CHAPTER FOUR: SUPPLY & DEMAND IN THE MARKET*

As scarce as truth is, the supply has always been in excess of the demand.
Josh Billings

When a cold snap hits Florida, the price of orange juice rises in supermarkets throughout the country. When the weather turns warm in New England every summer, the price of hotel rooms in the Caribbean plummets. When a war breaks out in the Middle East, the price of gasoline in the United States rises, and the price of a used Cadillac falls. What do these events have in common? They all show the workings of supply and demand.

Supply and demand are the two words that economists use most often—and for good reason. Supply and demand are the forces that make market economies work. They determine the quantity of each good produced and the price at which it is sold. If you want to know how any event or policy will affect the economy, you must think first about how it will affect supply and demand.

This chapter introduces the theory of supply and demand. It considers how buyers and sellers behave and how they interact with one another. It shows how supply and demand determine prices in a market economy and how prices, in turn, allocate the economy’s scarce resources.

MARKETS AND COMPETITION

The terms supply and demand refer to the behavior of people as they interact with one another in markets. A market is a group of buyers and sellers of a particular good or service. The buyers as a group determine the demand for the product, and the sellers as a group determine the supply of the product. Before discussing how buyers and sellers behave, let’s first consider more fully what we mean by a “market” and the various types of markets we observe in the economy.

COMPETITIVE MARKETS

Markets take many forms. Sometimes markets are highly organized, such as the markets for many agricultural commodities. In these markets, buyers and sellers meet at a specific time and place, where an auctioneer helps set prices and arrange sales.

More often, markets are less organized. For example, consider the market for ice cream in a particular town. Buyers of ice cream do not meet together at any one time. The sellers of ice cream are in different locations and offer somewhat different products. There is no auctioneer calling out the price of ice cream. Each seller posts a price for an ice-cream cone, and each buyer decides how much ice cream to buy at each store.

Even though it is not organized, the group of ice-cream buyers and ice-cream sellers forms a market. Each buyer knows that there are several sellers from which to choose, and each seller is aware that his product is similar to that offered by other sellers. The price of ice cream and the quantity of ice cream sold are not determined by any single buyer or seller. Rather, price and quantity are determined by all buyers and sellers as they interact in the marketplace.

The market for ice cream, like most markets in the economy, is highly competitive. A **competitive market** is a market in which there are many buyers and many sellers so that each has a negligible impact on the market price. Each seller of ice cream has limited control over the price because other sellers are offering similar products. A seller has little reason to charge less than the going price, and if he or she charges more, buyers will make their purchases elsewhere. Similarly, no single buyer of ice cream can influence the price of ice cream because each buyer purchases only a small amount.

In this chapter we examine how buyers and sellers interact in competitive markets. We see how the forces of supply and demand determine both the quantity of the good sold and its price.

**COMPETITION: PERFECT AND OTHERWISE**

We assume in this chapter that markets are perfectly competitive. *Perfectly competitive* markets are defined by two primary characteristics: (1) the goods being offered for sale are all the same, and (2) the buyers and sellers are so numerous that no single buyer or seller can influence the market price. Because buyers and sellers in perfectly competitive markets must accept the price the market determines, they are said to be price takers.

There are some markets in which the assumption of perfect competition applies perfectly. In the wheat market, for example, there are thousands of farmers who sell wheat and millions of consumers who use wheat and wheat products. Because no single buyer or seller can influence the price of wheat, each takes the price as given.

Not all goods and services, however, are sold in perfectly competitive markets. Some markets have only one seller, and this seller sets the price. Such a seller is called a *monopoly*. Your local cable television company, for instance, may be a monopoly. Residents of your town probably have only one cable company from which to buy this service.

Some markets fall between the extremes of perfect competition and monopoly. One such market, called an *oligopoly*, has a few sellers that do not always compete aggressively. Airline routes are an example. If a route between two cities is serviced by only two or three carriers, the carriers may avoid rigorous competition to keep prices high. Another type of market is *monopolistically competitive*; it contains many sellers, each offering a slightly different product. Because the products are not exactly the same, each seller has some ability to set the price for its own product. An example is the software industry. Many word processing programs compete with one another for users, but every program is different from every other and has its own price.
Despite the diversity of market types we find in the world, we begin by studying perfect competition. Perfectly competitive markets are the easiest to analyze. Moreover, because some degree of competition is present in most markets, many of the lessons that we learn by studying supply and demand under perfect competition apply in more complicated markets as well.

**DEMAND**

We begin our study of markets by examining the behavior of buyers. Here we consider what determines the **quantity demanded** of any good, which is the amount of the good that buyers are willing and able to purchase. To focus our thinking, let’s keep in mind a particular good—ice cream.

**WHAT DETERMINES THE QUANTITY AN INDIVIDUAL DEMANDS?**

Consider your own demand for ice cream. How do you decide how much ice cream to buy each month, and what factors affect your decision? Here are some of the answers you might give.

**Price.** If the price of ice cream rose to P50 per scoop, you would buy less ice cream. You might buy frozen yogurt instead. If the price of ice cream fell to P5 per scoop, you would buy more. Because the quantity demanded falls as the price rises and rises as the price falls, we say that the quantity demanded is negatively related to the price. This relationship between price and quantity demanded is true for most goods in the economy and, in fact, is so pervasive that economists call it the **law of demand**: Other things equal, when the price of a good rises, the quantity demanded of the good falls.

**Income.** What would happen to your demand for ice cream if you lost your job one summer? Most likely, it would fall. A lower income means that you have less to spend in total, so you would have to spend less on some—and probably most—goods. If the demand for a good falls when income falls, the good is called a **normal good**.

Not all goods are normal goods. If the demand for a good rises when income falls, the good is called an **inferior good**. An example of an inferior good might be bus rides. As your income falls, you are less likely to buy a car or take a cab, and more likely to ride the bus.

**Prices of Related Goods.** Suppose that the price of frozen yogurt falls. The law of demand says that you will buy more frozen yogurt. At the same time, you will probably buy less ice cream. Because ice cream and frozen yogurt are both cold, sweet, creamy desserts, they satisfy similar desires. When a fall in the price of one good reduces the demand for another good, the two goods are called **substitutes**. Substitutes are often pairs of goods that are used in place of each other, such as hot dogs and hamburgers, sweaters and sweatshirts, and movie tickets and video rentals.
Now suppose that the price of hot fudge falls. According to the law of demand, you will buy more hot fudge. Yet, in this case, you will buy more ice cream as well, because ice cream and hot fudge are often used together. When a fall in the price of one good raises the demand for another good, the two goods are called **complements**. Complements are often pairs of goods that are used together, such as gasoline and automobiles, computers and software, and skis and ski lift tickets.

**Tastes.** The most obvious determinant of your demand is your tastes. If you like ice cream, you buy more of it. Economists normally do not try to explain people’s tastes because tastes are based on historical and psychological forces that are beyond the realm of economics. Economists do, however, examine what happens when tastes change.

**Expectations.** Your expectations about the future may affect your demand for a good or service today. For example, if you expect to earn a higher income next month, you may be more willing to spend some of your current savings buying ice cream. As another example, if you expect the price of ice cream to fall tomorrow, you may be less willing to buy an ice-cream cone at today’s price.

**THE DEMAND SCHEDULE AND THE DEMAND CURVE**

We have seen that many variables determine the quantity of ice cream a person demands. Imagine that we hold all these variables constant except one—the price. Let’s consider how the price affects the quantity of ice cream demanded.

The table below shows how many ice-cream cones Catherine buys each month at different prices of ice cream. If ice cream is free, Catherine eats 12 cones. At $0.50 per cone, Catherine buys 10 cones. As the price rises further, she buys fewer and fewer cones. When the price reaches $3.00, Catherine doesn’t buy any ice cream at all. The table below is a **demand schedule**, a table that shows the relationship between the price of a good and the quantity demanded. (Economists use the term schedule because the table, with its parallel columns of numbers, resembles a train schedule.)

<table>
<thead>
<tr>
<th>Price of Ice-Cream Cone</th>
<th>Quantity of Cones Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>12</td>
</tr>
<tr>
<td>0.50</td>
<td>10</td>
</tr>
<tr>
<td>1.00</td>
<td>8</td>
</tr>
<tr>
<td>1.50</td>
<td>6</td>
</tr>
<tr>
<td>2.00</td>
<td>4</td>
</tr>
<tr>
<td>2.50</td>
<td>2</td>
</tr>
<tr>
<td>3.00</td>
<td>0</td>
</tr>
</tbody>
</table>
Observe the graph of the numbers in the table. By convention, the price of ice cream is on the vertical axis, and the quantity of ice cream demanded is on the horizontal axis. The downward-sloping line relating price and quantity demanded is called the demand curve.

CETERIS PARIBUS [revisited]

Whenever you see a demand curve, remember that it is drawn holding many things constant. Catherine’s demand curve in the graph shows what happens to the quantity of ice cream Catherine demands when only the price of ice cream varies. The curve is drawn assuming that Catherine’s income, tastes, expectations, and the prices of related products are not changing.

Economists use the term ceteris paribus to signify that all the relevant variables, except those being studied at that moment, are held constant. The Latin phrase literally means “other things being equal.” The demand curve slopes downward because, ceteris paribus, lower prices mean a greater quantity demanded.

Although the term ceteris paribus refers to a hypothetical situation in which some variables are assumed to be constant, in the real world many things change at the same time. For this reason, when we use the tools of supply and demand to analyze events or policies, it is important to keep in mind what is being held constant and what is not.

MARKET DEMAND VERSUS INDIVIDUAL DEMAND

So far we have talked about an individual’s demand for a product. To analyze how markets work, we need to determine the market demand, which is the sum of all the individual demands for a particular good or service.
The table below shows the demand schedules for ice cream of two individuals—Catherine and Nicholas. At any price, Catherine's demand schedule tells us how much ice cream she buys, and Nicholas's demand schedule tells us how much ice cream he buys. The market demand is the sum of the two individual demands.

Because market demand is derived from individual demands, it depends on all those factors that determine the demand of individual buyers. Thus, market demand depends on buyers’ incomes, tastes, expectations, and the prices of related goods. It also depends on the number of buyers. (If Peter, another consumer of ice cream, were to join Catherine and Nicholas, the quantity demanded in the market would be higher at every price.) The demand schedules in the table below show what happens to quantity demanded as the price varies while all the other variables that determine quantity demanded are held constant.

<table>
<thead>
<tr>
<th>Price of Ice-Cream Cone</th>
<th>Catherine</th>
<th>Nicholas</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>12</td>
<td>+ 7</td>
<td>= 19</td>
</tr>
<tr>
<td>0.50</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>1.00</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>1.50</td>
<td>6</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2.00</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>2.50</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3.00</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**INDIVIDUAL AND MARKET DEMAND SCHEDULES.** The quantity demanded in a market is the sum of the quantities demanded by all the buyers.
The graph below the table shows the demand curves that correspond to these demand schedules. Notice that we sum the individual demand curves horizontally to obtain the market demand curve. That is, to find the total quantity demanded at any price, we add the individual quantities found on the horizontal axis of the individual demand curves. Because we are interested in analyzing how markets work, we will work most often with the market demand curve. The market demand curve shows how the total quantity demanded of a good varies as the price of the good varies.

**SHIFTS IN THE DEMAND CURVE**

Suppose that the American Medical Association suddenly announces a new discovery: People who regularly eat ice cream live longer, healthier lives. How does this announcement affect the market for ice cream? The discovery changes people’s tastes and raises the demand for ice cream. At any given price, buyers now want to purchase a larger quantity of ice cream, and the demand curve for ice cream shifts to the right.

Whenever any determinant of demand changes, other than the good’s price, the demand curve shifts. As the graph below shows, any change that increases the quantity demanded at every price shifts the demand curve to the right. Similarly, any change that reduces the quantity demanded at every price shifts the demand curve to the left.
The table that follows lists the variables that determine the quantity demanded in a market and how a change in the variable affects the demand curve. Notice that price plays a special role in this table. Because price is on the vertical axis when we graph a demand curve, a change in price does not shift the curve but represents a movement along it. By contrast, when there is a change in income, the prices of related goods, tastes, expectations, or the number of buyers, the quantity demanded at each price changes; this is represented by a shift in the demand curve.

<table>
<thead>
<tr>
<th>VARIABLES THAT AFFECT QUANTITY DEMANDED</th>
<th>A CHANGE IN THIS VARIABLE . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>Represents a movement along the demand curve</td>
</tr>
<tr>
<td>Income</td>
<td>Shifts the demand curve</td>
</tr>
<tr>
<td>Prices of related goods</td>
<td>Shifts the demand curve</td>
</tr>
<tr>
<td>Tastes</td>
<td>Shifts the demand curve</td>
</tr>
<tr>
<td>Expectations</td>
<td>Shifts the demand curve</td>
</tr>
<tr>
<td>Number of buyers</td>
<td>Shifts the demand curve</td>
</tr>
</tbody>
</table>

In summary, the demand curve shows what happens to the quantity demanded of a good when its price varies, holding constant all other determinants of quantity demanded. When one of these other determinants changes, the demand curve shifts.
CASE STUDY: TWO WAYS TO REDUCE THE QUANTITY OF SMOKING DEMANDED

Public policymakers often want to reduce the amount that people smoke. There are two ways that policy can attempt to achieve this goal. One way to reduce smoking is to shift the demand curve for cigarettes and other tobacco products. Public service announcements, mandatory health warnings on cigarette packages, and the prohibition of cigarette advertising on television are all policies aimed at reducing the quantity of cigarettes demanded at any given price. If successful, these policies shift the demand curve for cigarettes to the left, as in panel (a) of the “Case Study Graph”.

Alternatively, policymakers can try to raise the price of cigarettes. If the government taxes the manufacture of cigarettes, for example, cigarette companies pass much of this tax on to consumers in the form of higher prices. A higher price encourages smokers to reduce the numbers of cigarettes they smoke. In this case, the reduced amount of smoking does not represent a shift in the demand curve. Instead, it represents a movement along the same demand curve to a point with a higher price and lower quantity, as in panel (b) of the “Case Study Graph”. How much does the amount of smoking respond to changes in the price of cigarettes? Economists have attempted to answer this question by studying what happens when the tax on cigarettes changes. They have found that a 10 percent increase in the price causes a 4 percent reduction in the quantity demanded. Teenagers are found to be especially sensitive to the price of cigarettes: A 10 percent increase in the price causes a 12 percent drop in teenage smoking.

A related question is how the price of cigarettes affects the demand for illicit drugs, such as marijuana. Opponents of cigarette taxes often argue that tobacco and marijuana are substitutes, so that high cigarette prices encourage marijuana use. By contrast, many experts on substance abuse view tobacco as a “gateway drug” leading the young to experiment with other harmful substances. Most studies of the data are consistent with this view: They find that lower cigarette prices are associated with greater use of marijuana. In other words, tobacco and marijuana appear to be complements rather than substitutes.
QUICK QUIZ: List the determinants of the quantity of pizza you demand. Make up an example of a demand schedule for pizza, and graph the implied demand curve. Give an example of something that would shift this demand curve. Would a change in the price of pizza shift this demand curve?
We now turn to the other side of the market and examine the behavior of sellers. The quantity supplied of any good or service is the amount that sellers are willing and able to sell. Once again, to focus our thinking, let’s consider the market for ice cream and look at the factors that determine the quantity supplied.

WHAT DETERMINES THE QUANTITY AN INDIVIDUAL SUPPLIES?

Imagine that you are running Student Sweets, a company that produces and sells ice cream. What determines the quantity of ice cream you are willing to produce and offer for sale? Here are some possible answers.

Price. The price of ice cream is one determinant of the quantity supplied. When the price of ice cream is high, selling ice cream is profitable, and so the quantity supplied is large. As a seller of ice cream, you work long hours, buy many ice-cream machines, and hire many workers. By contrast, when the price of ice cream is low, your business is less profitable, and so you will produce less ice cream. At an even lower price, you may choose to go out of business altogether, and your quantity supplied falls to zero.

Because the quantity supplied rises as the price rises and falls as the price falls, we say that the quantity supplied is positively related to the price of the good. This relationship between price and quantity supplied is called the law of supply: Other things equal, when the price of a good rises, the quantity supplied of the good also rises.

Input Prices. To produce its output of ice cream, Student Sweets uses various inputs: cream, sugar, flavoring, ice-cream machines, the buildings in which the ice cream is made, and the labor of workers to mix the ingredients and operate the machines. When the price of one or more of these inputs rises, producing ice cream is less profitable, and your firm supplies less ice cream. If input prices rise substantially, you might shut down your firm and supply no ice cream at all. Thus, the supply of a good is negatively related to the price of the inputs used to make the good.

Technology. The technology for turning the inputs into ice cream is yet another determinant of supply. The invention of the mechanized ice-cream machine, for example, reduced the amount of labor necessary to make ice cream. By reducing firms’ costs, the advance in technology raised the supply of ice cream.

Expectations. The amount of ice cream you supply today may depend on your expectations of the future. For example, if you expect the price of ice cream to rise in the future, you will put some of your current production into storage and supply less to the market today.

THE SUPPLY SCHEDULE AND THE SUPPLY CURVE

Consider how the quantity supplied varies with the price, holding input prices, technology, and expectations constant. In the table that follows, it shows the quantity supplied by Ben, an ice-cream seller, at various prices of ice cream. At a price below $1.00, Ben does not supply any ice cream at all. As the price rises, he supplies a greater and greater quantity. This table is called the supply schedule.
The graph below the table shows the relationship between the quantity of ice cream supplied and the price. The curve relating price and quantity supplied is called the supply curve. The supply curve slopes upward because, ceteris paribus, a higher price means a greater quantity supplied.

<table>
<thead>
<tr>
<th>Price of Ice-Cream Cone</th>
<th>Quantity of Cones Supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>0</td>
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<tr>
<td>0.50</td>
<td>0</td>
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<tr>
<td>1.00</td>
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<td>1.50</td>
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<td>2.00</td>
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<td>2.50</td>
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<tr>
<td>3.00</td>
<td>5</td>
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</tbody>
</table>

**BEN’S SUPPLY CURVE.** This supply curve, which graphs the supply schedule in the table above, shows how the quantity supplied of the good changes as its price varies. Because a higher price increases the quantity supplied, the supply curve slopes upward.
MARKET SUPPLY VERSUS INDIVIDUAL SUPPLY

Just as market demand is the sum of the demands of all buyers, market supply is the sum of the supplies of all sellers. The table below shows the supply schedules for two ice-cream producers—Ben and Jerry. At any price, Ben’s supply schedule tells us the quantity of ice cream Ben supplies, and Jerry’s supply schedule tells us the quantity of ice cream Jerry supplies. The market supply is the sum of the two individual supplies.

<table>
<thead>
<tr>
<th>Price of Ice-Cream Cone</th>
<th>Ben</th>
<th>Jerry</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.50</td>
<td>0</td>
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<td>1.00</td>
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<tr>
<td>1.50</td>
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<td>10</td>
</tr>
<tr>
<td>3.00</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>

Market supply depends on all those factors that influence the supply of individual sellers, such as the prices of inputs used to produce the good, the available technology, and expectations. In addition, the supply in a market depends on the number of sellers. (If Ben or Jerry were to retire from the ice-cream business, the supply in the market would fall.) The supply schedules in the previous table show what happens to quantity supplied as the price varies while all the other variables that determine quantity supplied are held constant. The graph below shows the supply curves that correspond to the supply schedules in the table above. As with demand curves, we sum the individual supply curves horizontally to obtain the market supply curve. That is, to find the total quantity supplied at any price, we add the individual quantities found on the horizontal axis of the individual supply curves. The market supply curve shows how the total quantity supplied varies as the price of the good varies.

![Graph showing market supply curves](https://example.com/graph.png)
SHIFTS IN THE SUPPLY CURVE

Suppose that the price of sugar falls. How does this change affect the supply of ice cream? Because sugar is an input into producing ice cream, the fall in the price of sugar makes selling ice cream more profitable. This raises the supply of ice cream:

At any given price, sellers are now willing to produce a larger quantity. Thus, the supply curve for ice cream shifts to the right. Whenever there is a change in any determinant of supply, other than the good’s price, the supply curve shifts. As the graph below shows, any change that raises quantity supplied at every price shifts the supply curve to the right. Similarly, any change that reduces the quantity supplied at every price shifts the supply curve to the left.
The table below lists the variables that determine the quantity supplied in a market and how a change in the variable affects the supply curve. Once again, price plays a special role in the table. Because price is on the vertical axis when we graph a supply curve, a change in price does not shift the curve but represents a movement along it. By contrast, when there is a change in input prices, technology, expectations, or the number of sellers, the quantity supplied at each price changes; this is represented by a shift in the supply curve.

<table>
<thead>
<tr>
<th>VARIABLES THAT AFFECT QUANTITY SUPPLIED</th>
<th>A CHANGE IN THIS VARIABLE . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>Represents a movement along the supply curve</td>
</tr>
<tr>
<td>Input prices</td>
<td>Shifts the supply curve</td>
</tr>
<tr>
<td>Technology</td>
<td>Shifts the supply curve</td>
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<tr>
<td>Expectations</td>
<td>Shifts the supply curve</td>
</tr>
<tr>
<td>Number of sellers</td>
<td>Shifts the supply curve</td>
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</tbody>
</table>

In summary, the supply curve shows what happens to the quantity supplied of a good when its price varies, holding constant all other determinants of quantity supplied. When one of these other determinants changes, the supply curve shifts.

QUICK QUIZ: List the determinants of the quantity of pizza supplied. Make up an example of a supply schedule for pizza, and graph the implied supply curve. Give an example of something that would shift this supply curve. Would a change in the price of pizza shift this supply curve?

SUPPLY AND DEMAND TOGETHER

Having analyzed supply and demand separately, we now combine them to see how they determine the quantity of a good sold in a market and its price.

EQUILIBRIUM

The figure below shows the market supply curve and market demand curve together. Notice that there is one point at which the supply and demand curves intersect; this point is called the market’s equilibrium. The price at which these two curves cross is called the equilibrium price, and the quantity is called the equilibrium quantity. Here the equilibrium price is $2.00 per cone, and the equilibrium quantity is 7 ice-cream cones.

The dictionary defines the word equilibrium as a situation in which various forces are in balance—and this also describes a market’s equilibrium. At the equilibrium price, the quantity of the good that buyers are willing and able to buy exactly balances the quantity that sellers are willing and able to sell. The equilibrium price is sometimes called the market-clearing price.
because, at this price, everyone in the market has been satisfied: Buyers have bought all they want to buy, and sellers have sold all they want to sell.

The actions of buyers and sellers naturally move markets toward the equilibrium of supply and demand. To see why, consider what happens when the market price is not equal to the equilibrium price.

Suppose first that the market price is above the equilibrium price, as in panel (a) of the graph showing “Markets Not In Equilibrium”. At a price of $2.50 per cone, the quantity of the good supplied (10 cones) exceeds the quantity demanded (4 cones). There is a surplus of the good: Suppliers are unable to sell all they want at the going price. When there is a surplus in the ice-cream market, for instance, sellers of ice cream find their freezers increasingly full of ice cream they would like to sell but cannot. They respond to the surplus by cutting their prices. Prices continue to fall until the market reaches the equilibrium.

Suppose now that the market price is below the equilibrium price, as in panel (b) of graph showing “Markets Not In Equilibrium”. In this case, the price is $1.50 per cone, and the quantity of the good demanded exceeds the quantity supplied. There is a shortage of the good: Demanders are unable to buy all they want at the going price. When a shortage occurs in the ice-cream market, for instance, buyers have to wait in long lines for a chance to buy one of the few cones that are available. With too many buyers chasing too few goods, sellers can respond to the shortage by raising their prices without losing sales. As prices rise, the market once again moves toward the equilibrium.
Thus, the activities of the many buyers and sellers automatically push the market price toward the equilibrium price. Once the market reaches its equilibrium, all buyers and sellers are satisfied, and there is no upward or downward pressure on the price. How quickly equilibrium is reached varies from market to market, depending on how quickly prices adjust. In most free markets, however, surpluses and shortages are only temporary because prices eventually move toward their equilibrium levels. Indeed, this phenomenon is so pervasive that it is sometimes called the **law of supply and demand**: The price of any good adjusts to bring the supply and demand for that good into balance.
THREE STEPS TO ANALYZING CHANGES IN EQUILIBRIUM

So far we have seen how supply and demand together determine a market’s equilibrium, which in turn determines the price of the good and the amount of the good that buyers purchase and sellers produce. Of course, the equilibrium price and quantity depend on the position of the supply and demand curves. When some event shifts one of these curves, the equilibrium in the market changes. The analysis of such a change is called comparative statics because it involves comparing two static situations—an old and a new equilibrium.

When analyzing how some event affects a market, we proceed in three steps. First, we decide whether the event shifts the supply curve, the demand curve, or in some cases both curves. Second, we decide whether the curve shifts to the right or to the left. Third, we use the supply-and-demand diagram to examine how the shift affects the equilibrium price and quantity.

Example: A Change in Demand. Suppose that one summer the weather is very hot. How does this event affect the market for ice cream? To answer this question, let’s follow our three steps.

1. The hot weather affects the demand curve by changing people’s taste for ice cream. That is, the weather changes the amount of ice cream that people want to buy at any given price. The supply curve is unchanged because the weather does not directly affect the firms that sell ice cream.
2. Because hot weather makes people want to eat more ice cream, the demand curve shifts to the right. The graph below shows this increase in demand as the shift in the demand curve from D1 to D2. This shift indicates that the quantity of ice cream demanded is higher at every price.
3. As the graph shows, the increase in demand raises the equilibrium price from $2.00 to $2.50 and the equilibrium quantity from 7 to 10 cones. In other words, the hot weather increases the price of ice cream and the quantity of ice cream sold.

![Supply and Demand Diagram](image-url)
**Shifts in Curves versus Movements along Curves.** Notice that when hot weather drives up the price of ice cream, the quantity of ice cream that firms supply rises, even though the supply curve remains the same. In this case, economists say there has been an increase in “quantity supplied” but no change in “supply.”

“Supply” refers to the position of the supply curve, whereas the “quantity supplied” refers to the amount suppliers wish to sell. In this example, supply does not change because the weather does not alter firms’ desire to sell at any given price. Instead, the hot weather alters consumers’ desire to buy at any given price and thereby shifts the demand curve. The increase in demand causes the equilibrium price to rise. When the price rises, the quantity supplied rises. This increase in quantity supplied is represented by the movement along the supply curve.

To summarize, a shift in the supply curve is called a “change in supply,” and a shift in the demand curve is called a “change in demand.” A movement along a fixed supply curve is called a “change in the quantity supplied,” and a movement along a fixed demand curve is called a “change in the quantity demanded.”

**Example: A Change in Supply.** Suppose that, during another summer, an earthquake destroys several ice-cream factories. How does this event affect the market for ice cream? Once again, to answer this question, we follow our three steps.

1. The earthquake affects the supply curve. By reducing the number of sellers, the earthquake changes the amount of ice cream that firms produce and sell at any given price. The demand curve is unchanged because the earthquake does not directly change the amount of ice cream households wish to buy.
2. The supply curve shifts to the left because, at every price, the total amount that firms are willing and able to sell is reduced. The graph below illustrates this decrease in supply as a shift in the supply curve from S1 to S2.
3. As the graph shows, the shift in the supply curve raises the equilibrium price from $2.00 to $2.50 and lowers the equilibrium quantity from 7 to 4 cones. As a result of the earthquake, the price of ice cream rises, and the quantity of ice cream sold falls.
Example: A Change in Both Supply and Demand. Now suppose that the hot weather and the earthquake occur at the same time. To analyze this combination of events, we again follow our three steps.

1. We determine that both curves must shift. The hot weather affects the demand curve because it alters the amount of ice cream that households want to buy at any given price. At the same time, the earthquake alters the supply curve because it changes the amount of ice cream that firms want to sell at any given price.

2. The curves shift in the same directions as they did in our previous analysis: The demand curve shifts to the right, and the supply curve shifts to the left. The graph below illustrates these shifts.

3. As the graph shows, there are two possible outcomes that might result, depending on the relative size of the demand and supply shifts. In both cases, the equilibrium price rises. In panel (a), where demand increases substantially while supply falls just a little, the equilibrium quantity also rises. By contrast, in panel (b), where supply falls substantially while demand rises just a little, the equilibrium quantity falls. Thus, these events certainly raise the price of ice cream, but their impact on the amount of ice cream sold is ambiguous.
(a) Price Rises, Quantity Rises

- Large increase in demand
- Small decrease in supply
- Initial equilibrium
- New equilibrium

(b) Price Rises, Quantity Falls

- Small increase in demand
- Large decrease in supply
- Initial equilibrium
- New equilibrium
Summary. We have just seen three examples of how to use supply and demand curves to analyze a change in equilibrium. Whenever an event shifts the supply curve, the demand curve, or perhaps both curves, you can use these tools to predict how the event will alter the amount sold in equilibrium and the price at which the good is sold. The table below shows the predicted outcome for any combination of shifts in the two curves. To make sure you understand how to use the tools of supply and demand, pick a few entries in this table and make sure you can explain to yourself why the table contains the prediction it does.

WHAT HAPPENS TO PRICE AND QUANTITY WHEN SUPPLY OR DEMAND SHIFTS?

<table>
<thead>
<tr>
<th></th>
<th>No Change in Supply</th>
<th>An Increase in Supply</th>
<th>A Decrease in Supply</th>
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<tbody>
<tr>
<td>No Change in Demand</td>
<td>P same</td>
<td>P down</td>
<td>P up</td>
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<td></td>
<td>Q same</td>
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<td>An Increase in Demand</td>
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<td>A Decrease in Demand</td>
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<td>Q down</td>
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QUICK QUIZ: Analyze what happens to the market for pizza if the price of tomatoes rises. Analyze what happens to the market for pizza if the price of hamburgers falls.

CONCLUSION: HOW PRICES ALLOCATE RESOURCES

This chapter has analyzed supply and demand in a single market. Although our discussion has centered around the market for ice cream, the lessons learned here apply in most other markets as well. Whenever you go to a store to buy something, you are contributing to the demand for that item. Whenever you look for a job, you are contributing to the supply of labor services. Because supply and demand are such pervasive economic phenomena, the model of supply and demand is a powerful tool for analysis. We will be using this model repeatedly in the following chapters.

One of the Ten Principles of Economics discussed in Chapter 1 is that markets are usually a good way to organize economic activity. Although it is still too early to judge whether market outcomes are good or bad, in this chapter we have begun to see how markets work. In any economic system, scarce resources have to be allocated among competing uses. Market economies harness the forces of supply and demand to serve that end. Supply and demand
together determine the prices of the economy’s many different goods and services; prices in turn are the signals that guide the allocation of resources.

For example, consider the allocation of beachfront land. Because the amount of this land is limited, not everyone can enjoy the luxury of living by the beach. Who gets this resource? The answer is: whoever is willing and able to pay the price. The price of beachfront land adjusts until the quantity of land demanded exactly balances the quantity supplied. Thus, in market economies, prices are the mechanism for rationing scarce resources.

Similarly, prices determine who produces each good and how much is produced. For instance, consider farming. Because we need food to survive, it is crucial that some people work on farms. What determines who is a farmer and who is not? In a free society, there is no government planning agency making this decision and ensuring an adequate supply of food. Instead, the allocation of workers to farms is based on the job decisions of millions of workers. This decentralized system works well because these decisions depend on prices. The prices of food and the wages of farm workers (the price of their labor) adjust to ensure that enough people choose to be farmers.

If a person had never seen a market economy in action, the whole idea might seem preposterous. Economies are large groups of people engaged in many interdependent activities. What prevents decentralized decision making from degenerating into chaos? What coordinates the actions of the millions of people with their varying abilities and desires? What ensures that what needs to get done does in fact get done? The answer, in a word, is prices. If market economies are guided by an invisible hand, as Adam Smith famously suggested, then the price system is the baton that the invisible hand uses to conduct the economic orchestra.