

Markets

LEARNING OBJECTIVES

- LO 3.1** Identify the defining characteristics of a competitive market.
 - LO 3.2** Draw a demand curve and describe the external factors that determine demand.
 - LO 3.3** Distinguish between a shift in and a movement along the demand curve.
 - LO 3.4** Draw a supply curve and describe the external factors that determine supply.
 - LO 3.5** Distinguish between a shift in and a movement along the supply curve.
 - LO 3.6** Explain how supply and demand interact to drive markets to equilibrium.
 - LO 3.7** Evaluate the effect of changes in supply and demand on the equilibrium price and quantity.
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MOBILES GO GLOBAL

For many people, a cell phone is on the list of things never to leave the house without, right up there with a wallet and keys. For better or worse, cell phones have become a fixture of everyday life.

It's hard to believe that as recently as the late 1990s, cell phones were a luxury that only a third of Americans enjoyed. Before that, in the 1980s, they were big, heavy devices, seldom bought for personal use at all. In less than a quarter of a century, this expensive sci-fi technology became a relatively cheap, universal convenience. Today there are approximately 90 cell phones for every 100 people in the United States. In fact, more than half of the world's 7 billion people now have a cell phone subscription.¹ In Africa, for instance, cell phone use has been growing by 20 percent a year and in 2011 topped 400 million users.² This phenomenal growth makes it easier to keep up with friends and family. It also connects small-town merchants to businesses in distant cities, opening up new economic possibilities.

How does a product move from expensive to cheap, from rare to commonplace, so quickly? The answer partly lies in the relationship between supply and demand. This chapter shows how the forces of supply and demand interact to determine the quantities and prices of goods that are bought and sold in competitive markets.

The basic story of how a new product takes hold is a familiar one. In the beginning, cell phones were expensive and rare. Over time, the technology improved, the price



dropped, the product caught on, and sales took off. Throughout this process of change, markets allow for ongoing communication between buyers and producers, using prices as a signal. The up and down movement of prices ensures that the quantity of a product that is available stays in balance with the quantity consumers want to buy.

To explain the leap in usage that cell phones have made over time, however, we need to go further than just price signals. Outside forces that influence supply and demand, such as changes in technology, fashion trends, and economic ups and downs, have driven that transformation. Markets have the remarkable ability to adjust to these changes without falling out of balance.

In this chapter, we'll step into the shoes of consumers and producers to examine the trade-offs they face. We'll see that the issues that drive supply and demand in the cell phone industry are not unique. In fact, the functioning of markets, as summarized in the theory of supply and demand, is the bedrock of almost everything in this book. Mastering this theory will help you to solve all kinds of problems, from what price to sell your product for as a businessperson, to how to find the cheapest gasoline, to the causes of a shortage of hybrid cars.

Markets

In Chapter 2, we discussed the power of the “invisible hand” to coordinate complex economic interactions. The key feature of an economy organized by the invisible hand is that private individuals, rather than a centralized planning authority, make the decisions. Such an economy is often referred to as a **market economy**.

market economy an economy in which private individuals, rather than a centralized planning authority, make the decisions

market buyers and sellers who trade a particular good or service

What is a market?

What do we mean by a *market*? The word might make you think of a physical location where buyers and sellers come together face-to-face—like a farmers’ market or a mall. But people do not have to be physically near each other to make an exchange. For example, think of online retailers like Amazon.com or of fruit that is grown in South America but sold all over the world. The term **market** actually refers to the buyers and sellers who trade a particular good or service, not to a physical location.

Which buyers and sellers are included in the market depends on the context. The manager of a clothing store at your local mall might think about the market for T-shirts in terms of people who live locally and the other places they could buy T-shirts, like competing stores, garage sales, or online retailers. The CEO of a major clothing brand, on the other hand, might include garment factories in China and the fashion preferences of customers living all over the world in her idea of a market. Which boundaries are relevant depends on the scope of trades that are being made.

What is a competitive market?

LO 3.1 Identify the defining characteristics of a competitive market.

competitive market a market in which fully informed, price-taking buyers and sellers easily trade a standardized good or service

Making simplifying assumptions can help us zero in on important ideas. In this chapter, we will make a big simplifying assumption—that markets are *competitive*. A **competitive market** is one in which fully informed, price-taking buyers and sellers easily trade a standardized good or service. Let’s unpack this multipart definition: Imagine you’re driving up to an intersection where there is a gas station on each corner. This scenario demonstrates the four important characteristics of a perfectly competitive market.

First, the gas sold by each station is the same—your car will run equally well regardless of *where* you fill your tank. This means that the gas being sold is a **standardized good**—a good or service for which any two units of it have the same features and are interchangeable. In a competitive market, the good being bought and sold is standardized.

Second, the price at each gas station is prominently displayed on a big sign. As you drive by, you can immediately see how much a gallon of each type of gas costs at each station. In a competitive market, you have *full information* about the price and features of the good being bought and sold.

Third, it's easy for you to choose any of the four gas stations at the intersection. The stations are very near each other, and you don't have to have special equipment to fill up your tank or pay an entrance fee to get into the station. In competitive markets, there are no **transaction costs**—the costs incurred by buyer and seller in agreeing to and executing a sale of goods or services. Thus, in competitive markets, you don't have to pay anything for the privilege of buying or selling in the market. You can easily do business in this four-station market for gasoline.

Finally, we bet you'd find that a gallon of gas costs the same in each station at the intersection. Why? Recall the third economists' question from Chapter 1: If one station tries to raise its price, *how will others respond?* Assuming the stations are offering standardized gallons of gas, customers should be indifferent between buying from one station or another at a given price. If one raises its price, all the drivers will simply go to a cheaper station instead. The gas station that raised prices will end up losing customers. For this reason, no individual seller has the power to change the market price. In economic terminology, a buyer or seller who cannot affect the market price is called a **price taker**.

The drivers going by are also price takers. If you try to negotiate a discount at one of the gas stations before filling your tank, you won't get far—the owner would rather wait and sell to other customers who will pay more. The price is the price; your choice is to take it or leave it. In competitive markets, both buyers and sellers are price takers.

By thinking about the gas stations at a single intersection, you have learned the four characteristics of perfectly competitive markets. Table 3-1 summarizes the four characteristics of a perfectly competitive market: a standardized good, full information, no transaction costs, and price-taking participants.

In reality, very few markets are truly *perfectly* competitive. Even gas stations at the same intersection might not be: Maybe one can charge a few cents more per gallon because it uses gas with less ethanol or offers regular customers an attractive loyalty scheme or has a Dunkin' Donuts to entice hungry drivers. In future chapters, we'll spend a lot of time thinking about the different ways that markets in the real world are structured and why it matters when they fall short of perfect competition.

The market for cell phones is not perfectly competitive either. Cell phones are not standardized goods—some models look cooler, or have better cameras, or have access to different apps or calling plans. You're unlikely to be completely indifferent between two different cell phones at the same price, as you are between two gallons

standardized good a good for which any two units have the same features and are interchangeable

transaction costs the costs incurred by buyer and seller in agreeing to and executing a sale of goods or services

price taker a buyer or seller who cannot affect the market price

Standardized good	Any two units of the good have the same features and are interchangeable.
Full information	Market participants know everything about the price and features of the good.
No transaction costs	There is no cost to participating in exchanges in the market.
Participants are price takers	Neither buyers nor sellers have the power to affect the market price.

TABLE 3-1
Four characteristics of perfectly competitive markets

of gas. Furthermore, the fact that there are a limited number of service providers means that sellers aren't always price takers. If only one network has good coverage in your area or has an exclusive deal with a popular type of phone, it can get away with charging a premium.

So, why *assume* perfect competition if markets in the real world are rarely perfectly competitive? The answer is that the simple model of competitive markets we will develop in this chapter leads us to useful insights, even in markets that aren't perfectly competitive. Taking the time now to make sure you understand perfect competition inside and out will better prepare you to understand why it matters when markets aren't perfectly competitive. As we go through this chapter we'll note some ways in which the real cell phone market departs from perfect competition. By the end of the chapter, we hope you'll agree that the simple model of perfect competition tells us a lot, if not everything, about how the real cell phone market works.

✓ CONCEPT CHECK

- What is a market? What are the characteristics of a competitive market? [LO 3.1]
- Why are participants in competitive markets called *price takers*? [LO 3.1]

Demand

Demand describes how much of something people are willing and able to buy under certain circumstances. Suppose someone approached you and asked if you would like a new cell phone. What would you answer? You might think, "Sure," but as a savvy person, you would probably first ask, "For how much?" Whether you want something (or how much of it you want) depends on how much you have to pay for it.

These days most people in the United States have cell phones, but that hasn't been the case for very long. Let's assume for the sake of our model that cell phones are standardized—one model, with given features and calling plans. Now, put yourself in the position of a consumer in the mid-1990s. Maybe you've seen cell phones advertised at \$499 and think it's not worth it to you. As the price goes down over time to \$399, and \$299, you're still not tempted to buy it. At \$199, you start to consider it. Then, the first time you see a cell phone advertised for less than \$125, you decide to buy.

Different people bought their first cell phone at different prices: At any given time, with any given price, some people in the population are willing to buy a phone and others aren't. If we add up all of these individual choices, we get overall *market demand*. The amount of a particular good that buyers in a market will purchase at a given price during a specified period is called the **quantity demanded**. For almost all goods, the lower the price goes, the higher the quantity demanded.

This inverse relationship between price and quantity demanded is so important that economists refer to it as the **law of demand**. The first requirement for the law of demand is the idea sometimes known as *ceteris paribus*, the Latin term for "all other things being the same." In other words, the law of demand says that, when all else is held equal, quantity demanded rises as price falls. Economists frequently rely on the idea of *ceteris paribus* to isolate the effect of a single change in the economy. If all else is not held equal, it is very difficult to see the true effect of something like a price change, because it may be accompanied by other changes that also affect quantity demanded. For instance, studies show that the demand for cell phones increases with people's incomes. So when we see both incomes *and* prices rising at the same time, we cannot immediately predict what will happen to cell phone sales. When we talk about the law of demand, therefore, it is important to remember that we are implying that nothing *other than* price changes.

quantity demanded the amount of a particular good that buyers will purchase at a given price during a specified period

law of demand a fundamental characteristic of demand which states that, all else equal, quantity demanded rises as price falls

The law of demand isn't a made-up law that economists have imposed on markets. Rather, it holds true because it describes the underlying reality of individual people's decisions. The key is to think about the *trade-offs* that people face when making the decision to buy.

What happens when the price of something falls? First, the benefit that you get from purchasing it remains the same, because the item itself is unchanged. But the opportunity cost has fallen, because when the price goes down you don't have to give up as many other purchases in order to get the item. When benefits stay the same and opportunity cost goes down, this trade-off suddenly starts to look a lot better. When the trade-off between costs and benefits tips toward benefits, more people will want to buy the good.

Of course, falling prices will not have been the only consideration in people's decisions to buy their first cell phone. Some might have decided to buy one when they got a pay raise at work. Others might have bought one at the point when most of their friends owned one. Incomes, expectations, and tastes all play a role; economists call these factors *nonprice determinants* of demand. We'll discuss their potential effects later in this chapter. First, let's focus on the relationship between price and quantity demanded.

The demand curve

LO 3.2 Draw a demand curve and describe the external factors that determine demand.

The law of demand says that the quantity of cell phones demanded will be different at every price level. For this reason, it is often useful to represent demand as a table, called a **demand schedule**, which shows the quantities of a particular good or service that consumers are willing to purchase (demand) at various prices. Figure 3-1 shows, in panel A, a hypothetical annual demand schedule for cell phones in the United States. (Remember, we're assuming that cell phones are a standardized good. This isn't quite right, but the basic principle holds true: When cell phone prices are lower, you're more likely to buy a new one.) The demand schedule assumes that factors other than price remain the same.

Panel B of Figure 3-1 shows another way to represent demand, by drawing each price-quantity combination from the demand schedule as a point on a graph. That graph, called a **demand curve**, visually displays the demand schedule. That is, it is a graph that shows the quantities of a particular good or service that consumers will demand at various prices. The demand curve also represents consumers' *willingness to buy*: It shows the highest amount consumers will pay for any given quantity.

On the demand curve, quantity goes on the *x*-axis (the horizontal axis) and price on the *y*-axis (the vertical axis). The result is a downward-sloping line that reflects the inverse relationship between price and quantity. The demand curve in Figure 3-1 represents exactly the same information as the demand schedule.

Determinants of demand

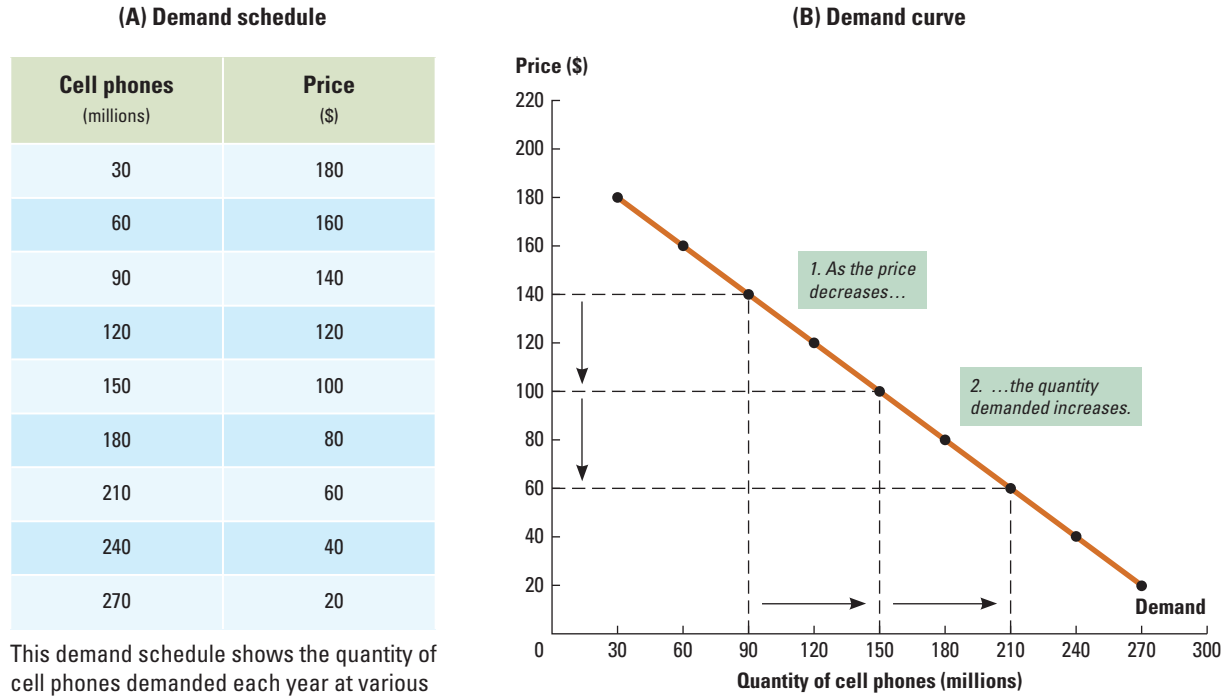
The demand curve represents the relationship between price and quantity demanded *with everything else held constant*. If everything else is *not* held constant—that is, if one of the nonprice factors that determines demand changes—the curve will shift.

The downward-sloping demand curve reflects the trade-offs that people face between (1) the benefit they expect to receive from a good and (2) the opportunity cost they face for buying it. Therefore, any factor that changes this balance at a given price will change people's willingness to buy, and thus their purchasing decisions.

demand schedule
a table that shows the quantities of a particular good or service that consumers will purchase (demand) at various prices

demand curve
a graph that shows the quantities of a particular good or service that consumers will demand at various prices

Since demand curves and other material in this chapter make extensive use of lines and linear equations, you may want to review those concepts in Appendix B, "Math Essentials: Working with Linear Equations" which follows this chapter.

FIGURE 3-1**Demand schedule and the demand curve**

This demand schedule shows the quantity of cell phones demanded each year at various prices. As prices decrease, consumers want to purchase more cell phones.

This demand curve is a graphic representation of the demand schedule for cell phones in the United States. Each entry in the demand schedule is plotted on this curve.

The nonprice determinants of demand can be divided into five major categories: consumer preferences, the prices of related goods, incomes, expectations of future prices, and the number of buyers in the market. Table 3-2 summarizes the impact of each factor on demand. Each of these nonprice determinants affects either the benefits or the opportunity cost of buying a good, even if the price of the good itself remains the same.

POTENTIALLY CONFUSING

Although these five factors include price-related issues such as the price of related goods and expectations about future prices, we refer to them as *nonprice determinants* to differentiate them from the effect of the current price of the good on demand for that good.

Consumer preferences. Consumer preferences are the personal likes and dislikes that make buyers more or less inclined to purchase a good. We don't need to know *why* people like what they like or to agree with their preferences; we just need to know that these likes and dislikes influence their purchases. At any given price, some consumers will get more enjoyment (i.e., benefits) out of a cell phone than others, simply based on how much they like talking to friends, or whether they use their phones for work, or any number of other personal preferences.

Some consumer preferences are fairly constant across time, such as those that arise from personality traits or cultural attitudes and beliefs. For example, a recluse may have little desire for a cell phone, while an on-the-go executive may find a cell phone (or two)

TABLE 3-2 Determinants of demand

Determinant	Examples of an increase in demand	Examples of a decrease in demand
Consumer preferences	A “Buy American” ad campaign appeals to national pride, increasing the demand for U.S.-made sneakers.	An outbreak of <i>E. coli</i> decreases the demand for spinach.
Prices of related goods	A decrease in the price of hot dogs increases the demand for relish, a complementary good.	A decrease in taxi fares decreases the demand for subway rides, a substitute good.
Incomes	An economic downturn lowers incomes, increasing the demand for ground beef, an inferior good.	An economic downturn lowers incomes, decreasing the demand for steak, a normal good.
Expectations	A hurricane destroys part of the world papaya crop, causing expectations that prices will rise and increasing the current demand for papayas.	An announcement that a new smartphone soon will be released decreases the demand for the current model.
Number of buyers	An increase in life expectancy increases the demand for nursing homes and medical care.	A falling birthrate decreases the demand for diapers.

to be essential. Other preferences will change over time, in response to external events or fads. For instance, it’s more useful to own a cell phone when all your friends already have one. The demand for cell phones also jumped after the World Trade Center attacks on September 11, 2001, because people wanted to make sure they could reach their families in emergencies.³

Prices of related goods. Another factor that affects the demand for a particular good is the prices of related goods. There are two kinds of related goods—substitutes and complements.

We say that goods are **substitutes** when they serve similar-enough purposes that a consumer might purchase one in place of the other—for example, rice and pasta. If the price of rice doubles while the price of pasta stays the same, demand for pasta will increase. That’s because the *opportunity cost* of pasta has decreased: You can buy less rice for the same amount of money, so you give up less potential rice when you buy pasta. If the two goods are quite similar, we call them *close substitutes*. Similar fishes, such as salmon and trout, might be considered close substitutes.

For many Americans deciding whether to buy their first cell phone, the nearest substitute would have been a landline phone. Cell phones and landlines are not very close substitutes: You can use them for the same purposes at home or the office, but only one of them can go for a walk with you. Still, if the price of U.S. landline phone service had suddenly skyrocketed, we can be sure that change would have increased the demand for cell phones.

In fact, the very high cost of landline phone services in many developing countries is one reason why cell phones spread very quickly. In the United States, almost every household had a landline phone before it had a cell phone. In many poor countries landlines are so expensive that very few people can afford one. That’s why cell phones are often called a *leapfrog technology*: People go straight from no phone to cell phone, hopping over an entire stage of older technology.

Related goods that are consumed together, so that purchasing one will make a consumer more likely to purchase the other, are called **complements**. Peanut butter and jelly, cereal and milk, cars and gasoline are all complements. If the price of one of the two goods increases, demand for the other will likely decrease. Why? As consumers purchase less of the first good, they will want less of the other to go with it.

substitutes goods that serve a similar-enough purpose that a consumer might purchase one in place of the other

complements goods that are consumed together, so that purchasing one will make consumers more likely to purchase the other

Conversely, if the price of one of the two goods declines, demand for the other will likely increase. For example, when the prices of new cell phones fall, consumers will be more likely to buy new accessories to go with them.

Incomes. Not surprisingly, the amount of income people earn affects their demand for goods and services: The bigger your paycheck, the more money you can afford to spend on the things you want. The smaller your paycheck, the more you have to cut back. Most goods are **normal goods**, meaning that an increase in income causes an increase in demand. Likewise, for normal goods a decrease in income causes a decrease in demand. For most people, cell phones are a normal good. If someone cannot afford a cell phone, she's more likely to buy one when her income rises. If someone already has a cell phone, she's more likely to upgrade to a newer, fancier cell phone when her income rises.

For some goods, called **inferior goods**, the opposite relationship holds: As income increases, demand decreases. Typically, people replace inferior goods with more expensive and appealing substitutes when their incomes rise. For many people, inexpensive grocery items like instant noodles, some canned foods, and generic store brands might be inferior goods. When their incomes rise, people replace these goods with fresher, more expensive ingredients. Decreases in income occur for many people during economic downturns; thus, the demand for inferior goods reflects the overall health of the economy. For an example, see the Real Life box "Can instant-noodle sales predict a recession?"

normal goods
goods for which
demand increases as
income increases

inferior goods
goods for which
demand decreases as
income increases

REAL LIFE

Can instant-noodle sales predict a recession?

If you were to open a typical college student's kitchen cupboard, what would you find? Many students rely on a decidedly unglamorous food item: ramen instant noodles. Packed with cheap calories, this tasty snack is famously inexpensive.

Ramen noodles are an example of an inferior good. When people's budgets are tight (as are those of most students), these noodles sell well. When incomes rise, ramen sales drop and more expensive foods replace them.

In Thailand, ramen noodles have even been used as an indicator of overall economic health. The Mama Noodles Index tracks sales of a popular brand of instant ramen noodles. Because the demand for inferior goods increases when incomes go down, an increase in ramen sales could signal a downturn in incomes and an oncoming recession. In fact, observers of the Thai economy say that the Mama Noodles Index does a pretty good job of reflecting changing economic conditions.

Even the demand for inferior goods may decrease during severe economic downturns, however. Although the Mama Noodles Index has risen as expected when the Thai economy falters, the index unexpectedly dropped 15 percent during the deep recession of early 2009.

So are instant noodles an inferior good or a normal good? In Thailand, the answer may depend on who you are or how severely your income has dropped. For the middle class, who choose between ramen and more expensive foods, ramen may indeed be an inferior good. For the poor, whose choice more likely is whether or not they will get enough to eat, ramen may be a normal good. When their incomes rise they may buy more ramen; when their incomes fall, even noodles may be a luxury.

Sources: "Using their noodles," Associated Press, September 5, 2005, <http://www.theage.com.au/news/world/using-their-noodles/2005/09/04/1125772407287.html>; "Downturn bites into instant-noodle market as customers tighten belts," *The Nation*, March 20, 2009, <http://www.nationmultimedia.com/business/Downturn-bites-into-instant-noodle-market-as-custo-30098402.html>.

Expectations. Changes in consumers' expectations about the future—especially future prices—can also affect demand. If consumers expect prices to fall in the future, they may postpone a purchase until a later date, causing current demand to decrease. Think about waiting to buy a new cell phone until it goes on sale, or holding off on purchasing a smartphone in the hope that the next model will be cheaper and faster than the prior one. When prices are expected to drop in the future, demand decreases.

Conversely, if consumers expect prices to rise in the future, they may wish to purchase a good immediately, to avoid a higher price. This reasoning often occurs in speculative markets, like the stock market or sometimes the housing market. Buyers purchase stock or a house expecting prices to rise, so they can sell at a profit. In these markets, then, demand increases when prices are low and are expected to rise.

Number of buyers. The demand curve represents the demand of a particular number of potential buyers. In general, an increase in the number of potential buyers in a market will increase demand; a decrease in the number of buyers will decrease it. Major population shifts, like an increase in immigration or a drop in the birthrate, can create nationwide changes in demand. As the number of teenagers and college students increases, the demand for cell phones increases too.

Shifts in the demand curve

LO 3.3 Distinguish between a shift in and a movement along the demand curve.

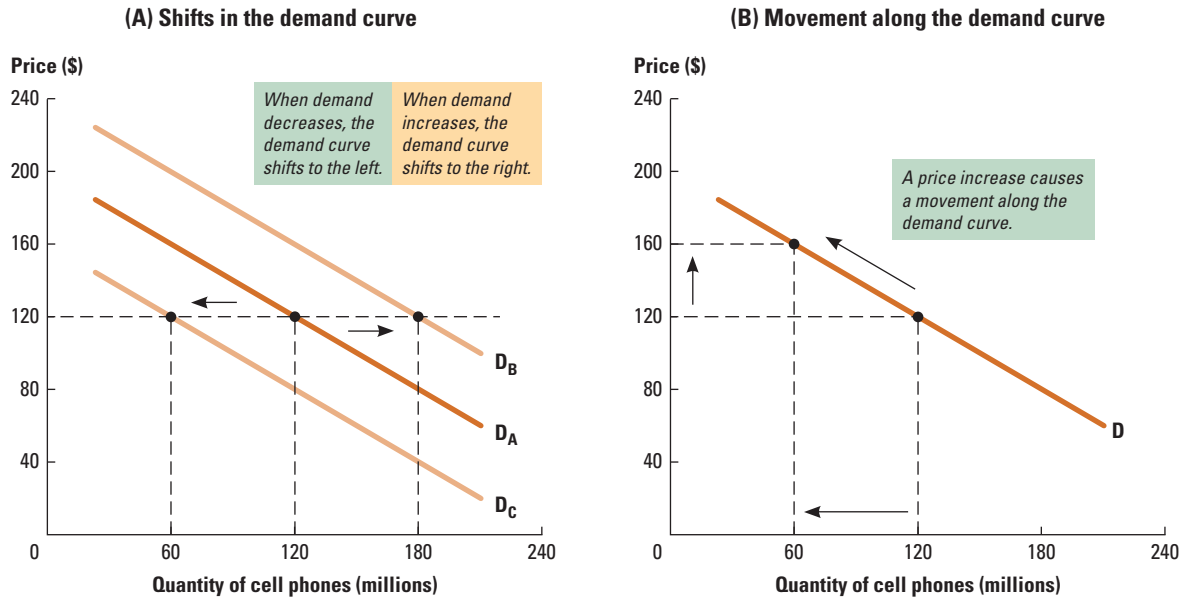
What happens to the demand curve when one of the five nonprice determinants of demand changes? The entire demand curve shifts, either to the right or to the left. The shift is horizontal rather than vertical, because nonprice determinants affect the quantity demanded at *each* price. The quantity demanded at a given price is now higher (or lower), so the point on the curve corresponding to that price is now further right (or left).

Consider what happens, for example, when the economy is growing and people's incomes are rising. The price of cell phones does not necessarily change, but more people will choose to buy a new one at any given price, causing quantity demanded to be higher at every possible price. Panel A of Figure 3-2 shows the resulting shift of the demand curve to the right, from D_A to D_B . In contrast, if the economy falls into a recession and people begin pinching pennies, quantity demanded will decrease at every price, and the curve will shift to the left, from D_A to D_C .

It is important to distinguish between these *shifts* in demand, which move the entire curve, and *movements along* a given demand curve. Remember this key point: *Shifts in the demand curve are caused by changes in the nonprice determinants of demand.* A recession, for example, would lower incomes and move the whole demand curve left. When we say "demand decreases," this is what we are talking about.

In contrast, suppose that the price of phones increases but everything else stays the same—that is, there is no change in the nonprice determinants of demand. Because the demand curve describes the quantity consumers will demand at any possible price, not just the current market price, we don't have to shift the curve to figure out what happens when the price goes up. Instead, we simply look at a different point on the curve to describe what is actually happening in the market right now.

To find the quantity that consumers will want to purchase at this new price, we move along the existing demand curve from the old price to the new one. If, for instance, the price of cell phones increases, we find the new quantity demanded by moving up along the demand curve to the new price point, as shown in panel B of Figure 3-2. The price change does not shift the curve itself, because the curve already describes what consumers will do at any price.

FIGURE 3-2**Movement along the demand curve versus shifts in the demand curve**

Changes in external factors cause the entire demand curve to shift. The shift from D_A to D_B represents an increase in demand, meaning that consumers want to buy more cell phones at each price. The shift from D_A to D_C represents a decrease in demand, meaning that consumers want to buy fewer cell phones at each price.

A price change causes a movement along the demand curve, but the curve itself remains constant.

To summarize, panel A of Figure 3-2 shows a *shift in demand* as the result of a change in the nonprice determinants; panel B shows a *movement along the demand curve* as the result of a change in price.

Economists use very specific terminology to distinguish between a shift in the demand curve and movement along the demand curve. We say that a change in one of the nonprice determinants of demand causes an “*increase in demand*” or “*decrease in demand*”—that is, a shift of the entire demand curve. To distinguish this from movement along the demand curve, we say that a change in price causes an “*increase in quantity demanded*” or “*decrease in the quantity demanded*.” Just keep in mind that a “change in demand” is different from a “change in the quantity demanded.” Observing this seemingly small difference in terminology prevents a great deal of confusion.

Understanding the effects of changes in both price and the nonprice determinants of demand is a key tool for businesspeople and policymakers. Suppose you are in charge of the Cell Phone Manufacturers’ Association, an industry lobby group, and your members want to spur demand for phones. One idea might be to start an advertising campaign. If you understand the determinants of demand, you know that an advertising campaign aims to change consumer preferences, increasing the real or perceived benefits of owning a cell phone. In other words, a successful advertising campaign would shift the demand curve for cell phones to the right. Similarly, if you are a congressional representative who is considering a tax cut to stimulate the economy, you know that a tax cut increases consumers’ disposable incomes, increasing the demand for all normal goods. In other words, you are hoping that the resulting increase in incomes will shift the demand curve for cell phones to the right.

✓ CONCEPT CHECK

- ❑ What are the five determinants of demand? [LO 3.2]
- ❑ What is the difference between a change in quantity and a change in quantity demanded? [LO 3.3]

Supply

We've discussed the factors that determine how many phones consumers want to buy at a given price. But are cell phone producers necessarily willing to sell that many? The concept of *supply* describes how much of a good or service producers will offer for sale under given circumstances. The **quantity supplied** is the amount of a particular good or service that producers will offer for sale at a given price during a specified period.

As with demand, we can find overall market supply by adding up the individual decisions of each producer. Imagine you own a factory that can produce cell phones or other consumer electronics. If the price of cell phones is \$110, you might decide there's good money to be made and use your entire factory space to produce cell phones. If the price is only \$80, you might produce some cell phones but decide it will be more profitable to devote part of your factory to producing laptop computers. If the cell phone price drops to \$55, you might decide you'd make more money by producing only laptops. Each producer will have a different price point at which it decides it's worthwhile to supply cell phones. This rule—all else held equal, quantity supplied increases as price increases, and vice versa—is called the **law of supply**.

(In reality, it's costly to switch a factory from making cell phones to laptops or other goods. However, the simple version illustrates a basic truth: The higher the price of a good, the more of that good producers will want to sell.)

As with demand, supply varies with price because the decision to produce a good is about the *trade-off* between the benefit the producer will receive from selling the good and the opportunity cost of the time and resources that go into producing it. When the market price goes up and all other factors remain constant, the benefit of production increases relative to the opportunity cost, and the trade-off involved in production makes it more favorable to produce more. For instance, if the price of phones goes up and the prices of raw materials stay the same, existing phone producers may open new factories, and new companies may start looking to enter the cell phone market. The same holds true across other industries. If air travelers seem willing to pay higher prices, airlines will increase the frequency of flights, add new routes, and buy new planes so they can carry more passengers. When prices drop, they cut back their flight schedules and cancel their orders for new planes.

The supply curve

LO 3.4 Draw a supply curve and describe the external factors that determine supply.

Like demand, supply can be represented as a table or a graph. A **supply schedule** is a table that shows the quantities of a particular good or service that producers will supply at various prices. A **supply curve** is a graph of the information in the supply schedule. Just as the demand curve showed consumers' willingness to buy, so the supply curve shows producers' *willingness to sell*: It shows the minimum price producers must receive to supply any given quantity. Figure 3-3 shows U.S. cell phone providers' supply schedule and their supply curve for cell phones.

quantity supplied

the amount of a particular good or service that producers will offer for sale at a given price during a specified period

law of supply

a fundamental characteristic of supply which states that, all else equal, quantity supplied rises as price rises

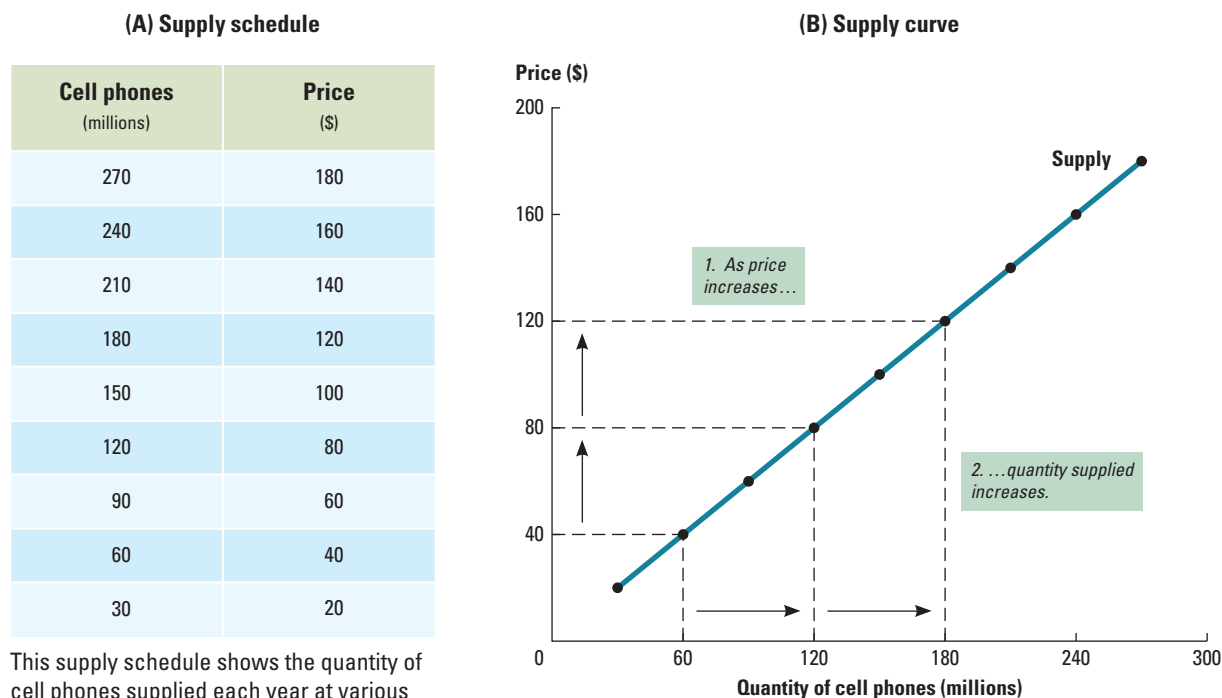
supply schedule

a table that shows the quantities of a particular good or service that producers will supply at various prices

supply curve

a graph that shows the quantities of a particular good or service that producers will supply at various prices

FIGURE 3-3
Supply schedule and the supply curve



This supply schedule shows the quantity of cell phones supplied each year at various prices. As prices decrease, suppliers want to produce fewer cell phones.

This supply curve is a graphic representation of the supply schedule for cell phones in the United States. It shows the quantity of cell phones that suppliers will produce at various prices.

Determinants of supply

The law of supply describes how the quantity that producers are willing to supply changes as price changes. But what determines the quantity supplied at any given price? As with demand, a number of nonprice factors determine the opportunity cost of production and therefore producers' willingness to supply a good or service. *When a nonprice determinant of supply changes, the entire supply curve will shift.* Such shifts reflect a change in the quantity of goods supplied at every price.

The nonprice determinants of supply can be divided into five major categories: prices of related goods, technology, prices of inputs, expectations, and the number of sellers. Each of these factors determines the opportunity cost of production relative to a given benefit (i.e., the price) and therefore the trade-off that producers face. Table 3-3 shows how the supply of various products responds to changes in each determinant.

Prices of related goods. Return to your factory, where you can produce either cell phones or laptops. Just as you chose to produce more laptops and fewer cell phones when the price of cell phones dropped, you would do the same if the price of laptops increased while the price of cell phones stayed constant.

The price of related goods determines supply because it affects the opportunity cost of production. When you choose to produce cell phones, you forgo the profits you would have earned from producing something else. If the price of that something else increases, the amount you forgo in profits also increases. For instance, imagine a farmer who can grow wheat or corn (or other crops, for that matter) on his land. If the price of corn increases, the quantity of wheat (the substitute crop) he is willing to grow falls, because each acre he devotes to wheat is one fewer acre he can use to grow corn.

TABLE 3-3 Determinants of supply

Determinant	Examples of an increase in supply	Examples of a decrease in supply
Price of related goods	The price of gas rises, so an automaker increases its production of smaller, more fuel-efficient cars.	The price of clean energy production falls, so the power company reduces the amount of power it supplies using coal power plants.
Technology	The installation of robots increases productivity and lowers costs; the supply of goods increases.	New technology allows corn to be made into ethanol, so farmers plant more corn and fewer soybeans; the supply of soybeans decreases.
Prices of inputs	A drop in the price of tomatoes decreases the production cost of salsa; the supply of salsa increases.	An increase in the minimum wage increases labor costs at food factories; the supply of processed food decreases.
Expectations	Housing prices are expected to rise, so builders increase production; the supply of houses increases.	New research points to the health benefits of eating papayas, leading to expectations that the demand for papayas will rise. More farmers plant papayas, increasing the supply.
Number of sellers	Subsidies make the production of corn more profitable, so more farmers plant corn; the supply of corn increases.	New licensing fees make operating a restaurant more expensive; some small restaurants close, decreasing the supply of restaurants.

Technology. Improved technology enables firms to produce more efficiently, using fewer resources to make a given product. Doing so lowers production costs, increasing the quantity producers are willing to supply at each price.

Improved technology has played a huge role in the changing popularity of cell phones. As technological innovation in the construction of screens, batteries, and mobile networks and in the processing of electronic data has leapt forward, the cost of producing a useful, consumer-friendly cell phone has plummeted. As a result, producers are now willing to supply more cell phones at lower prices.

Prices of inputs. The prices of the inputs used to produce a good are an important part of its cost. When the prices of inputs increase, production costs rise, and the quantity of the product that producers are willing to supply at any given price decreases.

Small amounts of silver and gold are used inside cell phones, for example. When the prices of these precious metals rise, the cost of manufacturing each cell phone increases, and the total number of units that producers collectively are willing to make at any given price goes down. Conversely, when input prices fall, supply increases.

Expectations. Suppliers' expectations about prices in the future also affect quantity supplied. For example, when the price of real estate is expected to rise in the future, more real estate developers will wait to embark on construction projects, decreasing the supply of houses in the near future. When expectations change and real estate prices are projected to fall in the future, many of those projects will be rushed to completion, causing the supply of houses to rise.

Number of sellers. The market supply curve represents the quantities of a product that a

In 1980, this cutting-edge technology cost \$4,000.



particular number of producers will supply at various prices in a given market. This means that the number of sellers in the market is considered to be one of the fixed parts of the supply curve. We've already seen that the sellers in the market will decide to supply more if the price of a good is higher. This does not mean that the number of sellers will change based on price in the short run.

There are, however, nonprice factors that cause the number of sellers to change in a market and move the supply curve. For example, suppose cell phone producers must meet strict licensing requirements. If those licensing requirements are dropped, more companies may enter the market, willing to supply a certain number of cell phones at each price. These additional phones must be added to the number of cell phones existing producers are already willing to supply at each price point.

Shifts in the supply curve

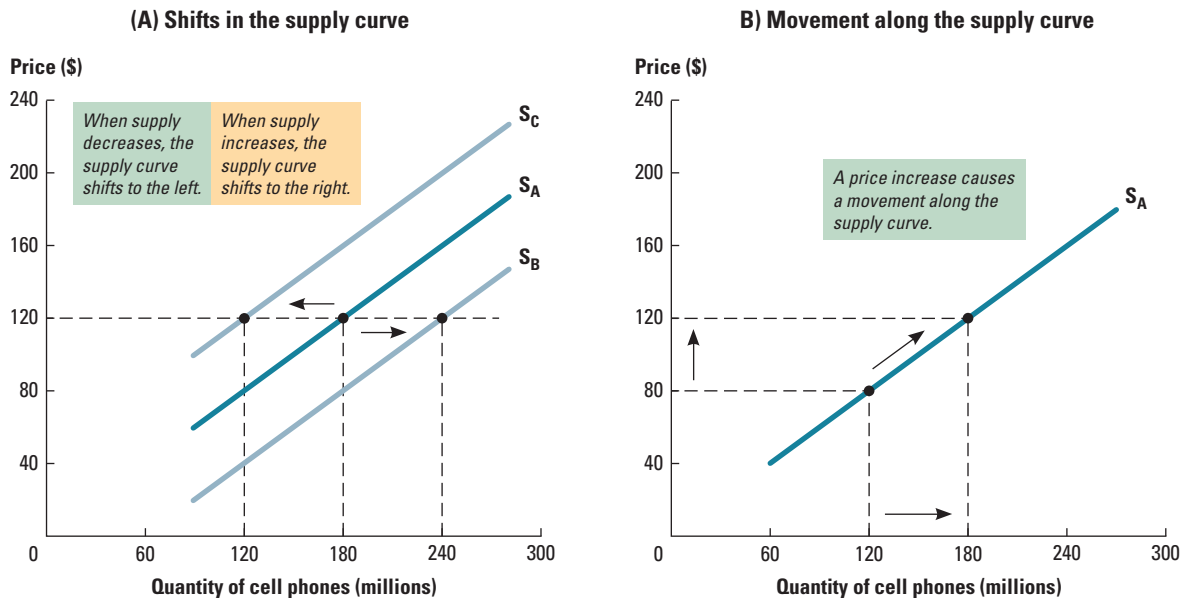
LO 3.5 Distinguish between a shift in and a movement along the supply curve.

Just as with demand, changes in price cause suppliers to move to a different point on the same supply curve, while changes in the nonprice determinants of supply shift the supply curve itself. A change in a nonprice determinant increases or decreases *supply*, while a change in price increases or decreases the *quantity supplied*.

A change in one of the nonprice determinants increases or decreases the supply at any given price. These shifts are shown in panel A of Figure 3-4. An increase in supply shifts the curve to the right. A decrease in supply shifts the curve to the left. For instance,

FIGURE 3-4

Movement along the supply curve versus shifts in the supply curve



Changes in external factors cause the entire supply curve to shift. The shift from S_A to S_B represents an increase in supply, meaning that producers are willing to supply more cell phones at each price. The shift from S_A to S_C represents a decrease in supply, meaning that producers are willing to supply fewer cell phones at each price.

A price change causes a movement along the supply curve, but the curve itself remains constant.

an improvement in battery technology that decreases the cost of producing cell phones will shift the entire supply curve to the right, from S_A to S_B , so that the quantity of phones supplied at every price is higher than before. Conversely, an increase in the price of the gold needed for cell phones raises production costs, shifting the supply curve to the left, from S_A to S_C .

As with demand, we differentiate these shifts in the supply curve from a movement along the supply curve, which is shown in panel B of Figure 3-4. If the price of cell phones changes, but the nonprice determinants of supply stay the same, we find the new quantity supplied by moving along the supply curve to the new price point.

✓ CONCEPT CHECK

- What does the law of supply say about the relationship between price and quantity supplied? [LO 3.4]
- In which direction does the supply curve shift when the price of inputs increases? [LO 3.5]

Market Equilibrium

We've discussed the factors that influence the quantities supplied and demanded by producers and consumers. To find out what actually happens in the market, however, we need to combine these concepts. The prices and quantities of the goods that are exchanged in the real world depend on the *interaction* of supply with demand.

Bear with us for a moment as we point out the obvious: There is no sale without a purchase. You can't sell something unless someone buys it. Although this point may be obvious, the implication for markets is profound. When markets work well, the quantity supplied exactly equals the quantity demanded.

Graphically, this convergence of supply with demand happens at the point where the demand curve intersects the supply curve, a point called the market **equilibrium**. The price at this point is called the **equilibrium price**, and the quantity at this point is called the **equilibrium quantity**. We can think of this intersection, where quantity supplied equals quantity demanded, as the point at which buyers and sellers "agree" on the quantity of a good they are willing to exchange at a given price. At higher prices, sellers want to sell more than buyers want to buy. At lower prices, buyers want to buy more than sellers are willing to sell. Because every seller finds a buyer at the equilibrium price and quantity, and no one is left standing around with extra goods or an empty shopping cart, the equilibrium price is sometimes called the *market-clearing price*.

In reality, things don't always work so smoothly: Short-run "friction" sometimes slows the process of reaching equilibrium, even in well-functioning markets. As a result, smart businesspeople may hold some inventory for future sale, and consumers may need to shop around for specific items. On the whole, though, the concept of equilibrium is incredibly accurate (and important) in describing how markets function.

Figure 3-5 shows the market equilibrium for cell phones in the United States. It was constructed by combining the market supply and demand curves shown in Figures 3-1 and 3-3. In this market, the equilibrium price is \$100, and the equilibrium quantity supplied and demanded is 150 million phones.

Reaching equilibrium

LO 3.6 Explain how supply and demand interact to drive markets to equilibrium.

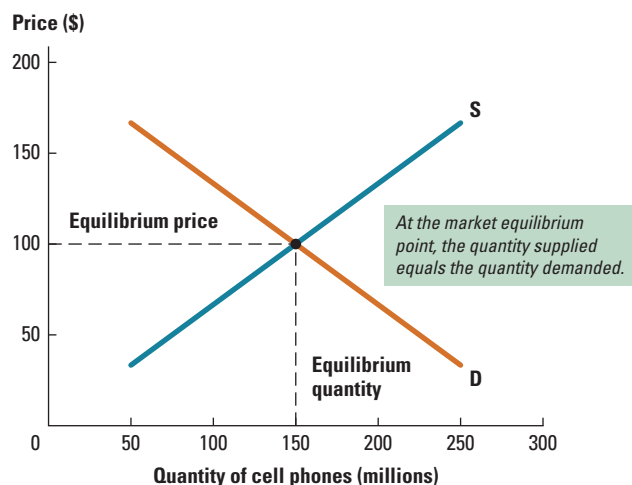
How does a market reach equilibrium? Do sellers know intuitively what price to charge? No. Instead, they tend to set prices by trial and error, or by past experience

equilibrium the situation in a market when the quantity supplied equals the quantity demanded; graphically, this convergence happens where the demand curve intersects the supply curve

equilibrium price the price at which the quantity supplied equals the quantity demanded

equilibrium quantity the quantity that is supplied and demanded at the equilibrium price

FIGURE 3-5
Market equilibrium in the U.S. market for cell phones



The point where the supply curve intersects the demand curve is called the equilibrium point. In this example, the equilibrium price is \$100, and the equilibrium quantity is 150 million cell phones. At this point, consumers are willing to buy exactly as many cell phones as producers are willing to sell.

with customers. The incentives buyers and sellers face will naturally drive the market toward equilibrium, as sellers raise or lower their prices in response to customers' behavior.

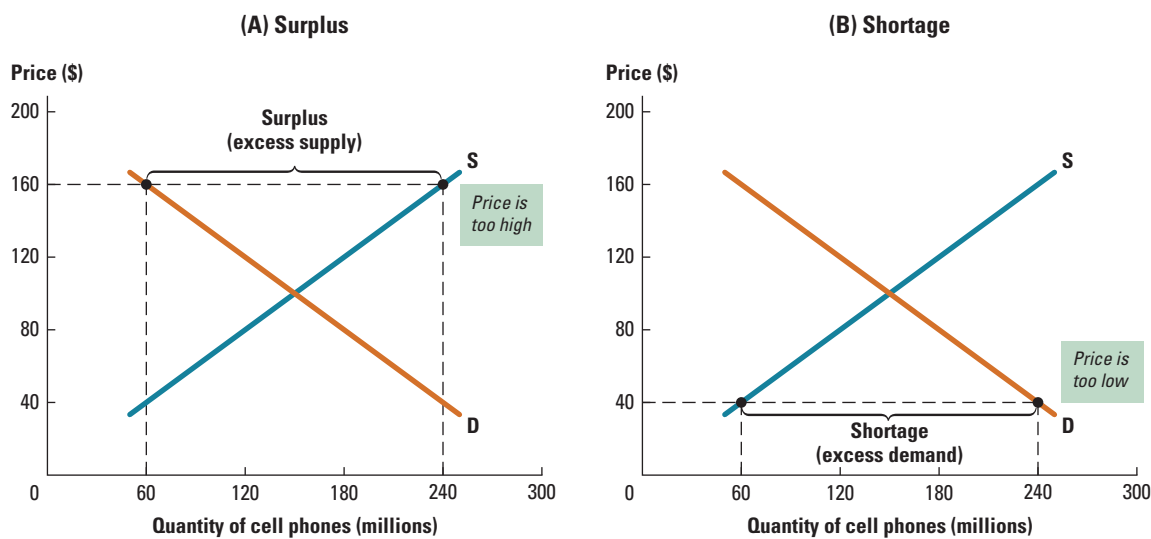
Figure 3-6 shows two graphs, one in which the starting price is above the equilibrium price and the other in which it is below the equilibrium price. In panel A, we imagine that cell phone suppliers think they'll be able to charge \$160 for a cell phone, so they produce 240 million phones, but they find that consumers will buy only 60 million. (We can read the quantities demanded and supplied at a price of \$160 from the demand and supply curves.) When the quantity supplied is higher than the quantity demanded, we say that there is a **surplus** of phones, or an **excess supply**. Manufacturers are stuck holding extra phones in their warehouses; they want to sell that stock and must reduce the price to attract more customers. They have an incentive to keep lowering the price until quantity demanded increases to reach quantity supplied.

In panel B of Figure 3-6, we imagine that cell phone producers make the opposite mistake—they think they'll be able to charge only \$40 per phone. They make only 60 million cell phones, but discover that consumers actually are willing to buy 240 million cell phones at that price. When the quantity demanded is higher than the quantity supplied, we say there is a **shortage**, or **excess demand**. Producers will see long lines of people waiting to buy the few available cell phones, and will quickly realize that they could make more money by charging a higher price. They have an incentive to increase the price until quantity demanded decreases to equal quantity supplied, and no one is left standing in line.

Thus, at any price above or below the equilibrium price, sellers face an incentive to raise or lower prices. No one needs to engineer the market equilibrium or share secret information about what price to charge. Instead, money-making incentives drive the market toward the equilibrium price, at which there is neither a surplus nor a shortage. The Real Life box "The Prius shortage of 2003" describes a case in which a producer started out charging the wrong price, but the market solved the problem.

surplus (excess supply) a situation in which the quantity of a good that is supplied is higher than the quantity demanded

shortage (excess demand) a situation in which the quantity of a good that is demanded is higher than the quantity supplied

FIGURE 3-6**Reaching equilibrium in the market for cell phones**

When the initial price for cell phones is above the equilibrium point, producers want to supply more cell phones than consumers want to buy. The gap between the quantity supplied and the quantity demanded is called a surplus, or excess supply.

When the initial price for cell phones is below the equilibrium point, consumers want to buy more cell phones than sellers want to produce. The distance between the quantity demanded and the quantity supplied is called a shortage, or excess demand.

REAL LIFE**The Prius shortage of 2003**

In 2003, Toyota introduced the first mainstream “hybrid” car, the Prius, to the U.S. auto market. A hybrid car runs on a combination of gasoline and electric power, using the engine to charge an electric battery in stop-and-go traffic. The Prius got much better gas mileage than its competitors—usually between 40 and 50 miles to the gallon. But for most families the gas savings were more than offset by the car’s higher price. The car’s main appeal was its environmentally friendly design.

When the Prius hit the U.S. market in October 2003, dealerships sold out immediately. Toyota had significantly underestimated the demand. Prospective buyers had to put their names on a waiting list, often for more than six months. A few years later, when gasoline prices spiked, demand was driven even higher as consumers grew more interested in good gas mileage. In the short run, Toyota could not do much to address the shortage; increasing plant capacity would take time.

Instead, the market found a way to solve the problem. As we know, price acts as a signal between buyers and sellers trying to match demand with supply. When demand is higher than supply, the price will rise. As we might expect, Prius buyers began to bid up the price of the car. Dealerships were soon charging thousands of dollars more than the manufacturer’s suggested price. For a while, even the price of a *used* Prius was higher than the suggested price for a new car.

Eventually, Toyota responded to the shortage by increasing production capacity of the Prius. The company moved production of the car to progressively larger plants; in 2008, total production topped 1 million. Shortages persisted, however, as increases in demand outstripped the increases in supply. As Toyota scrambled to catch up with demand, sellers happily charged a premium to clear the market.

Source: “Wait time for Prius buyers diminishing,” *CNNMoney*, November 6, 2006, <http://money.cnn.com/2006/11/06/autos/prius/index.htm>.

Changes in equilibrium

LO 3.7 Evaluate the effect of changes in supply and demand on the equilibrium price and quantity.

We've seen what happens to the supply and demand curves when a nonprice factor changes. Because the equilibrium price and quantity are determined by the interaction of supply and demand, a shift in either curve will also change the market equilibrium. Some changes will cause only the demand curve to shift; some, only the supply curve. Some changes will affect both the supply and demand curves.

To determine the effect on market equilibrium of a change in a nonprice factor, ask yourself a few questions:

1. Does the change affect demand? If so, does demand increase or decrease?
2. Does the change affect supply? If so, does supply increase or decrease?
3. How does the combination of changes in supply and demand affect the equilibrium price and quantity?

HINT

Remember, when we say that supply or demand increases or decreases, we're referring to a *shift in the entire curve*, not a movement along it, which is a change in quantity demanded.

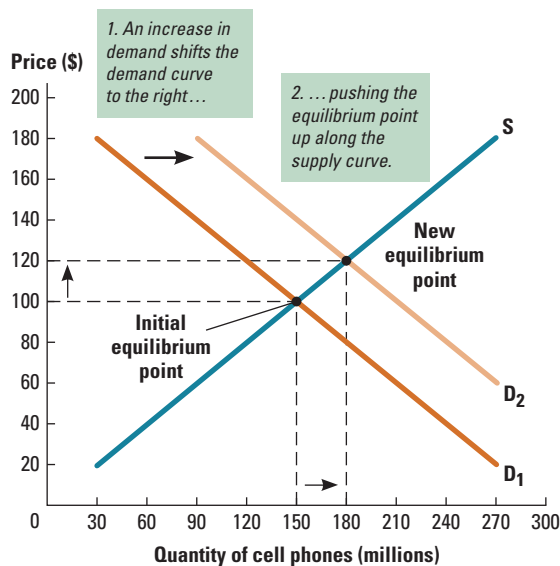
Shifts in demand. We suggested earlier that landline service is a *substitute* for cell phones and that if the price of landline service suddenly skyrockets, then demand for cell phones increases. In other words, the demand curve shifts to the right. The price of landline service probably doesn't affect the supply of cell phones, because it doesn't change the costs or expectations that cell phone manufacturers face. So the supply curve stays put. Figure 3-7 shows the effect of the increase in landline price on the market equilibrium for cell phones. Because the new demand curve intersects the supply curve at a different point, the equilibrium price and quantity change. The new equilibrium price is \$120, and the new equilibrium quantity is 180 million.

We can summarize this effect in terms of the three questions to ask following a change in a nonprice factor:

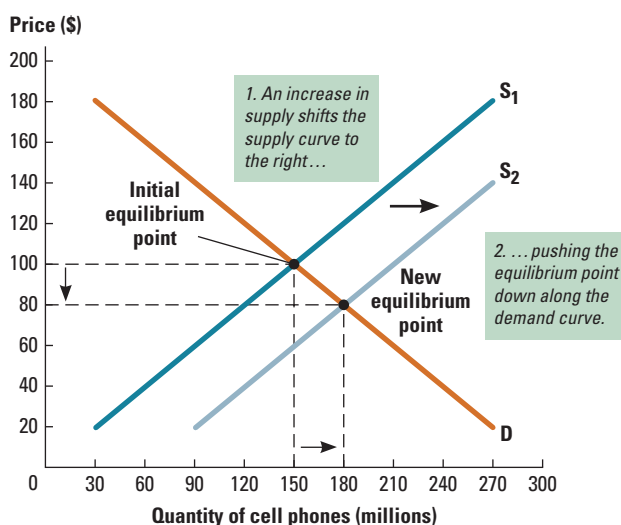
1. *Does demand increase/decrease?* Yes, the change in the price of landlines phone service increases demand for cell phones at every price.
2. *Does supply increase/decrease?* No, the change in the price of landline phone service does not affect any of the nonprice determinants of supply. The supply curve stays where it is.
3. *How does the combination of changes in supply and demand affect equilibrium price and quantity?* The increase in demand shifts the demand curve to the right, pushing the equilibrium to a higher point on the stationary supply curve. The new point at which supply and demand "agree" represents a price of \$120 and a quantity of 180 million phones.

To improve your understanding of shifts in demand, try the interactive graphing tutorial.

Shifts in supply. What would happen if a breakthrough in battery technology enabled cell phone manufacturers to construct phones with the same battery life for less money? Once again, asking *How will others respond?* helps us predict the market response. We can see that the new technology does not have much impact on demand: Customers probably have no idea how much the batteries in their phones cost to make, nor will they care as long as battery life stays the same. However, cheaper batteries definitely

FIGURE 3-7**Shift in the demand for cell phones**

When an external factor increases the demand for cell phones at all prices, the demand curve shifts to the right. This increase in demand results in a new equilibrium point. Consumers purchase more cell phones at a higher price.

FIGURE 3-8**Shift in the supply of cell phones**

When an external factor affects the supply of cell phones at all prices, the supply curve shifts. In this example, supply increases and the market reaches a new equilibrium point. Consumers purchase more phones at a lower price.

decrease production costs, increasing the number of phones manufacturers are willing to supply at any given price. So the demand curve stays where it is, and the supply curve shifts to the right. Figure 3-8 shows the shift in supply and the new equilibrium point. The new supply curve intersects the demand curve at a new equilibrium point, representing a price of \$80 and a quantity of 180 million phones.

Once again, we can analyze the effect of the change in battery technology on the market for cell phones in three steps:

1. *Does demand increase/decrease?* No, the nonprice determinants of demand are not affected by battery technology.
2. *Does supply increase/decrease?* Yes, supply increases, because the new battery technology lowers production costs.
3. *How does the combination of changes in supply and demand affect equilibrium price and quantity?* The increase in supply shifts the supply curve to the right, pushing the equilibrium to a lower point on the stationary demand curve. The new equilibrium price and quantity are \$80 and 180 million phones.

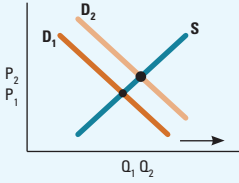
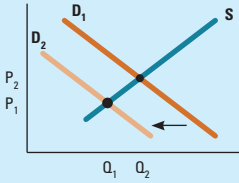
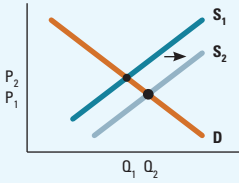
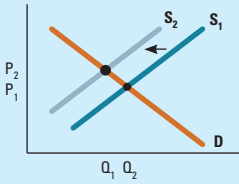
Table 3-4 summarizes the effect of some other changes in demand or supply on the equilibrium price and quantity.

Shifts in both demand and supply. In our discussion so far, we've covered examples in which only demand or supply shifted. However, it's possible that factors that shift demand (such as a hike in landline cost) and supply (such as an improvement in battery technology) in the market for cell phones could coincidentally happen at the same time. It's also possible that a single change could affect both supply and demand.

For instance, suppose that in addition to reducing the cost of production, the new battery technology makes cell phone batteries last longer. We already know that cheaper batteries will increase supply. As we saw before with increases in supply, price decreases

To improve your understanding of shifts in supply, try the interactive graphing tutorial.

TABLE 3-4 Effect of changes in demand or supply on the equilibrium price and quantity

Example of change in demand or supply	Effect on equilibrium price and quantity	Shift in curve
A successful “Buy American” advertising campaign increases the demand for Fords.	The demand curve shifts to the right. The equilibrium price and quantity increase.	
An outbreak of <i>E. coli</i> reduces the demand for spinach.	The demand curve shifts to the left. The equilibrium price and quantity decrease.	
The use of robots decreases production costs.	The supply curve shifts to the right. The equilibrium price decreases, and the equilibrium quantity increases.	
An increase in the minimum wage increases labor costs.	The supply curve shifts to the left. The equilibrium price increases, and the equilibrium quantity decreases.	

while the quantity increases. Asking *how consumers will respond* allows us to see that the improvement in battery life will also increase demand, because longer-lasting batteries will make a cell phone more valuable to consumers at any given price. As a result, both the demand curve and the supply curve shift to the right. Panel A and B of Figure 3-9 both show that the effect of a double change is a new equilibrium point at a higher price and a higher quantity.

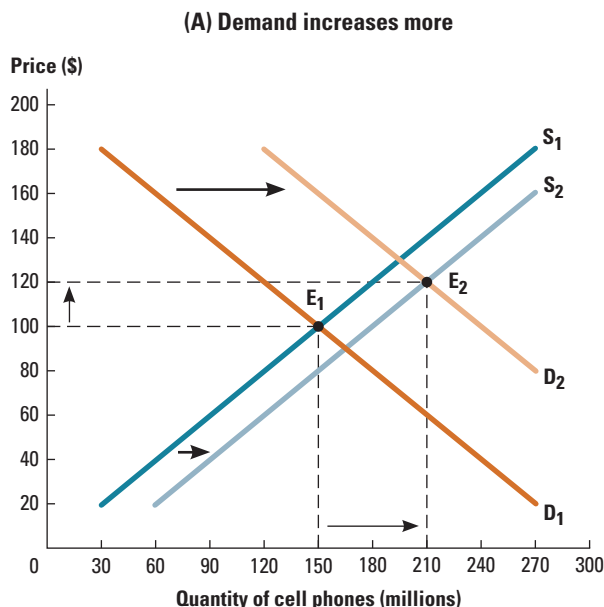
Even without looking at a graph, we could have predicted that in this case the equilibrium *quantity* would rise. Increases in demand and increases in supply both independently lead to a higher equilibrium quantity—and the combination will certainly do so as well. Without more information, however, we cannot predict the change in equilibrium *price*. Holding all else equal, an increase in demand leads to an increase in price, but an increase in supply leads to a decrease in price. To find the net effect on equilibrium price, we would have to know whether the shift in demand outweighs the shift in supply shown in panel A of Figure 3-9, or vice versa, which is shown in panel B.

We can state this idea more generally: When supply and demand shift together, it is possible to predict *either* the direction of the change in quantity *or* the direction of the change in price without knowing how much the curves shift. Table 3-5 shows some rules you can use to predict the outcome of these shifts in supply and demand. When supply and demand move in the *same* direction, we can predict the direction of the change in

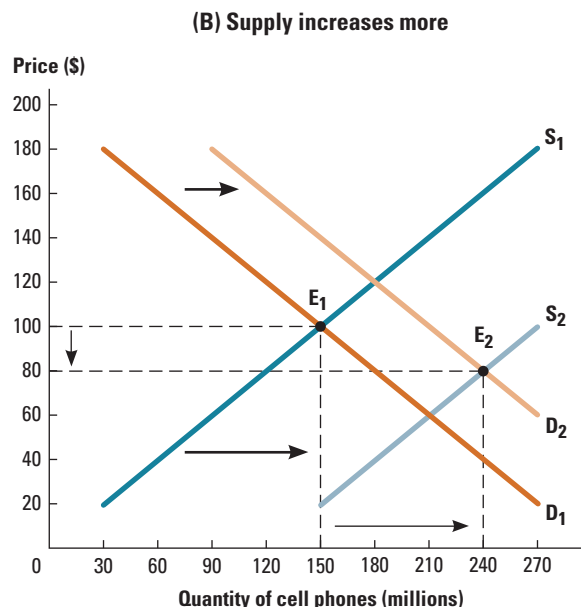
FIGURE 3-9

Shifts in both demand and supply

An increase in supply and demand shifts both curves to the right, resulting in a higher quantity traded. However, the direction of the price shift depends on whether supply or demand increases more.



Sometimes, supply and demand shift together. In this example, both curves shift to the right, but demand increases more. At the new equilibrium point, E_2 , consumers purchase more cell phones at a higher price.



Sometimes, supply and demand shift together. In this example, both curves shift to the right, but supply increases more. At the new equilibrium point, E_2 , consumers purchase more cell phones at a lower price.

Supply change	Demand change	Price change	Quantity change
Decrease	Decrease	?	↓
Decrease	Increase	↑	?
Increase	Increase	?	↑
Increase	Decrease	↓	?

TABLE 3-5
Predicting changes in price and quantity when supply and demand change simultaneously

quantity but not the direction of the change in price. When supply and demand move in *opposite* directions, the change in price is predictable, but not the change in quantity.

Thinking about the intuition behind these rules may help you to remember them. Any time you are considering a situation in which supply and demand shift at the same time, ask yourself, “What do buyers and sellers agree on?” For instance, when both supply and demand increase, buyers and sellers “agree” that at any given price, the quantity they are willing to exchange is higher. The reverse is true when both supply and demand decrease: Buyers and sellers agree that at a given price, the quantity they are willing to exchange is lower.

Applying this reasoning to opposite shifts in supply and demand—when one increases but the other decreases—is trickier. To find out what buyers and sellers “agree” on, try rephrasing what it means for demand to increase. One way to say it is that consumers are willing to buy a *higher* quantity at the *same* price. Another way to say it is that

To improve your understanding of simultaneous shifts in demand and supply, try the interactive graphing tutorial.

consumers are willing to pay a *higher* price to buy the *same* quantity. So, when demand increases and supply decreases, buyers are willing to pay more for the same quantity; also, sellers are willing to sell the same quantity only if they receive a higher price. In other words, they can “agree” on a higher price at any given quantity. We can therefore predict that the equilibrium price will increase.

The opposite is true when demand decreases and supply increases. Buyers are willing to buy the same quantity as before only if the price is lower, and sellers are willing to supply the same quantity at a lower price. Because the two groups can “agree” on a lower price at any given quantity, we can predict that the price will decrease.

Of course, you can always work out the effect of simultaneous shifts in demand and supply by working through the three questions described in the previous section. Draw the shifts in each curve on a graph, as is done in two cases in panels A and B in Figure 3-9, and find the new equilibrium.

Before you finish this chapter, read the Real Life box “Give a man a fish” for some information about how cell phones affected supply and demand in one developing country.

REAL LIFE

Give a man a fish

Are cell phones a technological luxury or a practical necessity? Maybe you can’t imagine life without the ability to call or text your friends anywhere, any time. But are cell phones as important as shelter, food, or water? A recent study in India showed that being able to communicate may help people to meet their basic needs.

In a competitive market, the price of a particular good is found at the point where the quantity supplied equals the quantity demanded. This model assumes that everywhere in the market, buyers and sellers are fully informed about prices and can adjust their behavior accordingly. If buyers and sellers do not have good information about prices, shortages can develop in some locations and surpluses in others.

When the economist Robert Jensen studied the market for fish in Kerala, a state in southwestern India, he found that it did not reach one equilibrium price. Instead, each local fish market has its own equilibrium. In this area, many people rely on fishing for their daily income. Fishermen tend to sell their fish at a single local market; they take the price that prevails at that market on a particular day. If that market has only a few buyers that day, the fishermen end up with too much fish. At the same time, if the fishermen in a neighboring village have a poor catch that day, some buyers at that market will go home empty-handed—even if they are willing to pay a high price. Without a way to know if there is a shortage or surplus in a nearby market, the fishermen can’t adjust their prices to reach equilibrium with customers.

Jensen found that the fishermen could solve this problem using cell phones. By communicating with one another and with people on land while out fishing, they were able to find out where their catches would be most profitable that day. They used that information to travel to the right village to sell their fish. Supply began to better match the demand in each village, and prices became more uniform across villages. Access to the right information allowed the market for fish to reach an efficient equilibrium. Sellers earned an average of 8 percent more in profits, and buyers paid an average of 4 percent less for their fish. Fishermen increased their incomes, and consumers stretched their incomes further.

As the saying goes, “Give a man a fish and he will eat for a day. Teach a man to fish and he will eat for a lifetime.” To this wisdom, we might add, “Give a man a cell phone. . . .”

Source: R. Jensen, “The digital provide: Information (technology), market performance, and welfare in the South Indian fisheries sector,” *The Quarterly Journal of Economics*, vol. CXXII (2007), issue 3.

✓ CONCEPT CHECK

- ❑ What is the market equilibrium? [LO 3.6]
- ❑ What happens to the equilibrium price and quantity if the supply curve shifts right but the demand curve stays put? [LO 3.7]

Conclusion

By the time you reach the end of this course, you'll be quite familiar with the words *supply* and *demand*. We take our time on this subject for good reason: An understanding of supply and demand is the foundation of economic problem solving. You'll be hard-pressed to make wise economic choices without it.

Although markets are not always perfectly competitive, you may be surprised at how accurately many real-world phenomena can be described using the simple rules of supply and demand. In the next chapters we'll use these rules to explain how consumers and producers respond to price changes and government policies.



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Key Terms

market, p. 50

market economy, p. 50

competitive market, p. 50

standardized good, p. 51

transaction costs, p. 51

price taker, p. 51

quantity demanded, p. 52

law of demand, p. 52

demand schedule, p. 53

demand curve, p. 53

substitutes, p. 55

complements, p. 55

normal goods, p. 56

inferior goods, p. 56

quantity supplied, p. 59

law of supply, p. 59

supply schedule, p. 59

supply curve, p. 59

equilibrium, p. 63

equilibrium price, p. 63

equilibrium quantity, p. 63

surplus (excess supply), p. 64

shortage (excess demand), p. 64

Summary

LO 3.1 Identify the defining characteristics of a competitive market.

A market is the group of buyers and sellers who trade a particular good or service. In competitive markets, a large number of buyers and sellers trade standardized goods and services. They have full information about the goods, and there is no cost to participating in exchanges in the market. Participants in competitive markets are called price takers because they can't affect the prevailing price for a good.

LO 3.2 Draw a demand curve and describe the external factors that determine demand.

A demand curve is a graph that shows the quantities of a particular good or service that consumers will demand at various prices. It also shows consumers' highest willingness to pay for a given quantity. The law of demand states that for almost all goods, the quantity demanded increases as the price decreases. This relationship results in a downward-sloping demand curve.

Several nonprice factors contribute to consumers' demand for a good at a given price: Consumer preferences, the prices of related goods, incomes, and expectations about the future all affect demand. On a marketwide level, the number of buyers can also increase or decrease total demand. When one of these underlying factors changes, the demand curve will shift to the left or the right.

LO 3.3 Distinguish between a shift in and a movement along the demand curve.

When one of the nonprice factors that drives demand changes, the entire curve *shifts* to the left or the right. With this shift, the quantity demanded at any given price changes. When demand increases, the curve shifts to the right; when demand decreases, it shifts to the left.

When the underlying demand relationship *stays the same*, a change in the price of a good leads to a *movement along* the curve, rather than a shift in the curve.

LO 3.4 Draw a supply curve and describe the external factors that determine supply.

A supply curve is a graph that shows the quantities of a particular good or service that producers will supply at various prices. It shows the minimum price producers must receive to supply any given quantity. The law of supply states that the quantity supplied increases as the price increases, resulting in an upward-sloping supply curve.

Several nonprice factors determine the supply of a good at any given price: They include the prices of related goods, technology, prices of inputs, expectations about the future, and the number of sellers in the market. If one of these underlying factors changes, the supply curve will shift to the left or the right.

LO 3.5 Distinguish between a shift in and a movement along the supply curve.

Just as with demand, a change in the nonprice determinants of supply will cause the entire supply curve to shift to the left or the right. As a result, the quantity supplied is higher or lower at any given price than it was before. When supply increases, the curve shifts to the right; when supply decreases, it shifts to the left.

A shift in the supply curve differs from movement along the supply curve. A movement along the curve happens when the price of a good increases but the nonprice determinants of supply stay the same.

LO 3.6 Explain how supply and demand interact to drive markets to equilibrium.

When a market is in equilibrium, the quantity supplied equals the quantity demanded. The incentives that individual buyers and sellers face drive a competitive market toward equilibrium. If the prevailing price is too high, a surplus will result, and sellers will lower their prices to get rid of the excess supply. If the prevailing price is too low, a shortage will result, and buyers will bid up the price until the excess demand disappears.

LO 3.7 Evaluate the effect of changes in supply and demand on the equilibrium price and quantity.

When one or more of the underlying factors that determine supply or demand changes, one or both curves will shift, leading to a new market equilibrium price and quantity.

To calculate the change in the equilibrium price and quantity, you must first determine whether a change affects demand, and if so, in which direction the curve will shift. Then you must determine whether the change also affects supply, and if so, in which direction that curve will shift. Finally, you must determine the new equilibrium point where the two curves intersect.

Review Questions

1. Think about a competitive market in which you participate regularly. For each of the characteristics of a competitive market, explain how your market meets these requirements. **[LO 3.1]**
2. Think about a noncompetitive market in which you participate regularly. Explain which characteristic(s) of competitive markets your market does not meet. **[LO 3.1]**
3. Explain why a demand curve slopes downward. **[LO 3.2]**
4. In each of the following examples, name the factor that affects demand and describe its impact on your demand for a new cell phone. **[LO 3.2]**
 - a. You hear a rumor that a new and improved model of the phone you want is coming out next year.
 - b. Your grandparents give you \$500.
 - c. A cellular network announces a holiday sale on a text-messaging package that includes the purchase of a new phone.
 - d. A friend tells you how great his new cell phone is and suggests that you get one, too.

5. Consider the following events:
 - a. The price of cell phones goes down by 25 percent during a sale.
 - b. You get a 25 percent raise at your job.

Which event represents a shift in the demand curve? Which represents a movement along the curve? What is the difference? **[LO 3.3]**

6. What is the difference between a change in demand and a change in quantity demanded? **[LO 3.3]**
7. Explain why a supply curve slopes upward. **[LO 3.4]**
8. In each of the following examples, name the factor that affects supply and describe its impact on the supply of cell phones. **[LO 3.4]**
 - a. Economic forecasts suggest that the demand for cell phones will increase in the future.
 - b. The price of plastic goes up.
 - c. A new screen technology reduces the cost of making cell phones.
9. Consider the following events:
 - a. A maggot infestation ruins a large number of apple orchards in Washington state.
 - b. Demand for apples goes down, causing the price to fall.

Which event represents a shift in the supply curve? Which represents a movement along the curve? What is the difference? **[LO 3.5]**

10. What is the difference between a change in supply and a change in quantity supplied? **[LO 3.5]**
11. What is the relationship between supply and demand when a market is in equilibrium? Explain how the incentives facing cell phone companies and consumers cause the market for cell phones to reach equilibrium. **[LO 3.6]**
12. Explain why the equilibrium price is often called the market-clearing price. **[LO 3.6]**
13. Suppose an economic boom causes incomes to increase. Explain what will happen to the demand and supply of phones, and predict the direction of the change in the equilibrium price and quantity. **[LO 3.7]**
14. Suppose an economic boom drives up wages for the sales representatives who work for cell phone companies. Explain what will happen to the demand and supply of phones, and predict the direction of the change in the equilibrium price and quantity. **[LO 3.7]**
15. Suppose an economic boom causes incomes to increase and at the same time drives up wages

for the sales representatives who work for cell phone companies. Explain what will happen to the demand for and supply of phones and predict the direction of the change in the equilibrium price and quantity. **[LO 3.7]**

Problems and Applications



1. Consider shopping for cucumbers in a farmers' market. For each statement below, note which characteristic of competitive markets the statement describes. *Choose from:* standardized good, full information, no transaction costs, and participants are price takers. **[LO 3.1]**
 - a. All of the farmers have their prices posted prominently in front of their stalls.
 - b. Cucumbers are the same price at each stall.
 - c. There is no difficulty moving around between stalls as you shop and choosing between farmers.
 - d. You and the other customers all seem indifferent about which cucumbers to buy.
2. Suppose two artists are selling paintings for the same price in adjacent booths at an art fair. By the end of the day, one artist has nearly sold out of her paintings while the other artist has sold nothing. Which characteristic of competitive markets has not been met and best explains this outcome? **[LO 3.1]**
 - a. Standardized good.
 - b. Full information.
 - c. No transaction costs.
 - d. Participants are price takers.
3. Using the demand schedule in Table 3P-1, draw the daily demand curve for slices of pizza in a college town. **[LO 3.2]**
4. Consider the market for cars. Which determinant of demand is affected by each of the following events? *Choose from:* consumer preferences, prices of related goods, incomes, expectations, and the number of buyers. **[LO 3.2]**
 - a. Environmentalists launch a successful One Family, One Car campaign.
 - b. A baby boom occurred 16 years ago.
 - c. Layoffs increase as the economy sheds millions of jobs.
 - d. An oil shortage causes the price of gasoline to soar.
 - e. The government offers tax rebates in return for the purchase of commuter rail tickets.

TABLE 3P-1

Price (\$)	Quantity demanded (slices)
0.00	350
0.50	300
1.00	250
1.50	200
2.00	150
2.50	100
3.00	50
3.50	0

- f. The government announces a massive plan to bail out the auto industry and subsidize production costs.
- If a decrease in the price of laptops causes the demand for cell phones to increase, are laptops and cell phones substitutes or complements? **[LO 3.2]**
 - If rising incomes cause the demand for beer to decrease, is beer a normal or inferior good? **[LO 3.2]**
 - Consider the market for corn. Say whether each of the following events will cause a shift in the demand curve or a movement along the curve. If it will cause a shift, specify the direction. **[LO 3.3]**
 - A drought hits corn-growing regions, cutting the supply of corn.
 - The government announces a new subsidy for biofuels made from corn.
 - A global recession reduces the incomes of consumers in poor countries, who rely on corn as a staple food.
 - A new hybrid variety of corn seed causes a 15 percent increase in the yield of corn per acre.
 - An advertising campaign by the beef producers' association highlights the health benefits of corn-fed beef.
 - The demand curve in Figure 3P-1 shows the monthly market for sweaters at a local clothing store. For each of the following events, draw the new outcome. **[LO 3.3]**
 - Sweaters fall out of fashion.
 - There is a shortage of wool.
 - The winter is particularly long and cold this year.
 - Sweater vendors offer a sale.

FIGURE 3P-1**TABLE 3P-2**

Price (\$)	Quantity supplied (slices)
0.00	0
0.50	50
1.00	100
1.50	150
2.00	200
2.50	250
3.00	300
3.50	350

- Using the supply schedule found in Table 3P-2, draw the daily supply curve for slices of pizza in a college town. **[LO 3.4]**
- Consider the market for cars. Which determinant of supply is affected by each of the following events? *Choose from:* prices of related goods, technology, prices of inputs, expectations, and the number of sellers in the market. **[LO 3.4]**
 - A steel tariff increases the price of steel.
 - Improvements in robotics increase efficiency and reduce costs.
 - Factories close because of an economic downturn.
 - The government announces a plan to offer tax rebates for the purchase of commuter rail tickets.
 - The price of trucks falls, so factories produce more cars.

- f. The government announces that it will dramatically rewrite efficiency standards, making it much harder for automakers to produce their cars.
11. Consider the market for corn. Say whether each of the following events will cause a shift in the supply curve or a movement along the curve. If it will cause a shift, specify the direction. [LO 3.5]
- A drought hits corn-growing regions.
 - The government announces a new subsidy for biofuels made from corn.
 - A global recession reduces the incomes of consumers in poor countries, who rely on corn as a staple food.
 - A new hybrid variety of corn seed causes a 15 percent increase in the yield of corn per acre.
 - An advertising campaign by the beef producers' association highlights the health benefits of corn-fed beef.
12. The supply curve in Figure 3P-2 shows the monthly market for sweaters at a local craft market. For each of the following events, draw the new outcome. [LO 3.5]
- The price of wool increases.
 - Demand for sweaters decreases.
 - A particularly cold winter is expected to begin next month.
 - Demand for sweaters increases.
13. Refer to the demand and supply schedule shown in Table 3P-3. [LO 3.6]
- If pizza parlors charge \$3.50 per slice, will there be excess supply or excess demand? What is the amount of excess supply or excess demand at that price?

FIGURE 3P-2



- If pizza parlors charge \$1.00 per slice, will there be excess supply or excess demand? What is the amount of excess supply or excess demand at that price?
- What are the equilibrium price and quantity in this market?

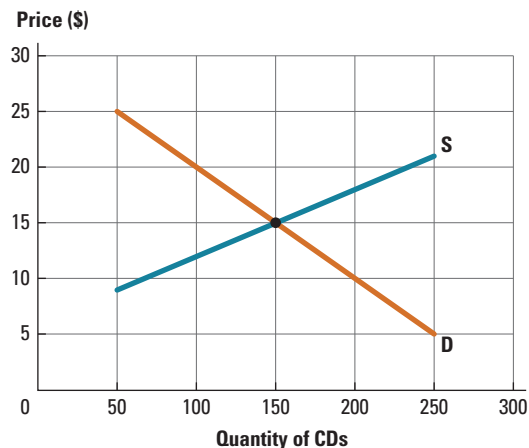
The graph in Figure 3P-3 shows the weekly market for compact discs in a small town. Use this graph to answer Problems 14–17.

14. Which of the following events will occur at a price of \$20? [LO 3.6]
- Equilibrium.
 - Excess demand.
 - Excess supply.

TABLE 3P-3

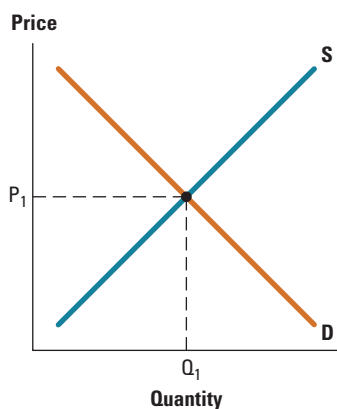
Price (\$)	Quantity demanded (slices)	Quantity supplied (slices)
0.00	350	0
0.50	300	50
1.00	250	100
1.50	200	150
2.00	150	200
2.50	100	250
3.00	50	300
3.50	0	350

FIGURE 3P-3



- d. No CDs supplied.
 - e. No CDs demanded.
15. Which of the following events will occur at a price of \$10? [LO 3.6]
- a. Equilibrium.
 - b. Excess demand.
 - c. Excess supply.
 - d. No CDs supplied.
 - e. No CDs demanded.
16. Answer the following questions: [LO 3.6]
- a. No CDs will be supplied unless the price is greater than what amount?
 - b. No CDs will be demanded unless the price is lower than what amount?
17. What are the equilibrium price and quantity of CDs? [LO 3.6]
18. The graph in Figure 3P-4 shows supply and demand in the market for automobiles. For each

FIGURE 3P-4



of the following events, draw the new market outcome, and say whether the equilibrium price and quantity will increase or decrease. [LO 3.7]

- a. Environmentalists launch a successful One Family, One Car campaign.
 - b. A steel tariff increases the price of steel.
 - c. A baby boom occurred 16 years ago.
 - d. An oil shortage causes the price of gasoline to soar.
 - e. Improvements in robotics increase efficiency and reduce costs.
 - f. The government offers a tax rebate for the purchase of commuter rail tickets.
19. Say whether each of the following changes will increase or decrease the equilibrium price and quantity, or whether the effect cannot be predicted. [LO 3.7]
- a. Demand increases; supply remains constant.
 - b. Supply increases; demand remains constant.
 - c. Demand decreases; supply remains constant.
 - d. Supply decreases; demand remains constant.
 - e. Demand increases; supply increases.
 - f. Demand decreases; supply decreases.
 - g. Demand increases; supply decreases.
 - h. Demand decreases; supply increases.

Chapter Endnotes

1. http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom.html.
2. Ibid.
3. G. Wright and M. Groppe, "Some businesses benefiting from 9-11," *The Baxter Bulletin*, August 29, 2002, http://www.biometricgroup.com/in_the_news/baxter_bulletin.html, retrieved June 14, 2009.