

Chapters in This Unit

4. *Demand*

5. *Supply*

6. *Prices*

7. *Market Structures*

Today is the Super Bowl . . .



Your favorite team is playing, the stadium is right across town, and you really want to go!

- How many other people are trying to get tickets?
- How many tickets are available?
- What determines the price of the tickets?
- From whom are you going to buy your ticket? Is there more than one ticket outlet?

Answers to all of these questions are based on the laws of supply and demand—two of the most important tools of economic analysis. In this unit you will study supply and demand to see how the prices of goods and services are affected by all sorts of changes in the economy, including higher incomes, technological innovation, and changes in consumer preferences.

Focus Activity

Brainstorm a list of goods that have either a limited supply or are in great demand. What generalizations can you make about the prices of these items? Compare your list with those of your classmates.

Chapter 4 Demand

Andre couldn't wait to get the hit film on the shelves of the video store he managed. He cleared ten shelves by the front door for display boxes. Every copy was rented that Friday for \$3.99. Six weeks later, only one third of the videos were rented on a Friday night. Andre cut the price to \$3.00 for a two-night rental. Three years later, Andre moved the one remaining copy to the back corner of the store. Customers could take it home for a week for only 99 cents.

Each of Andre's decisions was shaped by the needs and wishes of his customers. Economists use the term *demand* to describe the ability and desire of consumers to buy a good. Paired with supply, demand forms one of the building blocks of the marketplace.

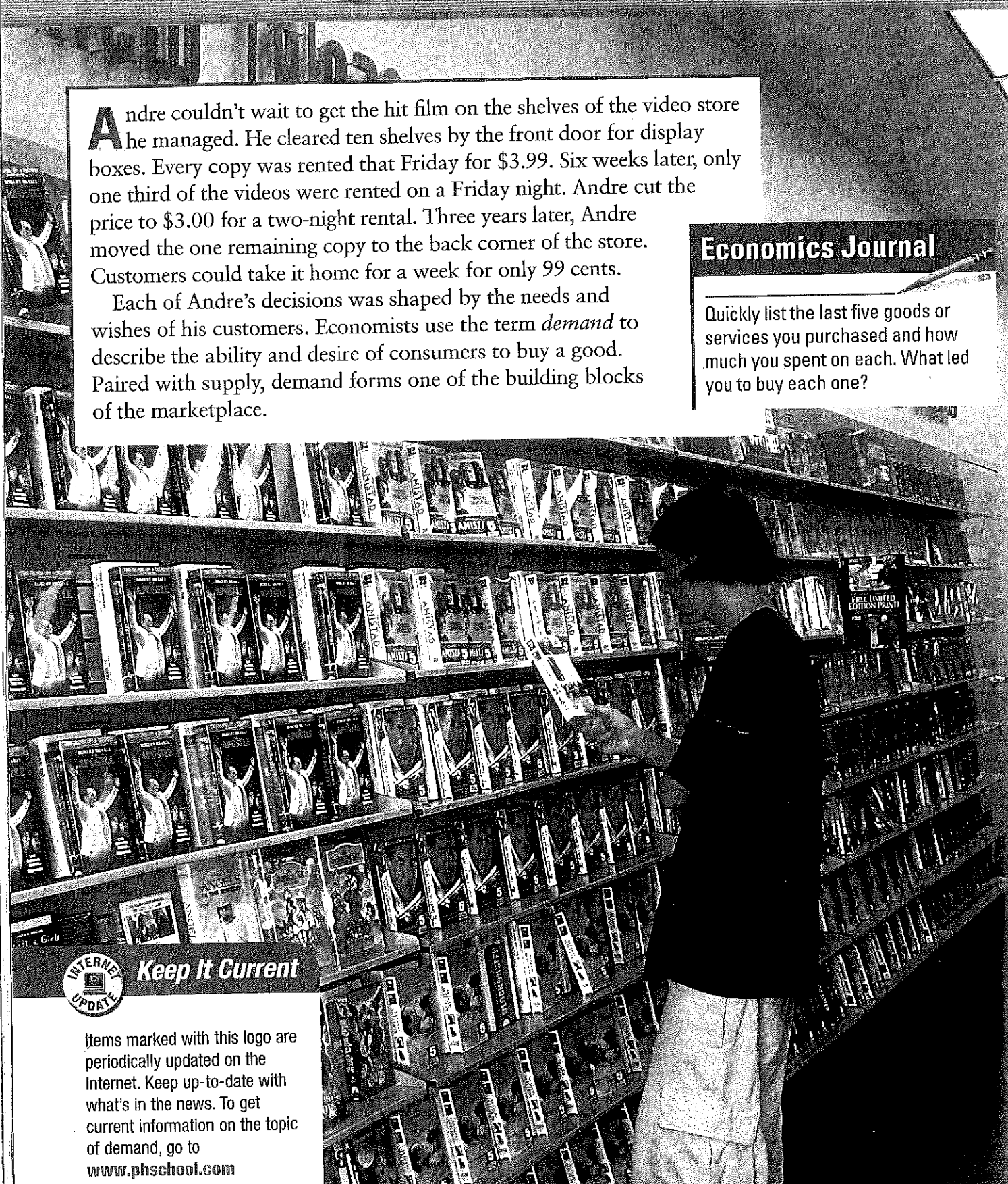
Economics Journal

Quickly list the last five goods or services you purchased and how much you spent on each. What led you to buy each one?



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Items marked with this logo are periodically updated on the Internet. Keep up-to-date with what's in the news. To get current information on the topic of demand, go to www.phschool.com



Section

Understanding Demand

Preview

Objectives

After studying this section you will be able to:

1. Explain the law of demand.
2. Understand how the substitution effect and the income effect influence decisions.
3. Create a demand schedule for an individual and a market.
4. Interpret a demand graph using demand schedules.

Section Focus

According to the law of demand, people buy less of a good when its price rises. Demand schedules and demand curves illustrate how people and markets react to different prices.

Key Terms

demand
law of demand
substitution effect
income effect
demand schedule
market demand schedule
demand curve

In Chapter 2, you read about *economic systems*, which are different ways of answering the three economic questions of *what to produce, how much to produce, and who gets what*. In the United States, most goods are allocated through a market system. In a market system, the interaction of buyers and sellers determines the prices of most goods as well as what quantity of a good will be produced. Buyers demand goods, sellers supply those goods, and the interactions between the two groups lead to an agreement on the price and the quantity traded.

Demand is the desire to own something and the ability to pay for it. We will look at the demand side of markets in this chapter. In the next chapter we will look at the actions of sellers, which economists call the supply side. In Chapter 6, we will look at supply and demand together and study how they interact to establish the prices that we pay for most goods.

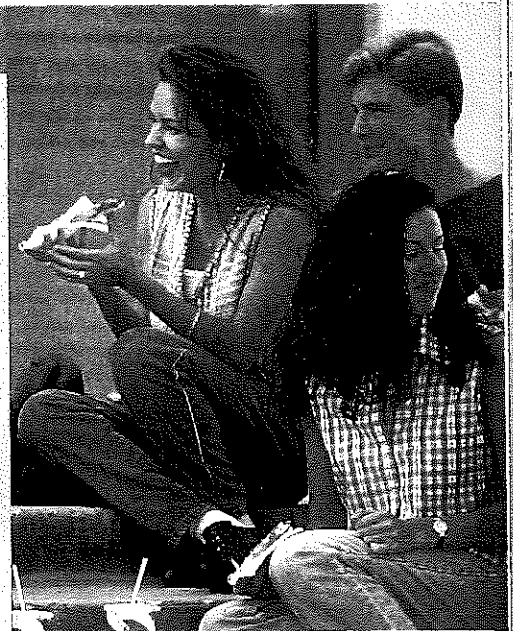
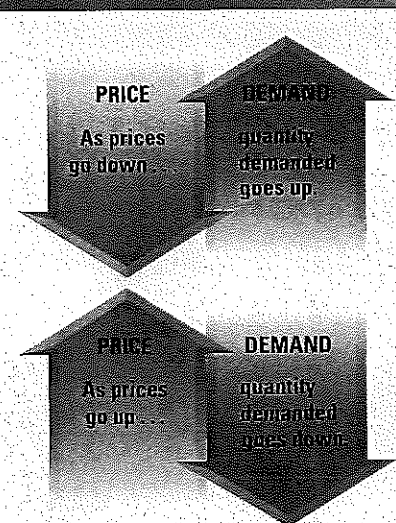
demand in our everyday purchasing decisions. Whether your income is \$10 or \$10 million, the price of a good will strongly influence your decision to buy.

Ask yourself this question: Would you buy a slice of pizza for lunch if it cost \$1? Many of us would, and some of us might

demand the desire to own something and the ability to pay for it

law of demand
consumers buy more of a good when its price decreases and less when its price increases

Figure 4.1 Law of Demand



The Law of Demand

Anyone who has ever spent money will easily understand the **law of demand**. The law of demand says that when a good's price is lower, consumers will buy more of it. When the price is higher, consumers will buy less of it. All of us act out this law of



If the price of pizza rises, people will buy fewer slices.

Incentives What does the law of demand say about lower prices?

FAST FACT

Do you know your rights as an online shopper? The Federal Trade Commission (FTC) requires firms that sell products online to (1) ship the merchandise within 30 days of receiving your order, (2) notify you if the shipment cannot be made on time, and (3) cancel your order and return your payment unless you agree to a delay.

substitution effect
when consumers react to an increase in a good's price by consuming less of that good and more of other goods

income effect the change in consumption resulting from a change in real income

even buy more than one slice. But would you buy the same slice of pizza if it cost \$2? Fewer of us would buy it at that price. Even real pizza lovers might reduce their consumption from 3 or 4 slices to just 1 or 2. How many of us would buy a slice for \$10? Probably very few. As the price of pizza gets higher and higher, fewer of us are willing to buy it. That is the law of demand

in action.

The law of demand is the result of not one pattern of behavior, but of two separate patterns that overlap. These two behavior patterns are the **substitution effect** and the **income effect**. The substitution effect and income effect describe two different ways that a consumer can change his or her spending patterns. Together, they explain why an increase in price decreases the quantity purchased. Figure 4.2 describes how the substitution effect and the income effect can change a consumer's buying habits.

The Substitution Effect

When the price of pizza rises, pizza becomes more expensive compared to other foods, such as tacos and salads. So, as the price of a slice of pizza rises, consumers become more and more likely to buy one of those alternatives as a substitute for pizza. This causes a drop in the amount of pizza demanded. For example, instead of eating pizza for lunch on Mondays and Fridays, a student could eat pizza on Mondays and a bagel on Fridays. This change in spending is known as the substitution effect. The substitution effect takes place when a consumer reacts to a rise in the price of one good by consuming less of that good and more of a substitute good.

The substitution effect can also apply to a drop in prices. If the price of pizza drops, pizza becomes cheaper compared to other alternatives. Consumers will now substitute pizza for tacos, salads, and other lunch choices, causing the quantity of pizza demanded to rise.

The Income Effect

Rising prices have another effect that we have all felt. They make us feel poorer. When the price of movie tickets, shoes, or pizza increases, your limited budget just won't buy as much as it used to. It feels as if you have less money. You can no longer afford to buy the same combination of goods, and you must cut back your purchases of some goods. If you buy fewer slices of pizza without increasing your purchases of other foods, that is the income effect.

One important fact to remember is that economists measure consumption in the amount of a good that is bought, not the amount of money spent to buy it. Although you are spending more on pizza, you are consuming fewer slices, so your consumption has gone down. If the price rises from \$1 a slice to \$2 a slice, you may decide to pay extra and order your usual lunch, but you certainly would not choose to buy more slices than before. Although people spend more of their money on pizza, when

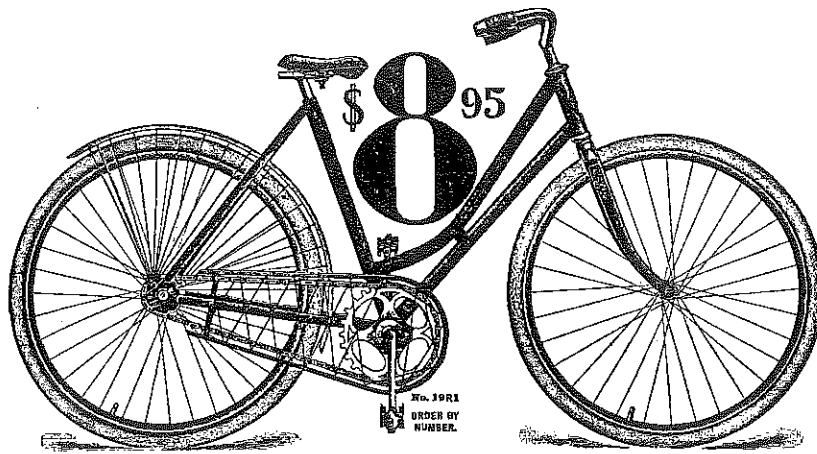
Figure 4.2 Building the Law of Demand

	Price of A increases		Price of A decreases	
	Consumption of A	Consumption of other goods	Consumption of A	Consumption of other goods
Income effect	↓	↓	↑	↑
Substitution effect	↓	↑	↑	↓
Combined effect	↓	↕	↑	↕



Both the substitution effect and the income effect lead consumers to buy less of good A when it becomes more expensive. However, the income effect leads consumers to spend less on other goods so they can afford good A, while the substitution effect encourages consumers to replace expensive good A with other, less expensive substitutes.

Supply and Demand Explain in your own words how an increase in the price of A affects consumption of other goods.



◀ Today, a bicycle might cost \$100, and most people purchase only one. If bikes still cost \$8.95, as they did in 1902, you might buy two or more and spend the rest on other goods. This is the income effect in action.

the price goes up, the quantity demanded goes down. In this sense, the income effect leads to the law of demand.

Remember, too, that the income effect also operates when the price is lowered. If the price of pizza falls, all of a sudden you feel wealthier. If as a result you buy more pizza, that's the income effect.

A Demand Schedule

The law of demand explains how the price of any item affects the quantity demanded of that item. Before we look at the relationship between price and quantity demanded for a specific good, we need to look more closely at how economists use the word *demand*.

Understanding Demand

To have demand for a good, you must be willing and able to buy it at the specified price. This means that you want the good,

and you can afford to buy it. You may desperately want a new car, a laptop computer, or a trip to Alaska, but if you can't truly afford any of these goods, then you do not demand them. You might demand compact discs, though, if at the current price you have enough money and want to buy some.

A **demand schedule** is a table that lists the quantity of a good that a person will purchase at each price in a market. For example, the table on the left in Figure 4.3 illustrates individual "demand for pizza." The schedule shows specific quantities that a student named Ashley is willing and able to purchase at specific prices. For example, at a price of \$2.00, Ashley's "quantity demanded" of pizza is two slices per day.

demand schedule a table that lists the quantity of a good a person will buy at each different price

Market Demand Schedules

If you owned a store, knowing the demand schedule of one customer might not be very helpful. You would want to know how

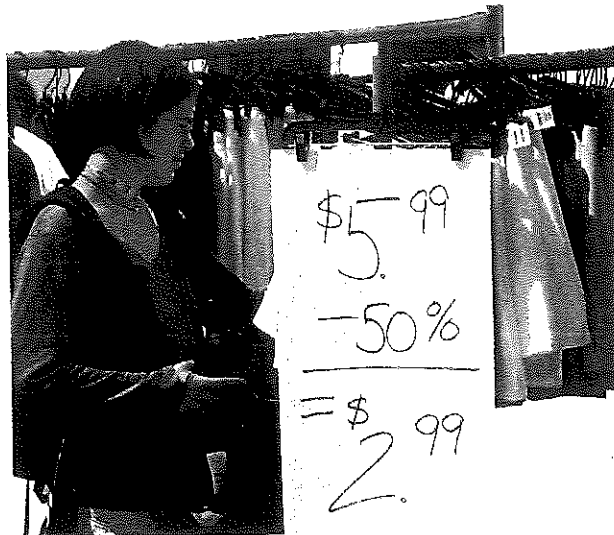
Figure 4.3 Demand Schedules

Individual Demand Schedule		Market Demand Schedule	
Price of a slice of pizza	Quantity demanded per day	Price of a slice of pizza	Quantity demanded per day
\$0.50	5	\$0.50	300
\$1.00	4	\$1.00	250
\$1.50	3	\$1.50	200
\$2.00	2	\$2.00	150
\$2.50	1	\$2.50	100
\$3.00	0	\$3.00	50



Demand schedules show that demand for a good falls as the price rises.

Supply and Demand How does the market demand for pizza change when the price falls from \$2.50 to \$1.00 a slice? Be specific.



▲ A sale can encourage consumers to buy more.

market demand schedule a table that lists the quantity of a good all consumers in a market will buy at each different price

demand curve a graphic representation of a demand schedule

customers as a whole would react to price changes. When you add up the demand schedules of every buyer in the market, you can create a market demand schedule. A **market demand schedule** shows the quantities demanded at each price by all consumers in the market. A market demand schedule for pizza would allow a restaurant owner to predict the total sales of pizza at several different prices.

The owner of a pizzeria could create a market demand schedule for pizza slices by surveying his or her customers and then adding up the quantities demanded by all individual consumers at each price. The

resulting market demand schedule will look like Ashley's demand schedule, but the quantities will be larger, as shown in Figure 4.3.

Note that the market demand schedule on the right in Figure 4.3 contains the same prices as Ashley's individual demand schedule, since those are the possible prices that may be charged by the pizzeria. The schedule also exhibits the law of demand. At higher prices the quantity demanded is lower. The only difference between the two demand schedules is that the market schedule lists larger quantities demanded. This is the case, since now we are talking about the purchase decisions of *all* potential consumers in the market.

The Demand Graph

What if you took the numbers in Ashley's demand schedule in Figure 4.3 and plotted them on a graph? The result would be a **demand curve**. A demand curve is a graphic representation of a demand schedule.

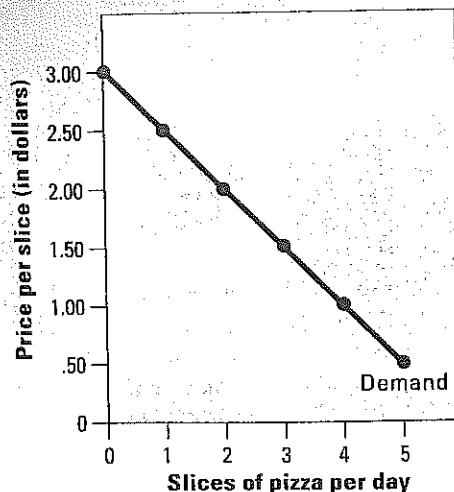
How do economists create a demand curve? When they transfer numbers from a demand schedule to a graph, they always label the vertical axis with the lowest possible prices at the bottom and the highest at the top. Likewise, they always label the quantities demanded on the horizontal axis with the lowest possible quantity at the left and the highest possible quantity at the right. As Figure 4.4 shows, each pair of price and quantity-demanded numbers on the schedule is plotted as a point on the graph. Connecting the points creates a demand curve.



Ashley's demand curve shows the number of slices of pizza she is willing and able to buy at each price.

Supply and Demand
How many slices of pizza does she demand when the price is \$1.50?

Figure 4.4 Ashley's Demand Curve



Reading a Demand Curve

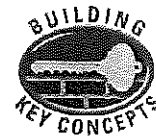
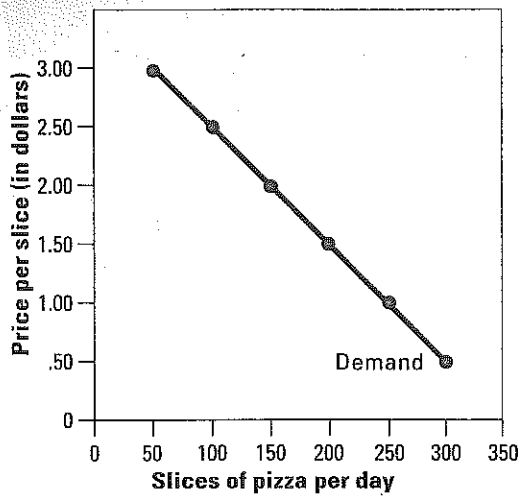
Note two facts about the graph shown in Figure 4.4. First, the graph shows only the relationship between the price of this good and the quantity that Ashley will purchase. It assumes that all other factors that would affect Ashley's demand for pizza—like the price of other goods, her income, and the quality of the pizza—are held constant.

Second, the demand curve on the graph slopes downward to the right. If you follow the curve with your finger from the top left

to the bottom right, you will notice that as price decreases, the quantity demanded increases. This is just another way of stating the law of demand, which states that higher prices will always lead to lower quantities demanded. All demand schedules and curves reflect the law of demand.

The demand curve in Figure 4.4 shows Ashley's demand for slices of pizza. A market demand curve shows the quantities demanded by all consumers at the same prices. Thus, in Figure 4.5, the prices listed on the vertical axis are identical to those in Ashley's demand curve. The quantities listed on the horizontal axis are much larger, corresponding to those in the market demand schedule in Figure 4.3.

Figure 4.5 Market Demand Curve



The market demand curve illustrates demand for pizza in an entire market.
Supply and Demand
 How is the market demand curve similar to Ashley's demand curve?

Limits of a Demand Curve

The market demand curve can be used to predict how people will change their buying habits when the price of a good rises or falls. For example, if the price of pizza is \$1.50 a slice, the pizzeria will sell 200 slices a day.

This market demand curve is only accurate for one very specific set of market

conditions. If a nearby factory were to close, so that fewer people were in the area at lunchtime, the pizzeria would sell less pizza even if the price stayed the same. In the next section, you will read about how demand curves can shift because of changes in factors other than price.

Section 1 Assessment

Key Terms and Main Ideas

1. Define and give an example of the **income effect**.
2. What are three characteristics of a **demand curve**?

Applying Economic Concepts

3. **Critical Thinking** Explain why the law of demand can apply only in a free market economy.
4. **Try This** Create an individual demand schedule like the one in Figure 4.3 for your demand for CDs. Fill in six different prices for CDs. Assume that you have a part-time job that pays \$80 a week. How many CDs would you buy at each of the six different prices? Compare your demand schedule to those of your classmates.

5. **Critical Thinking** Some economists believe that there are goods that do not obey the law of demand, because the demand for them would actually drop if their price fell. One example is a top-of-the-line luxury car. Why do you think prospective buyers might feel differently about these goods?
6. **Math Practice** Use the market demand schedule below to draw a demand curve for miniature golf.

Cost to Play a Game	Games Played per Month
\$1.50	350
\$2.00	250
\$3.00	140
\$4.00	80



Take It to the NET

Demand affects our everyday lives. Find a recent article online that is on the topic of demand. Use the links provided in the Social Studies area at the following Web site for help in completing this activity. www.phschool.com

Analyzing Tables

Economists use tables as a way to organize data and illustrate trends. The table below presents the results of a hypothetical survey of 100 high school seniors from across the country and 100 of their parents. Both groups were asked if they would be willing to pay \$5 for a ticket to a movie on opening night, for a meal at a fine restaurant, or for an asthma inhaler (assuming they suffered from asthma). Next, they were asked if they would pay \$10 for each of these goods, and next, if they would pay \$30. The table below lists the number in each group that answered “yes” at each price.

- Determine the kinds of information shown in the table.** The title of the table and the labels for each vertical column and horizontal row tell you exactly what information is presented.
 - What is the title of the table?
 - What does the first column of data specifically describe?
- Read the information in the table.** Note that each dollar value has two sets of data, one for students, and the other for parents. Answer the following questions.
 - How many students were willing to pay \$30 for the meal?
 - How many parents?
 - Which item were nearly all members of both groups unwilling to buy for \$30?
- Study the table to find relationships among the data and draw conclusions.** You can use the data in this table to compare the demand for different

goods at one price level, or to see how demand for one good changes as the price increases or decreases. (a) Which good saw the sharpest drop in demand when its price rose from \$5 to \$30? (b) Which good saw little change in demand when its price rose? Why might this be? (c) How did demand change for students when the price of a meal went up? (d) Name two conclusions you can draw about the differences between the patterns of demand of the students and their parents.

Additional Practice

Draw a new chart reflecting the data that you might expect to gather if you repeated this survey with different goods, such as a weekly bus pass, a concert ticket, and a best-selling novel.

Goods	\$5		\$10		\$30	
	Students	Parents	Students	Parents	Students	Parents
Movie ticket	70	67	11	35	1	0
Asthma medicine	91	94	86	88	79	85
Restaurant meal	94	96	62	80	13	37

Section 2

Shifts of the Demand Curve

Preview

Objectives

After studying this section you will be able to:

1. **Understand** the difference between a change in quantity demanded and a shift in the demand curve.
2. **Identify** the determinants that create changes in demand and that can cause a shift in the demand curve.
3. **Explain** how the change in the price of one good can affect demand for a related good.

Section Focus

Several factors can change the demand for a good at any price. A change in demand causes the entire demand curve to shift to the left or right.

Key Terms

ceteris paribus
normal good
inferior good
complements
substitutes

The market demand schedule for pizza in Figure 4.3 would appear to give the pizzeria owner all the information she needs to set the prices for her menu. All she has to do is look at the list, pick the price and quantity combination that will earn her the highest profit, and start baking.

Other factors, however, might have an effect. What would happen if the day after she printed a menu, the government announced that tomato sauce had a natural chemical that strengthened the immune system? Demand for pizza at all prices would climb.

When we counted the number of pizza slices that would sell as the price went up or down, we assumed that nothing besides the price of pizza would change. Economists refer to this assumption as *ceteris paribus*, the Latin phrase for “all other things held constant.” The demand schedule took only changes in price into account. It did not take the news reports into account, or any one of thousands of other factors that change from day to day. In this section, you will learn how economists consider the impact of these other changes on the demand for goods like pizza.

Changes in Demand

A demand curve is accurate only as long as there are no changes other than price that could affect the consumer’s decision. In other words, a demand curve is accurate only as long as the *ceteris paribus* assumption is true. When the price changes, we move along the curve to a different quantity demanded. For example, in the graph of Ashley’s demand for slices of pizza, an increase in the price from \$1.00 per slice to \$1.50 will make Ashley’s quantity demanded fall from four slices to three slices per day. This movement along the demand curve is referred to as a

ceteris paribus a Latin phrase that means “all other things held constant”

▼ A sudden winter storm can increase the demand for snow shovels.

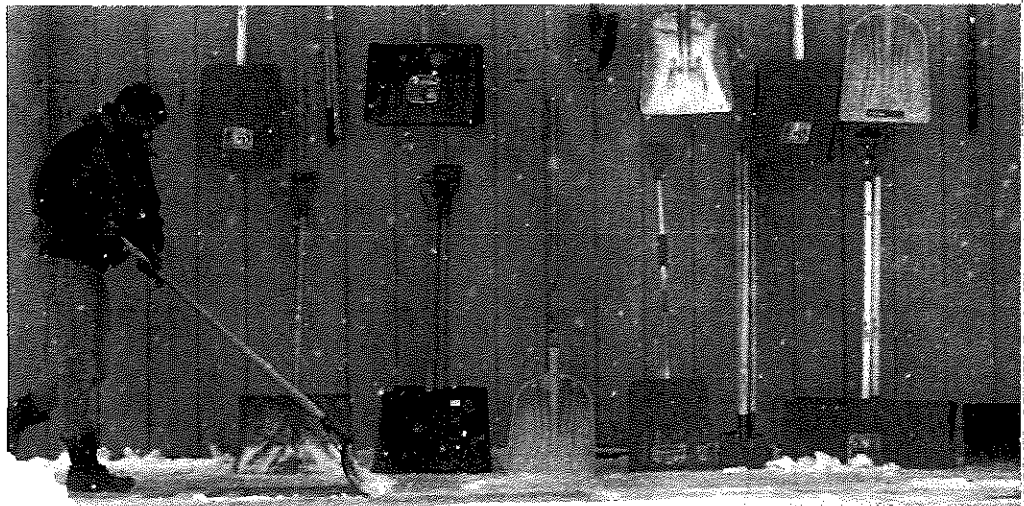
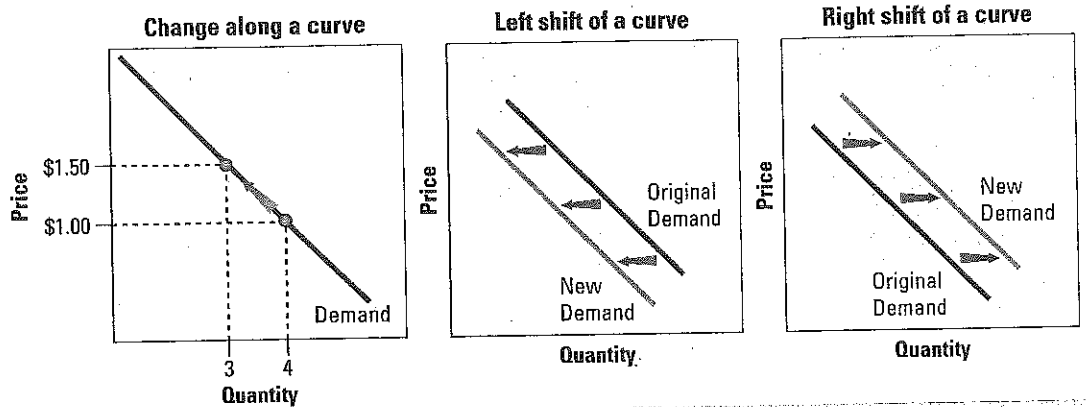


Figure 4.6 Graphing Changes in Demand



A change in quantity demanded caused by a change in price is shown as a movement *along* a demand curve. The curve does not shift. When factors other than price cause demand to fall, the demand curve shifts to the left. An increase in demand appears as a shift to the right. Supply and Demand **If the price of a book rose by \$1.00, how would you represent the change on one of these graphs?**

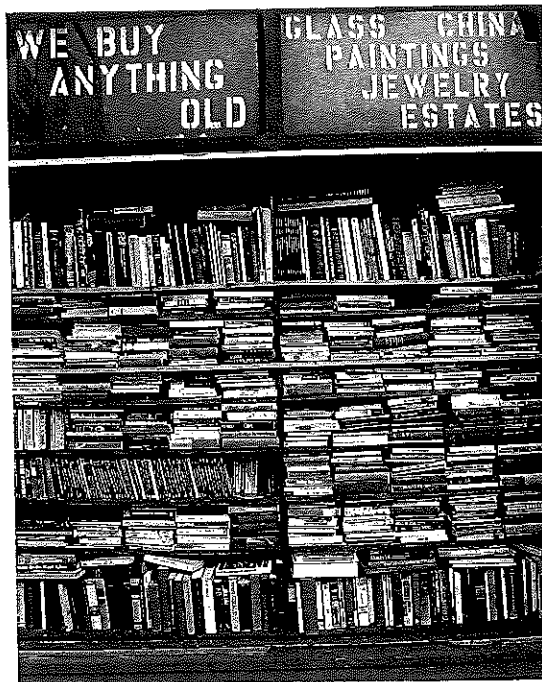
normal good a good that consumers demand more of when their incomes increase

decrease in the quantity demanded. By the same reasoning, a decrease in the price of pizza would lead to an *increase* in the quantity demanded.

When we drop the *ceteris paribus* rule and allow other factors to change, we no longer move along the demand curve. Instead, the entire demand curve shifts. A shift in the demand curve means that at

every price, consumers buy a different quantity than before. This shift of the entire curve is what economists refer to as a *change in demand*.

Suppose, for example, that Ashley's town is hit by a heat wave, and Ashley no longer feels as hungry for pizza. She will demand fewer slices at every price. The middle graph in Figure 4.6 shows her original demand curve and her new demand curve, adjusted for hot weather.



► Used paperback books are often inferior goods. When consumers can afford new, clean books, they will buy fewer old paperbacks.

What Causes a Shift?

As you have read, a change in the price of a good does not cause the demand curve to shift. The effects of changes in price are already built into the demand curve. However, several other factors can cause demand for a good to change. These changes can lead to a change in demand rather than simply a change in the quantity demanded.

Income

A consumer's income affects his or her demand for most goods. Most items that we purchase are **normal goods**, goods that consumers demand more of when their incomes increase. In other words, an increase

in Ashley's income from \$50 per week to \$75 per week will cause her to buy more of a normal good at every price level. If we were to draw a new demand schedule for Ashley, it would show a greater demand for slices of pizza at every price. Plotting the new schedule on a graph would produce a curve to the right of Ashley's original curve. For each of the prices on the vertical axis, the quantity demanded would be greater. This shift to the right of the curve is called an *increase in demand*. A fall in income would cause the demand curve to shift left. This shift is called a *decrease in demand*.

There are also other goods called **inferior goods**. They are called inferior goods because an increase in income causes demand for these goods to fall. Inferior goods are goods that you would buy in smaller quantities, or not at all, if your income were to rise and you could afford something better. Possible examples of inferior goods include macaroni and cheese, generic cereals, and used cars.

Consumer Expectations

Our expectations about the future can affect our demand for certain goods today. Suppose that you have had your eye on a new bicycle for several months. One day you walk in the store to look at the bike, and the salesperson mentions that the store will be raising the price in one week. Now that you expect a higher price in the near future, you are more likely to buy the bike today. In other words, the expectation of a higher price in the future has caused your immediate demand to increase.

If, on the other hand, the salesperson were to tell you that the bike will be on sale next week, your immediate demand for the bicycle would fall to zero. You would rather wait until next week to buy the bike at a lower price.

The current demand for a good is positively related to its expected future price. If you expect the price to rise, your current demand will rise, which means you will buy the good sooner. If you expect the price to drop, your current demand will fall and you will wait for the lower price.

Population

Changes in the size of the population will also affect the demand for most products. For example, a growing population needs to be housed and fed. Therefore, a rise in population will increase demand for houses, food, and many other goods and services.

Population trends can have a particularly strong effect on certain goods. For example, when American soldiers returned from World War II in the mid- to late 1940s, record numbers of them married and started families. This trend led to the "baby boom," a jump in the birthrate from the mid-1940s through 1964. Initially, the baby boom led to higher demand for baby clothes, baby food, and books on baby care. In the 1950s and 1960s, towns had to build thousands of new schools. Later, universities opened new classrooms, dormitories, and even whole new campuses to make room for the flood of new students. The baby boomers have now begun to retire. Over the next few decades the market will face rising demand for the goods and services that are desired by senior citizens, including medical care, recreational vehicles, and homes in the Sunbelt.

Consumer Tastes and Advertising

Who can explain why bell-bottom blue jeans were everywhere one year and rarely seen the next? Is it the result of clever advertising campaigns, social trends, the influence of television shows, or some combination of these factors? Although economists cannot always isolate the reasons why some fads begin, advertising and publicity often play an important role.

Changes in tastes and preferences cannot be explained by changes in income or population or worries about future price increases. Advertising is considered a factor

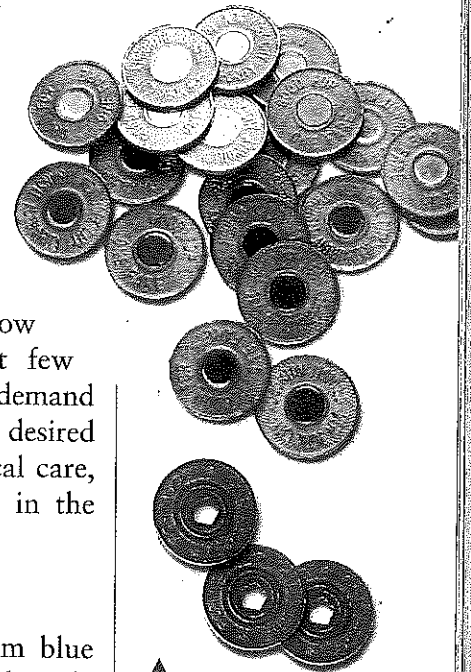
THE WALL STREET JOURNAL

CLASSROOM EDITION

In the News As this excerpt from an article in The Wall Street Journal Classroom Edition shows, retailers are looking to the next big wave of consumers to drive demand. Which goods and services are likely to be in high demand by teens in the coming years?

"Marketers hear a demographic drumbeat: The current bulge of 27 million teens is expected to swell 10% by 2010. So companies are rushing to quantify every aspect of the adolescent lifestyle."

inferior good a good that consumers demand less of when their incomes increase



▲ When New York City announced that the price of a subway token would rise 25 cents, commuters rushed to buy tokens at the old price. To prevent this, the city introduced a new token (bottom) to replace the older token commuters had bought. Expectations of higher prices had affected demand.



▲ Ski boots and skis are two goods that are complements.

complements two goods that are bought and used together

substitutes goods used in place of one another

that shifts demand curves because it plays an important role in many trends. Companies spend money on advertising because they hope that it will increase the demand for the goods they sell. Considering the growing sums of money spent on advertising in the United States each year, companies must feel that this investment is paying off.

- **Substitutes** are goods used in place of one another.

When we consider the demand for skis, ski boots are considered a complement. An increase in the price of ski boots will cause people to buy fewer boots. Because skis are useless without boots, the demand for skis will fall at all prices—after all, why buy new skis if you can't afford the ski boots you need to ski safely?

Now consider the effect on the demand for skis when the price of snowboards rises. Snowboards are a substitute for skis, because consumers will often buy one or the other, but not both. A rise in the price of snowboards will cause people to buy fewer snowboards, and therefore people will buy *more* pairs of new skis at every price. Likewise, a fall in the price of snowboards will lead consumers to buy fewer skis at all price levels.

Prices of Related Goods

The demand curve for one good can be affected by a change in the demand for another good. There are two types of related goods that interact this way: complements and substitutes.

- **Complements** are two goods that are bought and used together.

Section 2 Assessment

Key Terms and Main Ideas

1. What is an example of something you consider an **inferior good**?
2. What is one good that can be considered a **complement** for another?
3. What are two goods that can be considered **substitutes**?
4. How does the *ceteris paribus* assumption affect a demand curve?

Applying Economic Concepts

5. **Using the Databank** According to the law of demand and the chart of median house prices on page 540, how do you think demand for houses changed between 1994 and 1998? Explain.
6. **Critical Thinking** What is the difference between a shift along a demand curve and a shift of a demand curve?

7. **Decision Making** Decide whether each of these events would cause a change in *demand* or only a change in the *quantity demanded* of the good in parentheses, and explain why. (a) A computer manufacturer lowers its prices. (computers) (b) A volleyball maker convinces high schools to fund varsity volleyball teams. (volleyballs) (c) A freeze ruins the orange crop, and orange juice prices rise. (apple juice)
8. **Math Practice** Use the following demand schedule to draw a demand curve. Then find and label a combination of output and price that could result from: (a) an increase in the quantity demanded, (b) an increase in demand, and (c) a decrease in demand.

Price	Quantity Demanded
\$1.00	250
\$2.00	200
\$3.00	150
\$4.00	100
\$5.00	50



Take It to the NET

Many inferior goods are not inferior in their performance. Recently, people have begun to debate the role of generic medication in health care. Write a brief summary of the generic drug debate. Use the links provided in the Social Studies area at the following Web site for help in completing this activity. www.phschool.com

Elasticity of Demand

Preview

Objectives

After studying this section you will be able to:

1. Explain how to calculate elasticity of demand.
2. Identify factors that affect elasticity.
3. Explain how firms use elasticity and revenue to make decisions.

Section Focus

Elasticity of demand describes how consumers will react to a change in the price of a good. Their reaction depends on the original price of the good and the way that good is used by consumers.

Key Terms

elasticity of demand
inelastic
elastic
unitary elastic
total revenue

elasticity of demand
a measure of how consumers react to a change in price

inelastic describes demand that is not very sensitive to a change in price

elastic describes demand that is very sensitive to a change in price

Are there some goods that you would always find money to buy, even if the price were to rise drastically? Are there other goods that you would cut back on, or even stop buying altogether, if the price were to rise just slightly?

Economists describe the way that consumers respond to price changes as **elasticity of demand**. Elasticity of demand dictates how drastically buyers will cut back or increase their demand for a good

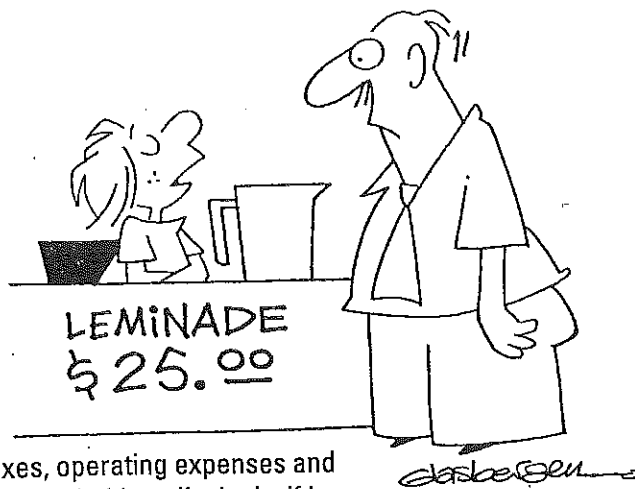
when the price rises or falls, respectively. Your demand for a good that you will keep buying despite a price increase is **inelastic**, or relatively unresponsive to price changes. In the second example, in which you buy much less of a good after a small price increase, your demand is **elastic**. A consumer with highly elastic demand for a good is very responsive to price changes.

Calculating Elasticity

To compute elasticity of demand, take the percentage change in the demand of a good, and divide this number by the percentage change in the price of the good. You can find the equation for elasticity in Figure 4.7 on page 92. The law of demand implies that the result will always be negative. This is because an increase in the price of a good will always decrease the quantity demanded, and a decrease in the price of a good will always increase the quantity demanded. For the sake of simplicity, economists drop the negative sign.

Price Range

The elasticity of demand for a good varies at every price level. Demand for a good can be highly elastic at one price and inelastic at a different price. For example, demand



"After taxes, operating expenses and profits to stockholders, I'm lucky if I see a nickel of it!"

▲ Misspelling "lemonade" might not be this entrepreneur's only mistake. How many people will buy lemonade if the price rises to \$25.00 a glass?

for a glossy magazine will be inelastic when the price rises 50 percent from 20 cents to 30 cents. The price is still very low, and people will buy almost as many copies as they did before. However, when the price increases 50 percent from \$4.00 to \$6.00, demand will be much more elastic. Many readers will refuse to pay \$2.00 more for the magazine. Yet in percentage terms, the change in the magazine's price is exactly the same as when the price rose from 20 cents to 30 cents.

Values of Elasticity

We have been using the terms *inelastic* and *elastic* to describe consumers' responses to price changes. These terms have precise mathematical definitions. If the elasticity of demand for a good at a certain price is *less* than 1, we describe demand as inelastic. If the elasticity is *greater* than one, demand is elastic. If elasticity is exactly equal to 1, we describe demand as **unitary elastic**.

When elasticity of demand is unitary, the percentage change in quantity demanded is exactly equal to the percentage change in the price. Suppose the elasticity of demand for a magazine at \$2 is unitary. When the price of the magazine rises by 50 percent to \$3, the newsstand will sell exactly half as many copies as before.

Think back to Ashley's demand schedule for pizza in Section 1. Ashley's demand schedule shows that if the price per slice were to rise from \$1.00 to \$1.50, her quantity demanded would fall from 4 slices to 3 slices per day. The change in price from \$1.00 to \$1.50 is a 50 percent increase. The change in quantity demanded from 4 to 3 slices is a 25 percent decrease. Dividing the 25 percent decrease in quantity demanded by the 50 percent increase in price gives us an elasticity of demand of 0.5.

Since Ashley's elasticity of demand at prices of \$1.00 to \$1.50 is less than 1, we say that Ashley's demand for pizza is inelastic. In other words, a price increase has a relatively small effect on the number of slices of pizza she buys.

Suppose that we survey another customer and find that, when the price of pizza rises by 40 percent, this person's quantity demanded falls by 60 percent. The change in the quantity demanded of 60 percent is divided by the change in price of 40 percent, equaling an elasticity of demand of 1.5 (60 percent/40 percent = 1.5). Since this result is greater than 1, this customer's demand is elastic. In other words, this customer is very sensitive to changes in the price of pizza.

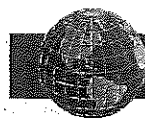
unitary elastic
describes demand whose elasticity is exactly equal to 1

Factors Affecting Elasticity

Why is the demand for some goods so much less elastic than for other goods? Rephrase the question and ask yourself, "What is essential to me? What goods must I have, even if the price rises greatly?" The goods you list might have some traits that set them apart from other goods and make your demand for those goods less elastic. Several different factors can affect a person's elasticity of demand for a specific good.

Availability of Substitutes

If there are few substitutes for a good, then even when its price rises greatly, you might still buy it. You feel you have no good alternatives. For example, if your favorite musical group plans to give a concert, and you want to attend, there really is no substitute for a ticket. You could go to a concert to hear some other band, but that would not be as good. You've got to have



Global Connections

Elasticity in the Kitchen Cooking varies from country to country, and so does **elasticity of demand** for certain foods. If the price of a gallon of milk or a pound of ground beef doubled in the United States, consumers might demand intervention by the government. Do you think this would happen if the price rise affected onions and potatoes? These two vegetables are essential to Indian cooking, and when floods ruined crops in India, their prices more than doubled. In November 1998, angry citizens voted the ruling party out of office in several states in part because of the high price of onions.

Figure 4.7 Elasticity of Demand

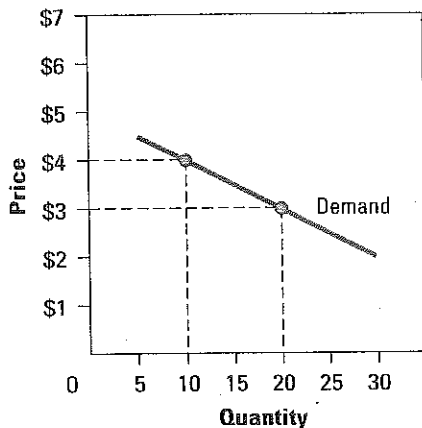
Elasticity is determined using the following formula:

$$\text{Elasticity} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

To find the percentage change in quantity demanded or price, use the following formula: Subtract the new number from the original number, and divide the result by the original number. Ignore any negative signs, and multiply by 100 to convert this number to a percentage:

$$\text{Percentage change} = \frac{\text{Original number} - \text{New number}}{\text{Original number}} \times 100$$

Example 1: Elastic Demand



If demand is elastic, a small change in price leads to a relatively large change in the quantity demanded. Follow this demand curve from left to right.

The price decreases from \$4 to \$3, a decrease of 25 percent.

$$\frac{\$4 - \$3}{\$4} \times 100 = 25$$

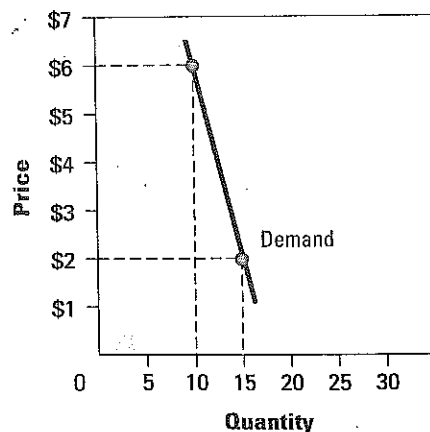
The quantity demanded increases from 10 to 20. This is an increase of 100 percent.

$$\frac{10 - 20}{10} \times 100 = 100$$

Elasticity of demand is equal to 4.0. Elasticity is greater than 1, so demand is elastic. In this example, a small decrease in price caused a large increase in the quantity demanded.

$$\frac{100\%}{25\%} = 4.0$$

Example 2: Inelastic Demand



If demand is inelastic, consumers are not very responsive to changes in price. A decrease in price will lead to only a small change in quantity demanded, or perhaps no change at all. Follow this demand curve from left to right as the price decreases sharply from \$6 to \$2.

The price decreases from \$6 to \$2, a decrease of about 67 percent.

$$\frac{\$6 - \$2}{\$6} \times 100 = 67$$

The quantity demanded increases from 10 to 15, an increase of 50 percent.

$$\frac{10 - 15}{10} \times 100 = 50$$

Elasticity of demand is about 0.75. The elasticity is less than 1, so demand for this good is inelastic. The increase in quantity demanded is small compared to the decrease in price.

$$\frac{50\%}{67\%} \approx 0.75$$

Unitary elastic demand is a special case. When demand is unitary elastic, an increase (or decrease) in price will be met by an equal percentage decrease (or increase) in quantity demanded. Elasticity of demand is exactly 1.



Elasticity of demand describes how strongly consumers will react to a change in price.

Supply and Demand If a good's elasticity of demand is 0.2, how will consumers react to an increase in price?

tickets for this concert, and nothing else will do. Under these circumstances, a moderate change in price is not going to change your mind. Your demand is inelastic.

Similarly, demand for life-saving medicine is usually inelastic. For many prescription drugs, the only possible substitute is to try an unproven treatment. For this reason, people with an illness will continue to buy as much needed medicine as they can afford, even when the price goes up.

If the lack of substitutes can make demand inelastic, a wide choice of substitute goods can make demand elastic. The demand for a particular brand of apple juice is probably elastic because people can choose from dozens of good substitutes if the price of their preferred brand rises.

Relative Importance

A second factor in determining a good's elasticity of demand is how much of your budget you spend on the good. If you already spend a large share of your income on a good, a price increase will force you to make some tough choices. Unless you want to cut back drastically on the other goods in your budget, you must reduce consumption of that good by a significant amount to keep your budget under control. The

higher the jump in price, the more you will have to adjust your purchases.

If you currently spend half of your budget on clothes, then even a modest increase in the cost of clothing will probably cause a large reduction in the quantity you purchase. In other words, your demand will be elastic.

However, if the price of shoelaces doubled, would you cut back on your shoelace purchases? Probably not. You may not even notice the difference. Even if you spend twice as much on shoelaces, they will still account for only a tiny part of your overall budget. Your demand for shoelaces is inelastic.

Necessities Versus Luxuries

The third factor in determining a good's elasticity varies a great deal from person to person, but it is nonetheless important. Whether a person considers a good to be a necessity or a luxury has a great impact on the good's elasticity of demand for that person. A necessity is a good people will always buy, even when the price increases. Parents often regard milk as a necessity. They will buy it at any reasonable price. If the price of a gallon of milk rises from \$2.49 to \$4.49, they will still buy as much milk as their children need to stay healthy. Their demand for milk is inelastic.



▲ Demand for some prescription drugs is relatively inelastic because the patient has few alternatives. Demand for any one of these drinks would be much more elastic because a consumer can easily find a less expensive choice.



▲ Many people consider lobster a luxury and can easily cut it out of their budget.

The same parents may regard steak as a luxury. When the price of steak increases by a little bit, say 20 percent, parents may cut their monthly purchases of steak by more than 20 percent, or skip steak altogether. Steak is a luxury, and consumers can easily reduce the quantity they consume. Because it is easy to reduce the quantity of luxuries demanded, demand is elastic.

Change over Time

When a price changes, consumers often need time to change their shopping habits. Consumers do not always react quickly to a price increase because it takes time to find substitutes. Because they cannot respond quickly to price changes, their demand is inelastic in the short term. Demand sometimes becomes more elastic over time, however, because people can eventually find substitutes that allow large adjustments to what they buy.

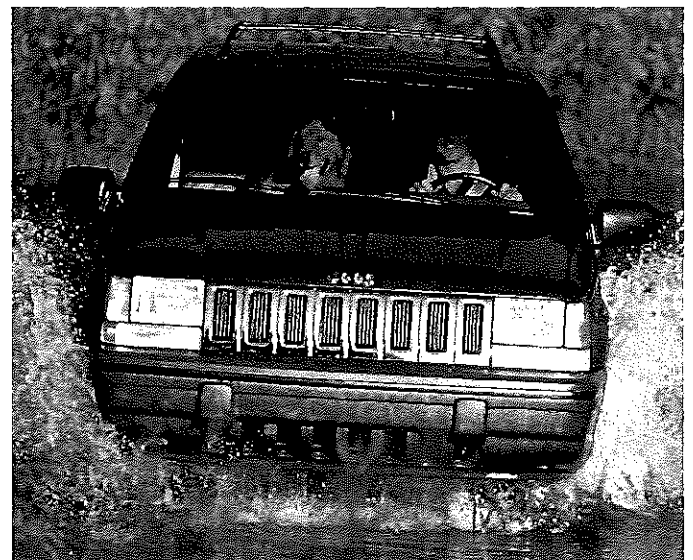
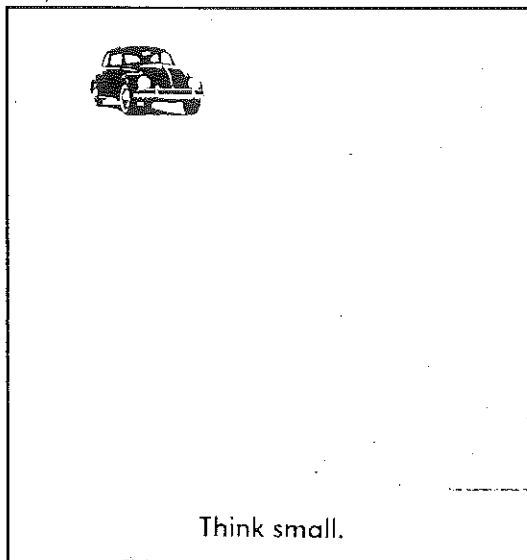
Consider the example of gasoline. When a person purchases a vehicle, he or she might choose a large vehicle that requires a greater volume of gasoline per mile to run. This same person might work at a job many miles away from home and shop at a

supermarket that is far from both work and home. These factors determine how much gasoline this person demands, and none can be changed easily.

In the early 1970s, several oil-rich countries cut their oil exports to the United States, and gasoline prices rose quickly. In the short run, there was very little that people could do to reduce their consumption of gasoline. They still needed to drive to school and work. At first, drivers were more likely to pay more for the same amount of gasoline than they were to buy fuel-efficient cars or move closer to their schools and workplaces.

However, because gas prices stayed high for a considerable period of time, some people eventually switched to more fuel-efficient cars. Others formed car pools, walked or rode bicycles, and used public transportation. In the long run, people reduced their consumption of gasoline by finding substitutes. Demand for gasoline, inelastic in the short term, is more elastic in the long term.

As another example, consider what happened to gasoline prices from the early 1980s through the 1990s. Adjusting for inflation, the price of a gallon of gas fell



▲ When gas prices rose in the 1970s, auto manufacturers advertised how little fuel their cars used. Gas prices were low in the 1990s, so new advertising emphasized strength and size, even though those cars used more gasoline.

considerably from its highs in the 1970s. In addition, gasoline prices remained low for many years. At first, people continued to seek out fuel-efficient cars. Over time, however, many Americans switched back to larger vehicles that get fewer miles to the gallon. Because the price of gas remained low, people gradually adjusted their habits to use more and more gasoline. Just as demand for gasoline responded slowly to an increase in price, it also responded slowly to a decrease in price.

Elasticity and Revenue

Elasticity is important to the study of economics because elasticity helps us measure how consumers respond to price changes for different products. Elasticity is also an important tool for business planners like the pizzeria owner described in Sections 1 and 2. The elasticity of demand determines how a change in prices will affect a firm's total revenue or income.

Computing a Firm's Total Revenue

A company's **total revenue** is defined as the amount of money the company receives by selling its goods. This is determined by two factors: the price of the goods and the quantity sold. If a pizzeria sells 125 slices of pizza per day at \$2.00 per slice, total revenue would be \$250 per day.

Total Revenue and Elastic Demand

The law of demand tells us that an increase in price will decrease the quantity demanded. When a good has an elastic demand, raising the price of each unit sold by 20 percent will decrease the quantity sold by a larger percentage, say 50 percent. The quantity sold will drop enough to actually *reduce* the firm's total revenue. Figure 4.8, drawn from the demand curve for the pizzeria, shows how this can happen. An increase in price from \$2.50 to \$3.00, or 20 percent, decreases the quantity sold from 100 to 50, or 50 percent. As a result, total revenue drops from \$250 to \$150.

Figure 4.8 Revenue Table

Price of a slice of pizza	Quantity demanded per day	Total revenue
\$.50	300	\$150
\$1.00	250	\$250
\$1.50	200	\$300
\$2.00	150	\$300
\$2.50	100	\$250
\$3.00	50	\$150



Setting prices too high or too low can hurt revenue. **Markets and Prices** When the price doubles from \$.50 to \$1.00, is demand elastic, unitary elastic, or inelastic?

The same process can also work in reverse. If the firm were to reduce the price by a certain percentage, the quantity demanded could rise by an even greater percentage. In this case, total revenues could rise.

It may surprise you that a firm could lose revenue by raising the price of its goods. But if the pizzeria started selling pizza at \$10 a slice, it would not stay in business very long. Remember that elastic demand comes from one or more of these factors:

1. availability of substitute goods
2. a limited budget that does not allow price changes
3. the perception of the good as a luxury item

If these conditions are present, then the demand for the good is elastic, and a firm may find that a price increase reduces its total revenue.

Total Revenue and Inelastic Demand

Remember that if demand is inelastic, consumers' demand is not very responsive to price changes. Thus, if the firm raises its price by 25 percent, the quantity demanded will fall, but by less than 25 percent. The firm will have greater total revenues. In other words, the higher price makes up for the firm's lower sales, and the firm brings in more money.

total revenue the total amount of money a firm receives by selling goods or services

Figure 4.9 Elasticity and Revenue



Elasticity of demand determines the effect of a price change on total revenues. Markets and Prices **Why will revenue fall if a firm raises the price of a good whose demand is elastic?**

On the other hand, a decrease in price will lead to an increase in the quantity demanded if demand is inelastic. However, demand will not rise as much, in percentage terms, as the price fell, and the firm's total revenue will decrease.

Elasticity and Pricing Policies

Because of these relationships, a firm needs to know whether the demand for its product is elastic or inelastic at a given price. This knowledge helps the firm make

pricing decisions that lead to the greatest revenue. If a firm knows that the demand for its product is elastic at the current price, it knows that an increase in price would reduce total revenues. On the other hand, if a firm knows that the demand for its product is inelastic at its current price, it knows that an increase in price will increase total revenue. In the next chapter, you will read more about the choices producers make to reach an ideal level of revenue.

Section 3 Assessment

Key Terms and Main Ideas

1. Explain **elasticity of demand** in your own words.
2. Name a good with **elastic** demand at its current price.
3. Why is demand for home heating fuel **inelastic** in cold weather?
4. How do we calculate **total revenue**?

Applying Economic Concepts

5. **Math Practice** Use the formula in Figure 4.7 to calculate the exact elasticity of demand in the following examples. Then tell if, in each case, demand is elastic, inelastic, or unitary elastic. (a) When the price of a deluxe car wash rises from \$10.00 to \$11.00, the number of daily customers falls from 60 to 48. (b) A dentist with 80 patients cuts his fee for a cleaning from \$60.00 to \$54.00 and attracts two new patients.
6. **Try This** Interview a manager at a local restaurant or store. Ask if he or she has changed the price of any good or service in the past year, and if so, how sales were affected. Is demand for each of these goods or services elastic or inelastic? What factors might explain your answer?
7. **Critical Thinking** Think of a good, like gasoline, for which demand can become more elastic over time. What changes can take place in the long term to affect demand?



Take It to the NET

Petroleum and petroleum products are important to our everyday lives. Find out how much oil is demanded by North America and how much is demanded by one other continent. Is each demand elastic or inelastic? Use the links provided in the Social Studies area at the following Web site for help in completing this activity. www.phschool.com