



## CHAPTER

# 4

# Demand, Supply, and Market Equilibrium

## LEARNING OUTCOMES

After reading this chapter, you should be able to

- 4.1 Describe and explain why buyers and sellers participate in markets.
- 4.2 Define and explain the law of demand.
- 4.3 Discuss shifts in market demand.
- 4.4 Define and explain the law of supply.
- 4.5 Discuss shifts in market supply.
- 4.6 Explain how the market equilibrium price and quantity are determined.

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Every morning fishermen bring in their daily catch. Along the pier, they negotiate with fish brokers—sellers find buyers, and buyers find sellers. Supply and demand is without a doubt the most powerful tool in the economist’s toolbox. It can help explain much of what goes on in the world and help predict what will happen tomorrow. In this chapter, we will learn about the law of demand and the law of supply and the factors that can change supply and demand.

We then bring market supply and market demand together to determine equilibrium price and quantity. We also learn how markets with many buyers and sellers adjust to temporary shortages and surpluses.

## 4.1 Markets

- What is a market?
- Why is it so difficult to define a market?

### 4.1a Defining a Market

Although we usually think of a market as a place where some sort of exchange occurs, a market is not really a place at all. A **market** is the process of buyers and sellers exchanging goods and services. Supermarkets, the New York Stock Exchange, drug stores, roadside stands, garage sales, Internet stores, and restaurants are all markets.

Every market is different. That is, the conditions under which the exchange between buyers and sellers takes place can vary. These differences make it difficult to precisely define a market. After all, an incredible variety of exchange arrangements exist in the real world—organized securities markets, wholesale auction markets, foreign exchange markets, real estate markets, labor markets, and so forth. The important point is not what a market looks like, but what it does—it facilitates trade.

### 4.1b Buyers and Sellers

The roles of buyers and sellers in markets are important. Buyers, as a group, determine the demand side of the market. Buyers include the consumers who purchase the goods and services and the firms that buy inputs—labor, capital, and raw materials. Sellers, as a group, determine the supply side of the market. Sellers include the firms that produce and sell goods and services and the resource owners who sell their inputs to firms—workers who “sell” their labor and resource owners who sell raw materials and capital. The interaction of buyers and sellers determines market prices and outputs—through the forces of supply and demand.

In the next few chapters, we will focus on how supply and demand work in a competitive market. A **competitive market** is one in which many buyers and sellers are offering similar products, and no single buyer or seller



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- The stock market involves many buyers and sellers, and profit statements and stock prices are readily available. New information is quickly understood by buyers and sellers and is incorporated into the price of the stock. When people expect a company to do better in the future, the price of the stock rises; when people expect the company to do poorly in the future, the price of the stock falls. •



iStock/NicolasMcComber

- eBay is an Internet auction company that brings together millions of buyers and sellers from all over the world. The gains from these mutually beneficial exchanges are large. Craigslist also uses the power of the Internet to connect many buyers and sellers in local markets. •

**market:** the process of buyers and sellers exchanging goods and services



Do markets have to be physical places?  
iStock/skynesher

## ECS

### economic content standards

Prices send signals and provide incentives to buyers and sellers. When supply or demand changes, market prices adjust, affecting incentives. Understanding the role of prices as signals and incentives helps people anticipate market opportunities and make better choices as producers and consumers.

**competitive market:** a market where the many buyers and sellers have little market power—each buyer’s or seller’s effect on market price is negligible

can influence the market price. That is, buyers and sellers have little market power. Because many markets contain a high degree of competitiveness, the lessons of supply and demand can be applied to many different types of problems.

The supply and demand model is particularly useful in markets such as agriculture, finance, labor, construction, services, wholesale, and retail.

In short, a model is only as good as how well it explains and predicts. The model of supply and demand is very good at predicting changes in prices and quantities in many markets, large and small.



## SECTION QUIZ

1. Which of the following is a market?
    - a. a garage sale
    - b. a restaurant
    - c. the New York Stock Exchange
    - d. an eBay auction
    - e. all of the above
  2. In a competitive market,
    - a. there are numerous buyers and sellers.
    - b. no single buyer or seller can appreciably affect the market price.
    - c. sellers offer similar products.
    - d. all of the above are true.
  3. Buyers determine the \_\_\_\_\_ side of the market; sellers determine the \_\_\_\_\_ side of the market.
    - a. demand; demand
    - b. demand; supply
    - c. supply; demand
    - d. supply; supply
- 
1. Why is it difficult to define a market precisely?
  2. Why do you get your produce at a supermarket rather than directly from farmers?
  3. Why do the prices people pay for similar items at garage sales vary more than the prices of similar items in a department store?

Multiple-choice answers: 1. e, 2. d, 3. b

## 4.2 Demand

- What is the law of demand?
- What is an individual demand curve?
- What is a market demand curve?

### 4.2a The Law of Demand

Sometimes observed behavior is so pervasive that it is called a *law*—the law of demand, for example. According to the **law of demand**, the quantity of a good or service demanded varies inversely (negatively) with its price, *ceteris paribus*. More directly, the law of demand says that,

**Law of demand:**  
the law stating that the quantity of a good or service demanded varies inversely (negatively) with its price, *ceteris paribus*

other things being equal, when the price ( $P$ ) of a good or service falls, the quantity demanded increases. Conversely, if the price ( $P$ ) of a good or service rises, the quantity demanded decreases.

$$P \uparrow \Rightarrow Q_D \downarrow \text{ and } P \downarrow \Rightarrow Q_D \uparrow$$

## 4.2b Individual Demand

### AN INDIVIDUAL DEMAND SCHEDULE

The **individual demand schedule** shows the relationship between the price of the good and the quantity demanded. For example, suppose Elizabeth enjoys drinking coffee. How many pounds of coffee would Elizabeth be willing and able to buy at various prices during the year? At a price of \$3 per pound, Elizabeth buys 15 pounds of coffee over the course of a year. If the price is higher, at \$4 per pound, she might buy only 10 pounds; if it is lower, say, \$1 per pound, she might buy 25 pounds of coffee during the year. Elizabeth's demand for coffee for the year is summarized in the demand schedule shown in Exhibit 1. Elizabeth might not be consciously aware of the quantities that she would purchase at prices other than the prevailing one, but that does not alter the fact that she has a schedule, in the sense that she would have bought various other quantities had other prices prevailed. It must be emphasized that the schedule is a list of alternative possibilities. At any one time, only one of the prices will prevail, and thus, a certain quantity will be purchased.

**individual demand schedule:** a schedule that shows the relationship between price and quantity demanded

### ECS

#### economic content standards

Higher prices for a good or service provide the incentives for buyers to purchase less. Lower prices for goods or services provide incentives to purchase more of the good or service.

#### Section 4.2 exhibit 1

Elizabeth's Demand Schedule  
for Coffee

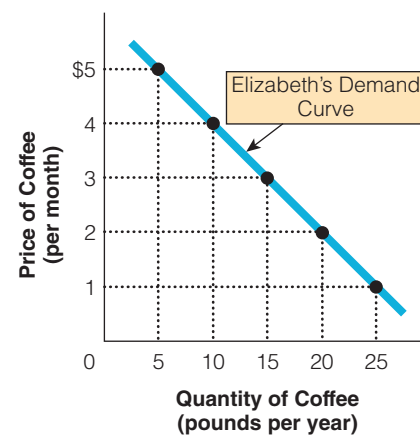
PRICE OF COFFEE (PER POUND)	QUANTITY OF COFFEE DEMANDED (POUNDS PER YEAR)
\$5	5
4	10
3	15
2	20
1	25

### AN INDIVIDUAL DEMAND CURVE

By plotting the different prices and corresponding quantities demanded in Elizabeth's demand schedule in Exhibit 1 and then connecting them, we can create the **individual demand curve** for Elizabeth shown in Exhibit 2. From the curve, we can see that when the price is higher, the quantity demanded is lower, and when the price is lower, the quantity demanded is higher. The demand curve shows how the quantity of the good demanded changes as its price varies.

#### Section 4.2 exhibit 2

Elizabeth's Demand Curve  
for Coffee



The dots represent various quantities of coffee that Elizabeth would be willing and able to buy at different prices in a given period. The demand curve shows how the quantity demanded varies inversely with the price of the good when we hold everything else constant—*ceteris paribus*. Because of this inverse relationship between price and quantity demanded, the demand curve is downward sloping.

## 4.2c What Is a Market Demand Curve?

Although we introduced the concept of the demand curve in terms of the individual, economists usually speak of the demand curve in terms of large groups of people—a whole nation, a community, or a trading area. That is, to analyze how the market works, we will need to use market demand. As you know, every individual has his or her demand curve for every product. The horizontal summing of the demand curves of many individuals is called the **market demand curve**.

**individual demand curve:** a graphical representation that shows the inverse relationship between price and quantity demanded

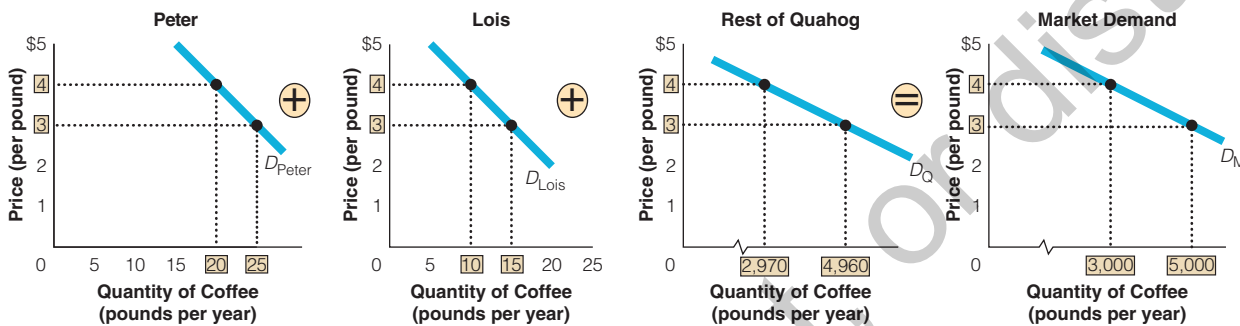
Section 4.2  
exhibit 3

## Creating a Market Demand Curve

## a. Creating a Market Demand Schedule for Coffee

PRICE (PER POUND)	QUANTITY OF COFFEE DEMANDED (POUNDS PER YEAR)						
	PETER	+	LOIS	+	REST OF QUAHOG	=	MARKET DEMAND
\$4	20	+	10	+	2,970	=	3,000
\$3	25	+	15	+	4,960	=	5,000

## b. Creating a Market Demand Curve for Coffee



**market demand curve:** the horizontal summation of individual demand curves

Suppose the consumer group is composed of Peter, Lois, and the rest of their small community, Quahog, and that the product is still coffee. The effect of price on the quantity of coffee demanded by Lois, Peter, and the rest of Quahog is given in the demand schedule and demand curves shown in Exhibit 3. At \$4 per pound, Peter would be willing and able to buy 20 pounds of coffee per year, Lois would be willing and able to buy 10 pounds, and the rest of Quahog would be willing and able to buy 2,970 pounds. At \$3 per pound, Peter would be willing and able to buy 25 pounds of coffee per year, Lois would be willing and able to buy 15 pounds, and the rest of Quahog would be willing and able to buy 4,960 pounds. The market demand curve is simply the (horizontal) sum of the quantities Peter, Lois, and the rest of Quahog demand at each price. That is, at \$4, the quantity demanded in the market would be 3,000 pounds of coffee ( $20 + 10 + 2,970 = 3,000$ ), and at \$3, the quantity demanded in the market would be 5,000 pounds of coffee ( $25 + 15 + 4,960 = 5,000$ ).

In Exhibit 4, we offer a more complete set of prices and quantities from the market demand for coffee during the year. Remember, the market demand curve shows the quantities that all the buyers in the market would be willing and able to buy at various prices. For example, when the price of coffee is \$2 per pound, consumers in the market collectively would be willing and able to buy 8,000 pounds per year. At \$1 per pound, the quantity demanded would be 12,000 pounds per year. The market demand curve is the negative (inverse) relationship between price and the quantity demanded, while holding all other factors that affect how much consumers are able and willing to pay constant, *ceteris paribus*. For the most part, we are interested in how the market works, so we will primarily use market demand curves.

#### 4.2d *Ceteris Paribus* and the Law of Demand

When we considered how Elizabeth's demand for coffee is affected by a change in price, we had to hold many other things constant, such as her income, her taste, the weather outside, the price of other things that Elizabeth buys, and so on. This *ceteris paribus* assumption allows us to focus on the variable we are interested in, which is the price of coffee.

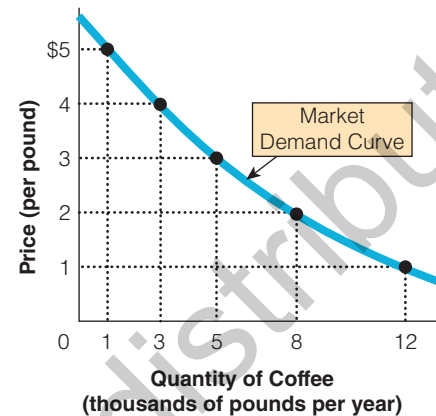
Section 4.2  
exhibit 4

## A Market Demand Curve

a. Market Demand Schedule for Coffee

PRICE (PER POUND)	QUANTITY DEMANDED (POUNDS PER YEAR)
\$5	1,000
4	3,000
3	5,000
2	8,000
1	12,000

b. Market Demand Curve for Coffee



The market demand curve shows the quantities that all the buyers in the market would be willing and able to buy at various prices. We find the market demand curve by adding horizontally the individual demand curves. For example, when the price of coffee is \$2 per pound, consumers in the market collectively would be willing and able to buy 8,000 pounds per year. At \$1 per pound, the quantity collectively demanded would be 12,000 pounds per year.

The *ceteris paribus* assumption also holds when we define a particular good. That is, we are assuming that all goods are the same (homogenous). For example, if we are referring to the market for frozen yogurt, we would assume that the serving of yogurt is the same size and quality. Not a higher-quality yogurt served in a chocolate-covered waffle cone versus a small scoop in a child-size cup—those would be two different goods. By allowing something other than the price of yogurt to change, you would be violating the *ceteris paribus* assumption.



- Why is gasoline consumption lower in Europe than in the United States? The main reason is price. Because of higher taxes, gasoline prices are at least twice as high in Europe. Consequently, Europeans on average consume half as much gasoline—buying smaller cars with better mileage. •



## SECTION QUIZ

1. If the demand for milk is downward sloping, then an increase in the price of milk will result in a(n)
  - a. increase in the demand for milk.
  - b. decrease in the demand for milk.
  - c. increase in the quantity of milk demanded.
  - d. decrease in the quantity of milk demanded.
  - e. decrease in the supply of milk.
2. Which of the following is true?
  - a. The law of demand states that when the price of a good falls (rises), the quantity demanded rises (falls), *ceteris paribus*.
  - b. An individual demand curve is a graphical representation of the relationship between the price and the quantity demanded.
  - c. The market demand curve shows the quantity of a good that all buyers in the market would be willing and able to buy at various prices.
  - d. All of the above are true.
3. Which of the following is true?
  - a. The relationship between price and quantity demanded is inverse, or negative.
  - b. The market demand curve is the vertical summation of individual demand curves.
  - c. A change in a good's price causes a movement along its demand curve.
  - d. All of the above are true.
  - e. Answers (a) and (c) are true.

- 
1. What is an inverse relationship?
  2. How do lower prices change buyers' incentives?
  3. How do higher prices change buyers' incentives?
  4. What is an individual demand schedule?
  5. What is the difference between an individual demand curve and a market demand curve?
  6. Why does the amount of dating on campus tend to decline just before and during final exams?

Multiple-choice answers: 1. d 2. d 3. e

## 4.3 Shifts in the Demand Curve

- What is the difference between a change in demand and a change in quantity demanded?
- What are the determinants of demand?
- What are substitutes and complements?
- What are normal and inferior goods?
- How does the number of buyers affect the demand curve?
- How do changes in taste affect the demand curve?
- How do changing expectations affect the demand curve?

**change in quantity demanded:** a change in a good's own price leads to a change in quantity demanded, a movement along a given demand curve

### 4.3a A Change in Demand versus a Change in Quantity Demanded

Understanding the relationship between price and quantity demanded is so important that economists make a clear distinction between it and the various other factors that can influence consumer behavior. A change in a good's own price is said to lead to a **change in quantity demanded**.

That is, it “moves you along” a given demand curve. The demand curve is the answer to the question “What happens to the quantity demanded when the price of the good changes?” The demand curve is drawn under the assumption that all other things are held constant, except the price of the good. However, economists know that price is not the only thing that affects the quantity of a good that people buy. The other variables that influence the demand curve are called *determinants of demand*, and a change in these other factors lead to **shifts in the demand curve**.

### 4.3b Shifts in Demand (“PYNTE”)

There are two ways the demand curve can shift. We say there is an increase in demand when the curve shifts rightward: At any given price, consumers demand a larger quantity of the good than before. Or when there is a decrease in demand, there is a leftward shift in the demand curve: At any given price, consumers demand a smaller quantity of the good than before. These shifts are shown in Exhibit 1.

Several variables can shift the demand curve, but here are some of the most important. It might be helpful to remember the old English spelling of the word pint—PYNTE. This acronym can help you remember the five important factors that shift the demand curve for a good or service.

- Changes in the Prices of Related Goods and Services (P)
- Changes in Income (Y)
- Changes in the Number of Buyers (N)
- Changes in Tastes (T)
- Changes in Expectations (E)

### 4.3c Changes in the Prices of Related Goods and Services (P)

In deciding how much of a good or service to buy, consumers are influenced by the price of that good or service, a relationship summarized in the law of demand. However, sometimes consumers are also influenced by the prices of *related* goods and services—substitutes and complements.

#### SUBSTITUTES

Substitutes are generally goods for which one could be used in place of the other. To many, substitutes would include muffins and bagels, Crest and Colgate toothpaste, domestic and foreign cars, movie tickets and video streaming, jackets and sweaters, Exxon and Shell gasoline, and Nikes and Reeboks.

Two goods are **substitutes** when an increase (decrease) in the price of one good causes an increase (decrease) in the demand for the other good. For example, if an increase in the price of Diet Pepsi (an upward movement along the demand curve for Diet Pepsi) causes an increase in demand for Diet Coke (a rightward shift of the demand curve for Diet Coke), we would say that for this buyer, the two goods are substitutes. (See the “Use What You’ve Learned” feature on substitute goods.)



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- Some cities have tried to reduce traffic congestion by lowering the price of substitutes for cars, such as buses and rail services. •

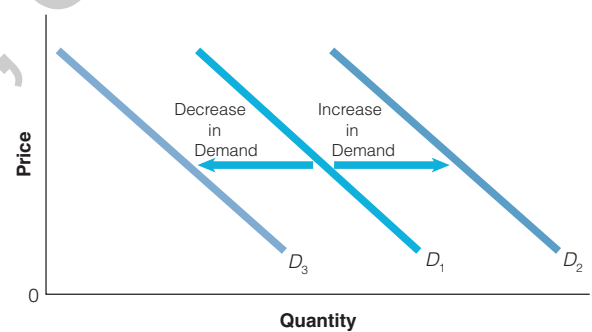
**shifts in the demand curve:** a change in one of the variables, other than the price of the good itself, that affects the willingness of consumers to buy



Does a movement along a given demand curve illustrate a change in demand or a change in quantity demanded?

#### Section 4.3 exhibit 1

#### Demand Shifts



Any change that will cause an increase in the quantity of a good that consumers want to buy at any given price shifts the demand curve to the right. Any change that will cause a decrease in the quantity that consumers want to buy at any given price will shift the demand curve to the left.

**substitutes:** goods for which an increase (decrease) in the price of one good causes an increase (decrease) in the demand for the other good





## USE WHAT YOU'VE LEARNED

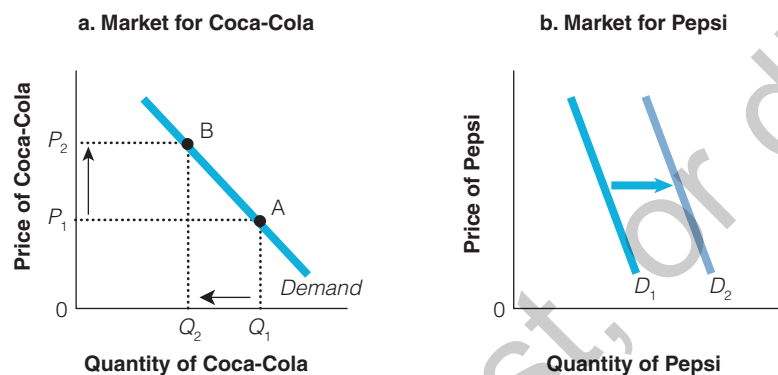
### Substitute Goods

**Question:** Can you describe the change we would expect to see in the demand curve for Pepsi if the relative price for Coca-Cola increased significantly?

**Answer:** In Exhibit 2(a), we see that an increase in the price of Coca-Cola—an upward movement along the demand curve for Coca-Cola, from point A to point B—causes a reduction in the quantity demanded of Coca-Cola. If the two goods are substitutes, the higher price for Coca-Cola will cause an increase in the demand for Pepsi (a rightward shift), as seen in Exhibit 2(b).

Section 4.3  
exhibit 2

### Substitute Goods



### COMPLEMENTS

Two goods are complements if they are used together, such as skis and bindings, peanut butter and jelly, hot dogs and buns, cars and gasoline, and printers and ink cartridges. When an increase (decrease) in the price of one good causes a decrease (increase) in the demand for another good, the two goods are called **complements**. For many people, motorcycles and motorcycle helmets are complements, especially in states that have required helmet laws. So when the price of motorcycles falls, the quantity of motorcycles demanded will rise—a movement downward along the demand curve for motorcycles. As more people buy motorcycles, they will demand more motorcycle helmets—the demand curve for motorcycle helmets shifts to the right. However, most pairs of goods are not closely related. For example, ice cream and housing or cars and pizzas are not closely related goods.

**complements:** goods for which an increase (decrease) in the price of one good leads to a decrease (increase) in the demand for the other good



## USE WHAT YOU'VE LEARNED

### Complementary Goods

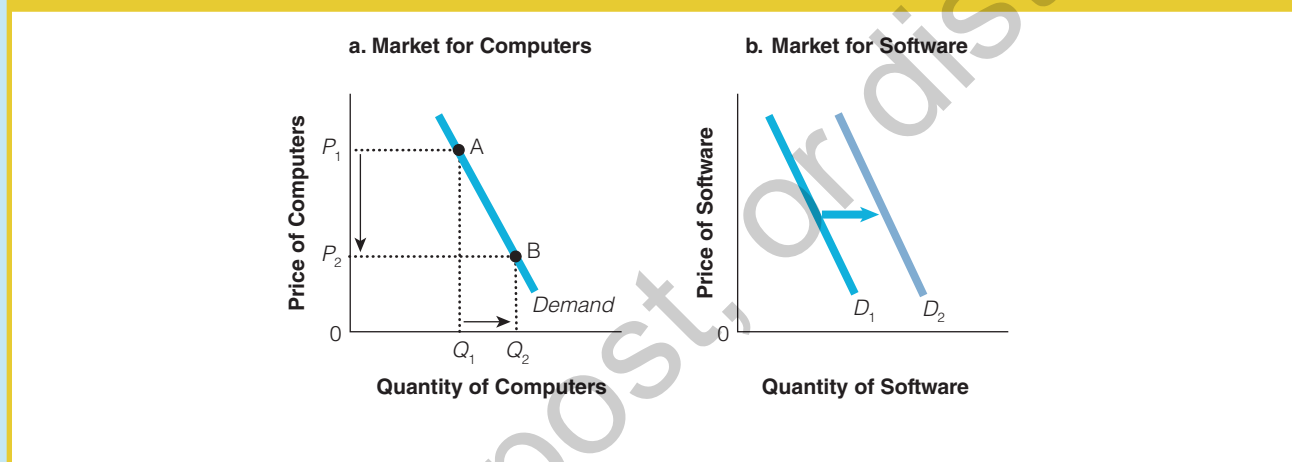
**Question:** If the price of computers fell markedly, what do you think would happen to the demand for software?

**Answer:** If computers and software are complements, the decrease in the price of computers will lead to more computers purchased

(a movement downward along the demand curve, from point A to point B, called an *increase in quantity demanded*) and an increase in the demand for software (a rightward shift). Of course, the opposite is true, too—an increase in the price of computers will lead to fewer people purchasing computers (a movement upward along the demand curve for computers, from point B to point A, called a *decrease in quantity demanded*) and a lower demand for software (a leftward shift).

Section 4.3  
exhibit 3

### Complementary Goods



### 4.3d Changes in Income (Y)

Why (Y)? The reason is because macroeconomists use the letter (I) for investment, so microeconomists often use the letter (Y) to denote income. Economists have observed that generally the consumption of goods and services is positively related to the income available to consumers. Empirical studies support the notion that as individuals receive more income, they tend to increase their purchases of most goods and services. Other things held equal, rising income usually leads to an increase in the demand for goods (a rightward shift of the demand curve), and decreasing income usually leads to a decrease in the demand for goods (a leftward shift of the demand curve).

#### NORMAL AND INFERIOR GOODS

If demand for a good increases when incomes rise and decreases when incomes fall, the good is called a **normal good**. Most goods are normal goods. Consumers will typically buy more clothes, pizzas, and trips to the movies as their incomes rise. However, if demand for a good decreases when incomes rise or if demand increases when incomes fall, the good is called an **inferior good**. For example, as your income rises, you may choose to stay in nice hotels rather than youth hostels, or you may purchase fewer fast-food meals. The term *inferior* in this sense does not refer to the quality of the good in question but shows that demand decreases when income increases and demand increases when income decreases.

Or if people's incomes rise and they increase their demand for movie tickets, we say that movie tickets are a normal good. But if people's incomes fall and they increase their demand for bus rides, we say that bus rides are an inferior good. Whether goods are normal or inferior, the point here is that income influences demand—usually positively, but sometimes negatively.

**normal goods:** if income increases, the demand for a good increases; if income decreases, the demand for a good decreases

**inferior goods:** if income increases, the demand for a good decreases; if income decreases, the demand for a good increases



## USE WHAT YOU'VE LEARNED

### Normal and Inferior Goods

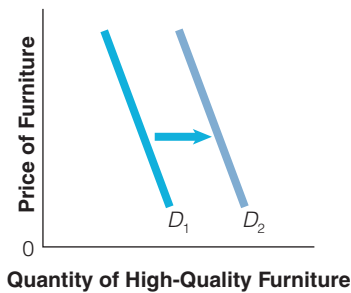
**Question:** Chester Field owns a high-quality furniture shop. If a boom in the economy occurs (with a higher average income per person and fewer people unemployed), can Chester expect to sell more high-quality furniture?

**Answer:** Yes. Furniture is generally considered a normal good, so a rise in income will increase the demand for high-quality furniture, as shown in Exhibit 4(a). However, if Chester sells unfinished, used, or low-quality furniture, the demand for his products might fall, as higher incomes allow customers to buy furniture that is finished, new, or of higher quality. Chester's furniture would then be an inferior good, as shown in Exhibit 4(b).

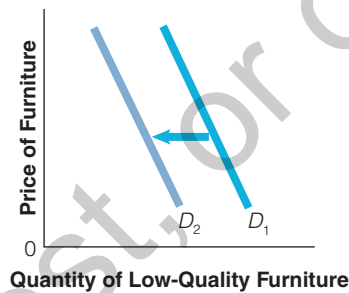
#### Section 4.3 exhibit 4

#### Normal and Inferior Goods

a. Rising Income and a Normal Good



b. Rising Income and an Inferior Good



Robert Alexander/Getty Images

- In the midst of a recession, is it possible that many people will increase their demand for fast-food restaurants? It is not only possible—it actually happened in 2009! If declining income causes demand for a good to rise, is it a normal good or an inferior good? •

### 4.3e Changes in the Number of Buyers (N)

The demand for a good or service will vary with the size of the potential consumer population. The demand for wheat, for example, rises as population increases because the added population wants to consume wheat products, such as bread or cereal. Marketing experts, who closely follow the patterns of consumer behavior regarding a particular good or service, are usually vitally concerned with the *demographics* of the product—the vital statistics of the potential consumer population, including size, race, income, and age characteristics. For example, market researchers for baby food companies keep a close watch on the birth rate.



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- Body piercing and tattoos have risen in popularity in recent years. The demand for these services has been pushed to the right. According to the Pew Research Center, 38 percent of 18- to 29-year-olds have at least one tattoo. •

### 4.3f Changes in Tastes (T)

The demand for a good or service may increase or decrease with changes in people's tastes or preferences. When tastes change in favor of a good, more people want to buy the good at any given price—a rightward shift in the demand curve. When tastes change against a good, fewer people want to buy the good at any given price—a leftward shift in the demand curve.

Changes in taste may be triggered by advertising or promotion, by a news story, by the behavior of some popular public figure, and so on. Changes in taste are particularly noticeable in apparel. Skirt lengths, coat lapels, shoe styles, and tie sizes change frequently.

Changes in preferences naturally lead to changes in demand. A person may grow tired of one type of recreation or food and try another type. People may decide they want more organic food; consequently, we will see more stores and restaurants catering to this change in taste. Changes in occupation, number of dependents, state of health, and age also tend to alter preferences. The birth of a baby might cause a family to spend less on recreation and more on food and clothing. Illness increases the demand for medicine and lessens purchases of other goods. A cold winter increases the demand for heating oil. Changes in customs and traditions also affect preferences, and the development of new products draws consumer preferences away from other goods. Compact discs replaced record albums, just as DVD players replaced VCRs, and DVD players are now being replaced by Internet streaming services such as Netflix and Hulu. A change in information can also impact consumers' demand. For example, a breakout of *E. coli* or new information about a defective and/or dangerous product, such as a baby crib, can reduce demand.



## BUSINESS WATCH

### The Rise and Fall of Crocs

Remember Crocs, the foam rubber shoes with the holes in the top? They became extremely popular in 2006 through 2007. More Crocs were sold, not because the company lowered the price, but because there was an increase in demand. More Crocs were sold at all prices—a rightward shift of the demand curve. Eventually, by 2008, the fad had run its course, and fewer Crocs were sold at all prices—a leftward shift in the demand curve.



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### 4.3g Changes in Expectations (E)

Sometimes the demand for a good or service in a given period will increase or decrease because consumers expect the good to change in price or availability at some future date. If people expect the future price to be higher, they will purchase more of the good now before the price increase—an increase in the demand today. If people expect the future price to be lower, they will purchase less of the good now and wait for the price decrease—a decrease in the demand today. For example, if you expect the price of computers to fall soon, you may be less willing to buy one today. Or you might buy next year's Halloween decorations on November 1 during a post-Halloween sale. That is, expectations of higher prices in the future could increase your demand now.

A change in consumers' expectations about their future incomes can also shift the demand curve. For example, if you expect to earn additional income next month, you may be more willing to dip into your current savings to buy something this month. If you expect your income to fall in the future, you may choose to save more today and reduce your demand for some goods.

### 4.3h Changes in Demand versus Changes in Quantity Demanded—Revisited

Economists put particular emphasis on the impact of a change in the price of a good on consumer behavior. We are interested in distinguishing between consumer behavior related to the price of a good itself (movements *along* a demand curve) and behavior related to changes in other factors (shifts *of* the demand curve).

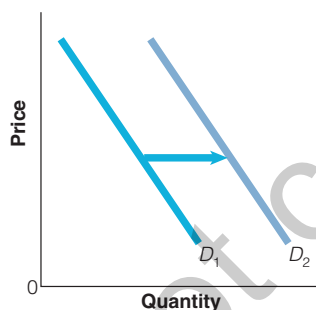
As indicated earlier, if the price of a good changes, it causes a *change in quantity demanded*, *ceteris paribus*. If one of the other factors (determinants) influencing consumer behavior changes, it results in a *change in demand*. The effects of some of the determinants that cause changes in demand (shifters) are reviewed in Exhibit 5. For example, there are two different ways to curb teenage smoking: raise the price of cigarettes (a reduction in the quantity of cigarettes demanded) or decrease the demand for cigarettes (a leftward shift in the demand curve for cigarettes). Both



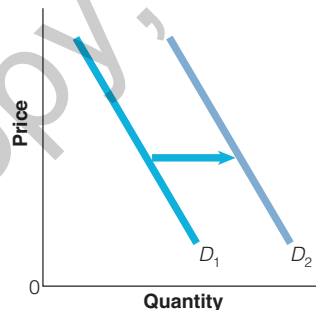
How is a change in demand different from a change in quantity demanded?

#### Section 4.3 Exhibit 5

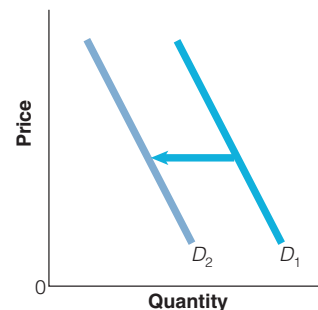
#### Possible Demand Shifters



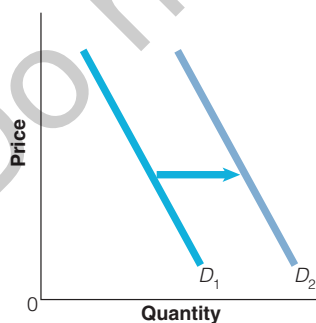
Price of Complement Falls  
or Price of Substitute Rises



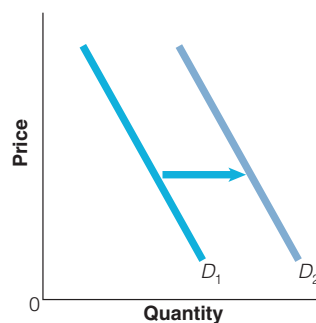
Income Increases (normal good)



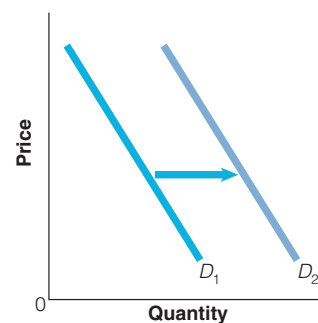
Income Increases (inferior good)



Increase in the Number of  
Buyers in the Market



Taste Change in Favor of the Good



Future Price Increase Expected



## USE WHAT YOU'VE LEARNED

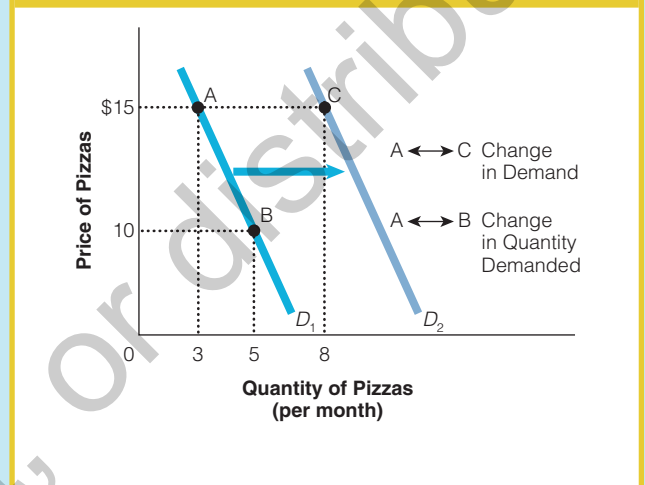
### Changes in Demand versus Changes in Quantity Demanded

**Question:** How would you use a graph to demonstrate the two following scenarios? (1) Someone buys more pizzas because the price of pizzas has fallen; and (2) a student buys more pizzas because she just received a 20 percent raise at work, giving her additional income.

**Answer:** In Exhibit 6, the movement from A to B is called an *increase in quantity demanded*, the movement from B to A is called a *decrease in quantity demanded*. Economists use the phrase “increase or decrease in quantity demanded” to describe movements along a given demand curve. However, the change from A to C is called an *increase in demand*, and the change from C to A is called a *decrease in demand*. The phrase “increase or decrease in demand” is reserved for a shift in the whole curve. So if an individual buys more pizzas because the price fell, we call it an *increase in quantity demanded*. However, if she buys more pizzas even at the current price, say \$15, we say it is an increase in demand. In this case, the increase in income was responsible for the increase in demand because she chose to spend some of her new income on pizzas.

#### Section 4.3 exhibit 6

#### Change in Demand versus Change in Quantity Demanded



would reduce the amount of smoking. Specifically, to increase the price of cigarettes, the government could impose a higher tax on manufacturers. Most of this would be passed on to consumers in the form of higher prices (more on this in Chapter 6). Or to shift the demand curve leftward, the government could adopt policies to discourage smoking, such as advertising bans and increasing consumer awareness of the harmful side effects of smoking—disease and premature death.

The following table lists some of the most important variables that affect how much consumers are willing to buy. Remember, changes in the price of the good itself cause a movement along a given demand curve, resulting in a change in quantity demanded. That is what happens to the quantity consumers demand when only a good's price changes and all the other variables that influence buyers are held constant. A change in the other variables shifts the curve, causing a change in demand.

VARIABLE	A CHANGE IN THIS VARIABLE CAUSES
Price of the good itself	a movement along the demand curve
Price of related goods and services	a shift in the demand curve
Income	a shift in the demand curve
Number of buyers	a shift in the demand curve
Tastes	a shift in the demand curve
Expectations	a shift in the demand curve



## SECTION QUIZ

- Which of the following would be most likely to increase the demand for jelly?
  - an increase in the price of peanut butter, which is often used with jelly
  - an increase in income; jelly is a normal good
  - a decrease in the price of jelly
  - medical research that finds that daily consumption of jelly makes people live 10 years less, on average
- Which of the following would not cause a change in the demand for cheese?
  - an increase in the price of crackers, which are consumed with cheese
  - an increase in the income of cheese consumers
  - an increase in the population of cheese lovers
  - an increase in the price of cheese
- Whenever the price of Good A decreases, the demand for Good B increases. Goods A and B appear to be
  - complements.
  - substitutes.
  - inferior goods.
  - normal goods.
  - inverse goods.
- Whenever the price of Good A increases, the demand for Good B increases as well. Goods A and B appear to be
  - complements.
  - substitutes.
  - inferior goods.
  - normal goods.
  - inverse goods.
- The difference between a change in quantity demanded and a change in demand is that a change in
  - quantity demanded is caused by a change in a good's own price, while a change in demand is caused by a change in some other variable, such as income, tastes, or expectations.
  - demand is caused by a change in a good's own price, while a change in quantity demanded is caused by a change in some other variable, such as income, tastes, or expectations.
  - quantity demanded is a change in the quantity people actually buy, while a change in demand is a change in the quantity they want to buy.
  - This is a trick question. A change in demand and a change in quantity demanded are the same thing.
- Suppose CNN announces that bad weather in Central America has greatly reduced the number of cocoa bean plants, and for this reason, the price of chocolate is expected to rise soon. As a result,
  - the current market demand for chocolate will decrease.
  - the current market demand for chocolate will increase.
  - the current quantity demanded for chocolate will decrease.
  - no change will occur in the current market for chocolate.
- If incomes are rising, in the market for an inferior good,
  - demand will rise.
  - demand will fall.
  - supply will rise.
  - supply will fall.

- 
- What is the difference between a change in demand and a change in quantity demanded?
  - If the price of zucchini increases, causing the demand for yellow squash to rise, what do we call the relationship between zucchini and yellow squash?





3. If incomes rise and, as a result, demand for jet skis increases, how do we describe that good?
4. How do expectations about the future influence the demand curve?
5. Would a change in the price of ice cream cause a change in the demand for ice cream? Why or why not?
6. Would a change in the price of ice cream likely cause a change in the demand for frozen yogurt, a substitute?
7. If plane travel is a normal good and bus travel is an inferior good, what will happen to the demand curves for plane and bus travel if people's incomes increase?

Multiple-choice answers: 1. b 2. d 3. a 4. b 5. a 6. b 7. b

## 4.4 Supply

- What is the law of supply?
- What is an individual supply curve?
- What is a market supply curve?

### 4.4a The Law of Supply

In a market, the answer to the fundamental question, “What do we produce, and in what quantities?” depends on the interaction of both buyers and sellers. Demand is only half the story. The willingness and ability of sellers to provide goods are equally important factors that must be weighed by decision makers in all societies. As with demand, the price of the good is an important factor. And just as with demand, factors other than the price of the good are also important to sellers, such as the cost of inputs or advances in technology. While behavior will vary among individual sellers, economists expect that, other things being equal, the quantity supplied will vary directly with the price of the good, a relationship called the **law of supply**. According to the law of supply, the higher the price of the good ( $P$ ), the greater the quantity supplied, and the lower the price ( $P$ ) of the good, the smaller the quantity supplied ( $Q_s$ ), *ceteris paribus*.

$$P \uparrow \Rightarrow Q_s \uparrow \text{ and } P \downarrow \Rightarrow Q_s \downarrow$$

The relationship described by the law of supply is a direct, or positive, relationship because the variables move in the same direction.

### 4.4b A Positive Relationship between Price and Quantity Supplied

Firms supplying goods and services want to increase their profits, and the higher the price per unit, the greater the profitability generated by supplying more of that good. For example, if you were a coffee grower, wouldn't you much rather be paid \$5 per pound than \$1 per pound, *ceteris paribus*?

When the price of coffee is low, the coffee business is less profitable, and less coffee will be produced. Some sellers may even shut down, reducing their quantity supplied to zero if the price is low enough.

### 4.4c An Individual Supply Curve

To illustrate the concept of an **individual supply curve**, consider the amount of coffee that an individual seller, Juan Valdés, is willing and able to supply in one year. The law of supply can be illustrated, like the law of demand, by a table or graph. Juan's supply schedule for coffee is shown in Exhibit 1(a). The combinations of price and quantity supplied were then plotted and joined to create the individual supply curve shown in Exhibit 1(b). Note that the individual supply curve is upward sloping as you move from left to right. At higher prices, there will be a greater quantity supplied, other things being equal. That is, existing firms or growers will produce more at higher prices than at lower prices.

**law of supply:** the law stating that the higher (lower) the price of the good, the greater (smaller) the quantity supplied, *ceteris paribus*

### ECS



**economic content standards**

Higher prices for a good or service provide incentives for producers to make or sell more of it. Lower prices for a good or service provide incentives for producers to make or sell less of it.

### ECS



**economic content standards**

An increase in the price of a good or service enables producers to cover higher costs, *ceteris paribus*, causing the quantity supplied to increase, and vice versa.

**individual supply curve:** a graphical representation that shows the positive relationship between price and quantity supplied



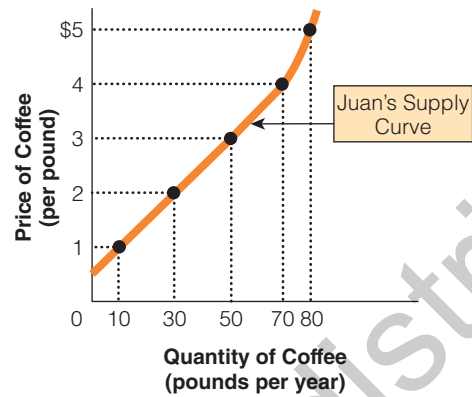
Section 4.4  
exhibit 1

## An Individual Supply Curve

a. Juan's Supply Schedule for Coffee

PRICE (PER POUND)	QUANTITY SUPPLIED (POUNDS PER YEAR)
\$5	80
4	70
3	50
2	30
1	10

b. Juan's Supply Curve for Coffee



**market supply curve:** the horizontal summation of the supply curves of producers; a graphical representation of the quantity of goods and services that all the individual producers are willing and able to supply at various prices

## 4.4d The Market Supply Curve

The **market supply curve** may be thought of as the horizontal summation of the supply curves for all the individual producers in the market. The market supply curve shows how the total quantity supplied varies with the market price of the good, while holding constant all other factors that affect how much producers are able and willing to supply. The market supply schedule, which reflects the total quantity supplied at each price by all of the coffee producers, is shown in Exhibit 2(a). Exhibit 2(b) illustrates the resulting market supply curve for this group of coffee producers.

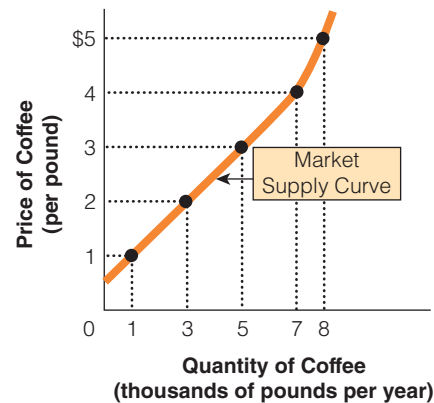
Section 4.4  
exhibit 2

## A Market Supply Curve

a. Market Supply Schedule for Coffee

PRICE (PER POUND)	QUANTITY SUPPLIED (POUNDS PER YEAR)				MARKET SUPPLY
	JUAN	+	OTHER PRODUCERS	=	
\$5	80	+	7,920	=	8,000
4	70	+	6,930	=	7,000
3	50	+	4,950	=	5,000
2	30	+	2,970	=	3,000
1	10	+	990	=	1,000

b. Market Supply Curve for Coffee



The dots on this graph indicate different quantities of coffee that sellers would be willing and able to supply at various prices. The line connecting those combinations is the market supply curve.



## SECTION QUIZ

1. An upward-sloping supply curve shows that
  - a. buyers are willing to pay more for particularly scarce products.
  - b. sellers expand production as the product price falls.
  - c. sellers are willing to increase production of their goods if they receive higher prices for them.
  - d. buyers are willing to buy more as the product price falls.
2. Along a supply curve,
  - a. supply changes as price changes.
  - b. quantity supplied changes as price changes.
  - c. supply changes as technology changes.
  - d. quantity supplied changes as technology changes.
3. A supply curve illustrates a(n) \_\_\_\_\_ relationship between \_\_\_\_\_ and \_\_\_\_\_.
  - a. direct; price; supply
  - b. direct; price; quantity demanded
  - c. direct; price; quantity supplied
  - d. introverted; price; quantity demanded
  - e. inverse; price; quantity supplied
4. Which of the following is true?
  - a. The law of supply states that the higher (lower) the price of a good, the greater (smaller) the quantity supplied.
  - b. The relationship between price and quantity supplied is positive because profit opportunities are greater at higher prices and because the higher production costs of increased output mean that suppliers will require higher prices.
  - c. The market supply curve is a graphical representation of the number of goods and services that suppliers are willing and able to supply at various prices.
  - d. All of the above are true.

1. What are the two reasons why a supply curve is positively sloped?
2. What is the difference between an individual supply curve and a market supply curve?

Multiple-choice answers: 1. c 2. b 3. c 4. d

### 4.5 Shifts in the Supply Curve

- What is the difference between a change in supply and a change in quantity supplied?
- What are the determinants of supply?
- How does the number of suppliers affect the supply curve?
- How does technology affect the supply curve?
- How do taxes affect the supply curve?

#### 4.5a A Change in Quantity Supplied versus a Change in Supply

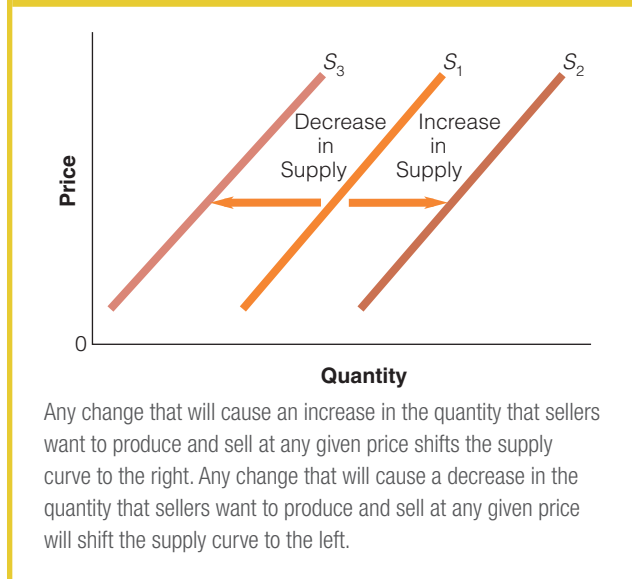
Changes in the price of a good lead to changes in the quantity supplied by sellers, just as changes in the price of a good lead to changes in the quantity demanded by buyers. Similarly, a change in supply, whether an increase or a decrease, can occur for reasons other than changes in the price of the product itself, just as changes in demand may be due to factors (determinants) other than the price of the good. In other words, a change in the price of the good in question is shown as a movement along a given supply curve, leading to a change in quantity supplied. A change in any other factor that can affect seller behavior (the seller's input prices, the prices of related products, expectations, the number of sellers, and technology) results in a *shift in the entire supply curve*. This is called a *change in supply*.



Why is a change in supply different from a change in quantity supplied?

Section 4.5  
exhibit 1

## Supply Shifts



## 4.5b Shifts in Supply (“SPENT”)

There are two ways the supply curve can shift. We say there is an increase in supply when the curve shifts rightward: At any given price, producers supply a larger quantity of the good than before. Or when there is a decrease in supply, there is a leftward shift in the supply curve: At any given price, producers supply a smaller quantity of the good than before. These shifts are shown in Exhibit 1. We now look at some of the possible determinants of supply—factors that determine the position of the supply curve—in greater depth.

Several variables can shift the supply curve, but here are some of the most important. It might be helpful to remember the word “SPENT.” This acronym can help you remember the five important factors that shift the supply curve for a good or service.

- Changes in the seller’s input prices (S)
- Changes in the prices of related goods and services (P)
- Changes in expectations (E)
- Changes in the number of sellers (N)
- Changes in technology (T)

## CHANGES IN THE SELLER’S INPUT PRICES (S)

Sellers are strongly influenced by the costs of inputs used in the production process, such as steel used for automobiles or microchips used in computers. Recall that inputs are used to make outputs of goods and services. Inputs, like outputs, also have prices. And if the input prices rise, this increases the cost of producing the output of a good or service. Consequently, the producer is less willing to supply the final good at any given price, causing the supply curve to shift to the left. For example, higher labor, materials, energy, or other input costs increase the costs of producing an automobile, causing the supply curve for automobiles to shift to the left. If input prices fall, producing the final good or service is less costly to the seller; thus, the seller is more willing to supply the good at any given price, so the supply curve shifts to the right.



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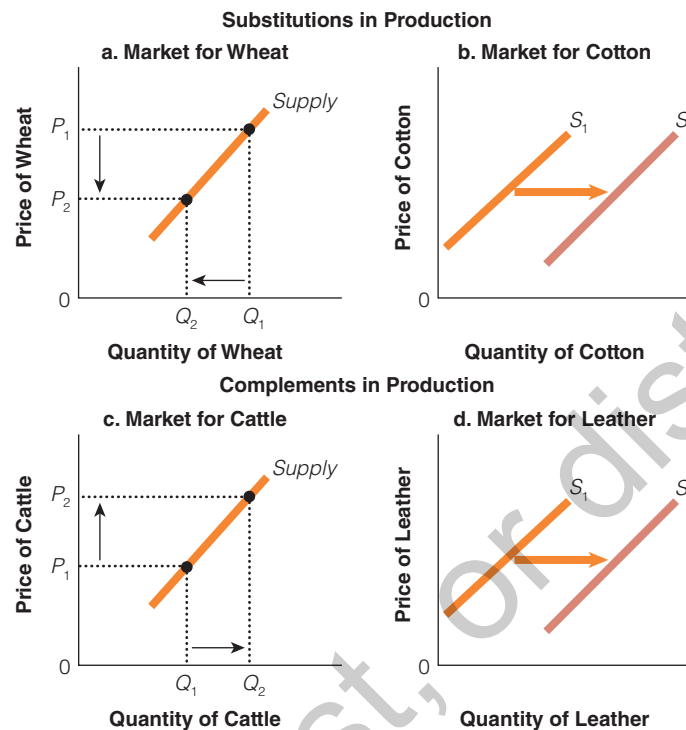
- Veterinarians can choose to work on either suburban pets or farm animals; they are substitutes in production. Veterinarians have increasingly chosen to live in metropolitan areas, where they can pursue much more lucrative practices specializing in domestic pets. Because the value of working on pets in the city has risen, the cost of being a farm veterinarian has increased, shifting the supply curve for farm veterinarians to the left. •

## CHANGES IN THE PRICES OF RELATED GOODS AND SERVICES (P)

The supply of a good increases if the price of one of its substitutes in production falls; and the supply of a good decreases if the price of one of its substitutes in production rises. Suppose you own your own farm, on which you plant cotton and wheat. One year, the price of wheat falls and farmers reduce the quantity of wheat supplied, as shown in Exhibit 2(a). What effect does the lower price of wheat have on your cotton production? It increases the supply of cotton. You want to produce relatively less of the crop that has fallen in price (wheat) and relatively more of the now more attractive other crop (cotton). Cotton and wheat are *substitutes in production* because both goods can be produced using the same resources. Producers tend to substitute the production of more profitable products for that of less profitable products. So the decrease in the price in the wheat market has caused an increase in supply (a rightward shift) in the cotton market, as seen in Exhibit 2(b).

Section 4.5  
Exhibit 2

## Substitutes and Complements in Production



If land can be used for either wheat or cotton, a decrease in the price of wheat causes a decrease in the quantity supplied, a movement downward along the supply curve in Exhibit 2(a). This may cause some farmers to shift out of the production of wheat and into the substitute in production—cotton—shifting the cotton supply curve to the right, as shown in Exhibit 2(b). In another example, if the price of the complement in production increases (cattle), it becomes more profitable and as a result cattle ranchers increase the quantity supplied of beef, moving up the supply curve for beef, as seen in Exhibit 2(c). When cattle ranchers produce more beef, they also produce more leather. Thus, when the price of beef increases, the supply of the related good, leather, shifts to the right, as seen in Exhibit 2(d).

If the price of wheat, a substitute in production, increases, then that crop becomes more profitable. This leads to an increase in the quantity supplied of wheat. Consequently, farmers will shift their resources out of the relatively lower-priced crop (cotton); the result is a decrease in supply of cotton.

Other examples of substitutes in production include automobile producers that have to decide between producing sedans and pick-ups or construction companies that have to choose between building single residential houses or commercial buildings. A producer of soccer balls may produce basketballs if the price of basketballs rises relative to soccer balls. This will increase profitability.

Some goods are *complements in production*. Producing one good does not prevent the production of the other, but actually enables production of the other. For example, leather and beef are complements in production. Suppose the price of beef rises and, as a result, cattle ranchers increase the quantity supplied of beef, moving up the supply curve for beef, as seen in Exhibit 2(c). When cattle ranchers produce more beef, they automatically produce more leather. Thus, when the price of beef increases, the supply of the related good, leather, shifts to the right, as seen in Exhibit 2(d). Suppose the price of beef falls, and as a result, the quantity supplied of beef falls; this leads to a decrease (a leftward shift) in the supply of leather.

Other examples of complements in production where goods are produced simultaneously from the same resource include a lumber mill that produces lumber and sawdust or an oil refinery that can produce gasoline and heating oil from the same resource—crude oil. Another example is that when dairy farmers produce skim milk, they also produce cream. If the price of skim milk rises, the dairy farmer produces more skim milk (an increase in the quantity supplied) and the supply of cream increases.



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- During the global recession of 2007–2009, oil demand dropped substantially. Early in 2009, as oil prices bottomed out, a situation known as *contango* developed, in which a large gap developed between oil prices trading on the daily spot market and future-dated oil contracts. Traders bought oil on the spot market and parked it in tankers until the prices went back up. Floating storage worldwide peaked in April with nearly 90 million barrels sitting in oil tankers waiting to be sold. •

### CHANGES IN EXPECTATIONS (E)

Another factor shifting supply is sellers' expectations. If producers expect a higher price in the future, they will supply less now than they otherwise would have, preferring to wait and sell when their goods will be more valuable. For example, if a cotton producer expected the future price of cotton to be higher next year, he might decide to store some of his current production of cotton for next year when the price will be higher. Oil refiners will often store some of their spring supply of gasoline for summer because gasoline prices typically peak in summer. In addition, some of the heating oil for the fall is stored to supply it in the winter when heating oil prices peak. Similarly, if producers expect now that the price will be lower later, they will supply more now. That is, expectations of lower prices can increase supply (shift the supply curve to the right) as producers scramble to sell off their inventories before the price falls.

### CHANGES IN THE NUMBER OF SELLERS (N)

We are normally interested in market demand and supply (because together they determine prices and quantities) rather than in the behavior of individual consumers and firms. As we discussed earlier in the chapter, the supply curves of individual suppliers can be summed horizontally to create a market supply curve. An increase in the number of sellers leads to an increase in supply, denoted by a rightward shift in the supply curve. For example, think of the number of gourmet coffee shops that have sprung up over the last 15 to 20 years, shifting the supply curve of gourmet coffee to the right. An exodus of sellers has the opposite impact, a decrease in supply, which is indicated by a leftward shift in the supply curve.

### CHANGES IN TECHNOLOGY (T)

Technological change can lower the firm's costs of production through productivity advances. These changes allow the firm to spend less on inputs and produce the same level of output. Human



## USE WHAT YOU'VE LEARNED

### Change in Supply versus Change in Quantity Supplied

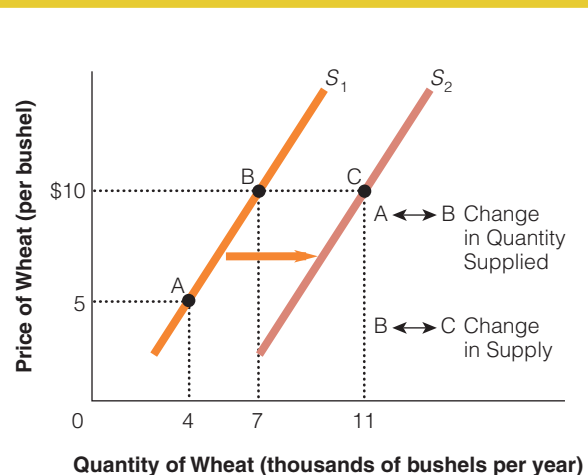
**Question:** How would you graph the following two scenarios: (1) the price of wheat per bushel rises; and (2) good weather causes an unusually abundant wheat harvest?

**Answer:** In the first scenario, the price of wheat (per bushel) increases, so the quantity supplied changes (i.e., a movement along the supply curve). In the second scenario, the good weather causes the supply curve for wheat to shift to the right, which is called a *change in supply* (not quantity supplied). A shift in the whole supply curve is caused by one of the other variables, not by a change in the price of the good in question.

As shown in Exhibit 3, the movement from A to B is called an *increase in quantity supplied*, and the movement from B to A is called a *decrease in quantity supplied*. However, the change from B to C is called an *increase in supply*, and the movement from C to B is called a *decrease in supply*.

#### Section 4.5 exhibit 3

### Change in Supply versus Change in Quantity Supplied

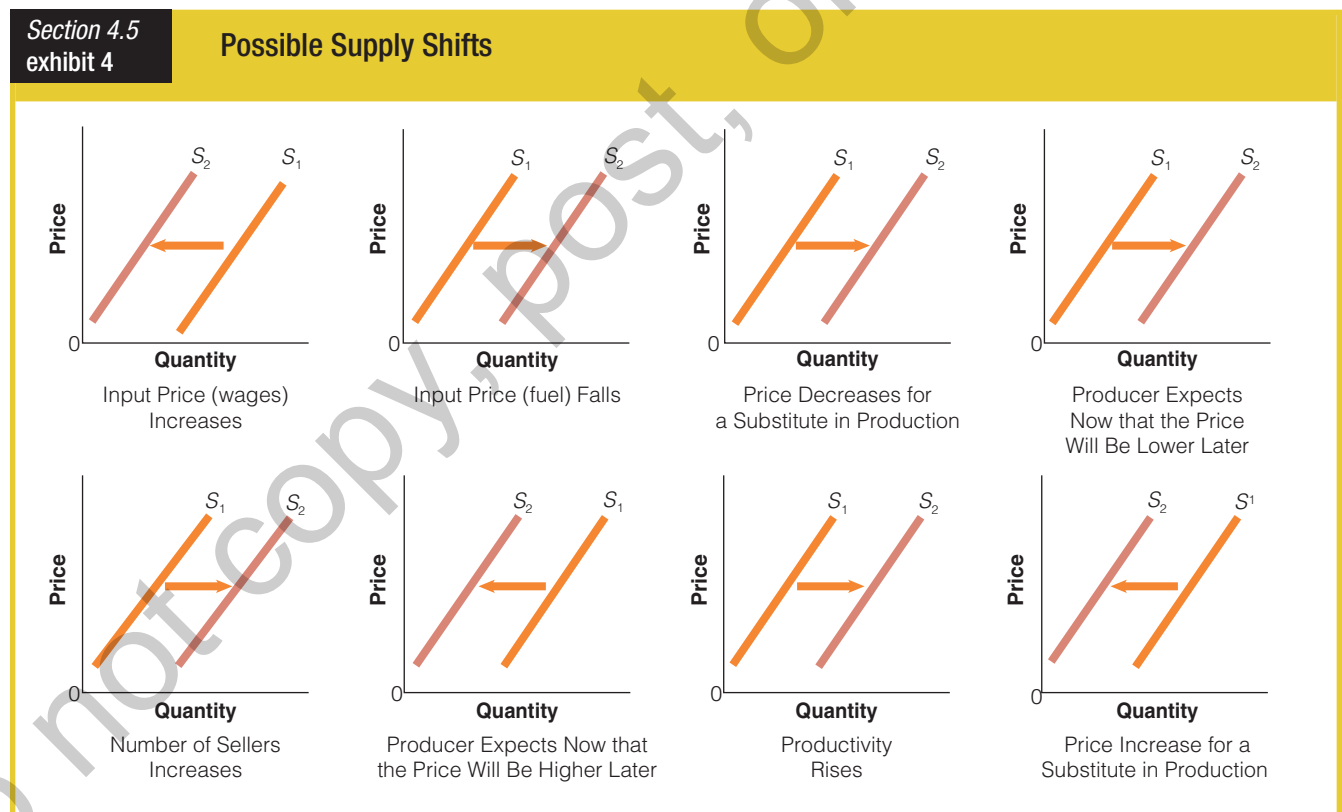


creativity works to find new ways to produce goods and services using fewer or less costly inputs of labor, natural resources, or capital. That is, changes in production technology, including the way you make, distribute, and sell a good, can change the cost of production. For example, a new and better technology can reduce the costs of production, raising the sellers' willingness to supply the good or service. Because the firm can now produce the good at a lower cost, it will supply more of the good at each and every price—the supply curve shifts to the right.

### 4.5c Change in Supply versus Change in Quantity Supplied—Revisited

If the price of the good changes, it leads to a change in the quantity supplied, *ceteris paribus*. If one of the other factors influences sellers' behavior, we say it results in a change in supply. For example, if production costs rise because of a wage increase or higher fuel costs, other things remaining constant, we would expect a decrease in supply—that is, a leftward shift in the supply curve. Alternatively, if some variable, such as lower input prices, causes the costs of production to fall, the supply curve will shift to the right. Exhibit 4 illustrates the effects of some of the determinants that cause shifts in the supply curve.

The following table lists some of the most important variables that affect how much producers are willing to produce and sell. Remember, changes in the price of the good itself, when all the other variables that influence sellers are held constant, cause movements along a given curve, changing quantity supplied. A change in any of these other variables shifts the supply curve, causing a change in supply.



VARIABLE	A CHANGE IN THIS VARIABLE CAUSES
Price of the good itself	a movement along the supply curve
Seller's input prices	a shift in the supply curve
Price of related goods and services	a shift in the supply curve
Expectations	a shift in the supply curve
Number of sellers	a shift in the supply curve
Technology	a shift in the supply curve



## SECTION QUIZ

- All of the following factors will affect the supply of shoes except one. Which will not affect the supply of shoes?
  - higher wages for shoe factory workers
  - higher prices for leather
  - a technological improvement that reduces waste of leather and other raw materials in shoe production
  - an increase in consumer income
- The difference between a change in quantity supplied and a change in supply is that a change in
  - quantity supplied is caused by a change in a good's own price, while a change in supply is caused by a change in some other variable, such as input prices, prices of related goods, expectations, or taxes.
  - supply is caused by a change in a good's own price, while a change in quantity supplied is caused by a change in some other variable, such as input prices, prices of related goods, expectations, or taxes.
  - quantity supplied is a change in the quantity people want to sell, while a change in supply is a change in the quantity they actually sell.
  - A change in supply and a change in quantity supplied are the same thing.
- Antonio's makes the greatest pizza and delivers it hot to all the dorms around campus. Last week Antonio's supplier of pepperoni informed him of a 25 percent increase in price. Which variable determining the position of the supply curve has changed, and what effect does it have on supply?
  - future expectations; supply decreases
  - future expectations; supply increases
  - input prices; supply decreases
  - input prices; supply increases
  - technology; supply increases
- Which of the following is not a determinant of supply?
  - input prices
  - technology
  - tastes
  - expectations
  - the prices of related goods
- A leftward shift in supply could be caused by
  - an improvement in productive technology.
  - a decrease in income.
  - some firms leaving the industry.
  - a fall in the price of inputs to the industry.

- 
- What is the difference between a change in supply and a change in quantity supplied?
  - If a seller expects the price of a good to rise in the near future, how will that expectation affect the current supply curve?
  - Would a change in the price of wheat change the supply of wheat? Would it change the supply of corn, if wheat and corn can be grown on the same type of land?
  - If a guitar manufacturer increased its wages to keep its workers, what would happen to the supply of guitars as a result?
  - What happens to the supply of babysitting services in an area when many teenagers get their driver's licenses at about the same time?

Multiple-choice answers: 1. d 2. a 3. c 4. c 5. c

## 4.6 Market Equilibrium Price and Quantity

- What is the equilibrium price?
- What is the equilibrium quantity?
- What is a shortage?
- What is a surplus?

### 4.6a Equilibrium Price and Quantity

The **market equilibrium** is found at the point at which the market supply and market demand curves intersect. The price at the intersection of the market supply curve and the market demand curve is called the **equilibrium price**, and the quantity is called the **equilibrium quantity**. At the equilibrium price, the quantity that buyers are willing and able to buy is exactly equal to the quantity that sellers are willing and able to produce. The equilibrium market solution is best understood with the help of a simple graph. Let's return to the coffee example we used in our earlier discussions of supply and demand. Exhibit 1 combines the market demand curve for coffee with the market supply curve. At \$3 per pound, buyers are willing to buy 5,000 pounds of coffee and sellers are willing to supply 5,000 pounds of coffee. Neither may be "happy" about the price; the buyers would probably like a lower price and the sellers would probably like a higher price. But both buyers and sellers are able to carry out their purchase and sales plans at the \$3 price. At any other price, either suppliers or demanders would be unable to trade as much as they would like.

### 4.6b Shortages and Surpluses

What happens when the market price is not equal to the equilibrium price? Suppose the market price is above the equilibrium price, as seen in Exhibit 2(a). At \$4 per pound, the quantity of coffee demanded would be 3,000 pounds, but the quantity supplied would be 7,000 pounds. At this price, a **surplus**, or excess quantity supplied, would exist. That is, at this price, growers would be willing to sell more coffee than demanders would be willing to buy. To get rid of the unwanted surplus, frustrated sellers have an incentive to cut their price to attract more buyers and cut back on production. Cutting the price will simultaneously increase the quantity demanded and decrease the quantity supplied. Note that the changes in quantity demanded and quantity supplied are movements along the supply and demand curves, *not* shifts in the curves. This adjustment will continue to reduce the surplus, as long as the price is above the equilibrium price, at \$3.

What would happen if the market price of coffee were below the equilibrium price? As seen in Exhibit 2(b), at \$2 per pound, the yearly quantity demanded of 7,000 pounds would be greater than the 3,000 pounds that producers would be willing to supply at that low price. So at \$2 per pound, a **shortage** or excess quantity demanded of 4,000 pounds would exist. Some consumers are lucky enough to find coffee, but others are not able to find any sellers who are willing to sell them coffee at \$2 per pound. Some frustrated consumers may offer to pay sellers more than \$2. In addition, sellers noticing that there are disappointed consumers will be more than willing to raise their prices. That is, with many buyers chasing few goods, sellers can respond to the shortage by raising prices without the fear of losing sales. These actions by buyers and sellers cause the market price to rise. As the market price rises, the quantity demanded falls and the quantity supplied rises. Notice that these are movements along the supply and demand curves that move the market toward equilibrium. The upward pressure on price continues until equilibrium is reached at \$3.

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

**equilibrium price:** the price at the intersection of the market supply and demand curves; at this price, the quantity demanded equals the quantity supplied

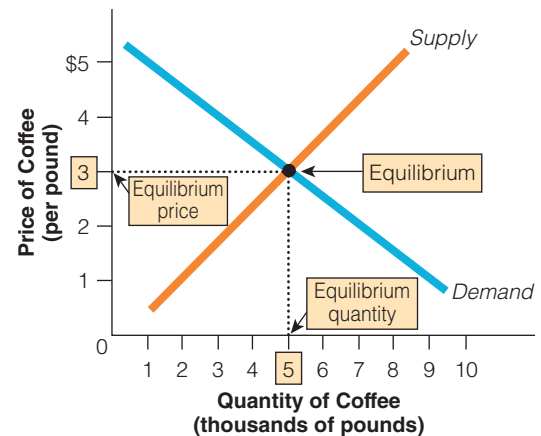
**equilibrium quantity:** the quantity at the intersection of the market supply and demand curves; at the equilibrium quantity, the quantity demanded equals the quantity supplied

**surplus:** a situation where quantity supplied exceeds quantity demanded

**shortage:** a situation where quantity demanded exceeds quantity supplied

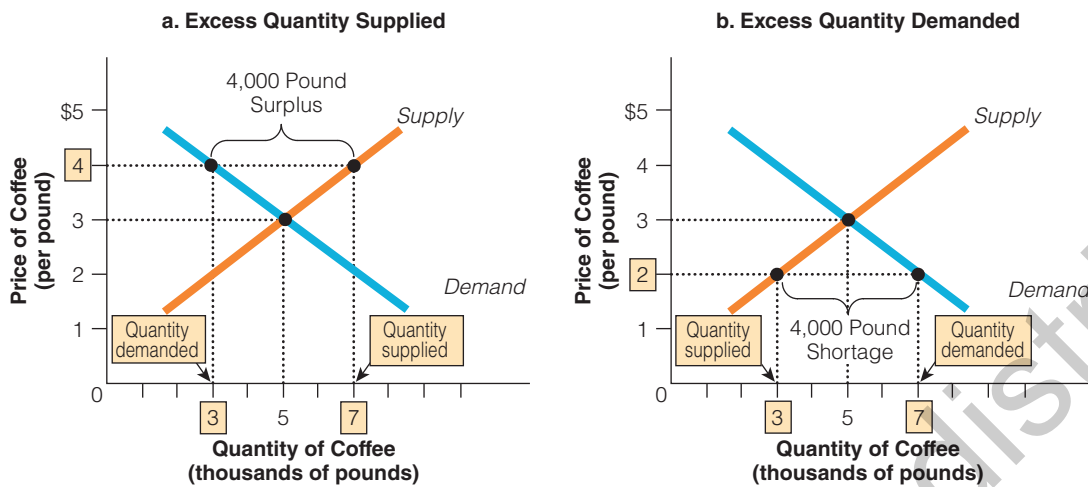
Section 4.6  
Exhibit 1

### Market Equilibrium



The equilibrium is found at the intersection of the market supply and demand curves. The equilibrium price is \$3 per pound, and the equilibrium quantity is 5,000 pounds of coffee. At the equilibrium quantity, the quantity demanded equals the quantity supplied.



**Section 4.6**  
**exhibit 2**
**Market in Temporary Disequilibrium**


In (a), the market price is above the equilibrium price. At \$4, the quantity supplied (7,000 pounds) exceeds the quantity demanded (3,000 pounds), resulting in a surplus of 4,000 pounds. To get rid of the unwanted surplus, suppliers cut their prices. As prices fall, consumers buy more, eliminating the surplus and moving the market back to equilibrium. In (b), the market price is below the equilibrium price. At \$2, the quantity demanded (7,000 pounds) exceeds the quantity supplied (3,000 pounds), and a shortage of 4,000 pounds is the result. The many frustrated buyers compete for the existing supply, offering to buy more and driving the price up toward the equilibrium level. Therefore, with both shortages and surpluses, market prices tend to pull the market back to the equilibrium level.

**ECS**
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A market exists when buyers and sellers interact. This interaction between supply and demand curves determines market prices and thereby allocates scarce goods and services.

Recall our earlier discussion of Adam Smith's invisible hand. Here it is in action. Producers independently decide how much they are going to produce and at what price, and consumers will show up at websites, garage sales, restaurants, and stores to buy those goods and services. Sometimes there might be too much supplied, while at other times there might not be enough. But over time, these mistakes will be corrected by the process of adjustment in supply and demand, which comprises the invisible hand of the market.

So whether the price starts off too high or too low, the activities of the many buyers and sellers will move the market toward equilibrium. Once equilibrium is reached, buyers and sellers are satisfied in their ability to buy and sell at that price, and there is no longer any pressure on prices. How quickly do markets adjust to equilibrium? It depends on the type of market. But in most competitive markets, shortages and surpluses tend to be temporary.

**4.6c Don't Confuse Scarcity and Shortages**

People often confuse scarcity with shortages. Remember, most goods are scarce—desirable but limited. A shortage occurs when the quantity demanded is greater than the quantity supplied at the current price. We can eliminate shortages by increasing the price, but we cannot eliminate scarcity.



## SECTION QUIZ

1. A market will experience a \_\_\_\_\_ in a situation where quantity supplied exceeds quantity demanded and a \_\_\_\_\_ in a situation where quantity demanded exceeds quantity supplied.
  - a. shortage; shortage
  - b. surplus; surplus
  - c. shortage; surplus
  - d. surplus; shortage
2. The price of a good will tend to rise when
  - a. a temporary shortage at the current price occurs (assuming no price controls are imposed).
  - b. a temporary surplus at the current price occurs (assuming no price controls are imposed).
  - c. demand decreases.
  - d. supply increases.
3. Which of the following is true?
  - a. The intersection of the supply and demand curves shows the equilibrium price and equilibrium quantity in a market.
  - b. A surplus is a situation where quantity supplied exceeds quantity demanded.
  - c. A shortage is a situation where quantity demanded exceeds quantity supplied.
  - d. Shortages and surpluses set in motion actions by many buyers and sellers that will move the market toward the equilibrium price and quantity unless otherwise prevented.
  - e. All of the above are true.

- 
1. How does the intersection of supply and demand indicate the equilibrium price and quantity in a market?
  2. What can cause a change in the supply and demand equilibrium?
  3. What must be true about the price charged for a shortage to occur?
  4. What must be true about the price charged for a surplus to occur?
  5. Why do market forces tend to eliminate both shortages and surpluses?
  6. If tea prices were above their equilibrium level, what force would tend to push tea prices down? If tea prices were below their equilibrium level, what force would tend to push tea prices up?

Multiple-choice answers: 1. d 2. a 3. e



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## INTERACTIVE SUMMARY

### Fill in the blanks:

- A(n) \_\_\_\_\_ is the process of buyers and sellers \_\_\_\_\_ goods and services.
- The important point about a market is what it does—it facilitates \_\_\_\_\_.
- \_\_\_\_\_, as a group, determine the demand side of the market. \_\_\_\_\_, as a group, determine the supply side of the market.
- A(n) \_\_\_\_\_ market consists of many buyers and sellers, no single one of whom can influence the market price.
- According to the law of demand, other things being equal, when the price of a good or service falls, the \_\_\_\_\_ increases.
- An individual \_\_\_\_\_ curve reveals the different quantities of a particular good a person would be willing and able to buy at various possible prices in a particular time interval, other things being equal.
- The \_\_\_\_\_ curve for a product is the horizontal summing of the demand curves of the individuals in the market.
- A change in \_\_\_\_\_ leads to a change in quantity demanded, illustrated by a(n) \_\_\_\_\_ demand curve.
- A change in demand is caused by changes in any of the other factors (besides the good's own price) that would affect how much of the good is purchased: the \_\_\_\_\_, \_\_\_\_\_, the \_\_\_\_\_ of buyers, \_\_\_\_\_, and \_\_\_\_\_.
- An increase in demand is represented by a(n) \_\_\_\_\_ shift in the demand curve; a decrease in demand is represented by a(n) \_\_\_\_\_ shift in the demand curve.
- Two goods are called \_\_\_\_\_ if an increase in the price of one causes the demand curve for another good to shift to the \_\_\_\_\_.
- For normal goods an increase in income leads to a(n) \_\_\_\_\_ in demand, and a decrease in income leads to a(n) \_\_\_\_\_ in demand, other things being equal.
- An increase in the expected future price of a good or an increase in expected future income may \_\_\_\_\_ current demand.
- According to the law of supply, the higher the price of the good, the greater the \_\_\_\_\_, and the lower the price of the good, the smaller the \_\_\_\_\_.
- The quantity supplied is positively related to the price because firms supplying goods and services want to increase their \_\_\_\_\_.
- An individual supply curve is a graphical representation that shows the \_\_\_\_\_ relationship between the price and the quantity supplied.
- The market supply curve is a graphical representation of the number of goods and services that sellers are \_\_\_\_\_ and \_\_\_\_\_ to supply at various prices.
- Possible supply determinants (factors that determine the position of the supply curve) are the \_\_\_\_\_ prices, the \_\_\_\_\_ of related goods; \_\_\_\_\_, the \_\_\_\_\_ of sellers, and \_\_\_\_\_.
- A fall in input prices will \_\_\_\_\_ the costs of production, causing the supply curve to shift to the \_\_\_\_\_.
- The supply of a good \_\_\_\_\_ if the price of one of its substitutes in production falls.
- The supply of a good \_\_\_\_\_ if the price of one of its substitutes in production rises.
- The price at the intersection of the market demand curve and the market supply curve is called the \_\_\_\_\_ price, and the quantity is called the \_\_\_\_\_ quantity.
- A situation where quantity supplied is greater than quantity demanded is called a(n) \_\_\_\_\_.
- A situation where quantity demanded is greater than quantity supplied is called a(n) \_\_\_\_\_.
- At a price greater than the equilibrium price, a(n) \_\_\_\_\_, or excess quantity supplied, would exist. Sellers would be willing to sell \_\_\_\_\_ than demanders would be willing to buy. Frustrated suppliers would \_\_\_\_\_ their price and \_\_\_\_\_ on production, and consumers would buy \_\_\_\_\_, returning the market to equilibrium.

**Answers:** 1. market; exchanging 2. trade 3. Buyers; Sellers 4. competitive 5. quantity demanded 6. demand 7. market demand 8. a good's price; movement along the 9. prices of related goods; income; number; tastes; expectations 10. rightward; leftward 11. substitutes; right 12. increase; decrease 13. increase 14. quantity supplied; quantity supplied 15. profits 16. positive 17. willing; able 18. seller's input; prices; expectations; number of sellers; technology 19. lower; right 20. increases 21. decreases 22. equilibrium; equilibrium 23. surplus 24. shortage 25. surplus; more; lower; cut back; more

## KEY TERMS AND CONCEPTS

change in quantity demanded 100	individual supply curve 109	market supply curve 110
competitive market 95	inferior goods 103	normal goods 103
complements 102	law of demand 96	shifts in the demand curve 101
equilibrium price 117	law of supply 109	shortage 117
equilibrium quantity 117	market 95	substitutes 101
individual demand curve 97	market demand curve 98	surplus 117
individual demand schedule 97	market equilibrium 117	

## ADDITIONAL SECTION QUIZ ANSWERS

### 4.1 Markets

#### 1. Why is it difficult to define a market precisely?

Every market is different. An incredible variety of exchange arrangements arise for different types of products, different degrees of organization, different geographical extents, and so on.

#### 2. Why do you get your produce at a supermarket rather than directly from farmers?

Supermarkets act as middlepersons between growers of produce and consumers of produce. You hire them to do this task for you when you buy produce from them, rather than directly from growers, because they conduct those transactions at lower costs than you could. (If you could do it more cheaply than supermarkets, you would buy directly rather than from supermarkets.)

#### 3. Why do the prices people pay for similar items at garage sales vary more than the prices of similar items in a department store?

Items for sale at department stores are more standardized, easier to compare, and more heavily advertised, which makes consumers more aware of the prices at which they could get a particular good elsewhere, reducing the differences in price that can persist among department stores. Garage sale items are nonstandardized, costly to compare, and not advertised, which means people are often quite unaware of how much a given item could be purchased for elsewhere, so price differences for similar items at different garage sales can be substantial.

### 4.2 Demand

#### 1. What is an inverse relationship?

An inverse, or negative, relationship is one where one variable changes in the opposite direction from the other—if one increases, the other decreases.

#### 2. How do lower prices change buyers' incentives?

A lower price for a good means that the opportunity cost to buyers of purchasing it is lower than before, and self-interest leads buyers to buy more of it as a result.

#### 3. How do higher prices change buyers' incentives?

A higher price for a good means that the opportunity cost to buyers of purchasing it is higher than before, and self-interest leads buyers to buy less of it as a result.

#### 4. What is an individual demand schedule?

An individual demand schedule reveals the different quantities of a good or service a person would be willing to buy at various possible prices in a particular time interval.

#### 5. What is the difference between an individual demand curve and a market demand curve?

The market demand curve shows the total quantities of a good or service all the buyers as a group are willing to buy at various possible prices in a particular time interval. The market quantity demanded at a given price is just the sum of the quantities demanded by each buyer at that price.

#### 6. Why does the amount of dating on campus tend to decline just before and during final exams?

The opportunity cost of dating—in this case, the value to students of the studying time forgone—is higher just before and during final exams than during most of the rest of an academic term. Because the cost is higher, students do less of it.

### 4.3 Shifts in the Demand Curve

#### 1. What is the difference between a change in demand and a change in quantity demanded?

A change in demand shifts the entire demand curve, while a change in quantity demanded refers to a movement along a given demand curve, caused by a change in the good's price.

#### 2. If the price of zucchini increases, causing the demand for yellow squash to rise, what do we call the relationship between zucchini and yellow squash?

Whenever an increased price of one good increases the demand for another, the goods are substitutes. The fact that some people consider zucchini an alternative to yellow squash explains in part why zucchini becomes more costly. Therefore, some people substitute by buying relatively cheaper yellow squash now instead.

#### 3. If incomes rise and, as a result, demand for jet skis increases, how do we describe that good?

If income rises and, as a result, demand for jet skis increases, we call jet skis a normal good because for most (or normal) goods, we would rather have more of them than less, so an increase in income would lead to an increase in demand for such goods.

#### 4. How do expectations about the future influence the demand curve?

Expectations about the future influence the demand curve because buying a good in the future is an alternative to buying it now. Therefore, the higher future prices are expected to be compared to the present, the less attractive future

purchases become, and the greater the current demand for that good; people will buy more now when it is expected to be cheaper, rather than later, when it is expected to be more costly.

#### 5. Would a change in the price of ice cream cause a change in the demand for ice cream? Why or why not?

No. The demand for ice cream represents the different quantities of ice cream that would be purchased at different prices. In other words, it represents the relationship between the price of ice cream and the quantity of ice cream demanded. Changing the price of ice cream does not change this relationship, so it does not change demand.

#### 6. Would a change in the price of ice cream likely cause a change in the demand for frozen yogurt, a substitute?

Yes. Changing the price of ice cream, a substitute for frozen yogurt, would change the quantity of frozen yogurt demanded at a given price. This change in price means that the whole relationship between the price and quantity of frozen yogurt demanded has changed, which means the demand for frozen yogurt has changed.

#### 7. If plane travel is a normal good and bus travel is an inferior good, what will happen to the demand curves for plane and bus travel if people's incomes increase?

The demand for plane travel and all other normal goods will increase if incomes increase, while the demand for bus travel and all other inferior goods will decrease if incomes increase.

### 4.4 Supply

#### 1. What are the two reasons why a supply curve is positively sloped?

A supply curve is positively sloped because when the price rises, the good becomes more profitable for sellers, so the quantity supplied rises; when the price falls, it becomes less profitable for sellers, and the quantity supplied falls.

#### 2. What is the difference between an individual supply curve and a market supply curve?

The market supply curve shows the total quantities of a good all the sellers as a group are willing to sell at various prices in a particular time period. The market quantity supplied at a given price is just the sum of the quantities supplied by each seller at that price.

### 4.5 Shifts in the Supply Curve

#### 1. What is the difference between a change in supply and a change in quantity supplied?

A change in supply shifts the entire supply curve, while a change in quantity supplied refers to a movement along a given supply curve.

#### 2. If a seller expects the price of a good to rise in the near future, how will that expectation affect the current supply curve?

Selling a good in the future is an alternative to selling it now. Therefore, the higher the expected future price relative to the current price, the more attractive future sales become, and the less attractive current sales become. This will lead

sellers to reduce (shift left) the current supply of that good, as they want to sell later, when the good is expected to be more valuable, rather than now.

- 3. Would a change in the price of wheat change the supply of wheat? Would it change the supply of corn, if wheat and corn can be grown on the same type of land?**

The supply of wheat represents the different quantities of wheat that would be offered for sale at different prices. In other words, it represents the relationship between the price of wheat and the quantity of wheat supplied. Changing the price of wheat does not change this relationship, so it does not change the supply of wheat. However, a change in the price of wheat changes the relative attractiveness of raising wheat instead of corn, which changes the supply of corn.

#### 4.6 Market Equilibrium Price and Quantity

- 1. How does the intersection of supply and demand indicate the equilibrium price and quantity in a market?**

The intersection of supply and demand indicates the equilibrium price and quantity in a market because at higher prices, sellers would be frustrated by their inability to sell all they would like, leading sellers to compete by lowering the price they charge; at lower prices, buyers would be frustrated by their inability to buy all they would like, leading buyers to compete by increasing the price they offer to pay.

- 2. What can cause a change in the supply and demand equilibrium?**

Changes in any of the demand curve shifters or the supply curve shifters will change the supply and demand equilibrium.

- 3. What must be true about the price charged for a shortage to occur?**

The price charged must be less than the equilibrium price, with the result that buyers would like to buy more at that price than sellers are willing to sell.

- 4. What must be true about the price charged for a surplus to occur?**

The price charged must be greater than the equilibrium price, with the result that sellers would like to sell more at that price than buyers are willing to buy.

- 5. Why do market forces tend to eliminate both shortages and surpluses?**

Market forces tend to eliminate both shortages and surpluses because of the self-interest of the market participants.

- 4. If a guitar manufacturer increased its wages to keep its workers, what would happen to the supply of guitars as a result?**

An increase in wages, or any other input price, would decrease (shift left) the supply of guitars, making fewer guitars available for sale at any given price, by raising the opportunity cost of producing guitars.

- 5. What happens to the supply of babysitting services in an area when many teenagers get their driver's licenses at about the same time?**

When teenagers get their driver's licenses, their increased mobility expands their alternatives to babysitting substantially, raising the opportunity cost of babysitting. This change decreases (shifts left) the supply of babysitting services.

A seller is better off successfully selling at a lower equilibrium price than not being able to sell at a higher price (the surplus situation) and a buyer is better off successfully buying at a higher equilibrium price than not being able to buy at a lower price (the shortage situation). Therefore, we expect market forces to eliminate both shortages and surpluses.

- 6. If tea prices were above their equilibrium level, what force would tend to push tea prices down? If tea prices were below their equilibrium level, what force would tend to push tea prices up?**

If tea prices were above their equilibrium level, sellers would be frustrated by their inability to sell as much tea as they would like at those prices. That is, not all producers could find willing buyers at these high prices. To eliminate the surplus, producers would try to attract more buyers by bringing the price down. As the price falls, the quantity demanded rises and the quantity supplied falls, until the market reaches the equilibrium quantity, where quantity demanded and quantity supplied are equal. If tea prices were below their equilibrium level, buyers would be frustrated by their inability to buy as much tea as they would like at those prices. Buyers who could find the good available would bid up the price, and this would incent producers to raise their prices. As the price rises, the quantity demanded falls and the quantity supplied rises, until the market reaches the equilibrium quantity, where quantity demanded and quantity supplied are equal.

## PROBLEMS

- Is the market for laptop computers local, national, or global?
- Sid moves from New York City, where he lived in a small condominium, to rural Minnesota, where he buys a big house on five acres of land. Using the law of demand, what do you think is true of land prices in New York City relative to those in rural Minnesota?
- The following table shows Hillary's demand schedule for Cherry Blossom Makeup. Graph Hillary's demand curve.

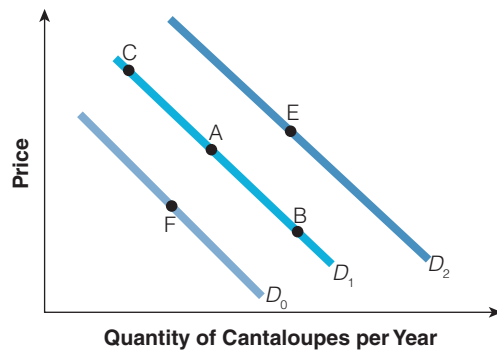
PRICE (DOLLARS PER OUNCE)	QUANTITY DEMANDED (OUNCES PER WEEK)
\$15	5 oz.
12	10
9	15
6	20
3	25

- The following table shows Cherry Blossom Makeup demand schedules for Hillary's friends, Barbara and Nancy. If Hillary, Barbara, and Nancy constitute the whole market for Cherry Blossom Makeup, complete the market demand schedule and graph the market demand curve.

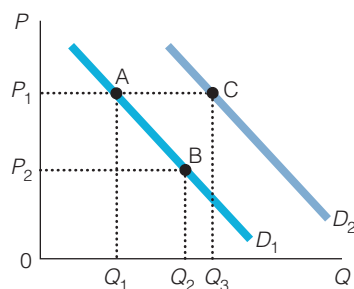
PRICE (DOLLARS PER OUNCE)	QUANTITY DEMANDED (OUNCES PER WEEK)			
	HILLARY	BARBARA	NANCY	MARKET
\$15	5	0	15	
12	10	5	20	
9	15	10	25	
6	20	15	30	
3	25	20	35	

- What would be the effects of each of the following on the demand for hamburger in Hilo, Hawaii? In each case, identify the responsible determinant of demand.
  - The price of chicken falls.
  - The price of hamburger buns doubles.
  - Scientists find that eating hamburger prolongs life.
  - The population of Hilo doubles.
- What would be the effect of each of the following on the demand for Chevrolets in the United States? In each case, identify the responsible determinant of demand.
  - The price of Fords plummets.
  - Consumers believe that the price of Chevrolets will rise next year.
  - The incomes of Americans rise.
  - The price of gasoline falls dramatically.

7. The following graph shows three market demand curves for cantaloupe. Starting at point A,
- which point represents an increase in quantity demanded?
  - which point represents an increase in demand?
  - which point represents a decrease in demand?
  - which point represents a decrease in quantity demanded?



8. Using the demand curve, show the effect of the following events on the market for beef:
- Consumer income increases.
  - The price of beef increases.
  - An outbreak of “mad cow” disease occurs.
  - The price of chicken (a substitute) increases.
  - The price of barbecue grills (a complement) increases.
9. Draw the demand curves for the following goods. If the price of the first good listed rises, what will happen to the demand for the second good, and why?
- hamburger and ketchup
  - Coca-Cola and Pepsi
  - golf clubs and golf balls
10. If the price of ice cream increased,
- what would be the effect on the demand for ice cream?
  - what would be the effect on the demand for frozen yogurt?
11. Using the graph below, answer the following questions.
- What is the shift from  $D_1$  to  $D_2$  called?
  - What is the movement from B to A called?
  - What is the movement from A to B called?
  - What is the shift from  $D_2$  to  $D_1$  called?





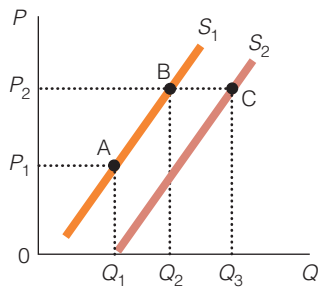
12. Felix is a wheat farmer who has two fields he can use to grow wheat. The first field is right next to his house, and the topsoil is rich and thick. The second field is 10 miles away in the mountains, and the soil is rocky. At current wheat prices, Felix produces from the field next to his house because the market price for wheat is just high enough to cover his costs of production, including a reasonable profit. What would have to happen to the market price of wheat for Felix to have the incentive to produce from the second field?
13. Show the impact of each of the following events on the oil market.
- OPEC becomes more effective in limiting the supply of oil.
  - OPEC becomes less effective in limiting the supply of oil.
  - The price for natural gas (a substitute for heating oil) rises.
  - New oil discoveries occur in Alaska.
  - Electric and hybrid cars become subsidized and their prices fall.
14. The following table shows the supply schedule for Rolling Rock Oil Co. Plot Rolling Rock's supply curve on a graph.

PRICE (DOLLARS PER BARREL)	QUANTITY SUPPLIED (BARRELS PER MONTH)
\$ 5	10,000
10	15,000
15	20,000
20	25,000
25	30,000

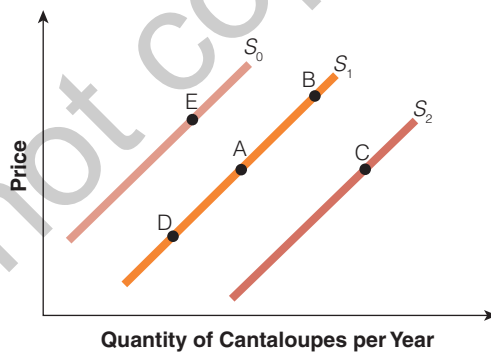
15. The following table shows the supply schedules for Rolling Rock and two other petroleum companies. Armadillo Oil and Pecos Petroleum. Assuming these three companies make up the entire supply side of the oil market, complete the market supply schedule and draw the market supply curve on a graph.

PRICE (DOLLARS PER BARREL)	QUANTITY SUPPLIED (BARRELS PER MONTH)			
	ROLLING ROCK	ARMADILLO OIL	PECOS PETROLEUM	MARKET
\$ 5	10,000	8,000	2,000	_____
10	15,000	10,000	5,000	_____
15	20,000	12,000	8,000	_____
20	25,000	14,000	11,000	_____
25	30,000	16,000	14,000	_____

16. If the price of corn rose,
- what would be the effect on the supply of corn?
  - what would be the effect on the supply of wheat?
17. Using the following graph, answer the below questions:
- What is the shift from  $S_1$  to  $S_2$  called?
  - What is the movement from A to B called?
  - What is the movement from B to A called?
  - What is the shift from  $S_2$  to  $S_1$  called?



18. What would be the effect of each of the following on the supply of salsa in the United States? In each case, identify the responsible determinant of supply.
- Tomato prices skyrocket.
  - Congress places a 26 percent tax on salsa.
  - Ed Scissorhands introduces a new, faster vegetable chopper.
  - J. Lo, Beyoncé, and Adam Sandler each introduce a new brand of salsa.
19. What would be the effects of each of the following on the supply of coffee worldwide? In each case, identify the responsible determinant of supply.
- Freezing temperatures wipe out half of Brazil's coffee crop.
  - Wages of coffee workers in Latin America rise as unionization efforts succeed.
  - Indonesia offers big subsidies to its coffee producers.
  - Genetic engineering produces a super coffee bean that grows faster and needs less care.
  - Coffee suppliers expect prices to be higher in the future.
20. The following graph shows three market supply curves for cantaloupe. Compared with point A, which point represents
- an increase in quantity supplied?
  - an increase in supply?
  - a decrease in quantity supplied?
  - a decrease in supply?



21. The following table shows the hypothetical monthly demand and supply schedules for cans of macadamia nuts in Hawaii.

- What is the equilibrium price of macadamia nuts in Hawaii?
- At a price of \$7 per can, is there equilibrium, a surplus, or a shortage? If it is a surplus or shortage, how large is it?
- At a price of \$10, is there equilibrium, a surplus, or a shortage? If it is a surplus or shortage, how large is it?

PRICE	QUANTITY DEMANDED (CANS)	QUANTITY SUPPLIED (CANS)
\$ 6	700	100
7	600	200
8	500	300
9	400	400
10	300	500

22. When asked about the reason for a lifeguard shortage that threatened to keep one-third of the city's beaches closed for the summer, the Deputy Parks Commissioner of New York responded that "Kids seem to want to do work that's more in tune with a career. Maybe they prefer carpal tunnel syndrome to sunburn." What do you think is causing the shortage? What would you advise the Deputy Parks Commissioner to do to alleviate the shortage?
23. If a price is above the equilibrium price, explain the forces that bring the market back to the equilibrium price and quantity. If a price is below the equilibrium price, explain the forces that bring the market back to the equilibrium price and quantity.
24. The market for baseball tickets at your college stadium, which seats 2,000, is the following:

PRICE	QUANTITY DEMANDED	QUANTITY SUPPLIED
\$2	4,000	2,000
4	2,000	2,000
6	1,000	2,000
8	500	2,000

- What is the equilibrium price?
- What is unusual about the supply curve?
- At what price(s) would a shortage occur?
- At what price(s) would a surplus occur?
- Suppose that the addition of new students (all big baseball fans) next year will add 1,000 to the quantity demanded at each price. What will this increase do to next year's demand curve? What is the new equilibrium price?

25. Assume the following information for the demand and supply curves for good Z.

DEMAND		SUPPLY	
PRICE	QUANTITY DEMANDED	PRICE	QUANTITY SUPPLIED
\$10	10	\$ 1	10
9	20	2	15
8	30	3	20
7	40	4	25
6	50	5	30
5	60	6	35
4	70	7	40
3	80	8	45
2	90	9	50
1	100	10	55

- Draw the corresponding supply and demand curves.
- What are the equilibrium price and quantity traded?
- Would a price of \$9 result in a shortage or a surplus? How large?
- Would a price of \$3 result in a shortage or a surplus? How large?
- If the demand for Z increased by 15 units at every price, what would the new equilibrium price and quantity traded be?
- Given the original demand for Z, if the supply of Z were increased by 15 units at every price, what would the new equilibrium price and quantity traded be?