CHAPTER

3

# The Market at Work

## Supply and Demand

### Sellers determine the price of the good.

What do Starbucks, Nordstrom, and Microsoft have in common? If you guessed that they all have headquarters in Seattle, that's true. But even more interesting is that each company supplies a product much in demand by consumers. Starbucks supplies coffee from coast to coast and seems to be everywhere someone wants a cup of coffee. Nordstrom, a giant retailer with hundreds of department stores, supplies fashion apparel to meet a broad spectrum of individual demand, from the basics to designer collections. Microsoft supplies software for customers all over the world. Demand for Microsoft products has made large fortunes for founder Bill Gates and other investors in the company.

**MISCONCEPTION**

Notice the two recurring words in the previous paragraph: "supply" and "demand." Economists consistently use these words when describing how an economy functions. Many people think that the seller determines the price of the good. Often our first instinct is to wonder about the price of something rather than how much someone will pay to get it. This one-sided impression of the market undermines our ability to fully appreciate how prices are determined. To correct this misconception, this chapter describes how markets work and the nature of competition. To shed light on the process, we introduce the formal model of demand and supply. We begin by looking at demand and supply separately. Then we combine them to see how they interact to establish the market price and determine how much is produced.

## BIG QUESTIONS

- **What are the fundamentals of markets?**
- **What determines demand?**
- **What determines supply?**
- **How do supply and demand interact to create equilibrium?**

## What Are the Fundamentals of Markets?

Markets bring trading partners together to create order out of chaos. Companies supply goods and services, and customers want to obtain the goods and services that companies supply. In a **market economy**, resources are allocated among households and firms with little or no government interference. Adam Smith, the founder of modern economics, described the dynamic best: "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest." In other words, producers earn a living by selling the products that consumers want. Consumers are also motivated by self-interest; they must decide how to use their money to select the goods that they need or want the most. This process, which Adam Smith called the **invisible hand**, guides resources to their highest-valued use.

Peak season is expensive . . .

The exchange of goods and services in a market economy happens through prices that are established in markets. Those prices change according to the level of demand for a product and how much is supplied. For instance, hotel rates near Disney World are reduced in the fall when demand is low, and they peak in March when spring break occurs. If spring break takes you to a ski resort instead, you will find lots of company and high prices. But if you are looking for an outdoor adventure during the summer, ski resorts have plenty of lodging available at great rates.

Similarly, many parents know how hard it is to find a reasonably priced hotel room in a college town on graduation weekend. Likewise, a pipeline break or unsettled political conditions in the Middle East can disrupt the supply of oil and cause the price of gasoline to spike overnight. When higher gas prices continue over a period of time, consumers respond by changing their driving habits or buying more fuel-efficient cars.

. . . but off-season is a bargain.

Why does all of this happen? Supply and demand tell the story. We begin our exploration of supply and demand by looking at where they interact—in markets. A firm's degree of control over the market price is the distinguishing feature between *competitive markets* and *imperfect markets*.

## Competitive Markets

Buyers and sellers of a specific good or service come together to form a market. Formally, a *market* is a collection of buyers and sellers of a particular product or service. The buyers create the demand for the product, while the sellers produce the supply. The interaction of the buyers and sellers in a market establishes the price and the quantity produced of a particular good or the amount of a service offered.

Markets exist whenever goods and services are exchanged. Some markets are online, and others operate in traditional "brick and mortar" stores. Pike Place Market in Seattle is a collection of markets spread across 9 acres. For over a hundred years, it has brought together buyers and sellers of fresh, organic, and specialty foods. Because there is a large number of buyers and sellers for each type of product, we say that the markets at

Pike Place are competitive. A **competitive market** is one in which there are so many buyers and sellers that each has only a small impact on the market price and output. In fact, the impact is so small that it is negligible.

One of many vendors at Pike Place Market.

At Pike Place Market, like other local markets, the goods sold by each vendor are similar. Because each buyer and seller is just one small part of the whole market, no single buyer or seller has any influence over the market price. These two characteristics—similar goods and many participants—create a highly competitive market in which the price and quantity sold of a good are determined by the market rather than by any one person or business.

To understand how competition works, let's look at sales of salmon at Pike Place Market. On any given day, dozens of vendors sell salmon at this market. If a single vendor is absent or runs out of salmon, the quantity supplied that day will not change significantly—the remaining sellers will have no trouble filling the void. The same is true for those buying salmon. Customers will have no trouble finding salmon at the remaining vendors. Whether a particular salmon buyer decides to show up on a given day makes little difference when hundreds of buyers visit the market each day. No single buyer or seller has any appreciable influence on the price of salmon. As a result, the market for salmon at Pike Place Market is a competitive one.

## Imperfect Markets

Markets are not always competitive. An **imperfect market** is a market in which either the buyer or the seller can influence the market price. For example, the Empire State Building affords an iconic

The Empire State Building has one of the best views in New York City.

view of Manhattan. Not surprisingly, the cost of taking the elevator to the top of the building is not cheap. But many customers buy the tickets anyway because they have decided that the view is worth the price. The managers of the Empire State Building can set a high price for tickets because there is no other place in New York City with such a great view. From this example, we see that when sellers produce goods and services that are different from their competitors', they gain some control, or leverage, over the price that they charge. The more unusual the product being sold, the more control the seller has over the price. When a seller has some control over the price, we say that the market is imperfect. Specialized products, such as popular video games, front-row concert tickets, or dinner reservations at a trendy restaurant, give the seller substantial pricing power. **Market power** is a firm's ability to influence the price of a good or service by exercising control over its demand, supply, or both.

In between the highly competitive environment at the Pike Place Market and markets characterized by a lack of competition, such as the Empire State Building with its iconic view, there are many other types of markets. Some, like the market for fast-food restaurants, are highly competitive but sell products that are not identical. Other businesses—for example, Comcast Cable—function like monopolies. A **monopoly** exists when a single company supplies the entire market for a particular good or service. We'll talk a lot more about different market structures, such as monopoly, in later chapters. But even in imperfect markets, the forces of supply and demand significantly influence producer and consumer behavior. For the time being, we'll keep our analysis focused on supply and demand in competitive markets.

# What Determines Demand?

Demand exists when an individual or group wants something badly enough to pay or trade for it. How much an individual or group actually buys depends on the price of the good or service. In economics, the amount of a good or service that buyers are willing and able to purchase at the current price is known as the **quantity demanded**.

When the price of a good increases, consumers often respond by purchasing less of the good or buying something else. For instance, many consumers who would buy salmon at $5 per pound would likely buy something else if the price of salmon rose to $20 per pound. Therefore, as price goes up, quantity demanded goes down. Similarly, as price goes down, quantity demanded goes up. This negative (opposite) relationship between the price and the quantity demanded is the law of demand. The **law of demand** states that, all other things being equal, the quantity demanded falls when the price rises, and the quantity demanded rises when the price falls. The law of demand holds true over a wide range of goods and settings.

## The Demand Curve

A table that shows the relationship between the price of a good and the quantity demanded is known as a **demand schedule**. Table 3.1 shows Ryan Seacrest's hypothetical demand schedule for salmon. When the price is $20.00 or more per pound, Ryan will not purchase any salmon. However, below $20.00, the amount that Ryan purchases is negatively related to the price. For instance, at a price of $10.00, Ryan's quantity demanded is 4 pounds per month. If the price rises to $12.50 per pound, he demands 3 pounds. Every time the price increases, Ryan buys less salmon. In contrast, every time the price falls, he buys more. If the price falls to zero, Ryan would demand 8 pounds. That is, even if the salmon is free, there is a limit to his demand because he would grow tired of eating the same thing.

TABLE 3.1

**Ryan Seacrest's Demand Schedule for Salmon**

| Price of salmon (per pound) | Pounds of salmon demanded (per month) |
|---|---|
| $20.00 | 0 |
| $17.50 | 1 |
| $15.00 | 2 |
| $12.50 | 3 |
| $10.00 | 4 |
| $ 7.50 | 5 |
| $ 5.00 | 6 |
| $ 2.50 | 7 |
| $ 0.00 | 8 |

The numbers in Ryan's demand schedule from Table 3.1 are plotted on a graph in Figure 3.1, known as a demand curve. A **demand curve** is a graph of the relationship between the prices in the demand schedule and the quantity demanded at those prices. For simplicity, the demand "curve" is often drawn as a straight line. Economists always place the independent variable, which is the price, on the *y* (vertical) axis and the dependent variable, which is the quantity demanded, on the *x* (horizontal) axis. (If you need a refresher on these terms, review Appendix 2A.) The relationship between the price and the quantity demanded produces a downward-sloping curve. In Figure 3.1, we see that as the price rises from $0.00 to $20.00 along the *y* axis, the quantity demanded decreases from 8 pounds to 0 pounds along the *x* axis.

**FIGURE 3.1**


**Ryan Seacrest's Demand Curve for Salmon**

Ryan's demand curve for salmon plots the data from Table 3.1. When the price of salmon is $10.00 per pound, he buys 4 pounds. If the price rises to $12.50 per pound, Ryan reduces the quantity that he buys to 3 pounds. The figure illustrates the law of demand by showing a negative relationship between price and the quantity demanded.

## Market Demand

So far, we have studied individual demand, but a market is composed of many different buyers. In this section, we examine the collective demand of all of the buyers in a given market.

The **market demand** is the sum of all the individual quantities demanded by each buyer in a market at each price. During a typical day at Pike Place Market, over 100 individuals buy salmon. However, to make our analysis simpler, let's assume that our market consists of only two buyers, Melissa Rivers and Ryan Seacrest, each of whom enjoys eating salmon. Figure 3.2 shows individual demand schedules for the two people in this market, a combined market demand schedule, and the corresponding graphs. At a price of $10 per pound, Melissa buys 2 pounds a month, while Ryan buys 4 pounds. To determine the market demand curve, we add Melissa's 2 pounds to Ryan's 4 pounds for a total of 6 pounds. As you can see in the table within Figure 3.2, by adding Melissa's demand and Ryan's demand, we arrive at the total (that is, combined) market demand. Any demand curve shows the law of demand with movements along (up or down) the curve that reflect a price change's effect on the quantity demanded of the good or service. Only a change in price can cause a movement along a demand curve.

**FIGURE 3.2**

| Price of salmon (per pound) | Melissa's demand (per month) | Ryan's demand (per month) | Combined market demand |
|---|---|---|---|
| $20.00 | 0 | 0 | 0 |
| $17.50 | 0 | 1 | 1 |
| $15.00 | 1 | 2 | 3 |
| $12.50 | 1 | 3 | 4 |
| $10.00 | 2 | 4 | 6 |
| $ 7.50 | 2 | 5 | 7 |
| $ 5.00 | 3 | 6 | 9 |
| $ 2.50 | 3 | 7 | 10 |
| $ 0.00 | 4 | 8 | 12 |


**Calculating Market Demand**

To calculate the market demand for salmon, we add Melissa's quantity demanded and Ryan's quantity demanded.

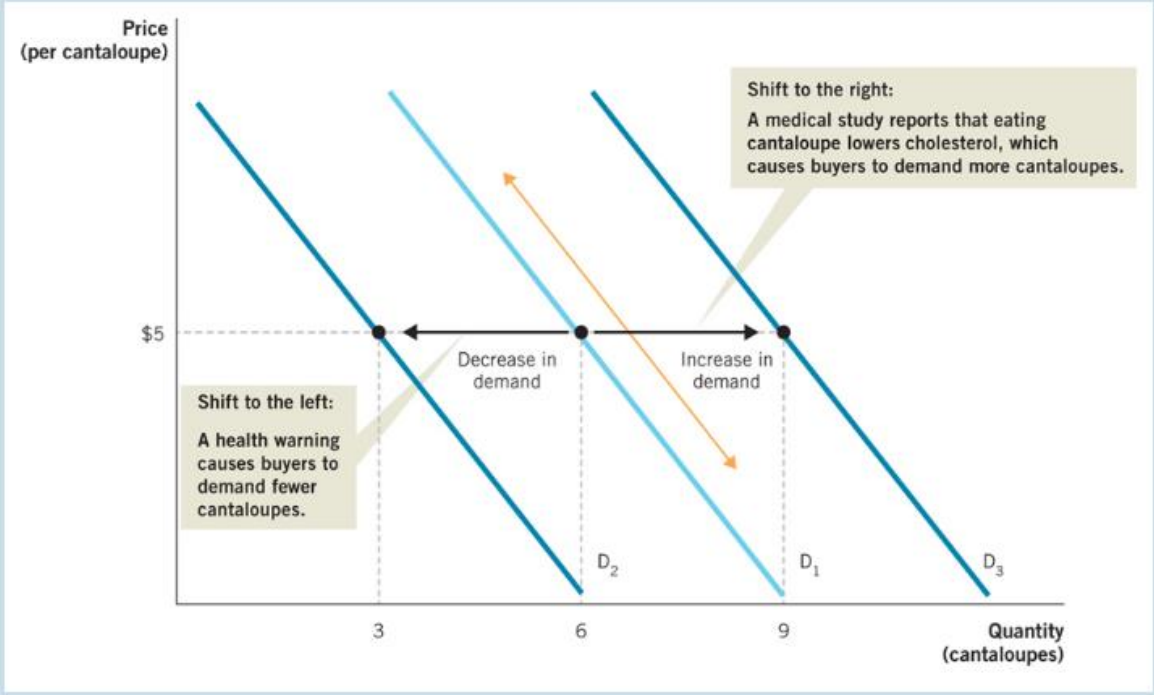
## Shifts of the Demand Curve

We have examined the relationship between price and quantity demanded. This relationship, described by the law of demand, shows us that when price changes, consumers respond by altering the amount they purchase. But in addition to price, many other variables influence how much of a good or service is purchased. For instance, news about the possible risks or benefits associated with the consumption of a good or service can change overall demand.

Suppose that the government issues a nationwide safety warning that cautions against eating cantaloupe because of a recent discovery of *Listeria* bacteria in some melons. The government warning would cause consumers to buy fewer cantaloupes at any given price, and overall demand would decline. Looking at Figure 3.3, we see that an overall decline in demand will cause the entire demand curve to shift to the left of the original curve, from $D_1$ to $D_2$. Note that though the price remains at $5 per cantaloupe, demand has moved from 6 melons to 3. Figure 3.3 also shows what does *not* cause a shift of the demand curve: the price. The orange arrow alongside $D_1$ indicates that the quantity demanded will rise or fall in response to a price change. *A price change causes a movement along a given demand curve, but it cannot cause a shift of the demand curve.*

If a new medical study indicates that eating more cantaloupe lowers cholesterol, would this finding cause a shift in demand, or a movement along the demand curve?

**FIGURE 3.3**




**A Shift of the Demand Curve**

When the price changes, the quantity demanded changes along the existing demand curve, as indicated by the orange arrow. A shift of the demand curve, indicated by the black arrows, occurs when something other than price changes.

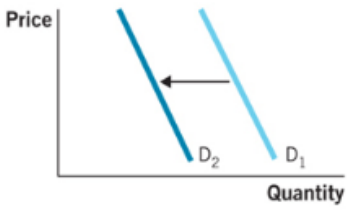
A decrease in overall demand shifts the demand curve to the left. What happens when a variable causes overall demand to increase? Suppose that the news media have just announced the results of a medical study indicating that cantaloupe contains a natural substance that lowers cholesterol. Because of the newly discovered health benefits of cantaloupe, overall demand for it will increase. This increase in demand shifts the demand curve to the right, from $D_1$ to $D_3$, as Figure 3.3 shows.

In our cantaloupe example, we saw that demand shifted because of changes in consumers' tastes and preferences. However, many different variables can shift demand. These include changes in buyers' income, the price of related goods, changes in buyers' tastes and preferences, price expectations, the number of buyers, and taxes.

Figure 3.4 provides an overview of the variables, or factors, that can shift demand. The easiest way to keep all of these elements straight is to ask yourself a simple question: Would this change cause me to buy more or less of the good? If the change reduces how much you would buy at any given price, you shift the demand curve to the left. If the change increases how much you would buy at any given price, you shift the curve to the right.

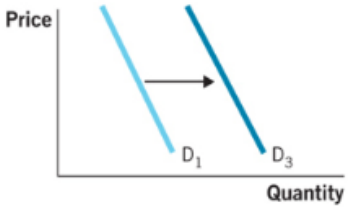
**FIGURE 3.4**

**Factors That Shift Demand to the Left (Decrease Demand)**




- Income falls (demand for a normal good).
- Income rises (demand for an inferior good).
- The price of a substitute good falls.
- The price of a complementary good rises.
- The good falls out of style.
- There is a belief that the future price of the good will decline.
- The number of buyers in the market falls.
- Excise or sales taxes increase.

**Factors That Shift Demand to the Right (Increase Demand)**




- Income rises (demand for a normal good).
- Income falls (demand for an inferior good).
- The price of a substitute good rises.
- The price of a complementary good falls.
- The good is currently in style.
- There is a belief that the future price of the good will rise.
- The number of buyers in the market increases.
- Excise or sales taxes decrease.

**Factors That Shift the Demand Curve**

The demand curve shifts to the left when a factor decreases demand. The demand curve shifts to the right when a factor increases demand. (*Note*: A change in price does not cause a shift. Price changes cause movements along the demand curve.)

## Changes in Buyers' Income

When your income goes up, you have more to spend. Assuming that prices don't change, individuals with higher incomes are able to buy more of what they want. Similarly, when your income declines, your **purchasing power**, or how much you can afford, falls. In either case, your income affects your overall demand.

When economists look at how consumers spend, they often differentiate between two types of goods: normal and inferior. Consumers will buy more of a **normal good** as their income goes up (assuming all other factors remain constant). An example of a normal good is a meal at a restaurant. When income goes up, the demand for restaurant meals increases and the demand curve shifts to the right. Similarly, if income falls, the demand for restaurant meals goes down and the demand curve shifts to the left.

While consumers with an increased income may purchase more of some things, the additional purchasing power will mean that they purchase fewer inferior goods. An **inferior good** is purchased out of necessity rather than choice. Examples include rooms in boarding houses, as opposed to one's own apartment or house, and hamburger and ramen noodles, as opposed to filet mignon. As income goes up, consumers buy less of an inferior good because they can afford something better. Within a specific product market, you can often find examples of inferior and normal goods in the form of different brands.

## The Price of Related Goods

Another factor that can shift the demand curve is the price of related goods. Certain goods directly influence the demand for other goods. **Complements** are two goods that are used together. **Substitutes** are two goods that are used in place of each other.

Consider this pair of complements: color ink cartridges and photo paper. You need to print a photo in color. What happens when the price of one of the complements—say, color ink cartridges—rises? As you would expect, the quantity demanded of ink cartridges goes down. But demand for its complement, photo paper, also goes down because people are not likely to use one without the other.

Substitute goods work the opposite way. When the price of a substitute good increases, the quantity demanded declines, and the demand for the alternative good increases. For example, if the price of the PlayStation 4 goes up and the price of Microsoft's Xbox remains unchanged, the demand for Xbox will increase while the quantity demanded of the PS4 will decline.

## Changes in Tastes and Preferences

Fashion goes in and out of style quickly. Walk into Nordstrom or another clothing retailer, and you will see that fashion changes from season to season and year to year. For instance, what do you think of madras shorts? They were popular 20 years ago and may be popular again today, but it is safe to assume that in a few years they will once again go out of style. While something is popular, demand increases. As soon as it falls out of favor, you can expect demand for it to decrease. Tastes and preferences can change quickly, and this fluctuation alters the demand for a particular good.

Are these boots Sn-UGG-ly or just plain UGG-ly? It depends on consumers' tastes in fashion at the time.

Though changes in fashion trends are usually purely subjective, other changes in preferences are the result of new information about the goods and services that we buy. Recall our example of shifting demand for cantaloupe as the result of either the *Listeria* infection or new positive medical findings. This is one example of how information can influence consumers' preferences. Contamination would cause a decrease in demand because people would no longer want to eat cantaloupe. In contrast, if people learn that eating cantaloupe lowers cholesterol, their demand for the melon will go up.

### The Number of Buyers

Recall that the market demand curve is the sum of all individual demand curves. Therefore, another way for market demand to increase is for more individual buyers to enter the market. The United States adds 3 million people each year to its population through immigration and births. All those new people have needs and wants, just as the existing population of 325 million does. Collectively, the new people add about 1% to the overall size of many existing markets on an annual basis.

The number of buyers also varies by age. Consider two markets—one for baby products (such as diapers, high chairs, and strollers) and the other for health care (including medicine, cancer treatments, hip replacement surgery, and nursing facilities). In countries with aging populations—for example, in Italy, where the birthrate has plummeted over several generations—the demand for baby products will decline and the demand for health care will expand. In other words, demographic changes in society are another source of shifts in demand. In many markets, ranging from movie theater attendance to home ownership, population trends play an important role in determining whether the market is expanding or contracting.

### Taxes

Changes in excise taxes (which are taxes on a single product or service) and sales taxes (which are general taxes on most goods and services) affect demand as well. Higher taxes lower demand because consumers must now pay the higher tax in addition to the price they pay for the good. Lower taxes reduce the overall cost to consumers and therefore increase demand.

# What Determines Supply?

Even though we have learned a great deal about demand, our understanding of markets is incomplete without also analyzing supply. Let's start by focusing on the behavior of producers interested in selling fresh salmon at Pike Place Market.

We have seen that with demand, price and output are *negatively related*. That is, they move in opposite directions. With supply, however, the price level and quantity supplied are *positively related*. That is, they move in the same direction. For instance, few producers would sell salmon if the market price were $2.50 per pound, but many would sell it at a price of $20.00 per pound. (At $20.00, producers earn more profit than they do at a price of $2.50.) The **quantity supplied** is the amount of a good or service that producers are willing and able to sell at the current price. Higher prices cause the quantity supplied to increase. Conversely, lower prices cause the quantity supplied to decrease.

When price increases, producers often respond by offering more for sale. As price goes down, quantity supplied also goes down. This direct relationship between price and quantity supplied is the law of supply. The **law of supply** states that, all other things being equal, the quantity supplied increases when the price rises, and the quantity supplied falls when the price falls. This law holds true over a wide range of goods and settings.

## The Supply Curve

A **supply schedule** is a table that shows the relationship between the price of a good and the quantity supplied. The supply schedule for salmon in Table 3.2 shows how many pounds of salmon Sol Amon, owner of Pure Food Fish, would sell each month at different prices. (Pure Food Fish is a fish stand that sells all kinds of freshly caught seafood.) When the market price is $20.00 per pound, Sol is willing to sell 800 pounds. At $12.50, Sol's quantity offered is 500 pounds. If the price falls to $10.00, he offers 400 pounds. Every time the price falls, Sol offers less salmon. This means he is constantly adjusting the amount he offers. As the price of salmon falls, so does Sol's profit from selling it. Because Sol's livelihood depends on selling seafood, he has to find a way to compensate for the lost income. So he might offer more cod instead.

Sol and the other seafood vendors must respond to price changes by adjusting what they offer for sale in the market. This is why Sol offers more salmon when the price rises and less salmon when the price declines.

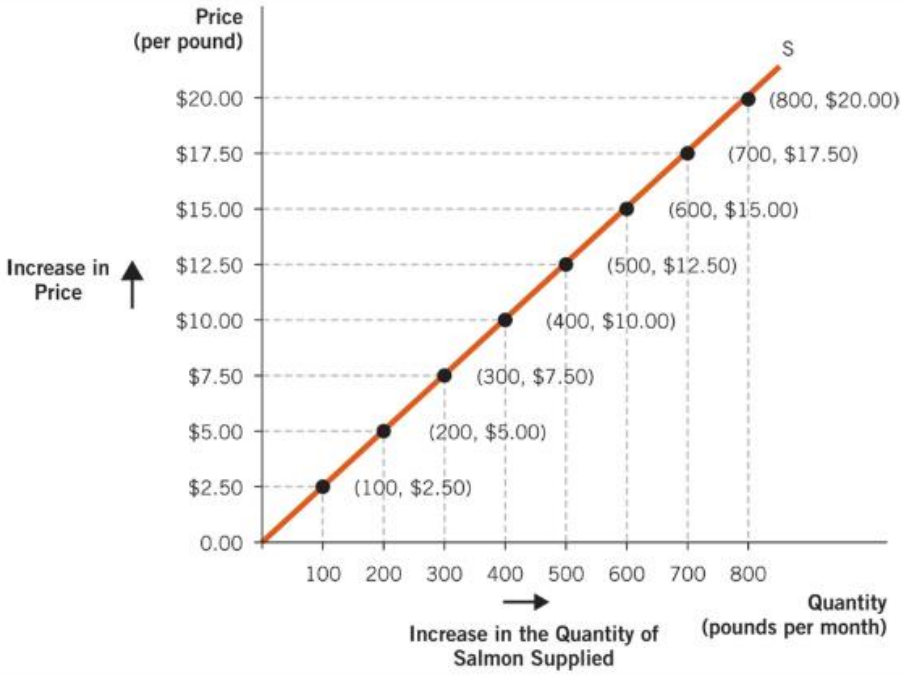
When we plot the supply schedule in Table 3.2, we get the supply curve shown in Figure 3.5. A **supply curve** is a graph of the relationship between the prices in the supply schedule and the quantity supplied at those prices. As you can see in Figure 3.5, this relationship produces an upward-sloping curve. Sellers are more willing to supply the market when prices are high, because this higher price generates more profits for the business. The upward-sloping curve means that the slope of the supply curve is positive, which illustrates a direct (positive) relationship between the price and the quantity offered for sale. For instance, when the price of salmon increases from $10.00 per pound to $12.50 per pound, Pure Food Fish will increase the quantity it supplies to the market from 400 pounds to 500 pounds.

TABLE 3.2

**Pure Food Fish's Supply Schedule for Salmon**

| Price of salmon (per pound) | Pounds of salmon supplied (per month) |
|---|---|
| $20.00 | 800 |
| $17.50 | 700 |
| $15.00 | 600 |
| $12.50 | 500 |
| $10.00 | 400 |
| $ 7.50 | 300 |
| $ 5.00 | 200 |
| $ 2.50 | 100 |
| $ 0.00 | 0 |

**FIGURE 3.5**




**Pure Food Fish's Supply Curve for Salmon**

Pure Food Fish's supply curve for salmon plots the data from Table 3.2. When the price of salmon is $10.00 per pound, Pure Food Fish supplies 400 pounds. If the price rises to $12.50 per pound, Pure Food Fish increases its quantity supplied to 500 pounds. The figure illustrates the law of supply by showing a positive relationship between price and the quantity supplied.

## Market Supply

Sol Amon is not the only vendor selling fish at the Pike Place Market. The **market supply** is the sum of the quantities supplied by each seller in the market at each price. However, to make our analysis simpler, let's assume that our market consists of just two sellers, City Fish and Pure Food Fish, each of which sells salmon. Figure 3.6 shows supply schedules for those two fish sellers and the combined, total-market supply schedule and the corresponding graphs.

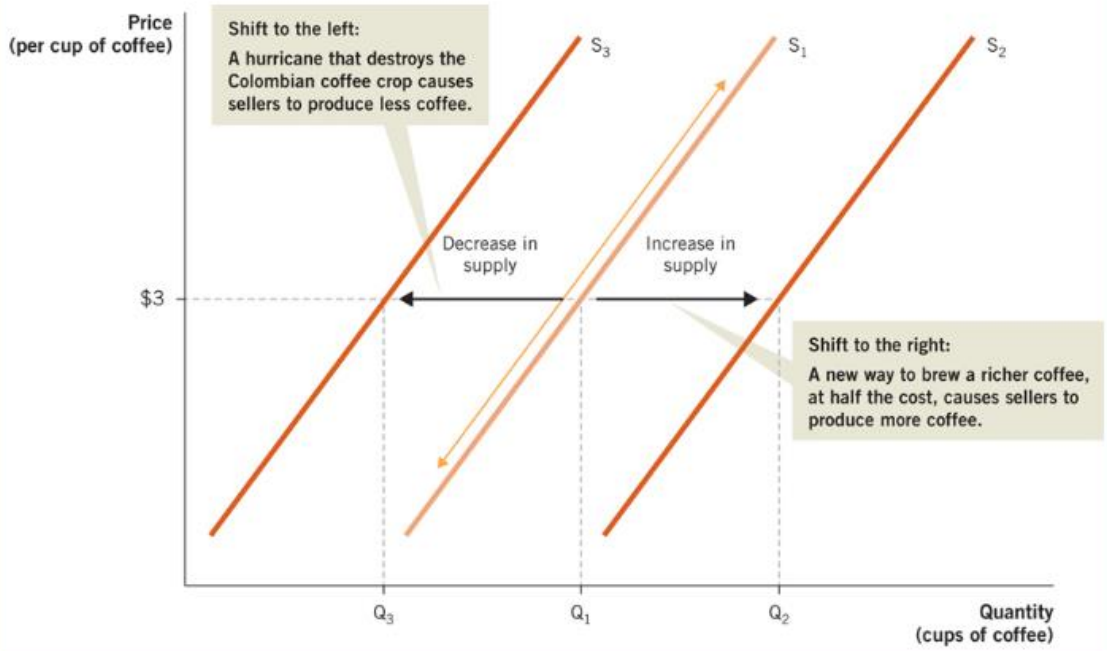
**FIGURE 3.6**

| Price of salmon (per pound) | City Fish's supply (per month) | Pure Food Fish's supply (per month) | Combined Market supply (pounds of salmon) |
|---|---|---|---|
| $20.00 | 200 | 800 | 1000 |
| $17.50 | 175 | 700 | 875 |
| $15.00 | 150 | 600 | 750 |
| $12.50 | 125 | 500 | 625 |
| $10.00 | 100 | 400 | 500 |
| $ 7.50 | 75 | 300 | 375 |
| $ 5.00 | 50 | 200 | 250 |
| $ 2.50 | 25 | 100 | 125 |
| $ 0.00 | 0 | 0 | 0 |


**Calculating Market Supply**

Market supply is calculated by adding together the quantity supplied by individual vendors. The total quantity supplied, shown in the last column of the table, is illustrated in the market supply graph above.

**FIGURE 3.7**




**A Shift of the Supply Curve**

When the price changes, the quantity supplied changes along the existing supply curve, illustrated here by the orange arrow. A shift in supply occurs when something other than price changes, illustrated by the black arrows.

We have just seen that an increase in supply shifts the supply curve to the right. But what happens when a variable causes supply to decrease? Suppose that a hurricane devastates the coffee crop in Colombia and reduces the world coffee supply by 10% for that year. There is no way to make up for the destroyed coffee crop, and for the rest of the year at least, the quantity of coffee supplied will be less than the previous year. This decrease in supply shifts the supply curve in Figure 3.7 to the left, from $S_1$ to $S_3$.

Many variables can shift supply, but Figure 3.7 also reminds us of what does *not* cause a shift in supply: the price. Recall that price is the variable that causes the supply curve to slope upward. The orange arrow alongside $S_1$ indicates that the quantity supplied will rise or fall in response to a price change. *A price change causes a movement along the supply curve, not a shift in the curve.*

Factors that shift the supply curve include the cost of inputs, changes in technology or the production process, taxes and subsidies, the number of firms in the industry, and price expectations. Figure 3.8 provides an overview of these variables that shift the supply curve. The easiest way to keep them straight is to ask yourself a simple question: Would the change cause a business to produce more of the good or less of the good? If the change would reduce the amount of a good or service a business is willing and able to supply at every given price, the supply curve shifts to the left. If the change would increase the amount of a good or service a business is willing and able to supply at every given price, the supply curve shifts to the right.

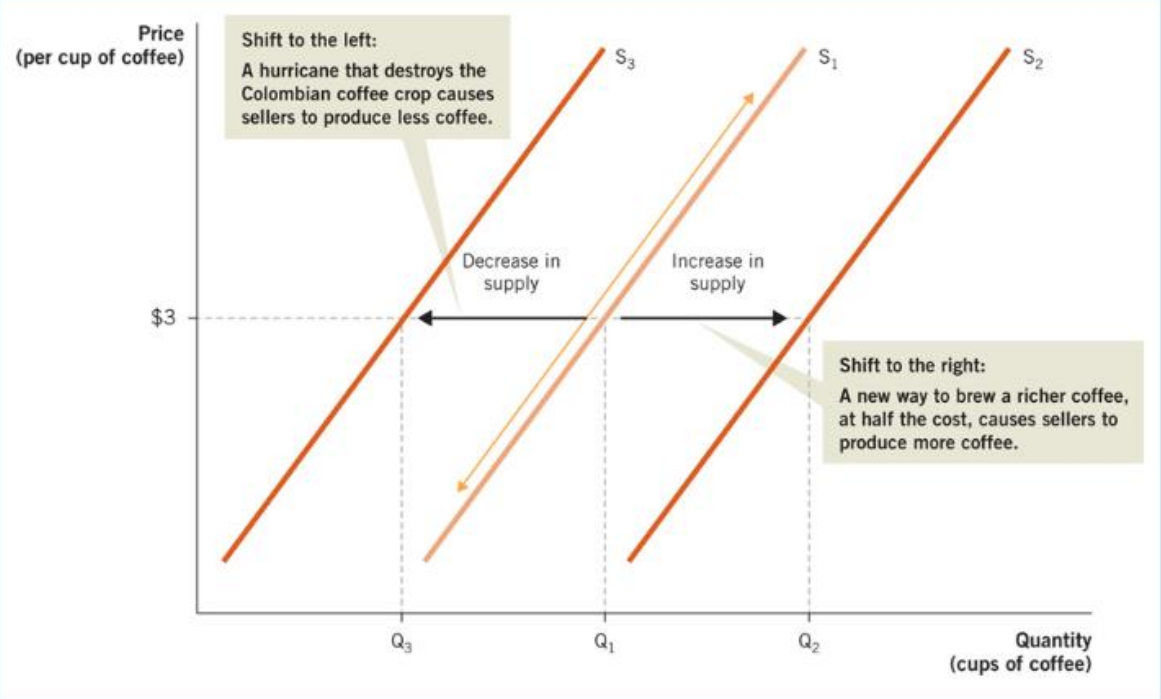
Looking at the supply schedule (the table within the figure), you can see that at a price of $10.00 per pound, City Fish supplies 100 pounds of salmon, while Pure Food Fish supplies 400 pounds. To determine the total market supply, we add City Fish's 100 pounds to Pure Food Fish's 400 pounds for a total market supply of 500 pounds.

## Shifts of the Supply Curve

When a variable other than the price changes, the entire supply curve shifts. For instance, suppose that beverage scientists at Starbucks discover a new way to brew a richer coffee at half the cost. The new process would increase the company's profits because its costs of supplying a cup of coffee would go down. The increased profits as a result of lower costs motivate Starbucks to sell more coffee and open new stores. Therefore, overall supply increases. Looking at Figure 3.7, we see that the supply curve shifts to the right of the original curve, from $S_1$ to $S_2$. Note that the retail price of coffee ($3 per cup) has not changed. When we shift the curve, we assume that price is constant and that something else has changed.

The first Starbucks opened in 1971 in Pike Place Market.

**FIGURE 3.7**

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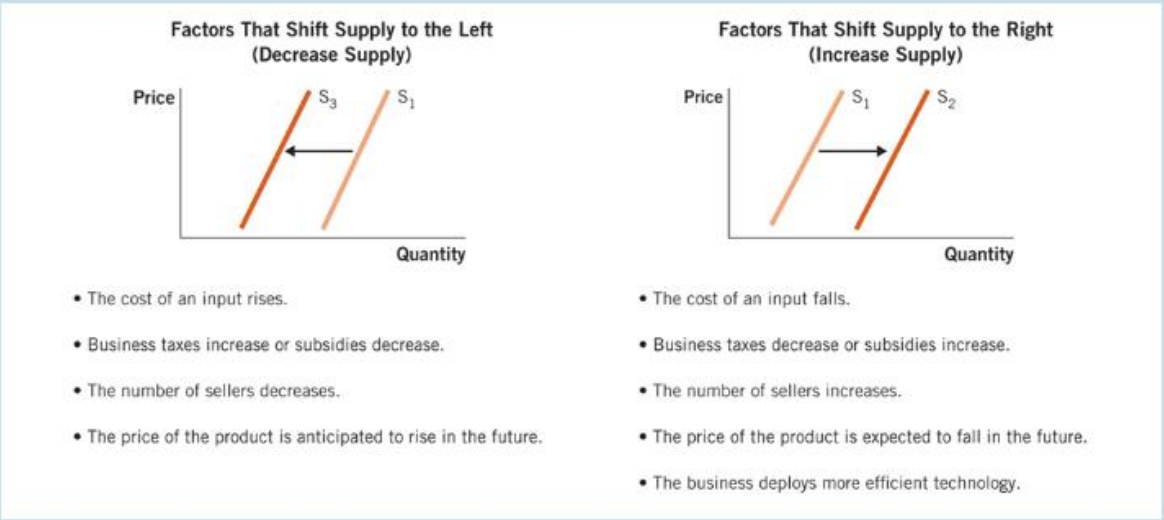
When the price changes, the quantity supplied changes along the existing supply curve, illustrated here by the orange arrow. A shift in supply occurs when something other than price changes, illustrated by the black arrows.

We have just seen that an increase in supply shifts the supply curve to the right. But what happens when a variable causes supply to decrease? Suppose that a hurricane devastates the coffee crop in Colombia and reduces the world coffee supply by 10% for that year. There is no way to make up for the destroyed coffee crop, and for the rest of the year at least, the quantity of coffee supplied will be less than the previous year. This decrease in supply shifts the supply curve in Figure 3.7 to the left, from $S_1$ to $S_3$.

Many variables can shift supply, but Figure 3.7 also reminds us of what does *not* cause a shift in supply: the price. Recall that price is the variable that causes the supply curve to slope upward. The orange arrow alongside $S_1$ indicates that the quantity supplied will rise or fall in response to a price change. *A price change causes a movement along the supply curve, not a shift in the curve.*

Factors that shift the supply curve include the cost of inputs, changes in technology or the production process, taxes and subsidies, the number of firms in the industry, and price expectations. Figure 3.8 provides an overview of these variables that shift the supply curve. The easiest way to keep them straight is to ask yourself a simple question: Would the change cause a business to produce more of the good or less of the good? If the change would reduce the amount of a good or service a business is willing and able to supply at every given price, the supply curve shifts to the left. If the change would increase the amount of a good or service a business is willing and able to supply at every given price, the supply curve shifts to the right.

**FIGURE 3.8**




**Factors That Shift the Supply Curve**

The supply curve shifts to the left when a factor decreases supply. The supply curve shifts to the right when a factor increases supply. (*Note*: A change in price does not cause a shift. Price changes cause movements along the supply curve.)

## The Cost of Inputs

**Inputs** are resources used in the production process. Inputs may include workers, equipment, raw materials, buildings, and capital goods. Each of these resources is critical to the production process. When the cost of inputs change, so does the seller's profit. If the cost of inputs declines, profits improve. Improved profits make the firm more willing to supply the good. So, for example, if Starbucks is able to purchase coffee beans at a significantly reduced price, it will want to supply more coffee. Conversely, higher input costs reduce profits. For instance, at Starbucks, the salaries of Starbucks store employees (or baristas, as they are commonly called) are a large part of the production cost. An increase in the minimum wage would require Starbucks to pay its workers more. This higher minimum wage would raise the cost of making coffee and make Starbucks less willing to supply the same amount of coffee at the same price.

Baristas' wages make up a large share of the cost of selling coffee.

### Changes in Technology or the Production Process

*Technology* encompasses knowledge that producers use to make their products. An improvement in technology enables a producer to increase output with the same resources or to produce a given level of output with fewer resources. For example, if a new espresso machine works twice as fast as the old machine, Starbucks could serve its customers more quickly, reduce long lines, and increase its sales. As a result, Starbucks would be willing to produce and sell more espressos at each price in its established menu. In other words, if the producers of a good discover a new and improved technology or a better production process, there will be an increase in supply. That is, the supply curve for the good will shift to the right.

### Taxes and Subsidies

Taxes placed on suppliers are an added cost of doing business. For example, if property taxes are increased, the cost of doing business goes up. A firm may attempt to pass along the tax to consumers through higher prices, but higher prices will discourage sales. So, in some cases, the firm will simply have to accept the taxes as an added cost of doing business. Either way, a tax makes the firm less profitable. Lower profits make the firm less willing to supply the product; thus, the supply curve shifts to the left and the overall supply declines.

The reverse is true for a **subsidy**, which is a payment made by the government to encourage the consumption or production of a good or service. Consider a hypothetical example where the government wants to promote flu shots for high-risk groups like the young and the elderly. One approach would be to offer large subsidies to clinics and hospitals, thus offsetting those firms' costs of immunizing the targeted groups. The supply curve of immunizations greatly shifts to the right under the subsidy, so the price falls. As a result, vaccination rates increase over what they would be in a market without the subsidy.

### The Number of Firms in the Industry

We saw that an increase in total buyers (population) shifts the demand curve to the right. A similar dynamic happens with an increase in the number of sellers in an industry. Each additional firm that enters the market increases the available supply of a good. In graphic form, the supply curve shifts to the right to reflect the increased production. By the same reasoning, if the number of firms in the industry decreases, the supply curve shifts to the left.

Changes in the number of firms in a market are a regular part of business. For example, if a new pizza joint opens up nearby, more pizzas can be produced and supply expands. Conversely, if a pizzeria closes, the number of pizzas produced falls and supply contracts.

### Price Expectations

A seller who expects a higher price for a product in the future may wish to delay sales until a time when the product will bring a higher price. For instance, florists know that the demand for roses spikes on Valentine's Day and Mother's Day. Because of higher demand, they can charge higher prices. To be able to sell more flowers during the times of peak demand, many florists work longer hours and hire temporary employees. These actions allow them to make more deliveries, increasing their ability to supply flowers while the price is high.

Likewise, the expectation of lower prices in the future will cause sellers to offer more while prices are still relatively high. This effect is particularly noticeable in the electronics sector, where newer—and much better—products are constantly being developed and released. Sellers know that their current offerings will soon be replaced by something better and that consumer demand for the existing technology will then plummet. This means that prices typically fall when a product has been on the market for a time. Because producers know that the price will fall, they supply as many of the current models as possible before the next wave of innovation cuts the price that they can charge.

## ECONOMICS IN THE REAL WORLD

### Why Do the Prices of New Electronics Always Drop?

The first personal computers released in the 1980s cost as much as $10,000. Today, you can purchase a laptop computer for less than $500. When a new technology emerges, prices are initially very high and then tend to fall rapidly. The first PCs profoundly changed the way people could work with information. Before the PC, complex programming could be done only on large mainframe computers that often took up an entire room. But at first only a few people could afford a PC. What makes emerging technology so expensive when it is first introduced and so inexpensive later in its life cycle? Supply and demand tell the story.

In the case of PCs and other recent technologies, both demand and supply increase through time. Demand increases as consumers find more uses for the new technology. An increase in demand, by itself, would ordinarily drive the price up. However, producers are eager to supply this new market and therefore ramp up production quickly. When the supply expands more rapidly than the demand, there is both an increase in the quantity sold and a lower price.

Differences in expectations account for some of the difference between the increase in supply and the increase in demand. Both parties expect the price to fall, and they react accordingly. Suppliers try to get their new products to market as quickly as possible—before the price starts to fall appreciably. Therefore, the willingness to supply the product expands quickly. Consumer demand is slower to pick up because consumers expect the price to fall. This expectation tempers consumers' desire to buy the new technology immediately. The longer they wait, the lower the price will be. Therefore, demand does not increase as fast as the supply. ✷

# How Do Supply and Demand Interact to Create Equilibrium?

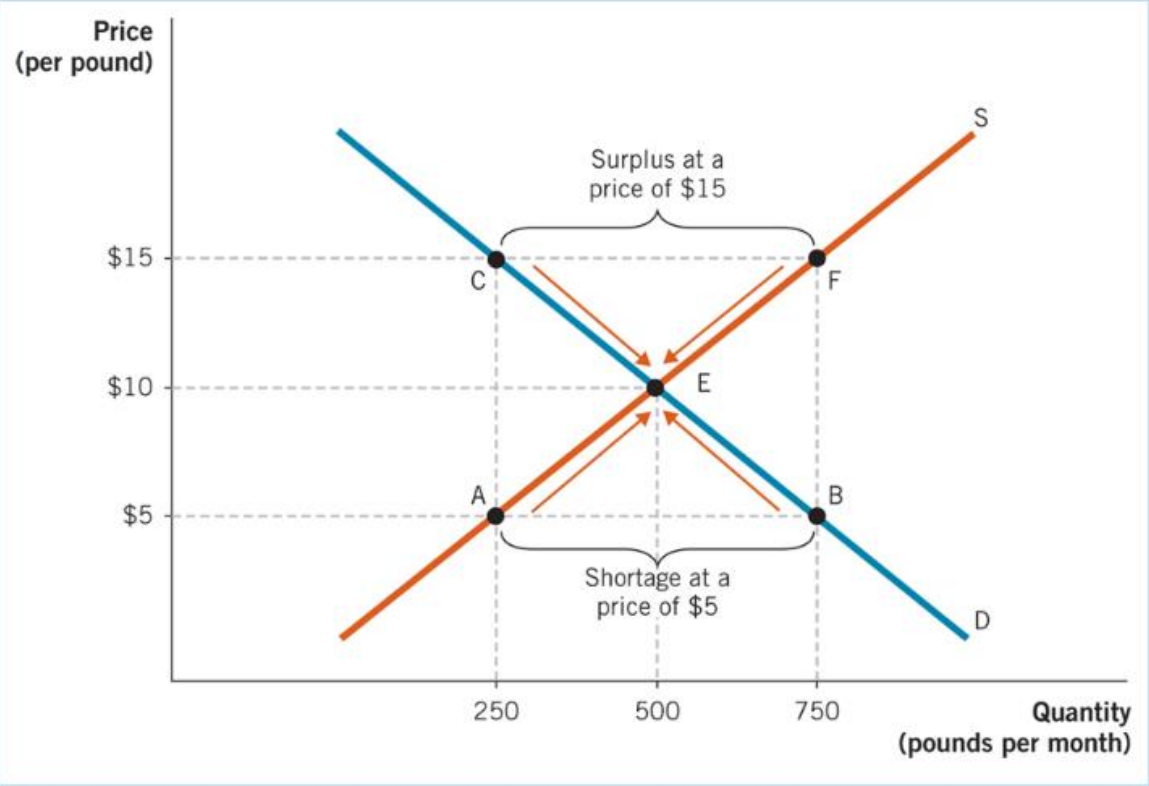
We have examined supply and demand separately. Now it is time to see how the two interact. The real power of supply and demand analysis is in how well it predicts prices and output in the entire market.

## Supply, Demand, and Equilibrium

Let's consider the market for salmon again. This example meets the conditions for a competitive market because the salmon sold by one vendor is essentially the same as the salmon sold by another, and there are many individual buyers.

In Figure 3.9, we see that when the price of salmon fillets is $10 per pound, consumers demand 500 pounds and producers supply 500 pounds. This situation is represented graphically at point E, known as the point of **equilibrium**, where the demand curve and the supply curve intersect. At this point, the two opposing forces of supply and demand are perfectly balanced.

**FIGURE 3.9**




**The Salmon Market**

At the equilibrium point, E, quantity supplied and quantity demanded are perfectly balanced. At prices above the equilibrium price, a surplus exists. At prices below the equilibrium price, a shortage exists.

Notice that at $10 per pound, the quantity demanded equals the quantity supplied. At this price, and only this price, the entire supply of salmon in the market is sold. Moreover, every buyer who wants salmon is able to find some and every producer is able to sell his or her entire stock. We say that $10 is the **equilibrium price** because the quantity supplied equals the quantity demanded. The equilibrium price is also called the *market-clearing price*, because this is the only price at which no surplus or shortage of the good exists. Similarly, there is also an **equilibrium quantity** at which the quantity supplied equals the quantity demanded (in this example, 500 pounds). When the market is in equilibrium, we sometimes say that *the market clears* or that *the price clears the market*.

The equilibrium point has a special place in economics because movements away from that point throw the market out of balance. The equilibrium process is so powerful that it is often referred to as the **law of supply and demand**, the idea that market prices adjust to bring the quantity supplied and the quantity demanded into balance.

### Shortages and Surpluses

How does the market respond when it is not in equilibrium? Let's look at two other prices for salmon shown on the $y$ axis in Figure 3.9: $5 per pound and $15 per pound.

At a price of $5 per pound, salmon is quite attractive to buyers but not very profitable to sellers. The quantity demanded is 750 pounds, represented by point B on the demand curve (D). However, the quantity supplied, which is represented by point A on the supply curve (S), is only 250 pounds. So at $5 per pound there is an excess quantity of 750 - 250 = 500 pounds demanded. This excess demand creates disequilibrium in the market.

When there is more demand for a product than sellers are willing or able to supply, we say there is a shortage. A **shortage**, or *excess demand*, occurs whenever the quantity supplied is less than the quantity demanded. In our case, at a price of $5 per pound of salmon, there are three buyers for each pound. New shipments of salmon fly out the door, providing a strong signal for sellers to raise the price. As the market price increases in response to the shortage, sellers continue to increase the quantity that they offer. You can see the increase in quantity supplied on the graph in Figure 3.9 by following the upward-sloping arrow from point A to point E. At the same time, as the price rises, buyers demand an increasingly smaller quantity, represented by the arrow from point B to point E along the demand curve. Eventually, when the price reaches $10 per pound, the quantity supplied and the quantity demanded are equal. The market is in equilibrium.

What happens when the price is set above the equilibrium point—say, at $15 per pound? At this price, salmon is quite profitable for sellers but not very attractive to buyers. The quantity demanded, represented by point C on the demand curve, is 250 pounds. However, the quantity supplied, represented by point F on the supply curve, is 750 pounds. In other words, sellers provide 500 pounds more than buyers wish to purchase. This excess supply creates disequilibrium in the market. Any buyer who is willing to pay $15 for a pound of salmon can find some because there are 3 pounds available for every customer. A **surplus**, or *excess supply*, occurs whenever the quantity supplied is greater than the quantity demanded.

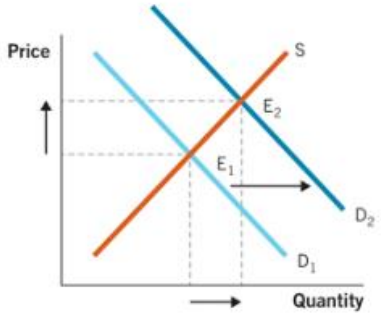
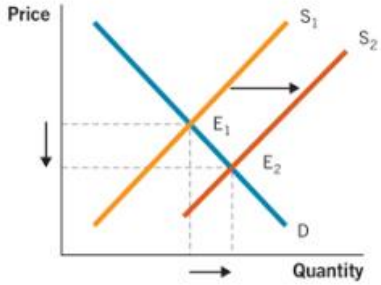
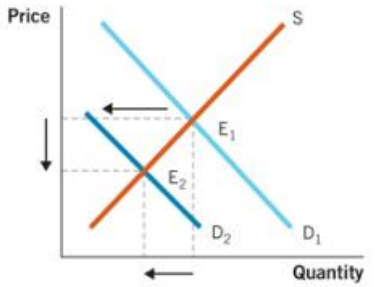
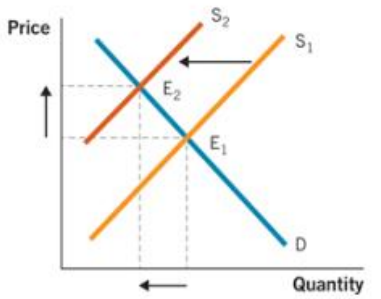
When there is a surplus, sellers realize that salmon has been oversupplied, giving them a strong signal to lower the price. As the market price decreases in response to the surplus, more buyers enter the market and purchase salmon. Figure 3.9 represents this situation on the demand side by the downward-sloping arrow moving from point C to point E along the demand curve. At the same time, sellers reduce output, represented by the arrow moving from point F to point E on the supply curve. As long as the surplus persists, the price will continue to fall. Eventually, the price reaches $10 per pound. At this point, the quantity supplied and the quantity demanded are equal and the market is in equilibrium again.

In competitive markets, surpluses and shortages are resolved through the process of price adjustment. Buyers who are unable to find enough salmon at $5 per pound compete to find the available stocks; this competition drives the price up. Likewise, businesses that cannot sell their product at $15 per pound must lower their prices to reduce inventories; this desire to sell all inventory drives the price down.

Every seller and buyer has a vital role to play in the market. Venues like the Pike Place Market bring buyers and sellers together. Amazingly, market equilibrium occurs without the need for government planning to ensure an adequate supply of the goods that consumers want or need. You might think that a decentralized system would create chaos, but nothing could be further from the truth. Markets work because buyers and sellers can rapidly adjust to changes in prices. These adjustments bring balance. When markets were suppressed in communist countries during the twentieth century, shortages were commonplace, in part because there was no market price system to signal that additional production was needed.

In summary, Figure 3.10 provides four examples of what happens when either the supply curve or the demand curve shifts. As you study these examples, you should develop a sense for how price and quantity are affected by changes in supply and demand. When one curve shifts, we can make a definitive statement about how price and quantity will change. In Appendix 3A, we consider what happens when supply and demand change at the same time. There you will discover the challenges in simultaneously determining price and quantity when more than one variable changes.

**FIGURE 3.10**

| Change | Illustration | Impact on price and quantity |
|---|---|---|
| 1. Demand increases; supply does not change. |   | The demand curve shifts to the right. As a result, the equilibrium price and the equilibrium quantity increase. |
| 2. Supply increases; demand does not change. |   | The supply curve shifts to the right. As a result, the equilibrium price decreases and the equilibrium quantity increases. |
| 3. Demand decreases; supply does not change. |   | The demand curve shifts to the left. As a result, the equilibrium price and the equilibrium quantity decrease. |
| 4. Supply decreases; demand does not change. |   | The supply curve shifts to the left. As a result, the equilibrium price increases and the equilibrium quantity decreases. |

**Price and Quantity When Either Supply or Demand Changes**

## Conclusion

Do sellers determine the price of goods? As you learned in this chapter, the answer is no. Demand and supply contribute equally to the functioning of markets. Five years from now, if someone asks you what you remember about your first course in economics, you will probably respond with two words: "supply" and "demand." These two forces allow us to model market behavior through prices. Supply and demand help establish the market equilibrium, or the price at which quantity supplied and quantity demanded are in balance. At the equilibrium point, every good and service produced has a corresponding buyer who wants to purchase it. When the market is out of equilibrium, a shortage or surplus exists. This condition persists until buyers and sellers have a chance to adjust the quantity they demand and the quantity they supply, respectively.

In the next chapter, we extend our understanding of supply and demand by examining how sensitive, or responsive, consumers and producers are to price changes. With this knowledge, we can determine whether price changes have a big effect on behavior or not.

## ANSWERING THE BIG QUESTIONS

**What are the fundamentals of markets?**

- A market consists of a group of buyers and sellers for a particular product or service.
- A competitive market exists when there are so many buyers and sellers that each has only a small (negligible) impact on the market price and output.
- Not all markets are competitive. When firms have market power, markets are imperfect.

**What determines demand?**

- The law of demand states that, all other things being equal, quantity demanded falls when the price rises, and rises when the price falls.
- The demand curve is downward sloping.
- A price change causes a movement along the demand curve, not a shift of the curve.
- Changes in something other than price (including changes in income, the price of related goods, changes in tastes and preferences, price expectations, the number of buyers, and taxes) shift the demand curve.

**What determines supply?**

- The law of supply states that, all other things being equal, the quantity supplied of a good rises when the price of the good rises, and falls when the price of the good falls.
- The supply curve is upward sloping.
- A price change causes a movement along the supply curve, not a shift of the curve.
- Changes in something other than price (the cost of inputs, changes in technology or the production process, taxes and subsidies, the number of firms in the industry, and price expectations) shift the original supply curve.

**How do supply and demand interact to create equilibrium?**

- Supply and demand work together in a market-clearing process that leads to equilibrium, the balancing point between the two forces. The market-clearing price and output are determined at the equilibrium point.
- When the price is above the equilibrium point, a surplus exists and inventories build up. Suppliers lower their price in an effort to sell the unwanted goods. The process continues until the equilibrium price is reached.
- When the price is below the equilibrium point, a shortage exists and inventories are depleted. Suppliers raise the price until the equilibrium point is reached.

## CONCEPTS YOU SHOULD KNOW

competitive market (p. 73)
complements (p. 81)
demand curve (p. 76)
demand schedule (p. 76)
equilibrium (p. 94)
equilibrium price (p. 94)
equilibrium quantity (p. 95)
imperfect market (p. 74)
inferior good (p. 81)
inputs (p. 90)
invisible hand (p. 72)
law of demand (p. 76)
law of supply (p. 85)
law of supply and demand (p. 95)
market demand (p. 77)
market economy (p. 72)
market power (p. 74)
market supply (p. 87)
monopoly (p. 74)
normal good (p. 80)
purchasing power (p. 80)
quantity demanded (p. 75)
quantity supplied (p. 85)
shortage (p. 95)
subsidy (p. 91)
substitutes (p. 81)
supply curve (p. 85)
supply schedule (p. 85)
surplus (p. 95)

## QUESTIONS FOR REVIEW

1. What is a competitive market, and why does it depend on the existence of many buyers and sellers?
2. Why does the demand curve slope downward?
3. Does a price change cause a movement along a demand curve or a shift of the entire curve? What factors cause the entire demand curve to shift?
4. Describe the difference between inferior goods and normal goods. Give an example of each type of good.
5. Why does the supply curve slope upward?
6. Does a price change cause a movement along a supply curve or a shift of the entire curve? What factors cause the entire supply curve to shift?
7. Describe the process that leads a market toward equilibrium.
8. What happens in a competitive market when the price is above the equilibrium price? Below the equilibrium price?
9. What roles do shortages and surpluses play in the market?

## STUDY PROBLEMS

1. In the song "Money, Money, Money" by ABBA, one of the lead singers, Anni-Frid Lyngstad, is tired of the hard work that life requires and plans to marry a wealthy man. If she is successful, how will this marriage change her demand for goods? How will it change her supply of labor? Illustrate both changes with supply and demand curves. Be sure to explain what is happening in the diagrams. (*Note*: The full lyrics for the song can be found by Googling the song title and ABBA. For inspiration, try listening to the song while you solve the problem.)
2. For each of the following scenarios, determine if there is an increase or a decrease in demand for the good in *italics*.
   a. The price of *oranges* increases.
   b. The cost of producing *tires* increases.
   c. Samantha Brown, who is crazy about *air travel*, gets fired from her job.
   d. A local community has an unusually wet spring and a subsequent problem with mosquitoes, which can be deterred with *citronella*.
   e. Many motorcycle enthusiasts enjoy riding without *helmets* (in states where this is not prohibited by law). The price of new motorcycles rises.
3. For each of the following scenarios, determine if there is an increase or a decrease in supply for the good in *italics*.
   a. The price of *silver* increases.
   b. Growers of *tomatoes* experience an unusually good growing season.
   c. New medical evidence reports that consumption of *organic products* reduces the incidence of cancer.
   d. The wages of low-skilled workers, a resource used to help produce *clothing*, increase.
4. Are laser pointers and cats complements or substitutes? (Not sure? Search for videos of cats and laser pointers online.) Discuss.

**5.** The market for ice cream has the following demand and supply schedules:

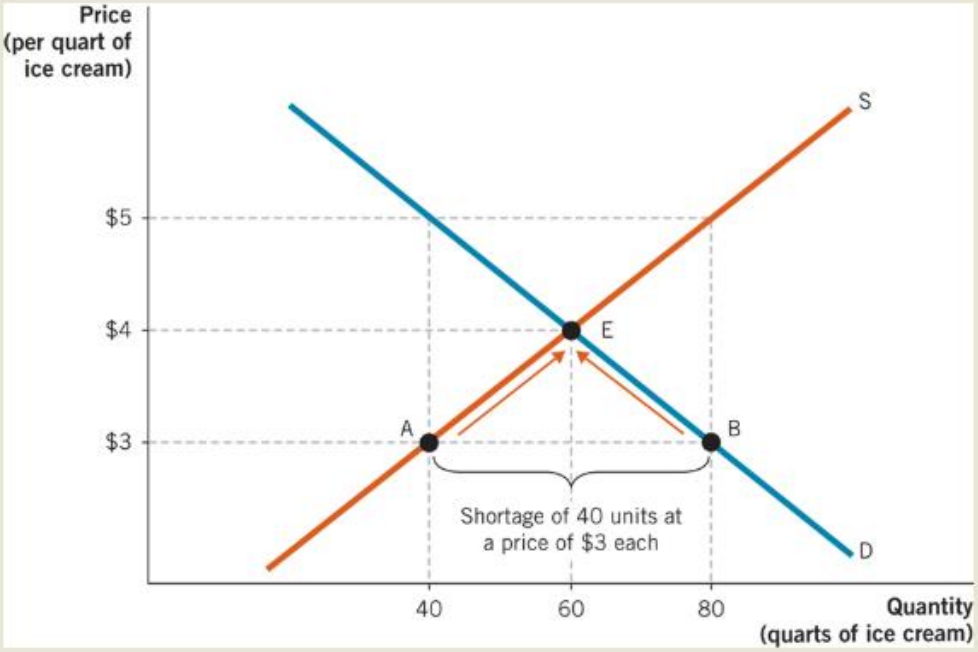
| Price (per quart) | Quantity demanded (quarts) | Quantity supplied (quarts) |
|---|---|---|
| $2 | 100 | 20 |
| $3 | 80 | 40 |
| $4 | 60 | 60 |
| $5 | 40 | 80 |
| $6 | 20 | 100 |

**a.** What are the equilibrium price and equilibrium quantity in the ice cream market? Confirm your answer by graphing the demand and supply curves.

**b.** If the actual price is $3 per quart, what would drive the market toward equilibrium?

CLICK TO HIDE ANSWER

**5a.** The equilibrium price is $4, and the equilibrium quantity is 60 quarts. The next step is to graph the curves, as shown here.




**b.** A shortage of 40 quarts of ice cream exists at $3 (quantity demanded is 80 and the quantity supplied is 40); therefore, there is excess demand. Ice cream sellers will raise their price as long as excess demand exists—that is, as long as the price is below $4. It is not until $4 that the equilibrium point is reached and the shortage is resolved.

**6.** Starbucks Entertainment announced in a 2007 news release that Dave Matthews Band's *Live Trax* CD was available only at the company's coffee shops in the United States and Canada. The compilation features recordings of the band's performances dating back to 1995. Why would Starbucks and Dave Matthews have agreed to partner in this way? To come up with an answer, think about the nature of complementary goods and how both sides can benefit from this arrangement.

**7.** The Seattle Mariners baseball team wishes to determine the equilibrium price for seats for each of the next two seasons. The supply of seats at the ballpark is fixed at 45,000.

| Price (per seat) | Quantity demanded in year 1 | Quantity demanded in year 2 | Quantity supplied |
|---|---|---|---|
| $25 | 75,000 | 60,000 | 45,000 |
| $30 | 60,000 | 55,000 | 45,000 |
| $35 | 45,000 | 50,000 | 45,000 |
| $40 | 30,000 | 45,000 | 45,000 |
| $45 | 15,000 | 40,000 | 45,000 |

Draw the supply curve and each of the demand curves for years 1 and 2.

**8.** Demand and supply curves can also be represented with equations. Suppose that the quantity demanded, $Q_D$, is represented by the following equation:

$$Q_D = 90 - 2P$$

The quantity supplied, $Q_S$, is represented by the equation

$$Q_S = P$$

**a.** Find the equilibrium price and quantity.

**Hint:** Set $Q_D = Q_S$ and solve for the price, P, and then plug your result back into either of the original equations to find Q.

**b.** Suppose that the price is $20. Determine $Q_D$ and $Q_S$.

**c.** At a price of $20, is there a surplus or a shortage in the market?

**d.** Given your answer in part (c), will the price rise or fall in order to find the equilibrium point?

CLICK TO HIDE ANSWER

**8.a.** The first step is to set $Q_D = Q_S$. Doing so gives us 90 - 2P = P. Solving for price, we find that 90 = 3P, or P = 30. Once we know that P = 30, we can plug this value back into either of the original equations, $Q_D = 90 - 2P$ or $Q_S = P$. Beginning with $Q_D$, we get 90 - 2(30) = 90 - 60 = 30, or we can plug it into $Q_S = P$, so $Q_S = 30$. Because we get a quantity of 30 for both $Q_D$ and $Q_S$, we know that the price of $30 is correct.

**b.** In this part, we plug $20 into $Q_D$. Doing so yields 90 - 2(20) = 50. Now we plug $20 into $Q_S$. Doing so yields 20.

**c.** Because $Q_D = 50$ and $Q_S = 20$, there is a shortage of 30 quarts.

**d.** Whenever there is a shortage of a good, the price will rise in order to find the equilibrium point.

✷**9.** Let's take a look at two real-world episodes in the market for gasoline and try to figure out why the price fluctuates so much.

**a.** In the summer of 2008, the price of regular gasoline in the United States soared to over $4 per gallon. Then, in the fall of that year, the U.S. economy fell into a deep recession that significantly reduced consumers' income. Use the supply and demand model to determine which curve shifted and what happened to the equilibrium price of gasoline. For this part of the question, assume no other changes in the market for gasoline.

**b.** By the summer of 2014, the price of regular gasoline in the United States was hovering around $3.50 per gallon. But innovations in oil extraction technology, such as hydraulic fracking, reduced the price of crude oil significantly. Crude oil is the primary input for gasoline production. Use the supply and demand model to determine which curve shifted and then what happened to the equilibrium price of gasoline. For this part of the question, assume no other changes in the market for gasoline.

CLICK TO HIDE ANSWER

**9 a.** The reduction in consumer income led to a negative, or leftward, shift in the demand curve for gasoline. Because this is the only change, the equilibrium price of gasoline fell. In fact, by the end of 2008, the price of gasoline had fallen to under $2 per gallon in the United States.

**b.** The significant drop in the cost of production led to a large increase, or rightward, shift in the supply of gasoline. This increase in supply led to a decrease in price. In fact, by early 2015, the average price of a gallon of regular gasoline in the United States fell to under $2 per gallon.

Looking at parts (a) and (b) together, you can see that very different causes led to steep drops in the price of gasoline. In 2008 the cause was a decline in demand; in 2014 it was an increase in supply.

✷**10.** If the price of alcohol decreases, what happens to the demand for red Solo (plastic) cups?

CLICK TO HIDE ANSWER

**10.** Because alcohol and Solo cups are complements, the key here is to recall that a change in the price of a complementary good shifts the demand curve for the related good. Lower alcohol prices will cause consumers to purchase more alcohol and therefore demand more Solo cups. In other words, the entire demand curve for Solo cups shifts to the right.