goods (like wheat or aircraft) or Canadian assets (like Ontario bonds or Nova Scotia sea front properties) they need Canadian dollars to make their purchases. Therefore, the total demand for Canadian dollars is the sum of the dollars demanded by foreigners for all purchases of Canadian goods, services, financial assets, and real assets. But the basic logic is the same—a lower exchange rate (or the price of one Canadian dollar) will, other things being equal, increase the quantity of Canadian dollars demanded in foreign exchange markets.

When Canadians travel in Europe, they supply Canadian dollars to the foreign exchange market and when Europeans travel in Canada, they demand Canadian dollars. The price matters to both—but Canadian tourists supply more dollars when the exchange rate is high, whereas European tourists demand more dollars when the exchange rate is low. It is the function of the foreign exchange market to bring supply and demand into equilibrium. Figure 3.6 shows the market for Canadian dollars in equilibrium at a price, or exchange rate, of 0.75 Euro/Canadian dollar.

As Marshall said, like the two blades of a scissors, supply and demand *together* determine equilibrium. If tourism were the only reason for foreign exchange transactions, then equilibrium would occur when the supply of Canadian dollars (by Canadians travelling in Europe) is equal to the demand for Canadian dollars (by Europeans travelling in Canada). In the real world, there are many other reasons why Canadians want to supply Canadian dollars and why Europeans demand Canadian dollars—but in total, for all different types of transactions, the supply of, and demand for, Canadian dollars must balance in equilibrium.

RECAP

MARKETS AND PRICES

The *market* for a good consists of the actual and potential buyers and sellers of that good. For any given price, the *supply curve* shows the total quantity that suppliers of the good would be willing to sell, and the *demand curve* shows the total quantity that demanders would be willing to buy. Suppliers are willing to sell more at higher prices (supply curves slope upward) and demanders are willing to buy less at higher prices (demand curves slope downward).

Market equilibrium, the situation in which all buyers and sellers are satisfied with their respective quantities at the market price, occurs at the intersection of the supply and demand curves. The corresponding price and quantity are called the *equilibrium price* and the *equilibrium quantity*.

Prices and quantities tend to be driven toward their equilibrium values by the competitive actions of buyers and sellers. If the price is initially too high, resulting in excess supply, dissatisfied sellers will compete for buyers by cutting their prices to sell more. If the price is initially too low, resulting in excess demand, competition among buyers drives the price upward. This process continues until equilibrium is reached. The equilibrating process depends on competition among large numbers of small buyers and sellers.

3.2 MARKETS AND SOCIAL WELFARE

When a market for a good is in equilibrium, the equilibrium price conveys important information to potential suppliers about the value that potential demanders place on that good. At the same time, the equilibrium price informs potential demanders about the opportunity cost of supplying the good. This rapid, two-way transmission of information is the reason that markets can coordinate an activity as complex as supplying Toronto with food and drink, even though no one person or organization oversees the process.

But are the prices and quantities determined in market equilibrium socially optimal in the sense of maximizing total economic surplus? That is, does equilibrium in unregulated markets always maximize the difference between the total benefits and total costs experienced by market participants? As we see in this section, the answer is “it depends”: A market that is out of equilibrium always creates opportunities for individuals to arrange transactions that will increase their individual economic surplus. However, a market for a good that is in equilibrium maximizes total, society-wide economic surplus only when the supply and demand curves in the market fully reflect the costs and benefits associated with the production and consumption of that good.

When a market is out of equilibrium, it is always possible to identify mutually beneficial exchanges. When people have failed to take advantage of all mutually beneficial exchanges, we often say that there is “cash on the table”—the economist’s metaphor for unexploited opportunities. When the price in a market is below the equilibrium price, there is cash on the table, because it will always be possible for a supplier to produce an additional unit at a cost that is lower than the price buyers are willing to pay.

efficient quantity the efficient quantity of a good is the quantity that results in the maximum possible economic surplus from producing and consuming the good

SMART FOR ONE, DUMB FOR ALL

The **efficient quantity** of any good is the quantity that maximizes the total economic surplus that results from producing and consuming the good. The *cost–benefit principle* tells us to keep expanding production of the good as long as the benefit of producing one more unit exceeds the cost of that additional unit. This means that the efficient quantity is that level of production for which the cost and benefit of one more unit of the good are the same.

When the quantity of a good is less than the efficient quantity, increasing its production will increase total economic surplus. By the same token, when the quantity of a good exceeds the efficient quantity, reducing its production will increase total economic surplus. **Economic efficiency** occurs when all goods and services in the economy are produced and consumed at levels that produce the maximum economic surplus for society.

Efficiency is an important social goal. Failure to achieve efficiency means that total economic surplus is smaller than it could have been. Movements toward



economic efficiency condition that occurs when all goods and services are produced and consumed at their respective socially optimal levels

efficiency make the total economic pie larger, making it possible for everyone to have a larger slice. The importance of efficiency will be a recurring theme as we move forward, and we state it here as one of the core principles:



The Efficiency Principle: Economic efficiency occurs when total economic surplus is maximized. Efficiency is an important social goal because, when the economic pie grows larger, everyone can potentially have a larger slice.

Is the market equilibrium quantity of a good efficient? That is, does it maximize the total economic surplus received by participants in the market for that good? When the market for a given good is in equilibrium, we can say that the cost *to the seller* of producing *an additional* unit of the good is the same as the benefit *to the buyer* of having *an additional* unit. If all costs of producing the good are borne directly by sellers, and if all benefits from the good accrue directly to buyers, it follows that the market equilibrium quantity of the good will equate the marginal cost and marginal benefit of the good. And this implies that the equilibrium quantity also maximizes total economic surplus.

But sometimes the production of a good entails costs that fall on people other than those who sell the good. These are referred to as *external costs*. This will be true, for instance, for goods whose production generates significant levels of environmental pollution. As extra units of these goods are produced, the extra pollution harms other people besides sellers. In the market equilibrium for such goods, the benefit *to buyers* of the last good produced is, as before, equal to the cost incurred by sellers to produce that good. But since producing that good also imposes pollution costs on others, we know that the *full* marginal cost of the last unit produced—the seller's private marginal cost plus the marginal pollution cost borne by others—must be higher than the benefit of the last unit produced. So in this case the market equilibrium quantity of the good will be higher than the socially optimal quantity. Total economic surplus would be higher if output of the good were lower. Yet neither sellers nor buyers have any incentive to alter their behaviour.

In Economic Naturalist 1.2 we discussed the environmental problems created by littering. If a brewery can sell beer in cans, without a deposit, the cash cost to consumers will be lower and the brewery will be able to sell more beer—but since some of those cans will be thrown away as litter, that littering is a social cost arising from the production and sale of beer cans, which is not being recognized in the price. Breweries often protest that their prices will be higher, and their production will be lower, if a deposit system is introduced—but without the deposit system, the social costs of litter are being ignored, and the market price will not fully reflect all the social costs of production.

Another possibility is that people other than those who buy the good may receive significant benefits from it. These are referred to as *external benefits*. For instance, when a beekeeper adds an additional hive to his apiary, his neighbour's apple orchard yields a larger crop because of the higher levels of pollination caused by the bees from the extra hive. From the perspective of society as a whole, the best thing to do would be to keep adding hives until their marginal cost is equal to their marginal benefit. The marginal benefit of a hive is the value of the extra honey *plus* the value of the extra apples. However, unless they are paid for pollination, beekeepers will add hives only up to the point that the cost of an extra hive is equal to the revenue from the extra honey. In this case, then, the market equilibrium quantity of beehives will be smaller than the quantity that maximizes total economic surplus. Yet individual beekeepers and individual consumers of honey have no incentive to alter their behaviour.

Situations like the ones just discussed provide examples of behaviours that we can call “smart for one but dumb for all.” In each case, the individual actors are

behaving rationally. They are pursuing their goals as best they can, and yet there remain unexploited opportunities for gain from the point of view of the whole society. The difficulty is that these opportunities cannot be exploited by individuals acting alone. In subsequent chapters we will see how people can often organize collectively to exploit such opportunities. In some cases buyers and sellers will realize that rational pursuit of individual goals is causing opportunities for social gain to remain unexploited, and they will devise ways to act on those opportunities. As we will see later, at least in some circumstances orchard owners will pay beekeepers for pollination provided by bees. If this occurs, an extra hive produces extra revenue from both additional honey and additional pollination. Individual actions then result in whatever number of hives maximizes total economic surplus. For now, we simply summarize this discussion in the form of the following core principle:

The Equilibrium Principle: A market in equilibrium leaves no unexploited opportunities for individuals but may not exploit all gains achievable through collective action.



For the remainder of this chapter, we will confine our attention to markets in which the supply and demand curves capture all relevant costs and benefits. Our focus will be on using supply and demand analysis to predict and explain changes in equilibrium prices and quantities.

RECAP

MARKETS AND SOCIAL WELFARE

When the supply and demand curves for a good reflect all significant costs and benefits associated with the production and consumption of that good, the market equilibrium will result in the largest possible economic surplus. But if people other than buyers benefit from the good, or if people other than sellers bear costs because of it, rational behaviour on the part of individuals need not maximize economic surplus.

3.3 EXPLAINING CHANGES IN PRICES AND QUANTITIES

If we know how the factors that govern supply and demand curves are changing, we can make informed predictions about how prices and the corresponding quantities will change. But when describing changing circumstances in the marketplace, we must take care to recognize some important terminological distinctions. For example, we must distinguish between the meanings of the seemingly similar expressions **change in the quantity demanded** and **change in demand**. When we speak of a “change in the quantity demanded,” we mean the change in quantity that people want to buy that occurs in response to a change in price. For instance, Figure 3.7(a) depicts an increase in the quantity demanded that occurs in response to a reduction in the price of tuna. When the price falls from \$5 to \$4 per can, the quantity demanded rises from 2000 to 4000 cans per day. By contrast, when we speak of a “change in demand,” we mean a *shift in the entire demand curve*. For example, Figure 3.7(b) depicts an increase in demand, meaning that at every price the quantity demanded is higher than before. In summary, a change in the quantity demanded refers to a movement *along* the demand curve, and a change in demand means a *shift* of the entire curve.

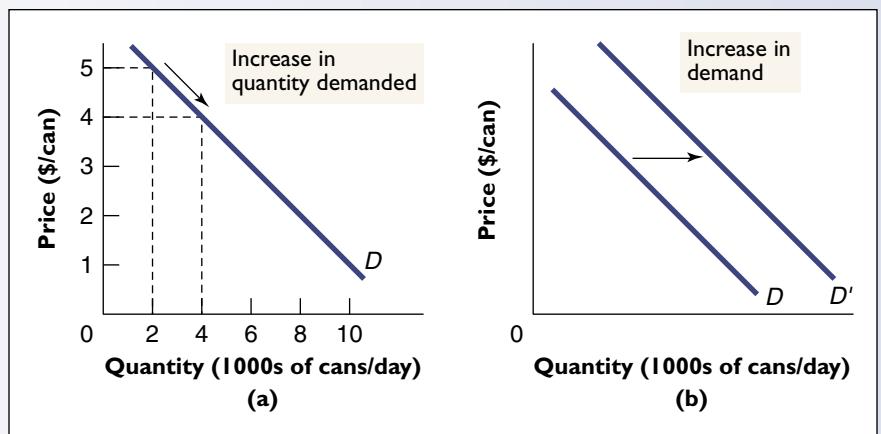
change in the quantity demanded a movement along the demand curve that occurs in response to a change in price

change in demand a shift of the entire demand curve

FIGURE 3.7

An Increase in the Quantity Demanded versus an Increase in Demand

Panel (a): An increase in quantity demanded is represented by a downward movement along the demand curve as price falls. Panel (b): An increase in demand is represented by an outward shift of the demand curve.



change in supply a shift of the entire supply curve

change in the quantity supplied a movement along the supply curve that occurs in response to a change in price

A similar terminological distinction applies on the supply side of the market. A **change in supply** means a shift in the entire supply curve, whereas a **change in the quantity supplied** refers to a movement along the supply curve.

Alfred Marshall's supply and demand model is one of the most useful tools of the economic naturalist. Once we understand the forces that govern the placements of supply and demand curves, we are suddenly in a position to make sense of a host of interesting observations in the world around us.

SHIFTS IN THE SUPPLY CURVE

To get a better feel for how the supply and demand model enables us to predict and explain price and quantity movements, it is helpful to begin with a few simple examples. Because the supply curve is based on costs of production, anything that changes production costs will shift the supply curve and hence will result in a new equilibrium quantity and price.

EXAMPLE 3.1

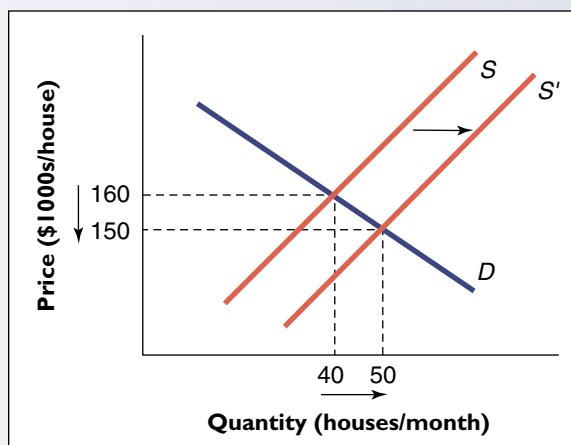
What will happen to the equilibrium price and quantity of new houses if the wage rate of carpenters falls?

Suppose the initial supply and demand curves for new houses are as shown by the curves S and D in Figure 3.8, resulting in an equilibrium price of \$160 000 per house and an equilibrium quantity of 40 houses per month. A decline in the wage

FIGURE 3.8

The Effect on the Market for New Houses of a Decline in Carpenters' Wage Rates

When input prices fall, supply shifts right, causing equilibrium price to fall and equilibrium quantity to rise.



rate of carpenters reduces the cost of making new houses, and this means that, for any given price of houses, more builders can profitably serve the market than before. Diagrammatically, this means a rightward shift in the supply curve of houses, from S to S' . (A “rightward shift” in the supply curve can also be described as a “downward shift.”)

Because carpenters make up only a tiny fraction of all potential home buyers, we may assume that lower wages have no significant effect on demand for houses. Thus, a reduction in carpenters’ wages produces a significant rightward shift in the supply curve of houses, but no perceptible shift in the demand curve. We see from Figure 3.8 that the new equilibrium price, \$150 000 per house, is lower than the original price, and the new equilibrium quantity, 50 houses per month, is higher than the original quantity.

Example 3.1 involved changes in the cost of an input in the production of a good—carpenters’ labour in the production of houses. As the following case illustrates, supply curves also shift when technology changes.

3.1

ECONOMIC NATURALIST

Why has the consumption of French fries increased substantially during the last 25 years?

Commercial techniques for peeling, cutting, cooking, and storing French fries are much more sophisticated now than they were 25 years ago. Today, raw potatoes are processed into French fries in a few large plants, frozen, and shipped to restaurants and consumers. Once in restaurants and homes, French fries are easily cooked. In the United States, consumption of potatoes has increased by about 30 percent since 1977, most of it because Americans are eating more French fries and potato chips.³

In Figure 3.9, the curves labelled S and D depict the supply and demand curves for French fries during the late 1970s. The curve S' represents the supply curve today. The increase in supply is the result of technological improvements in the production of French fries. As the graph shows, the equilibrium quantity of French fries has increased, and the price has decreased.

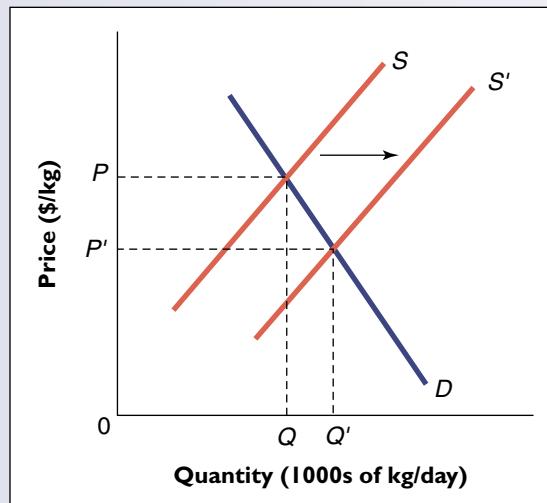


FIGURE 3.9

The Effect of Technical Change on the Market for French Fries

When new technology reduces the cost of production, supply shifts right, causing the equilibrium price to fall and the equilibrium quantity to rise.

³David M. Cutler, Edward L. Glaeser, and Jesse M. Shapiro, “Why have Americans Become More Obese?” *Journal of Economic Perspectives*, 17 (Summer 2003), p. 94.

Changes in input prices and technology are two of the most important factors that give rise to shifts in supply curves. In the case of agricultural commodities, weather may be another important factor, since good weather means larger crops—shifting the supply curves to the right. (Weather may also affect the supply curves of nonagricultural products through its effects on the national transportation system.) Expectations of future changes may also shift current supply curves, as when the expectation of poor crops from a current drought causes suppliers to withhold supplies from existing stocks in the hope of selling at higher prices in the future. An increase in a subsidy can also shift a supply curve to the right, as can an increase in the number of firms serving a market. A reduction in a subsidy or the number of firms in a market would shift a supply curve to the left. The next example shows how a change in the demand for European assets will affect the supply of Canadian dollars in the market for foreign exchange.

EXAMPLE 3.2

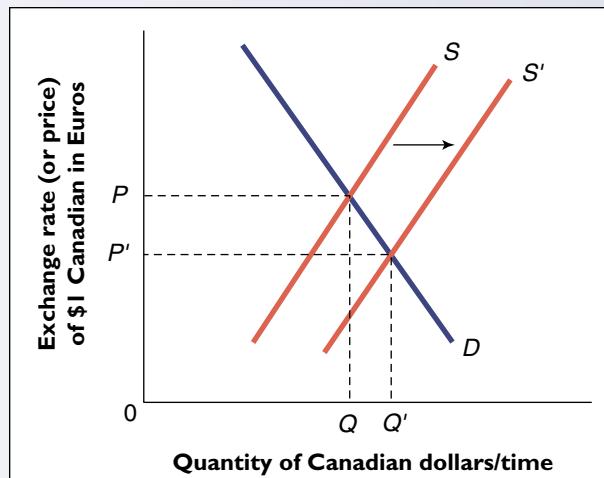
Suppose that as the European community becomes more closely integrated, the European economy shows ever stronger performance. Canadian investors perceive that rates of return earned on shares in European financial companies are improving significantly. What will happen to the exchange rate of the Canadian dollar and to the quantity of Canadian dollars traded?

If Canadians want to purchase more European assets, they will have to acquire more Euros to pay for them. Canadians can obtain more Euros by supplying more dollars to the market for Canadian dollars and accepting payment for their dollars in Euros. Therefore, in Figure 3.10, the supply curve for Canadian dollars shifts from S to S' . The exchange rate of one Canadian dollar in Euros decreases from P to P' , and the quantity of dollars traded increases from Q to Q' .

FIGURE 3.10

An Increase in the Supply of Canadian Dollars

When the supply of Canadian dollars in the foreign exchange market increases, the equilibrium exchange rate decreases, and the equilibrium quantity of dollars traded increases.



SHIFTS IN DEMAND

The preceding examples involved changes that gave rise to shifts in supply curves. Next, we'll look at what happens when demand curves shift. In the following example, the shift in demand results from events outside the particular market itself.

What will happen to the equilibrium price and quantity of tennis balls if court rental fees decline?

EXAMPLE 3.3

Let the initial supply and demand curves for tennis balls be as shown by the curves S and D in Figure 3.11, where the resulting equilibrium price and quantity are \$1 per ball and 40 million balls per month, respectively. Tennis courts and tennis balls are what economists call **complements**, goods that are more valuable when used in combination than when used alone. Tennis balls, for example, would be of less value if there were no tennis courts on which to play. (Tennis balls would still have *some* value even without courts—for example, to the parents who pitch them to their children for batting practice.) As tennis courts become cheaper to use, people will respond by playing more tennis, and this will increase their demand for tennis balls. A decline in court rental fees will thus shift the demand curve for tennis balls rightward to D' . (A “rightward shift” of a demand curve can also be described as an “upward shift.”)

complements two goods are complements in consumption if an increase in the price of one causes a leftward shift in the demand curve for the other

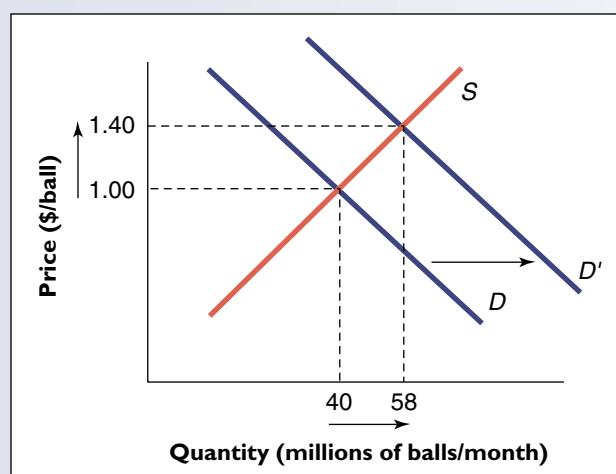


FIGURE 3.11
The Effect on the Market for Tennis Balls of a Decline in Court Rental Fees

When the price of a good's complement falls, demand for the good shifts right, causing equilibrium price and quantity to rise.

Note in Figure 3.11 that for the illustrative demand shift shown, the new equilibrium price of tennis balls, \$1.40, is higher than the original price, and the new equilibrium quantity, 58 million balls per month, is higher than the original quantity.

What will happen to the equilibrium price and quantity of overnight letter delivery service as more people gain access to the Internet?

EXAMPLE 3.4

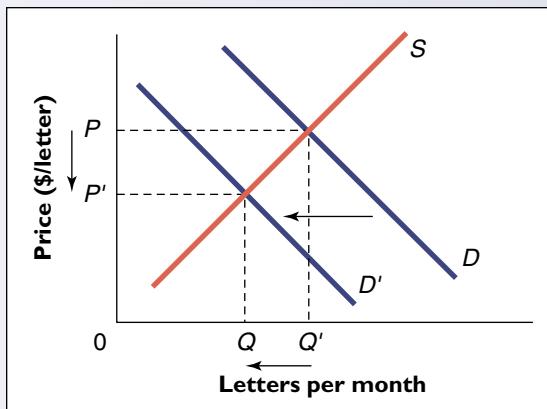
Suppose that the initial supply and demand curves for overnight letter deliveries are as shown by the curves S and D in Figure 3.12 and that the resulting equilibrium price and quantity are denoted P and Q . E-mail messages and overnight letters are examples of what economists call **substitutes**, meaning that, in many applications at least, the two serve similar functions for people. (Many noneconomists would call them substitutes, too. Economists don't *always* choose obscure terms for important concepts!) When two goods or services are substitutes, a decrease in the effective price of one will cause a leftward shift in the demand curve for the other. (A “leftward shift” in a demand curve can also be described as a “downward shift.”) An increase in Internet access is, in effect, a decline in the price of a substitute for overnight delivery for affected users. Diagrammatically, this means a leftward shift in the demand curve for overnight delivery service to D' in Figure 3.12.

substitutes two goods are substitutes in consumption if an increase in the price of one causes a rightward shift in the demand curve for the other

FIGURE 3.12

The Effect on the Market for Overnight Letter Delivery of a Decline in the Price of Internet Access

When the price of a substitute for a good falls, demand for the good shifts left, causing equilibrium price and quantity to fall.



As the figure shows, both the new equilibrium price P' and the new equilibrium quantity Q' are lower than the initial values P and Q . More widespread Internet access probably won't put Purolator and UPS out of business, but it will definitely cost them many customers.

To summarize, economists define goods as substitutes if an increase in the price of one causes a rightward shift in the demand curve for the other. By contrast, goods are complements if an increase in the price of one causes a leftward shift in the demand curve for the other.

The concepts of substitutes and complements enable you to answer questions like the one posed in the following exercise.

EXERCISE 3.1

How will a decline in airfares affect intercity (or long distance) bus fares and the price of hotel rooms in resort communities?

Demand curves are shifted not just by changes in the prices of substitutes and complements but also by other factors that change the amounts that people are willing to pay for a given good or service. One of the most important such factors is income.

3.2

ECONOMIC NATURALIST

When the price of oil rises, why do prices for houses in Calgary rise?

Calgary's economy is heavily dependent on the oil industry. If the price of oil rises, oil companies respond by exploring for more oil and by developing existing oil fields more intensively. As oil companies increase their activity, more people will be drawn to Calgary, some to work in the oil industry, others to supply more goods and services to the oil industry as it expands, and still others to supply goods and services to Calgary's rising population. (For example, if more families move to Calgary, more teachers will be required.) In addition, wages and salaries will tend to be bid

up to attract more workers, there will be more opportunities to work overtime, and so on. Thus, individuals will tend to have higher incomes because of the oil boom. Because of a larger population and because at least some individuals will have higher incomes (and now may be able to afford to move out of apartments into houses), the demand curve for houses will shift to the right, as shown by the demand curve labelled D' in Figure 3.13. As a result, the equilibrium price and quantity of houses, P' and Q' , will be higher than before.

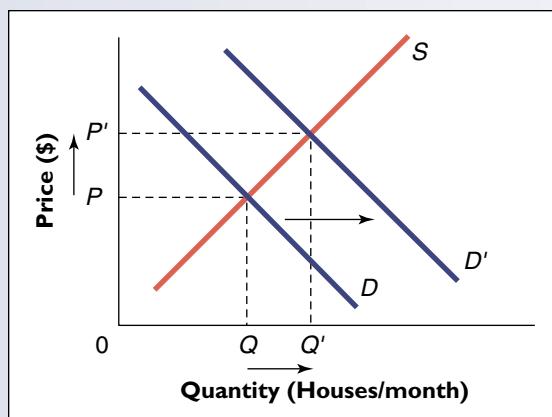


FIGURE 3.13
The Effect of an Increase in the Price of Oil on the Price of Houses in Calgary

An increase in income shifts demand for a normal good to the right, causing equilibrium price and quantity to rise.

Two factors caused the demand curve for houses in Calgary to shift to the right when the price of oil rose: the population of the city increased, and the income of individuals increased. Either effect by itself would have caused the demand curve to shift to the right; together, they reinforce each other. When incomes increase, the demand curves for most goods will shift to the right. In recognition of that fact, economists have chosen to call such goods **normal goods**.

Not all goods are normal goods, however. In fact, the demand curves for some goods actually shift leftward when income goes up, and such goods are called **inferior goods**.

When would having more money tend to make you want to buy less of something? In general, this will happen in the case of goods for which there are attractive substitutes that sell for only slightly higher prices. Apartments in an unsafe, inconveniently located neighbourhood are an example. Most residents would choose to move out of such neighbourhoods as soon as they could afford to, which means that an increase in income would cause the demand for such apartments to shift leftward.

Ground beef with high fat content is another example of an inferior good. For health reasons, most people prefer grades of meat with low fat content, and when they do buy high-fat meats it is usually a sign of budgetary pressure. When people in this situation receive higher incomes, they usually switch quickly to leaner grades of meat.

Normal and inferior goods were defined in terms of how their demand curves are affected by an increase in income. How will a decrease in income affect the demand for a normal good? an inferior good?

EXERCISE 3.2

Preferences, or tastes, are another important factor that determines whether a given good will meet the cost–benefit test. Steven Spielberg’s films *Jurassic Park* and *The Lost World* appeared to kindle a powerful, if previously latent, preference among children for toy dinosaurs. In the wake of these films, the demand for such toys shifted sharply to the right. And the same children who couldn’t find enough dinosaur toys suddenly seemed to lose interest in toy designs involving horses and other present-day animals, whose respective demand curves shifted sharply to the left.

Expectations can also influence demand. For example, if many parents suddenly expect a special toy to be scarce during the holiday season, demand for the toy will increase before the holiday season.

normal good a good whose demand curve shifts rightward when the incomes of buyers increase

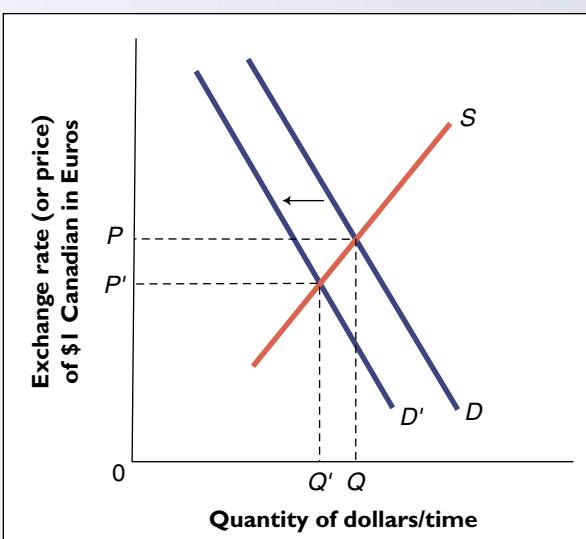
inferior good a good whose demand curve shifts leftward when the incomes of buyers increase

EXAMPLE 3.5**What would happen to the exchange rate of the Canadian dollar if Europeans reduce their travel to Canada because they are afraid of SARS?**

Severe Acute Respiratory Syndrome (SARS) first appeared in China late in 2002. The disease has no known cure, and it often kills its victims quickly. In early 2003, it spread to Canada, with outbreaks in Toronto and Vancouver, and the World Health Organization issued advisories against travelling to these cities. Out of fear of SARS, Europeans reduced their travel to Canada, both for business and for vacations. Demand by Europeans for Canadian dollars therefore decreased. Figure 3.14 shows demand for Canadian dollars decreasing from D to D' . As a result, the equilibrium exchange rate of one Canadian dollar in Euros decreased from P to P' , and the equilibrium quantity decreased from Q to Q' . (Fortunately, the SARS epidemic was quickly brought under control. The effects of SARS on tourism lingered for a while, but fear of SARS gradually receded—which implies that the demand curve for Canadian dollars eventually shifted back to D .)

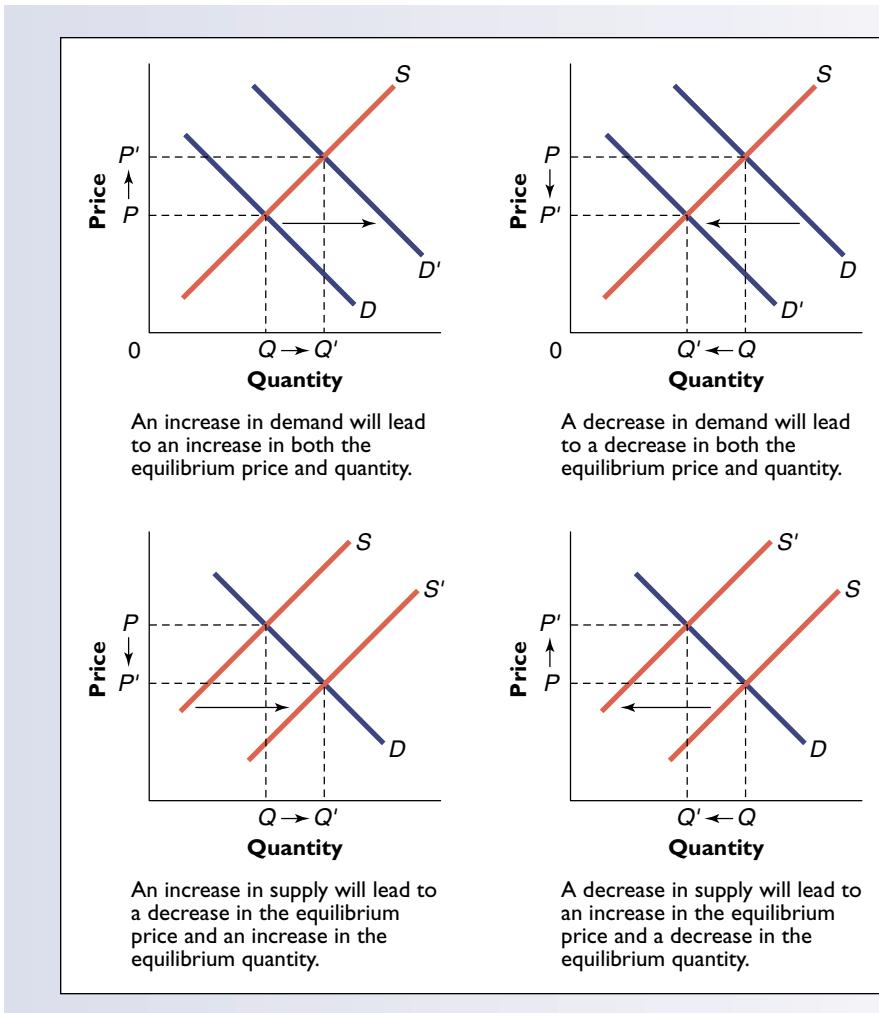
FIGURE 3.14**A Decrease in the Demand for Canadian Dollars**

When the demand for Canadian dollars in the foreign exchange market decreases, the equilibrium exchange rate decreases and the equilibrium quantity of dollars traded decreases.

**FOUR SIMPLE RULES**

For supply and demand curves that have the conventional slopes (upward sloping for supply curves, downward sloping for demand curves), the preceding examples illustrate the four basic rules that govern how shifts in supply and demand affect equilibrium prices and quantities. These rules are summarized in Figure 3.15.

The qualitative rules summarized in Figure 3.15 hold for supply or demand shifts of any magnitude, provided the curves have their conventional slopes. But although it is easy enough for textbook authors to invent examples where only one thing is happening in a market, in the real world we often observe simultaneous changes in demand and supply. As the next example demonstrates, when both supply and demand curves shift at the same time, the direction in which equilibrium price or quantity changes will depend on the relative magnitudes of the shifts.



How do shifts in both demand and supply affect equilibrium quantities and prices?

EXAMPLE 3.6

What will happen to the equilibrium price and quantity in the corn tortilla chip market if both the following events occur: (1) researchers discover that the oils in which tortilla chips are fried are harmful to human health, and (2) the price of corn-harvesting equipment falls?

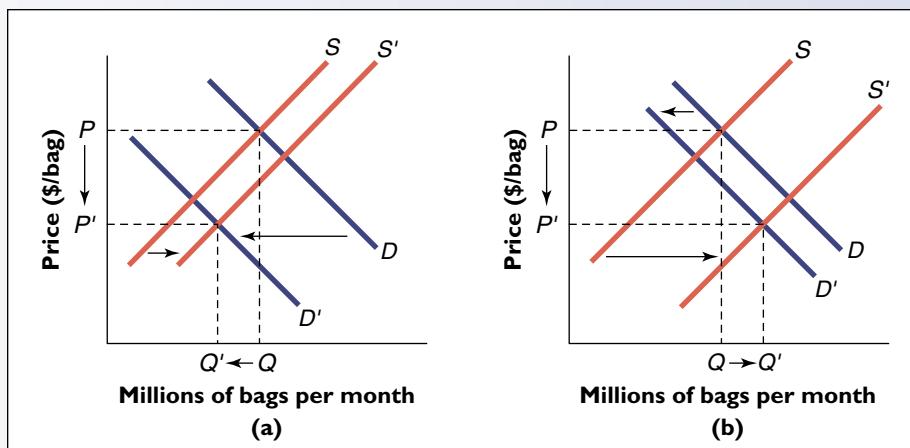
The discovery regarding the health effects of the oils will shift the demand for tortilla chips to the left, because many people who once bought chips in the belief that they were healthful will now switch to other foods. The decline in the price of harvesting equipment will shift the supply of chips to the right, because additional farmers will now find it profitable to enter the corn market. In Figure 3.16(a) and (b), the original supply and demand curves are denoted by S and D , while the new curves are denoted by S' and D' . Note that in both parts, the shifts lead to a decline in the equilibrium price of chips.

But note also that the effect of the shifts on equilibrium quantity cannot be determined without knowing their relative magnitudes. Taken separately, the demand shift causes a decline in equilibrium quantity, whereas the supply shift causes an increase in equilibrium quantity. The net effect of the two shifts thus depends on which of the individual effects is larger. In Figure 3.16(a), the demand shift dominates, so equilibrium quantity declines. In Figure 3.16(b), the supply shift dominates, so equilibrium quantity goes up.

FIGURE 3.16

The Effects of Simultaneous Shifts in Supply and Demand

When demand shifts left and supply shifts right, equilibrium price falls, but equilibrium quantity may either rise [panel (b)] or fall [panel (a)].



The following exercise asks you to consider a simple variation on the problem posed in Example 3.6.

EXERCISE 3.3

What will happen to the equilibrium price and quantity in the corn tortilla chip market if both the following events occur: (1) researchers discover that a vitamin found in corn helps protect against cancer and heart disease; and (2) a swarm of locusts destroys part of the corn crop?

3.3 ECONOMIC NATURALIST

Why do the prices of some goods, like airline tickets to Europe, go up during the months of heaviest consumption, while others, like sweet corn, go down?

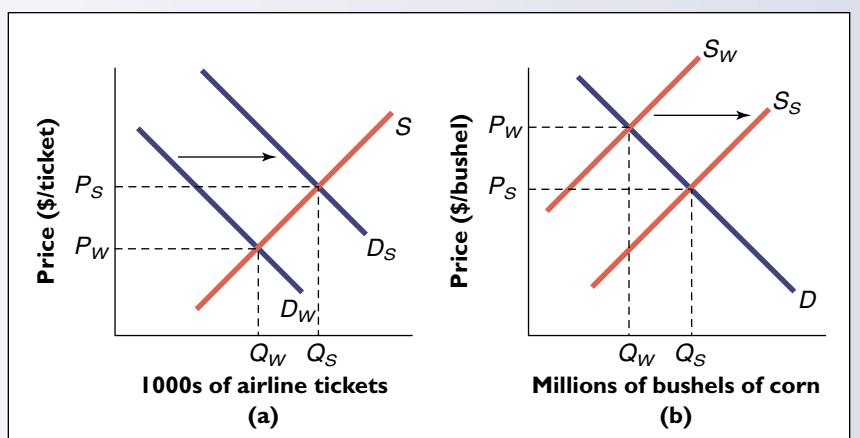
Seasonal price movements for airline tickets are primarily the result of seasonal variations in demand. Thus, ticket prices to Europe are highest during the summer months because the demand for tickets is highest during those months, as shown in Figure 3.17(a) (where the w and s subscripts denote winter and summer values, respectively).

By contrast, seasonal price movements for sweet corn are primarily the result of seasonal variations in supply. The price of sweet corn is lowest in the summer months because its supply is highest during those months [Figure 3.17(b)].

FIGURE 3.17

Seasonal Variation in the Air Travel and Corn Markets

Panel (a): Prices are highest during the period of heaviest consumption when heavy consumption is the result of high demand. Panel (b): Prices are lowest during the period of heaviest consumption when heavy consumption is the result of high supply.



RECAP**FACTORS CAUSING AN INCREASE IN SUPPLY
(SUPPLY CURVE SHIFTS RIGHT)**

1. A decrease in the cost of materials, labour, or other inputs used in the production of the good or service
2. An improvement in technology that reduces the cost of producing the good or service
3. An increase in a subsidy provided by government
4. An increase in the number of firms

When these factors move in the opposite direction, supply will shift left.

**FACTORS CAUSING AN INCREASE IN DEMAND
(DEMAND CURVE SHIFTS RIGHT)**

1. A decrease in the price of complements to the good or service
2. An increase in the price of substitutes for the good or service
3. An increase in income (for a normal good)
4. An increased preference by demanders for the good or service
5. An increase in the population of potential buyers

When these factors move in the opposite direction, demand will shift left. When both supply and demand shift, it is often necessary to know the relative magnitudes of the shifts to determine if equilibrium price and equilibrium quantity increase or decrease.

SUMMARY

- **3.1** Eighteenth-century economists tried to explain differences in the prices of goods by focusing on differences in their cost of production. But this approach cannot explain why a conveniently located house sells for more than one that is less conveniently located. Early nineteenth-century economists tried to explain price differences by focusing on differences in what buyers were willing to pay. But this approach cannot explain why the price of a lifesaving appendectomy is less than that of a surgical facelift.
- **3.1** Alfred Marshall's model of supply and demand explains why neither cost of production nor value to the purchaser (as measured by willingness to pay) by itself is sufficient to explain why some goods are cheap and others are expensive. To explain variations in price, we must examine the interaction of cost and willingness to pay. As we saw in this chapter, goods differ in price because of differences in their respective supply and demand curves.
- **3.1** The supply curve is an upward-sloping line indicating the quantity sellers will offer at any given price. The demand curve is a downward-sloping line that tells what quantity

buyers will demand at any given price. Market equilibrium occurs when the quantity buyers demand at the market price is exactly the same as the quantity that sellers offer. The equilibrium price–quantity pair is the one at which the demand and supply curves intersect. In equilibrium, market price measures both the value of the last unit sold to buyers and the cost of the resources required to produce it.

- **3.1** When the price of a good lies above its equilibrium value, there is an excess supply, or surplus, of that good. Excess supply motivates sellers to cut their prices, and price continues to fall until the equilibrium price is reached. When price lies below its equilibrium value, there is excess demand, or shortage. With excess demand, dissatisfied buyers are motivated to offer higher prices, and the upward pressure on prices persists until equilibrium is reached. The equilibrating process depends on competition among many small buyers and sellers. A remarkable feature of the market system is that, relying only on the tendency of people to respond in self-interested ways to market price signals, it somehow manages to coordinate the actions of literally billions of buyers and sellers worldwide.

- 3.2 When the supply and demand curves for a good reflect all significant costs and benefits associated with the production and consumption of that good, the market equilibrium price will guide people to produce and consume the quantity of the good that results in the largest possible economic surplus. This conclusion does not apply if others, beside buyers, benefit from the good (as when orchard owners benefit from beehives), or if others besides sellers bear costs because of the good (as when its production generates pollution). It also does not apply if competition among many small buyers and sellers is absent. In such cases, rational behaviour on the part of individuals does not result in the greatest gain for all.
- 3.2 The efficiency of markets in allocating resources does not eliminate social concerns about how goods and services are distributed among different people. For example, we often lament the fact that many buyers enter the market with too little income to buy even the most basic goods and services. If the difficulty is that the poor have too little money, one solution is to discover ways of boosting their incomes directly.
- 3.3 The basic supply and demand model is a primary tool of the economic naturalist. Changes in the equilibrium price of a good, and in the amount of it traded in the marketplace, can be predicted on the basis of shifts in its supply or demand curves. The following four rules hold for any good with a downward-sloping demand curve and an upward-sloping supply curve:
 1. An increase in demand will lead to an increase in equilibrium price and quantity.
 2. A reduction in demand will lead to a reduction in equilibrium price and quantity.
 3. An increase in supply will lead to a reduction in equilibrium price and an increase in equilibrium quantity.
 4. A decrease in supply will lead to an increase in equilibrium price and a reduction in equilibrium quantity.
- 3.3 Incomes, tastes, population, and the prices of substitutes and complements are among the factors that shift demand schedules. Supply schedules, in turn, are primarily governed by such factors as technology, input prices, and, for agricultural products, the weather. Changes in expectations can also shift supply and demand schedules.

CORE



The Efficiency Principle

Economic efficiency occurs when total economic surplus is maximized. Efficiency is an important social goal because, when the economic pie grows larger, everyone can have a larger slice.



The Equilibrium Principle

A market in equilibrium leaves no unexploited opportunities for individuals but may not exploit all gains achievable through collective action.

KEY TERMS

change in demand (71)
change in quantity demanded (71)
change in quantity supplied (72)
change in supply (72)
complements (75)
demand curve (61)
economic efficiency (69)
efficient quantity (69)

equilibrium (62)
equilibrium price (62)
equilibrium quantity (62)
excess demand (64)
excess supply (64)
foreign exchange rate (65)
inferior good (77)

market (59)
market equilibrium (63)
normal good (77)
shortage (64)
substitutes (75)
supply curve (60)
surplus (64)

REVIEW QUESTIONS

1. Why isn't knowing how much it costs to produce a good sufficient to predict its market price?
2. Distinguish between the meaning of the expressions "change in demand" and "change in the quantity demanded."
3. Last year a government official proposed that gasoline price controls be imposed to protect the poor from ris-
- ing gasoline prices. What evidence could you consult to discover whether this proposal was enacted?
4. Explain why, in unregulated markets, the equilibrium principle suggests that excess demand and excess supply tend to be fleeting.
5. Give an example of behaviour you have observed that could be described as "smart for one but dumb for all."

■ PROBLEMS

1. State whether the following pairs of goods are complements or substitutes. (If you think a pair is ambiguous in this respect, explain why.)
 - a. Tennis courts and squash courts
 - b. Squash racquets and squash balls
 - c. Ice cream and chocolate
 - d. Cloth diapers and disposable diapers
2. How would each of the following affect the Canadian market supply curve for wheat?
 - a. A new and improved crop rotation technique is discovered.
 - b. The price of fertilizer falls.
 - c. The government offers new tax breaks to farmers.
 - d. The Prairies suffer a drought.
3. Indicate how you think each of the following would affect demand in the indicated market:
 - a. An increase in family income on the demand for winter vacations in the Caribbean
 - b. A study linking beef consumption to heart disease on the demand for hamburgers
 - c. A relaxation of immigration laws on the demand for elementary-school places
 - d. An increase in the price of audiocassettes on the demand for CDs
 - e. An increase in the price of CDs on the demand for CDs
4. A student at the University of Regina claims to have spotted a UFO outside Regina. How will his claim affect the supply of binoculars in Regina stores?
5. What will happen to the equilibrium price and quantity of oranges if the wages paid to farm workers rise?
6. How will an increase in the birthrate affect the equilibrium price of land?
7. What will happen to the equilibrium price and quantity of fish if it is discovered that fish oils help prevent heart disease?
8. What will happen to the equilibrium price and quantity of beef if the price of chicken feed increases?
9. Use supply and demand analysis to explain why hotel room rental rates near your campus during parents' weekend and graduation weekend might differ from the rates charged during the rest of the year.
10. How will a new law mandating an increase in required levels of automobile insurance affect the equilibrium price and quantity in the market for new automobiles?
11. Suppose the current issue of *The Globe and Mail* reports an outbreak of mad cow disease in Manitoba, as well as the discovery of a new breed of chicken that gains more weight than existing breeds from the same amount of food. How will these developments affect the equilibrium price and quantity of chicken sold in Canada?
12. What will happen to the equilibrium quantity and price of potatoes if population increases and a new, higher yielding variety of potato plant is developed?
13. What will happen to the equilibrium price and quantity of apples if apples are discovered to help prevent colds and a fungus kills 10 percent of existing apple trees?
14. What will happen to the equilibrium quantity and price of corn if the price of butter increases and the price of fertilizer decreases?
15. Tofu was available 25 years ago only from small businesses operating in Chinese quarters of large cities. Today tofu has become popular as a high-protein health food and is widely available in supermarkets throughout Canada. At the same time, production has evolved to become factory-based, using modern food-processing technologies. Draw a diagram with demand and supply curves depicting the market for tofu 25 years ago and the market for tofu today. Given the information above, what does the demand-supply model predict about changes in the quantity of tofu sold in Canada between then and now? What does it predict about changes in the price of tofu?

ANSWERS TO IN-CHAPTER EXERCISES

- 3.1 Travel by air and travel by bus are substitutes, so a decline in airfares will shift the demand for bus travel to the left, resulting in lower bus fares and fewer bus trips taken. Travel by air and the use of resort hotels are complements, so a decline in airfares will shift the demand for resort hotel rooms to the right, resulting in higher hotel rates and an increase in the number of rooms rented.
- 3.2 A decrease in income will shift the demand curve for a normal good to the left and will shift the demand curve for an inferior good to the right.
- 3.3 The vitamin discovery shifts the demand for chips to the right, and the crop losses shift the supply of chips to the left. Both shifts result in an increase in the equilibrium price of chips. But depending on the relative magnitude of the shifts, the equilibrium quantity of chips may either rise [panel (a) of the figure] or fall [panel (b) of the figure].

