

20. Why does a new car lose so much of its value in the first year? Is it because Americans have an irrational attachment to cars that are new rather than used?
- Which year-old car is more likely to be on the used-car market: one that performed handsomely for its owner or one that had to be taken in regularly for repairs during its first year?
 - Which set of vehicles being offered for sale will contain a larger percentage of vehicles with defects known to the seller but unknown to the buyer: new cars or year-old cars?
 - What does all this imply about the prices sellers are willing to accept and that buyers are willing to offer for year-old cars, relative to what they would be if all buyers and sellers had complete information?
 - Why do used-car dealers sometimes provide warranties with the cars they sell and at other times advertise "As Is—No Warranties, All Sales Final"?

Substitutes Everywhere: The Concept of Demand

3

LEARNING OBJECTIVES

- Establish the argument that there are substitutes for all scarce goods.
- Introduce the insight that choices are made at the margin.
- Introduce and explain the law of demand.
- Clearly distinguish between demand and quantity demanded.
- Investigate the factors that shift the demand curve.
- Develop and apply the price elasticity of demand.

So far we've discussed trade-offs quite a bit. We've learned that *most goods are scarce*, which means that they can be obtained only by sacrificing some other good, something else of value. In this chapter, we will consider a further implication of scarcity—*there are substitutes for anything*. Yes, anything. It follows that intelligent choice—choice that obtains the most of what is wanted from what is available, economizing choice—requires comparing the expected additional costs of using alternative means against the expected additional benefits of doing so. *Everyday choice entails trade-offs*. We shall develop the notion of consumer demand to explain how buyers face trade-offs and how market price signals encourage buyers to economize.

On the Notion of "Needs"

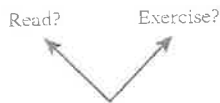
What is the relationship between our claim that people face "trade-offs" versus the claim that people have genuine "needs?" Consider, for example, these four statements:

- The average person needs eight glasses of water per day in order to maintain optimal health.
- All citizens should be able to obtain the medical care they need regardless of their ability to pay.
- A diabetic needs insulin.
- You need to read your economics textbook.

These statements all have the notion of *necessity* in common. Although the economic way of thinking doesn't deny that real people have real needs, it does suggest that these statements can be seriously misleading. We could use a little thinking "outside the box."

Consider the last statement first. *You need to read your economics textbook.* The professor who put this on her syllabus surely believes it's true. Indeed, failure to keep up with the reading often does explain poor grades. And, after all, if your professor holds a Ph.D., then you the student received your doctor's orders—something like a prescription. But the issue isn't merely what your professor believes you need to do in order to pass the class; the issue is what will students actually do? Students face scarcity and therefore an array of trade-offs. Are you aware of any students who chose *not* to even purchase a textbook because its price was too high? Or what about any students who paid full price for the text, but never bothered to open it up during the semester? (They must have considered their expenditure a "sunk cost"—something we'll discuss in a later chapter.) What of the students who valiantly attempt to read their econ book but also "need" to read their calculus, philosophy, and physics textbooks as well, and therefore merely skim, rather than carefully read each assigned chapter? An upcoming physics midterm raises the cost of reading the assigned chapter in economics.

All students face this kind of problem. *Reading the economics textbook entails sacrifices.* As the sacrifice or cost increases, students tend to do less. They search, instead, for *substitutes*. For example, you might ask a classmate (who read the chapter) about the textbook's main points; you might sleep with it under your pillow and hope you absorb its contents; you might wish for pure luck when you take your exams; or, if you're really brave, you might go to your professor's office hours and ask her to clarify the issues in the chapter, insinuating that you've read the material but still don't completely understand it (we know all of the tricks). These are all substitutes for reading the book.



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While that might resonate with your own experience, what about the first statement? *The average person needs eight glasses of water per day in order to maintain optimal health.* Surely most medical authorities believe this is true. And now we're talking about a person's *health*, rather than mere grades in a college class. Still, another fact remains. Even the "average person" might be willing to drink less water in favor of more coffee, beer, or soda. Or someone might eat a tangerine instead. None of these are water; they are *substitutes* for water. (By the way, have you also managed to eat your required daily servings of fruit and vegetables lately? If not, why not?) And what of the person who currently does drink eight glasses of water per day? Is this person likely to continue to do so if the price of water jumps to, say, \$2 a glass? \$5? \$50?

Okay, now on to the apparently tougher statements. *All citizens should be able to obtain the medical care they need regardless of their ability to pay.* But how much medical care does any person need? We might all agree that a woman with a terribly inflamed appendix and no money should have an appendectomy completely at the taxpayers' expense if she is unable to meet any of the costs herself. But what of the teenager with a mild case of acne? The services of physicians and others in the medical community are scarce goods, and they would not cease being scarce even if every physician were required to treat patients without charging them. There just would not be enough physicians to go around if everyone consulted a doctor for every minor ailment. Indeed, the lower the price of visiting a doctor, the more frequently people substitute a trip to the doctor for such other remedies as going to bed, eating enough fruits and vegetables, taking it easy, or waiting and hoping. One could confidently predict that lower monetary fees would result in higher costs of *other* sorts—such as waiting in line for many hours, being whisked through the office exam, and so on, because the services of physicians are scarce goods.

A diabetic needs insulin. True. Without it the diabetic would be terribly uncomfortable at the least and most likely face death. So surely a diabetic, although he might substitute other goods for eight glasses of water a day, or sacrifice reading his textbook for discussions with classmates, surely faces no substitutes for insulin, right? Not so fast. Common substitutes include a better diet and appropriate exercise. Holistic care and organic medicines are also increasing in popularity (even if they are not as effective as insulin, the fact remains that people do use these in place of insulin, not unlike the student who might wish for luck rather than read the textbook). Because even insulin is a scarce good for most diabetics, its use entails *trade-offs*, or the sacrifice of *other* goods they value.

*Scarce goods can be obtained
only by sacrificing other
goods.*

Marginal Values

Which is more valuable, water or diamonds? Most people who are asked that question answer without hesitation: "water." But follow up with a slightly altered question and they waver: Which is more valuable, a glass of water or a glass of diamonds? If they again answer "water," we can ask which they would take if offered the choice between a glass of water and a glass of diamonds. Diamonds win every time.

How can people say that water is more valuable than diamonds when they would, without a moment's hesitation, take diamonds rather than water if offered the choice? Because, they say, water is a necessity for life; diamonds aren't. True, the water would be more valuable than another diamond if they were in the middle of a desert dying of thirst. But that response confuses the different contexts, and trade-offs, within which our choices are conducted. *Our choices depend on the situations we face.*

An old newspaper is more valuable than the collected works of Shakespeare if you are trying to swat a mosquito intent on giving you a case of yellow fever. A toothpick is more valuable than a computer if the piece of corn stuck between your teeth is driving you insane. Just about anything could be more valuable than anything else *under appropriate circumstances*, because, like our choices, *values depend on the situation, too.*

Economists have their own way of saying the same thing. *The values that matter are marginal values.* Economic analysis is basically marginal analysis. Many economists even use the word *marginalism* to refer to what we have called "the economic way of thinking." *Marginal* means "on or at the edge" (the margin on this page is the edge of the page). A marginal benefit or a marginal cost is an *additional* benefit or cost. Economic theory is marginal analysis because it assumes that people make decisions by weighing expected additional benefits against expected additional costs, all measured from the frontier on which the decision maker currently stands. Nothing matters in economic decision making, except marginal benefits and marginal costs.

What do I expect to gain?
What do I expect to sacrifice?

Forks in the Road: Everyday Choices Are Marginal Choices

A bit too abstract? Okay, then, suppose that your boyfriend phones you at 9:00 in the evening while you're studying desperately for tomorrow's physics exam. (You've already given up your assigned, required reading for your economics class.) He wants to come over for a couple of hours. You say you have to study. He pleads. You say no. He asks plaintively, "Is physics more



important than I am?" And if you've grasped the economic way of thinking, you respond without hesitation: "Only at the margin."

If your boyfriend still doesn't get it, suggest that he enrolls next semester in an economics class and go back to your studies. The issue of your friend's value versus the value of physics just doesn't arise in this situation. The question, rather, is whether an *additional* two hours with your friend on this margin—on this particular evening—is worth more than an *additional* two hours with your physics text.

Your friend is making a common mistake: thinking in terms of "all or nothing." "Me" versus "physics." But that just isn't the choice when your friend phones on the evening before your exam. In fact, that is rarely the choice we face when we're called on to make decisions. It's usually more of this and less of that versus more of that and less of this, measured from the position in which we find ourselves when called on to decide. The economic way of thinking rejects the all-or-nothing approach in favor of attention to marginal benefits and marginal costs. This is true for people who economize on *any* scarce good, including a basic "necessity" such as water.

The Demand Curve

The concept of "needs" encourages all-or-nothing thinking and fails to appreciate the idea of marginal thinking. People *do* have needs. But, in a world of scarcity individuals incur trade-offs—choosing less of one good for more of another. That's why economists have developed the idea of "demand." Demand is a concept that relates amounts people want to obtain to the sacrifices they must make to obtain these amounts. It is a further, and very important, application of marginal analysis.

Consider, for example, Table 3-1, which depicts the amount of water people plan to use, at various prices, in a "typical" American town.

We can all agree that people do need water. But take a good look at the table. The table illustrates an interesting relationship, a relationship that has to do with the way those townspeople alter

Table 3-1

Price per Gallon (\$)	Gallons per Day (millions)
0.07	23
0.04	40
0.02	80
0.01	160
0.005	320

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How should I spend the next
two hours?

their planned water use when the price of water changes. If water is priced at 7 cents per gallon, a total of 23 million gallons would be used per day. Should the price of water fall—for whatever reason—people would plan to use more water. At 2 cents per gallon, people would plan to consume 80 million gallons per day; at a half a cent per gallon, they'd consume 320 million gallons per day. (The word *consume* doesn't necessarily mean they are all trying to drink that much water per day! It simply means they are trying to *acquire and use* that much water for a *variety of different purposes*.)

Things become more interesting when we illustrate the information in our table with the aid of the graph in Figure 3-1. The vertical axis shows those possible prices that might be charged for water, in cents per gallon. The horizontal axis shows the quantity of water that people in the community would plan to purchase at those prices. By plotting those points from the table, and connecting them together, we get a downward-sloping curve.

Economists call that a *demand curve*. A demand curve illustrates the amount of a good that consumers plan to purchase at any given price. We "read" a demand curve by taking some specific price and finding the corresponding point on the horizontal axis. That quantity represents the amount that people would plan to purchase. We call that the *quantity demanded*. The demand curve in our graph shows, for example, that if the price of water is \$0.005 per gallon, people will want to use about 320 gallons each day. That's their quantity demanded. They will

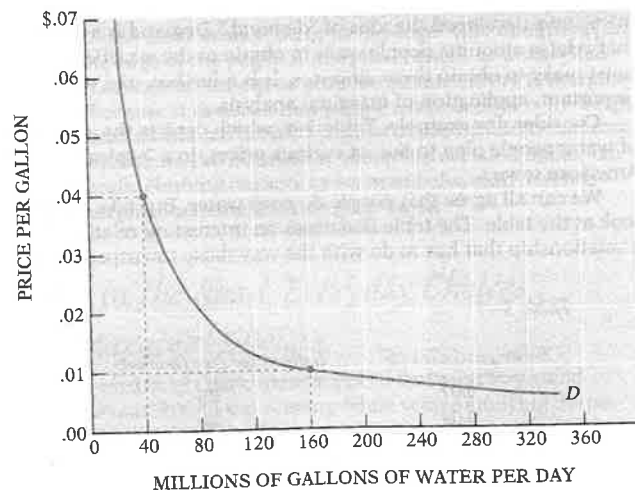


Figure 3-1 Demand for water for a "typical" American town

Quantity demanded: the amount that consumers plan to purchase at a given price.

Substitutes everywhere: The concept of demand

use water as if it had no value at all, or, more accurately, as if its value was about one-half cent per gallon, because that is in fact what they must pay to obtain water. When it's relatively cheap, people will of course use water for drinking, bathing, cooking, and washing clothes, but also for countless *other purposes*, such as filling swimming pools, watering lawns, washing cars, and so on. (These, too, are all acts of *consumption*.) Many homeowners will hose off rather than sweep the driveway and sidewalks after mowing the lawn; they will flush their toilets after each use; they will take long showers; and they will let the washing machine fill with water to do just a quarter load of laundry.

Double the price of water to \$0.01 per gallon, however, and households will begin to behave quite differently. People will tend to *alter their plans*. The quantity demanded will change. They will give up their least valuable uses for water and, according to the graph, cut their daily water consumption in half. Double the price again to \$0.02 and they will economize further. The same pattern unfolds at \$0.04 per gallon. Now the quantity demanded is only 40 million gallons per day. Many might water their lawns or wash their cars less frequently. Washing machines might be run only with full loads of dirty laundry. Others might decide not to fill their swimming pools at such high prices. Notice, even if the price were to reach \$0.07 per gallon, people do not go *completely* without water. Some 23 million gallons will still be consumed per day, most likely being devoted to the "most important" or most highly valued purposes in the eyes of the individual choosers.

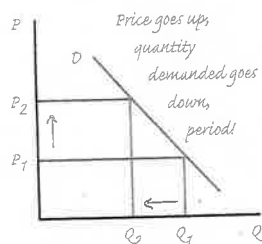
Looking at the graph, can you determine how much water this community *needs*? The economic way of thinking provides no special insights into how much water people need. We'll leave that up to physiologists. That's a part of *their* comparative advantage, not ours. But, the concept of demand, and the illustration of the demand curve for water, does offer a rather underappreciated insight: the economist's emphasis on *marginal analysis*. We find in this example that *consumers make marginal adjustments to changes in the price of water*. They don't normally engage in all-or-nothing trade-offs.

Instead, as *economizers*, people tend to *conserve* water when they face higher prices. They seek out *substitutes for water*. As water becomes more costly to acquire, they'll strive to "waste less water." They'll decide that some of their uses are no longer worth it. They'll seek out *more economically efficient* ways of accomplishing their goals. (Don't forget the ideas you learned in Chapter 2!) Those who washed off the grass clippings on the driveway may now be inclined to use a broom. They'll be more likely to install high-pressure showerheads. Rather than frequently water their lawns, some might decide for the longer run to plant more shade trees. A swimming pool might be replaced by a backyard trampoline. In these cases, we can say that brooms, shower heads, shade trees (and, with a bit of a stretch, even trampolines) are used as substitutes for water.

Water has many substitutes, in part because it is used for many different purposes.

A broom can be a substitute for water!

Law of demand: Negative relationship between price and quantity demanded, other things being constant.



The Law of Demand

The pattern of which we're speaking is so fundamental that some economists have been willing to assign it the status of a law: the law of demand. We call it a "law" because it applies not only to water, but to all scarce goods. It states: *If the price of a good increases, holding other things constant, the quantity demanded will decrease. Likewise, if the price of a good decreases, other things constant, the quantity demanded will increase.*

This law asserts that there is a negative or inverse relationship between the amount of anything that people will want to purchase and the price (sacrifice) they must pay to obtain it. *Price and the amount demanded move in opposite directions.* At higher prices, consumers will plan to purchase less; at lower prices they will strive to purchase more. Would you agree that this generalization can be called a law? Or can you think of exceptions? (What about insulin? Not yet—we want to tantalize you a bit longer.) Why would people be indifferent to the sacrifices they must make? Or prefer more sacrifice to less? That is what a person would be doing who bought more of something when the cost of obtaining it increased. Other things being constant, fewer tablets will be purchased at \$899 compared to \$599 each; more people will sign up for cell phone plans when the rates come down; Old Navy is likely to be crowded with eager teenage shoppers during a storewide sale. More students will reconsider a college education as the cost continues to escalate.

Demand and Quantity Demanded

In using the concept of demand, you must remain alert for the possibility that something else has changed in addition to the price. Your best protection is a clear grasp of the distinction between *demand* and *quantity demanded*. Commentators on economic events often use the word *demand* as a shorthand term for *quantity demanded*. That can and often does lead to error, as we shall see later.

Demand in economic theory is a relationship between two specific variables: price and the amount people plan to purchase. You can't state the demand for any good simply as an amount. Demand is always a *relationship* that connects different prices with the quantities (or amounts) that people would want to purchase at each of those prices. We express that fact by saying that demand is a schedule (in Table 3-1) or a curve. A movement from one row of the schedule to another, or from one point on the curve to another point on the curve, should always be called a change in the quantity demanded, not a change in the demand. Pay close attention to how we state the law of demand. We don't say that demand increases when the price decreases, for example. Instead, we say that the *quantity demanded* increases.

Demand is a curve.

Quantity demanded is a specific amount that consumers plan to buy at a specific price.

Substitutes everywhere: The concept of demand

We see this all at work in Figure 3-1. If the price had been set at \$0.01 per gallon, and was then lowered to \$0.005 per gallon, the *quantity demanded* would increase from 160 to 320 gallons per day. At a price of \$0.04, the *quantity demanded* would be only 40 gallons per day. That's what the households strive to purchase at the 4-cent price. But the *demand* would be unchanged through all this, because *the demand is the whole curve or schedule*. Notice in our graph that the demand curve didn't move or shift or change. We moved along the given demand curve. The demand curve itself illustrates the different quantities the consumers plan to purchase at various prices. Perhaps the best way to keep this distinction straight is to remember that the word *curve* or the word *schedule* should always be able to follow the word *demand*. If you say "demand" but cannot, in the context, say "demand curve," you have made a common mistake. You probably mean not *demand*, but *quantity demanded*.

Demand Itself Can Change

"Are you telling us that demand itself *never* changes?" asks the skeptic from the back of the classroom. "Didn't you say that people will probably buy more high-pressure showerheads or whatever when water itself becomes expensive? They are buying those things because *water* is more expensive, *not* because showerheads are cheaper, right? So then your 'law of demand' doesn't apply to showerheads—because people are buying more of those even though their price hasn't changed!"

This student raises a good question. And, although his conclusion is in error, we respect the fact that he's paying close attention to everything we've said so far. So let's continue to pay attention as we try to further develop the demand concept.

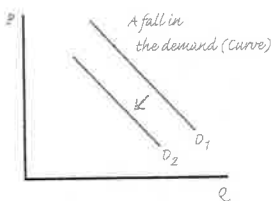
The law of demand does hold true, across the board. It says that if the price of a good changes, *holding other things constant*, the quantity demanded for that good will also change. The key here is the phrase *other things constant*. Price is an important influence on our choices, but we also recognize that there are *other influences, besides the price itself*, that might encourage people to increase or decrease their consumption of goods and services. *If people's willingness to buy changes even though the price of the good in question remains constant, then overall demand for that good must have changed.* The demand curve itself can shift. Demand for any particular good *can* increase or decrease.

Let's return to our original example regarding the townspeople's demand for water itself. All along we were assuming that the only important source of change is the change in the price of water. We held constant all other influences on the townspeople's willingness to purchase water. Quantity demanded changed *only* because the price of water changed. For the overall *demand* to

Table 3-2

Price per Gallon (\$)	Gallons per Day	Gallons per Day
0.07	40	15
0.04	60	25
0.02	140	55
0.01	240	100
0.005	400	200

increase in demand: The entire curve shifts right.



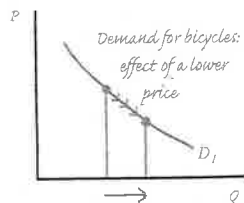
increase, something would have to occur that made the households want to purchase more water than before at each price. At a price of \$0.005 per gallon, people might choose to consume more than the original 320 million gallons per day, if, for example, they strive to water their lawns more often due to a drought in the region. The demand (curve) would shift to the right. Or suppose, instead, that the community discovers some trace contaminants in the water supply. Households might reduce their uses of water. (Drinking? No. Showering? Only briefly. Maintaining the swimming pool? No. Watering lawns, why not?) Were this to occur, people would tend to consume less water than before, at any given price. Their overall demand would decrease. The curve itself would shift to the left.

If you would like to graph an increase in the demand for water, plot the quantities in the second column shown in Table 3-2. (Feel free to mark up the book. It's yours, not ours.) If you prefer to graph a decrease in demand, practice with the third column. You shall see, in either case, that for any given price per gallon, the quantity demanded would be higher or lower than before. The law of demand still holds. We still depict a downward-sloping demand curve. In each case there's an inverse relationship between price and quantity demanded. But the curve itself shifts to a new position.

Everything Depends on Everything Else

We can clearly isolate several influences that can cause a change in the demand for a good, influences that can "shift the demand curve," as it were. Any student of economics ought to be aware of these. Let's start with the most obvious.

A change in the number of consumers (demanders). A growing population among our townspeople would tend to increase the demand for water within the township; a shrinking population would tend to reduce it. As more teens receive their driver's licenses, and beg for Mom's car, that adds to the overall population of drivers, and the demand for gasoline would tend to rise – the curve would shift right. A growing elderly population, on the other hand, would



tend to put some downward pressure on the demand for gasoline. It would also likely lead to an increase in the demand for nursing-home care services.

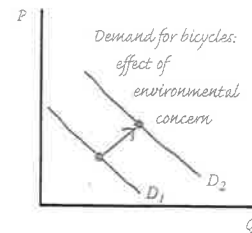
A change in consumer tastes and preferences. A decade ago the Atkins Diet craze hurt Krispy Kreme donut sales. Demand fell as health-conscious consumers shied away from such foods. They didn't buy fewer donuts because donut prices increased. Their tastes had changed. They now preferred to eat foods with fewer carbohydrates. There are probably a few students in your class who were once big fans of Justin Bieber but now wouldn't even consider downloading his latest release, even if the downloads were available for free. For them, the demand curve has shifted so far to the left that it disappears completely. People's tastes can and do change over time, and that can cause shifts in demand.

A change in income. Of course our demand is driven not only by our tastes, but also by our incomes. And, normally, we might expect that a rise in income would lead to a rise in the demand for a particular good or service, while a fall in income would lead to a fall in demand. You might tend to buy more fine clothing while working your summer job (an increase in demand, shifting the curve to the right), but reduce your purchases when you're back in school full-time and your income is low (a decrease and leftward shift of the demand curve.) More people are likely to travel to Disney World when the economy is doing well and their incomes are up. In a sluggish economy, with more people out of work, the demand would likely fall. Changes in income are positively related to changes in demand for a "normal" good. That is how we define a normal good: income and demand move in the same direction. Higher income shifts the demand curve to the right, lower income shifts it to the left.

But not all goods are "normal" goods. There are also a whole array of goods in which the opposite pattern occurs. Economists call those inferior goods. A good is an inferior good if consumers demand less when their income rises. Likewise, they demand more when their income falls. For example, college students on low budgets often eat macaroni and cheese or ramen noodles. After graduation, and landing that first great job, they might choose to spend their incomes differently, buying much less macaroni and cheese and more restaurant meals that they can now afford. For those students, macaroni and cheese would be an inferior good: As their income rises, their demand for that good falls, and the curve shifts to the left.

Let's not forget, however, that value is in the eyes of the chooser. What is an inferior good for one consumer might in fact be a normal good for another. The term inferior is an unfortunate one, because it seems to imply that the good must be of poor or inferior quality. But the "inferior" label is not necessarily tied to quality at all. For better or worse, we're stuck using that label. Economists distinguish normal from inferior goods exclusively by

Substitutes everywhere: The concept of demand



the way consumers respond to changes in income. Consider the case of Jones and Brown, our home-brewing neighbors from Chapter 2. Suppose they both received substantial pay raises. Jones can now afford to send his kids to the local community college. His household demand for that good has increased. Brown, on the other hand, is happy that her child can leave that community college and apply to Ivy College. Her household demand for community college has now decreased. Community college is, therefore, a normal good for the Jones household, and an inferior good for Brown's.

The economic way of thinking appreciates the fact that everything is interconnected. Economists like to say that *everything depends on everything else*. And they mean it. We've seen so far that consumers' willingness to purchase a good is connected to the price of the good in question, as well as their tastes, preferences, and their income. But there's more. While selecting among different options, consumers will also compare the prices of other goods. Changes in the prices of other goods can very well generate a change in the demand for a given good under consideration. After all, *the price of any single good has meaning only when considered against the prices of the vast array of other goods and services that a chooser considers*.

This leads us to a fourth factor that changes demand: *A change in the price of a substitute good*. Look what happened when the price of water increased in our township: The demand for water-saving, high-pressure showerheads increased. People bought more of those not because their price decreased, but instead because the price of water increased.

Let's consider more examples. Were the price of organic vegetables to fall, holding the price of nonorganic constant, the overall demand for nonorganic vegetables would tend to fall—that curve would shift to the left. Or suppose the price of imported Costa Rican coffee falls. The law of demand suggests people will buy more of that—the quantity demanded would rise. But this may very well reduce the demand for both Starbucks and Dunkin' Donuts coffees, which are substitutes for the import. Similarly, cheaper foreign cars imported into the United States tend to reduce the demand for American-made vehicles. No wonder U.S. automobile producers insist on a series of quotas or taxes to raise the prices of their foreign competitors. *All else being constant, a rise (or fall) in the price of a given good will tend to increase (or decrease) the demand for the substitute good*.

A change in the price of a complementary good can also generate a demand shift. Complementary goods are goods that are consumed and used together, like hot dogs and hot dog buns, water and swimming pools, iPods and iTunes downloads, or gasoline and SUVs. The grocer who puts hot dogs on sale will likely sell more hot dogs. That's the law of demand at work: The quantity demanded of hot dogs will tend to rise. He is also more likely

"That has become too expensive!"

Substitutes....

...and complements

Substitutes everywhere: The concept of demand

to sell more hot dog buns (the complement) even if he doesn't put those on sale. More hot dog purchases will lead to more bun purchases. Since bun prices are constant, the overall demand for buns will increase, the curve shifting to the right. Higher water prices would likely reduce the demand for new swimming pools. Higher gasoline prices would tend to reduce the demand for gas-guzzling vehicles, shifting the curve to the left. *Everything else being constant, a rise (or fall) in the price of a given good will tend to decrease (or increase) the demand for the complementary good*.

And, finally, a change in the expected price of a good can cause a change in the overall demand for that good. The demand for gasoline surged on the day of the 9/11 terrorist attacks on New York City and Washington, D.C. People's expectations regarding the future price of gasoline changed suddenly and dramatically. They now expected the price to jump. They acted on their new expectation by rushing off to buy more gasoline, attempting to fill up now before the price rises. In other words, their demand for gasoline surged to the right on 9/11. This occurred throughout the United States. (And, in fact, that surge in gasoline demand brought about a surge in gasoline prices!) Or consider a different situation. Suppose you're considering buying an HDTV. As you're shopping, and prepared to purchase one today, you come across a classmate who works at the store. She quietly tells you that those TVs will be put on sale next week, at 20 percent off the current price. How would you respond? If you decide to wait until the price falls—acting on your new expectation of next week's lower price—then your current demand for the HDTV decreases in light of that new expectation.

"Let's buy more now before the price goes even higher."

"Hold off for next week's sale."

Misperceptions Caused by Inflation

One major reason why many people think that the law of demand doesn't operate is that they have forgotten to take the effects of inflation into account. In a period of rapid inflation, most apparent price increases are not real price increases at all. The nature, causes, and consequences of inflation will be examined in detail later in this book (beginning with Chapter 13), but inflation so distorts our perceptions of relative price and cost changes that we'd better think about it before going any further. An ounce of anticipation may prevent a pound of confusion.

Inflation means an increase in the average money price of goods. But because we're accustomed to think of the price of anything as the quantity of money we have to sacrifice to get it, we easily conclude that twice as much money means twice as large a cost or sacrifice. That isn't the case, however, if twice as many dollars have only half as much purchasing power. If the money price of each and every good, including human labor and whatever else people sell or rent to obtain money, were to double, then no good would have changed in real price—except money,

of course, which would have fallen by one-half. And so a doubling of the price of gasoline won't necessarily induce people to use any less gasoline—if at the same time their incomes and the prices of all the other goods they use have also doubled.

Consider this very simple situation. Suppose you make \$7 per hour (after tax) working at the college library. Also suppose you can purchase ramen noodles at five packs for \$1.00 and hamburger at \$3.50 per pound. Your hour's worth of work, and particularly the income it generates, provides you the power to purchase up to 35 packs of ramen noodles or at most 2 pounds of hamburger. Suppose instead that *all prices*, including your own hourly wage, were to double. Now you earn \$14 per hour. Anybody would rather earn \$14 as opposed to \$7 per hour, *other things being constant*. But if the prices of the goods that others provide also double, then, in fact, you are no richer than before. You can still purchase, at most, up to 35 packs of noodles or 2 pounds of hamburger with your new \$14 hourly money income. In this overly simple example, we clearly see that the *relative price* of your labor, ramen noodles, and hamburger has not changed. Inflation muddies the price signals.

All money prices do not, in fact, change in equal proportion as a result of inflation—which is one of the reasons inflation creates problems. But they do tend to move together. Consequently, if we want to examine the effect of a particular price increase, we must first abstract from the effects of a general increase in prices. Gas prices have increased substantially over the past several decades. The average price was 36 cents per gallon in 1970. As we revise this textbook it's \$4.00 per gallon—11 times higher. But that's somewhat deceptive because we have yet to take inflation into account. What cost 36 cents in 1970 would, after inflation alone, cost around \$2.15 today. The fact that gas costs \$4.00 at the time of this writing means that gas prices have almost doubled—in real terms—over the past 40 years.

Time Is on Our Side

How large a relative price increase will it take to cut gasoline consumption? The answer clearly depends on the time allowed for adjustments. People will buy cars that use less fuel, will move closer to work, and will arrange car pools if the price of gasoline rises far enough; but they won't do so all at once. It will also take time for automotive engineers to increase the fuel efficiency of cars and for buses and airlines to expand their schedules, thereby providing automobile users with more and better substitutes for gasoline. In the short run, we're in trouble. But over time (in the longer run), we learn to seek out substitutes for gasoline (car pools, six- and four-cylinder engines, shorter pleasure drives through the country, and so on). We find new ways to economize.

*"In the good old days, a movie cost only 50 cents."
(But grandpa, didn't you earn only 50 cents an hour back then?)*

Substitutes everywhere: The concept of demand

By taking our examples almost entirely from the area of household decisions, we may have obscured the important fact that customers include producers as well as households. Business firms use water and gasoline, too, and they sometimes use so much that they are exceptionally sensitive to price changes. You'll be neglecting some of the major factors that cause demand curves to slope downward if you overlook the contribution producers make to the demand for many goods. In the case of water, location decisions are often made on the basis of the expected price of water, and those decisions then affect the quantities demanded in different geographic areas.

But it takes time for customers to find and begin to use substitutes. It also takes time for producers to devise, produce, and publicize substitutes. As a result, the amount by which people increase or decrease their purchases when prices change depends very much on the time period over which we are observing the adjustment. Occasionally, even a rather large price increase (or decrease) will lead to no significant decrease (or increase) in consumption—at first. And this sometimes causes people to conclude that price has no effect on consumption. A very mistaken conclusion! Nothing in this world happens instantly. People, creatures of habit that they are, must be allowed time to discover for themselves that there are substitutes for anything.

It takes time to discover substitutes.

Price Elasticity of Demand

It is quite cumbersome to talk about "the amount by which people increase or decrease their purchases when the price changes." But this is an important relationship with many useful applications. So economists have invented a special concept that summarizes the relationship. The formal title of the concept is *price elasticity of demand*. That's an appropriate name. Elasticity means responsiveness. (A golf ball is more elastic than a marble when hit by a three iron.) But it's really about price sensitivity. If the amount of any good that people want to purchase changes substantially in response to a small change in price, demand is said to be elastic. If even a very large price change results in little change in the amount demanded, demand is said to be inelastic.

How sensitive are buyers to a change in price?

Price elasticity of demand is defined precisely as *the percentage change in quantity demanded divided by the percentage change in price*. Thus, if a 10 percent increase in the price of eggs leads to a 5 percent reduction in the number of eggs people want to buy, the elasticity of demand is 5 percent divided by 10 percent, or 0.5. (To be completely accurate, it is *negative* 0.5, since price and amount purchased vary inversely. But for simplicity we shall ignore the minus sign and treat all coefficients of elasticity as if they were positive.)

Whenever the coefficient of elasticity is greater than 1.0 (ignoring the sign)—that is, whenever the percentage change

Price elasticity of demand =

$$\frac{\% \text{ change in } Q}{\% \text{ change in } P}$$

in quantity demanded is *greater* than the percentage change in price—demand is said to be elastic. Whenever the coefficient of elasticity is less than 1.0, which means whenever the percentage change in quantity demanded is *less* than the percentage change in price, demand is said to be inelastic. Compulsive learners will want to know what is said when the percentage change in quantity demanded is exactly equal to the percentage change in price, so that the coefficient of demand elasticity is exactly 1.0. You may file away the information that demand is then *unit elastic*.

Elasticity is influenced by three factors:

Time (as already discussed). The longer the period people have to adjust to price changes, the more elastic demand will become.

The availability and closeness of known substitutes. Consumers economize in face of a higher price by seeking substitutes. There are, indeed, substitutes for everything, but some things have more known substitutes than others. The more the substitutes, the greater the elasticity of demand. Fewer substitutes lead to lower elasticity of demand. (Can you see how time and the availability of known substitutes are related to each other? It often takes time for us to consider and discover appropriate substitutes.)

The proportion of one's budget spent on a good. The smaller the proportion of one's budget spent on a good, the less sensitive consumers will be to price changes. Demand will be less elastic. If a larger proportion of one's budget is spent on a good, buyers will likely be more careful and discerning shoppers—more sensitive to changes in price—and therefore the demand will tend to be more elastic.

You can begin to familiarize yourself with the uses of this concept by asking whether demand is elastic or inelastic in the circumstances described next. Each case is discussed in the subsequent paragraphs.

- "The price of salt could double, and I'd still buy the same amount—so much for the alleged law of demand."
- The demand for SUVs.
- The demand for American SUVs.
- The demand for Chevy SUVs.
- "The university's total receipts from tuition would actually increase if tuition rates were cut by 20 percent."
- The demand for insulin.

Thinking About Elasticity

"The price of salt could double and I'd still buy the same amount—so much for the alleged law of demand." Sure, for many consumers hooked on salt, in their view there are very few good

Substitutes everywhere: The concept of demand

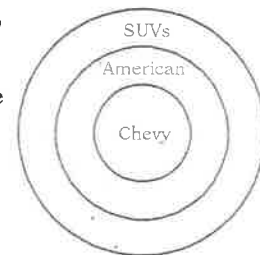
substitutes for salt. Moreover, consumers of many cheap things, such as salt, toothpicks, ramen noodles, perhaps even pencils, aren't very sensitive to changes in price. It's not so much the "cheapness" itself that creates a highly inelastic demand, however, as it is the proportion of one's budget spent on an item. Chances are your yearly purchases of table salt make up a miniscule portion of your yearly grocery purchases, let alone your total purchases. You might not even know offhand how much you spend on salt each year. You have little incentive to be a careful, "picky" shopper of salt. But we bet you have a pretty good idea how much you spend on tuition or rent each year, because they're likely to be a much more significant percentage of your budget. (Of course, you might not know if your parents are footing your bills, but surely they do!)

If salt increases from 50 cents to a dollar per pound, many people will continue to purchase as usual; they won't respond dramatically, if at all. But pay attention to two things: (1) This does not violate the law of demand, for it is a relationship that unfolds over the entire range of possible prices. Would households continue to buy as usual if the relative price of salt continued its ascent, to, say, \$5? \$10? (2) Other users of salt—consider some restaurants or prepared-food establishments—who use a larger portion of their budget to purchase salt would be much more likely to economize on salt as its price rises. Surely the "salt potato" industry in parts of the Northeast would attempt to economize more carefully.

The demand for SUVs. Let's consider this example, and the next two, in the context of availability of known substitutes. Can you list some substitutes for SUVs? A short list might include delivery vans, conversion vans, passenger cars, public transportation, even horses and bikes. If the price of SUVs *in general* were to increase, people would seek out substitutes such as these.

Now consider the *demand for American SUVs*. Notice that we've narrowed the product class. What would happen if the price of American SUVs *alone* were to increase? People could switch to substitutes, such as those in our list. But now there are actually *more* substitutes than those. We can now add Toyota, Mazda, Suzuki, and all other foreign SUVs to the list.

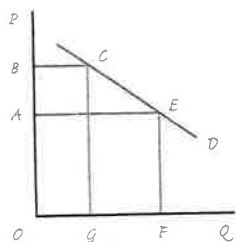
Finally, *the demand for Chevy SUVs*. The product class is even narrower. But that means the number of substitutes is necessarily larger—now we can add Ford, Jeep, GMC, etc., to our list. The demand curve for Chevies would be even more elastic than the demand for domestic SUVs, which means consumers would be even more price sensitive to increases in the price of Chevy SUVs alone.



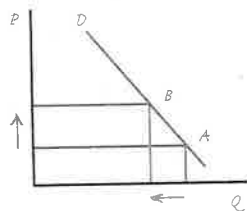
Elasticity and Total Receipts

"The university's total receipts from tuition would actually increase if tuition rates were cut by 20 percent." The university's total receipts from tuition are the product of the tuition rate and the

Chapter Three

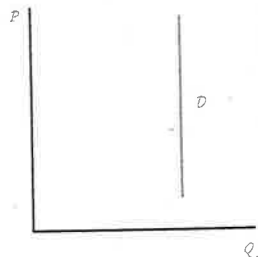


Demand is elastic between C and E because $OBCG < OAEF$.



Demand is inelastic between points A and B.

A Mythical Creature



number of students who enroll. If a 20 percent decrease in the tuition rate results in an increase in tuition receipts, then there must have been a more than 20 percent increase in enrollment. The percentage change in quantity demanded is greater than the percentage change in price, so demand is elastic.

This suggests a simple way of thinking about elasticity. Keep in mind that the quantity demanded will always move in the opposite direction from the price. *If the price change causes total receipts to move in the opposite direction from the price change, demand must be elastic.* The change in the quantity demanded has to be larger in percentage terms than the price change because total receipts are nothing but the product of price and quantity. And that is the definition of an elastic demand. *If a price change causes total receipts to move in the same direction as the price change, demand must be inelastic.* The change in the amount demanded was not large enough to outweigh the change in price. And that is the meaning of an inelastic demand.

Don't jump to the conclusion that the university will always be in a better financial position, given an elastic demand, if it lowers its tuition. It is true that lower tuition charges will mean larger receipts whenever demand is elastic, but a larger enrollment probably also means higher total costs. The university must decide in such a case whether the addition to total receipts will be larger than the addition to total costs. (But problems of pricing strategy must be deferred until we reach Chapter 8.)

On the other hand, the relationship between elasticity and total receipts does lead us to question a common mistake: Many people believe that all that a firm needs to do to "make more money" is raise its price. But if a firm raises price by, say, 20 percent, and quantity demanded falls (the law of demand!) by more than 20 percent, total receipts will fall.

The Myth of Vertical Demand

Demand curves are not *completely inelastic* over the *entire* price range. No exceptions. A completely inelastic demand curve would graph as a vertical line, suggesting there are *no* substitutes for the good in question. You would be wise not to look for such demand curves in the real world. It would be like looking for a unicorn in a world of horses.

Which finally leads us, as promised, to *the demand for insulin*. Is it a vertical line? Well, we already recognized that a better diet and holistic health care are considered substitutes, and we could, if we like, perhaps add prayer, the power of positive thinking, and a slew of others to the list. But suppose you're still skeptical. Let's assume—temporarily—that diabetics do not consider any of these

as potential substitutes. If we *assume* the demand for insulin is completely vertical, what are the implications? Diabetics would fill their prescriptions (again, on doctor's orders) *regardless of the price they themselves have to pay for insulin*. If their prescription costs \$3 a week, they'll do it. If the same prescription costs \$30 a week, they'll do it. If it costs \$300 a week, they'll do it. *Or will they?* Is it safe to assume people really behave this way? The economic way of thinking suggests, instead, that prayer would look like an increasingly attractive alternative as the price of insulin rose.

Look at it from another way. Suppose, instead, that the price of insulin is \$30 a week, and then drops substantially to only \$1 a week. Would more diabetics use insulin now? Yes. But what does that imply? Diabetics are more likely to fill their prescriptions when their out-of-pocket cost is lower. The quantity demanded increases as the price they pay decreases. Of course, that means the demand for insulin is *downward-sloping*, rather than a vertical line. And, in fact, it is.

The law of demand can now be expressed in the language of elasticity: *There is no such thing as a completely inelastic demand over the entire range of possible prices.* Most purchasers will respond at least a little to changes in the cost to them, and all purchasers will respond to a sufficiently large change. If this seems too obvious to bother mentioning, consult your daily newspaper for evidence that it is by no means obvious to everyone. Well-intentioned people and some not so well intentioned, talk constantly of basic needs, minimum requirements, and absolute necessities. But demand curves are rarely as inelastic as they suppose. This does not imply, of course, that demands are always elastic. That is a more difficult question, to be answered by looking at each case. But as we shall subsequently discover, it is a very important question for anyone who wants to decide how well our economic system functions.

What Role Should Demand Play?

We have so far been using market prices, and willingness to pay them, as our primary criteria determining who gets what scarce goods and services, from water to SUVs to insulin.

If a good is scarce—if people cannot obtain as much of it as they would like to have without sacrificing something else that they also value, a criterion or rule of some kind must evolve or be established to determine who will get how much. Allowing people to express their demands through the willingness to pay money for the good is one such criterion, but there are many other systems that we might actually use. It's a *property rights* issue.

Substitutes everywhere: The concept of demand

Property rights matter

One is outright rationing. The idea of "to each according to his need" appeals instinctively to many people, but will appeal less to anyone who has read the first part of this chapter, or who has simply thought about how vague, subjective, arbitrary, relative, uncertain, and subject to abuse this criterion would become in any society that tried to employ it on a large scale. Another system is "first come, first served." Whenever you see people standing in line to purchase something, you're observing the operation of a process that employs this criterion, usually as a supplement to willingness to pay money. A lottery serves as another alternative. That strikes many of us as a fair way to ration a scarce good when none of those who want it seem to have better claims than anyone else. Sometimes we decide using the criterion of equal shares for all. We cut the cake or the pizza into slices of equal size and let everybody have just one. Animals interested in feeding on a carcass regularly employ the criterion "might makes right" as their way of fighting over a scarce good, as do human beings on some occasions. Humans also employ the criterion of merit in some contexts: Scarce goods go to those who deserve them, for whatever reason.

Each of these processes has advantages. But each also has some serious disadvantages when considered as a *general system* for determining who gets scarce goods and services, especially among the members of what Adam Smith called "a commercial society." People would spend an awful lot of time standing in line if most goods were obtained through the criterion of "first come, first served." Although a lottery commends itself to us on fairness grounds when no one has any special claim to the scarce goods, allocating by chance pays no attention to diversity of desire and condition. Equal shares for all makes little sense when goods cannot easily be divided into equal shares, or when shares cut up into equal parts would be too small to be of much value to any user. The principle that might makes right has obvious drawbacks, not only for the weak, but also for the strong, who are compelled to expend valuable resources to seize and defend their portion. Were merit an essential criterion, it would require that everybody can agree on what constitutes merit, and on what procedure to use to decide exactly how much merit each person possesses. Those conditions are rarely satisfied outside of very small social circles, such as a closely knit family.

Most important, all of these criteria just mentioned ignore the problem of *supply*. Because very few goods fall from heaven like manna, how much will be available is rarely independent of the property rights and other rules of the game. Most goods are produced by people who want to be rewarded for their efforts. A system that does not produce appropriate rewards for those whose decisions create the goods will eventually collapse. But we're postponing consideration of supply in order to focus on

the concept of demand in this chapter. Even when viewed exclusively from the demand side, a system that encourages voluntary exchange of property rights to scarce goods, with those goods going to those who are willing to pay the most money at the margin, has important advantages that are too often overlooked: it tends to expand people's freedom and power by enabling individuals to economize as their own particular circumstances suggest. Consider the case of gasoline.

There are many ways to economize on gasoline: walk more, take the bus, ride a bicycle, form a car pool, move closer to work, reduce highway speed, tune the engine, eliminate joy-riding, plan more carefully, consolidate trips, take vacations closer to home, or purchase a smaller or more fuel-efficient car. The cost or sacrifice that each of these economizing steps will entail is going to vary, sometimes enormously, among individuals. Those with access to good bus service may sacrifice little by taking the bus—unless riding a bus induces nausea. Those who have work colleagues in their neighborhood may be able to form a car pool at low cost—unless they do some of their best thinking all alone on the daily commute while listening to loud music. Those who were already planning to buy a new car may find little inconvenience in replacing a large car with a small car—unless they have a huge family, or regularly use their car to transport musical instruments and sound equipment. There is no formula that will fit everyone, and no one best way to economize. Europeans have long tolerated more mixing of residential housing with business in the same or adjacent buildings and walking a short distance to work. If we think it's important that people economize on gasoline and that they economize in ways that are not enormously costly, we ought to look favorably on an increase in the relative money price for gasoline.

When the price of a good rises, users of the good don't have to be *told* to economize—they *don't need economists to tell them what to do*. Instead, they find it in their *own* best interest to economize, even if they have never heard that word before. They also don't have to be told to cut back first on the most wasteful uses of the good; that's *exactly* what they will want to do, though they might differ extensively on what constitutes a wasteful use. They won't have to be watched to make certain that they really do economize; those who "cheat" will be cheating themselves. Raise the price of water and they will have the incentive to find and fix the leak. They won't, for the most part, have to suffer greatly in order to "do their part," because they will naturally choose those ways to economize that entail the smallest sacrifice; and since they know their own circumstances far better than anyone else does, they will be in the best position to pick and choose among all the alternative ways of economizing.

Is Money All That Matters? Money Costs, Other Costs, and Economic Calculation

None of our discussion in this chapter implies, however, that the price in money that must be paid for something is a complete measure of its cost to the purchaser. Indeed, sometimes it is a very inadequate measure. Economists know this at least as well as anyone else. The concept of demand definitely does not suggest that money is the only thing that matters to people.

To assert that people purchase less of anything as the cost to them increases does not imply that people pay attention *only* to money, or that people are selfish, or that concern for social welfare does not influence behavior. The economic way of thinking suggests instead that *as the opportunity cost of an action increases, the chooser will tend to undertake less of that action; as the opportunity cost of an action decreases, the chooser will tend to undertake more of that action*. People respond not merely to changes in expected benefit; they compare the expected additional benefit against the expected additional cost, *in whatever way that cost is conceived*. In a commercial market economy, money is a common denominator. It is a "yardstick" that is fairly easy to understand. More specifically, it allows individuals to *calculate* relative costs and benefits. It is something to which everyone pays attention because all can use it to further whatever projects they happen to be interested in.

If man can't live on bread alone, then he certainly can't live on money alone, either. But that doesn't imply that bread or money fails to provide important advantages and uses. Changes in money prices are useful signals that coordinate people's consumption and production plans. That's why economists give such changes so much of their attention.

Once Over Lightly

Trade-offs, trade-offs, trade-offs—most goods are scarce, which means that they can be obtained only by sacrificing other goods.

There are substitutes for any good. Economizing is the process of making trade-offs among scarce goods by comparing the expected additional benefits and the expected additional costs from alternative ways of pursuing one's objectives. Marginal benefits and costs are the additional benefits and costs expected in the existing situation.

The concept of "needs" overlooks what the concept of demand emphasizes: the great variety of means for achieving ends, and the consequent importance of considering trade-offs.

The "law of demand" asserts that people economize: They will want to purchase more of any good at lower prices and less at higher prices.

Prices measured in money allow for economic calculation.

Substitutes everywhere: The concept of demand

The demand for a good expresses the relationship between the price that must be paid to obtain the good and the quantity of the good people will plan to purchase. Demand is a curve and should not be confused with the specific quantity that will be demanded at any particular price.

Don't confuse a change in quantity demanded with a change in overall demand! If the price of a specific good changes, holding everything else constant, only the quantity demanded for that good is subject to change. In the graph, we simply move along a given curve.

When economists say that demand itself increases or decreases, they mean the entire curve shifts right or left, and there are six general reasons why this can happen. Other things constant, demand will *increase* if (1) the number of consumers increases, (2) consumer tastes and preferences change, making the good more desirable, (3) income increases if the good is a normal good, or income decreases if the good is inferior, (4) the price of a substitute good rises, (5) the price of a complementary good falls, and (6) consumers expect a higher price in the future.

Likewise, demand will *decrease* if (1) the number of consumers decreases, (2) consumer tastes and preferences change, making the good less desirable, (3) income decreases if the good is a normal good, or income increases if the good is inferior, (4) the price of a substitute good falls, (5) the price of a complementary good rises, and (6) consumers expect a lower price in the future.

The extent to which people will want to increase or decrease their purchases of a good in response to a change in its price is expressed by the concept of price elasticity of demand, which is the percentage change in the quantity demanded divided by the percentage change in the price.

When the percentage change in quantity demanded is greater than the percentage change in price, demand is said to be elastic, and price changes will lead to changes in dollar expenditures on the good that move in the opposite direction from the price change. When the percentage change in the quantity demanded is less than the percentage change in the price, demand is said to be inelastic, and price changes will lead to changes in dollar expenditures on the good that move in the same direction as the price change.

Just how sensitive are buyers to a change in price? The price elasticity of demand for a good depends primarily on the availability of substitutes. The better or more abundant the substitutes for a good, the greater will be the elasticity of the demand for it. Often it takes time to seek out and discover such substitutes, so time, too, plays a role in determining the price elasticity of demand. The more time people have to adjust to a higher price, the more elastic their response tends to be. Also, the proportion or percentage of one's budget devoted to a good has an effect on elasticity. Consumers tend to be less sensitive to price changes

for cheap and low-budget items, and more sensitive to the price changes of expensive, high-budget items.

In markets people express their plans to obtain scarce goods and services by their willingness to reach agreements on prices. Although many different criteria can be and are used to determine who gets what, an economic system as a whole, which is based upon the voluntary exchange of private property rights, and by the criterion of money price, tends to enhance the economic freedom and power of individuals. Such rules, and the information signals they generate, allow people to calculate, and therefore better economize on the basis of the particular facts of their unique situation.

QUESTIONS FOR DISCUSSION

1. What do people have in mind when they talk about "needs?"
 - (a) According to a National Automobile Safety Study conducted some years ago by Northeastern University, before airbags were mandatory, 16 percent of all surveyed consumers said they would "definitely buy" an air-bag safety system for their automobiles if one were available for \$500. Only 5 percent of them would "definitely buy," however, at a price of \$1,000. What does this imply about the "need" for air bags on the part of those people who are convinced that air bags will work? What does the study suggest in general about the "need" for lifesaving goods?
 - (b) Would you agree with the results of a survey showing that about 60 percent of all middle-income Americans have "unmet legal needs?" What are some "legal needs" that many people will have only if they can hire a lawyer cheaply?
 - (c) Here is a paragraph from a front-page story that was published in *Workers World* during a record-breaking heat wave in the midwestern United States:

Shouldn't air-conditioning be a right? Why should it only be accessible to those who can afford it? Only a system which defines human worth based on how much money you have would reject the simple solution that in these crisis weeks everyone who needs air-conditioning must have it.

Who "needs" air-conditioning? Do people in wealthy nations such as the United States "need" air-conditioning more than people in much hotter, but also much poorer nations, such as Bangladesh or Niger? Did anyone "need" air-conditioning before it had been invented?

2. The contention that certain goods are "basic human needs" carries a strong suggestion that access to those goods should be a matter of right,

not of privilege. But the assertion of rights logically entails the assertion of obligations. Your right to vote, for example, entails the obligation of election officials to accept and count your ballot; your right to use your own umbrella implies an obligation on the part of others not to borrow it without your permission.

- (a) The American Medical Association (AMA) officially proclaims that "health care is the right of everyone." What quantity and quality of health care do you suppose the AMA is talking about? Is a liver transplant, for example, the right of everyone with a diseased liver?
 - (b) If "health care is the right of everyone," who has the obligation to provide health care to everyone? Who currently accepts the obligation to provide people with health care? How are they persuaded to accept these obligations?
 - (c) Here are three news items relating to the cost of medical care: (i) Use of primary care services at a leading health maintenance organization fell 11 percent when the HMO imposed a \$5 charge per office visit. (ii) During the Great Recession of recent years, disability claims increased, while the nation's unemployment rate remained poor. (iii) When Sweden's welfare system reduced sick-leave insurance benefits from 100 percent of pay to 75 percent for the first three sick days, and 90 percent for each day thereafter, the number of sick-leave days fell nearly 20 percent. What does all this suggest about the "need" for health care?
3. When asked if there are any substitutes for water, students often respond with "Yeah—death!" Explain why that answer misunderstands what economists mean by "substitutes."
 4. Someone says: "It's not true that there are substitutes for anything. If you want omelets, you need eggs. There are no substitutes for eggs in an omelet." How would you respond?
 5. "The *Mona Lisa* is a priceless painting." Evaluate.
 6. Do you think more cancer patients would elect chemotherapy treatment if the price they pay for chemotherapy falls? Do you think fewer would elect the treatment if the price they pay triples? What does this say about the demand curve for chemotherapy? Is it vertical?
 7. "According to the law of demand, the lower the price of meals, the more meals I'll eat. But I always eat three meals a day. Obviously the law of demand doesn't apply to me." Has this person found an exception to the law of demand?
 8. Would you embark on a 2,000-mile journey through the mountain states without a spare tire? To answer this question, wouldn't it be nice to know if the spare tire costs \$50, \$500, or \$1,000?
 9. A letter to the editor of a newspaper from a citizen interested in curbing Americans' consumption of gasoline recommends the elimination by law of nonessential uses and mentions as an example, reducing rural mail deliveries to fewer than six days per week. Would we be eliminating a nonessential use of gasoline if all rural carriers took Saturdays off? Why don't we eliminate Tuesday and Thursday deliveries as well and save even more gasoline?

Substitutes everywhere: The concept of demand

10. According to a report by the American Planning Association, the average four-member household uses about 345 gallons of water daily. The report broke that down into 235 gallons for inside use and 110 for outside use. Of the "inside" water, about 95 gallons per day went to flush toilets. Drinking and cooking used 9 to 10 gallons per day. Water rates vary, but they are rarely higher than 0.1 cent (that's \$0.001) per gallon (which is a *much lower* price than we used in our hypothetical township example!). Would a doubling or even a quadrupling of water rates from the \$0.001 level work a serious hardship on poor people?
11. "Landlords have been known to place a couple of bricks in the water tanks of toilets to economize on water when its price rises. Therefore, bricks are substitutes for water in this context." True or false?
12. In 2008, both John McCain and Hillary Clinton proposed that the 18-cents-per-gallon federal tax on gasoline should be temporarily suspended, to help the American consumer. Evaluate the following argument against their proposal:
Repealing the 18-cents-per-gallon tax will give oil companies an additional incentive to raise prices. If skyrocketing gas prices are due to supply and demand factors, as oil companies argue, a reduction of 18 cents will increase demand on a product already in short supply. The increased demand will contribute to increased pump prices. What mistake has the author of that argument made?
13. Is it strictly true that a change in the price of a good causes a change in the quantity of that good demanded, but *not* a shift in the demand curve for the good?
- What effect do you suppose the large increases in the price of gasoline in the 1970s had on the demand (curve) for fuel-efficient cars?
 - What effect did this have after several years on the original demand (curve) for gasoline?
 - How did the huge increase in the price of home heating oil during 2003 affect the demand for housing insulation? How did this eventually shift the demand for heating oil?
 - Can you think of similar processes through which changes in the price of a good would lead, over time, to shifts in the demand for the good?
 - If the price of a good returned to its previous level after a time, but the quantity demanded did not, would this be evidence that the demand had changed in the interim?
14. The graphs in Figure 3-2 show the demand for bus services (left) and the demand for downtown parking space (right) in an imaginary city. If the city raises bus fares from P_1 to P_2 , the demand curve will not change, but the quantity demanded will fall. With fewer people riding the bus, what will happen to the demand for downtown parking? What effect will this have on downtown parking rates? With higher parking rates, more people will want to ride the bus. So what effect will the higher bus fares have after all on the demand for bus service?

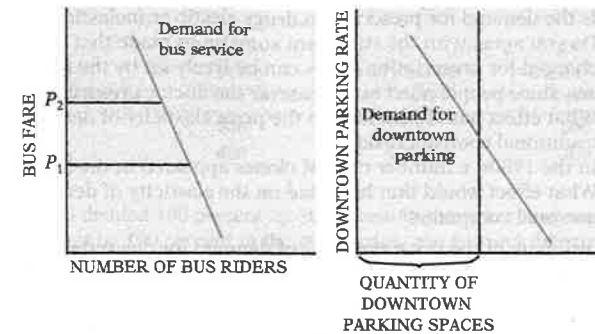


Figure 3-2 Demand curves for bus service and downtown parking

15. If customers always want to purchase less at higher prices, why would any seller publicize the fact that its prices are high?
- The advertising slogan of Maker's Mark Whiskey is: "It tastes expensive . . . and it is." Isn't the firm foolish to advertise its high price? Or will people buy more if they think Maker's Mark is more expensive than other whiskeys? If so, does this contradict the law of demand?
 - A waiter at Jean-Louis, a restaurant in Washington, D.C., often patronized by eminent politicians, says: "It is good to be known as expensive. People know they can impress their guests here." What does he think people are purchasing when they go to Jean-Louis for dinner?
 - Robert Cialdini reports the following event in his book *Influence: The Psychology of Persuasion*. The owner of an Arizona jewelry store was unable to move some fine-quality turquoise jewelry that was selling at low prices, in the height of the tourist season. So she instructed her assistant to cut the prices in half just before leaving on a business trip. But the assistant misunderstood and doubled the prices. When the owner returned a few days later, every piece had been sold. Can you explain this in a way that does not contradict the law of demand?
16. A change in expectations can cause a change in demand. Explain how this could lead to a situation in which a price increase was followed by an increase in the amount people wanted to purchase.
17. What makes demand curves elastic or inelastic?
- How do you think e-mail has affected the elasticity of demand for snail mail provided by the U.S. Postal Service? Do you think the Postal Service is pleased by the results?
 - The demand for aspirin at currently prevailing prices seems to be highly inelastic. What do you think would happen to the elasticity of demand if the price of aspirin relative to everything else were five times as high? Fifty times as high? Why?

Substitutes
everywhere: The
concept of
demand

- (c) Is the demand for prescription drugs elastic or inelastic? Why? Do you agree with the statement sometimes made that the prices charged for prescription drugs can be freely set by the manufacturers, since people must buy whatever the doctor prescribes?
- (d) What effect has iTunes had on the price elasticity of demand for traditional compact disks?
- (e) In the 1980s, a number of IBM clones appeared in the PC industry. What effect would that have had on the elasticity of demand for IBM personal computers?
18. One estimate of the price elasticity of demand for cigarettes puts it at 0.4: A 10 percent increase in the price of cigarettes will lead to a 4 percent decline in the quantity demanded.
- (a) Does this imply that an increase in the tax on cigarettes is an effective way to reduce smoking?
- (b) Does it imply that an increase in the cigarette tax is an effective way for the government to increase its revenue?
- (c) If government officials would like both to reduce smoking and to increase government revenue from the tax on cigarettes, how elastic or inelastic do they want the demand for cigarettes to be?
19. Studies have shown that states with higher cigarette taxes have lower rates of teenage smoking. But subsequent studies that excluded the states of North Carolina, Kentucky, and Virginia found no significant relationship between the tax on cigarettes and the incidence of teenage smoking. Can you think of a plausible explanation? Why is there no significant difference in the incidence of teenage smoking between high-tax and low-tax states when North Carolina, Kentucky, and Virginia are excluded from the study?
20. Some people have suggested that we can distinguish between luxuries and necessities in the following way: Luxuries are goods for which the demand is very elastic, and necessities are goods for which the demand is very inelastic. Do you agree that relative elasticity of demand provides an effective criterion for distinguishing luxuries from necessities? Think of some specific items that most people would classify as luxuries and some that most people would classify as necessities, and then ask yourself whether the demand curves would generally be elastic or inelastic in each case.
21. According to an article on the abuse of statistics that appeared in *The Economist* (April 18, 1998), the government of Mexico City in the late 1970s, increased the capacity of the *Viaducto*, a four-lane expressway, by repainting the lines to make it six lanes wide: a 50 percent increase in capacity. But after this resulted in more fatal accidents, the government switched back to four lanes: a reduction in capacity of one-third, or 33 percent. Did the successive changes produce a net 17 percent increase in capacity, as the government allegedly claimed in a report on social progress? (If you're wondering what this has to do with economics, go on to question 22.)
22. Price elasticity of demand can be calculated by dividing the percentage change in the quantity demanded by the percentage change in the price.
- (a) What is the coefficient of elasticity between the two points of the demand schedule in each of the cases shown in Table 3-3?

Table 3-3

Price per Ticket (\$)	Tickets Demanded	Price per Cup of Coffee	Cups of Coffee Demanded
2	200	2.50	600
1	400	5.00	300

- (b) If you divided 100 percent by 50 percent in the ticket case, and 50 percent by 100 percent in the coffee case, you got very different coefficients (2 and 0.5, respectively) for what are actually identical relative changes. The different results come from using the larger price and the smaller quantity as the base from which to calculate the percentage change in the ticket case, and using the smaller price and the larger quantity as the base in the coffee case. But the coefficient of elasticity should be the same between two points regardless of the direction in which the change is measured. How can this problem be handled?
- (c) What is the coefficient of elasticity in each of these cases if you use the *average* of the prices and quantities between which the change is occurring as the base for calculating the percentage changes?
- (d) In both cases, total expenditure (price times quantity) does not change when the price changes. What does this imply about the elasticity of demand between the prices given? Does this implication agree with your answer in (c)? (It should.)
23. Figure 3-3 shows a hypothetical demand curve for strawberries.
- (a) What price per case would maximize the gross receipts of strawberry growers? [Peek at part (d) of this question rather than waste too much time trying all sorts of different prices. The price that maximizes gross receipts will be found at the midpoint of a straight-line

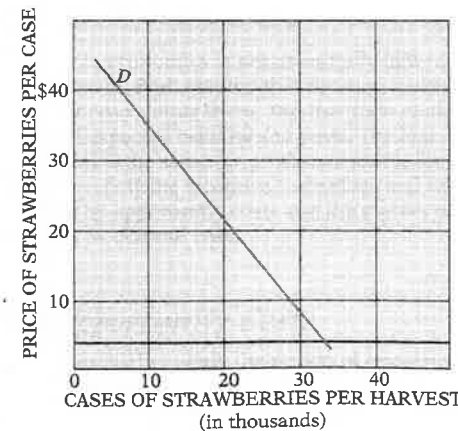


Figure 3-3 Demand curve for strawberries

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demand curve when the curve is extended to the axes. If you see why, good. If not, it's a bit of knowledge with only academic usefulness anyway.]

- (b) If the price of strawberries is determined by the total quantity harvested in conjunction with the demand, what size crop will result in the price quoted in part (d)?
 - (c) What would the gross receipts of strawberry growers be if the crop turned out to be 30,000 cases?
 - (d) Can you prove that the demand for strawberries is elastic above a price of \$24 per case and inelastic below that price?
 - (e) If strawberry growers can make more money by selling fewer than 30,000 cases, why would they ever market that much? Why wouldn't they destroy some of the crop rather than "spoil the market?"
24. See if you can clarify this analysis: "If half of our forests were destroyed in a fire, the value of the remaining lumber would be greater than the value of all the lumber in the country before the fire. This absurdity—that the whole is worth less than a half—shows that values are distorted in a market economy."

Cost and Choice: The Concept of Supply

4

LEARNING OBJECTIVES

- Review the concept of opportunity cost.
- Distinguish between sunk and marginal cost, and explore the action-oriented nature of cost.
- Establish how opportunity cost influences decisions to supply, and derive the supply curve using a production possibilities frontier.
- Explain the factors that shift the supply curve.
- Analyze the price elasticity of supply.

The theory of supply in economics is not essentially different from the theory of demand. Both assume that decision makers face alternatives and choose among them, and that their choices reflect a comparison of expected benefits and costs. The logic of the economizing process is the same for producers as it is for consumers. We shall discuss how the incentive to produce and supply scarce goods is shaped by opportunity costs and the market prices that reflect and inform us of those costs.

Refresher on Opportunity Costs

First, let's see if you can further apply the notion of opportunity cost developed in the previous chapters to explain typically puzzling events.

Why are poor people more likely to travel between cities by bus and wealthy people more likely to travel by air? A simple answer would be that taking the bus is "cheaper." But it isn't. It's a very costly mode of transportation for people for whom the opportunity cost of time is high (think of a lawyer who values her time at \$100 an hour); and the opportunity cost of time is typically much lower for poor people than for those with a high income from working.

Why is it often so much harder to find a teenage babysitter in a wealthy residential area than in a low-income area? The frustrated couple unable to find a babysitter may complain that all the kids in the neighborhood are lazy. But that is a needlessly harsh explanation. Teenage babysitters can be found by any couple willing to pay the opportunity cost. That means bidding the babysitters away from their most valued alternative opportunity. If the demand for babysitters in the area is large because wealthy people go out more often, and if the local teenagers receive such generous allowances that they value a date or leisure more than the ordinary income from babysitting, why be surprised to find that the opportunity cost of hiring a babysitter is high?

Why do more college students continue on to graduate school during a recession? Poor job prospects reduce the opportunity cost of staying in college; therefore, more students are inclined to consider spending another year or two to obtain an M.A. or M.B.A. rather than accept a job offer as overnight manager of a twenty-four-hour gas station.

Why are more young people from low-income regions more likely to join the military? Do you have the idea?

Costs Are Tied to Actions, Not Things

It is clear from these examples that costs are not tied to *things*. Costs are always tied to actions, decisions, choices. It is for this reason that the economic way of thinking recognizes no objective costs. That offends common sense, which teaches that things do have "real" costs, costs that depend on the laws of physics rather than the vagaries of the human psyche. It's hard to win a battle against common sense, but we must try. Again, we could profit by thinking outside the box of common sense.

Perhaps we can disarm common sense most quickly by pointing out that "things" have no costs at all. Only actions do. If you think that things do indeed have costs and are ready with an example to prove it, you are almost certainly smuggling in an unnoticed action to give your item a cost.

For example: What is the cost of a baseball? "Ten dollars," you say. But you mean that the cost of *purchasing* an official major league baseball at the local sporting goods store is \$10.

A "thing" cannot have a cost.
Only actions (or decisions)
have costs.

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Since purchasing is an action, it can entail sacrificed opportunities and thereby have a cost. But note the smuggled-in action. With other actions, the cost of a baseball changes. The cost of *manufacturing* a baseball is quite different. *Selling* one has yet another cost. And what about the cost of *catching* one at the ballpark? Just consider what the fan unintentionally did to himself, and the Chicago Cubs, during the 2003 playoffs!

Consider college education. What does it cost? The answer is that "it" cannot have a cost. We must first distinguish the cost of *obtaining* a college education from the cost of *providing* one. As soon as we make that distinction, we should also notice something that has been implicit in everything we've said so far about costs, either in this or the preceding chapters: Costs are always costs to *someone*. The cost of obtaining an education usually means the cost to the student. But it could mean the cost to the student's parents, which is not the same. Or, if that student's admission entailed the rejection of some other applicant, it could even mean the cost to John (who was refused admission) of Marsha's obtaining entrance to the first-year class. Those will all be different.

A great deal of fruitless argument about the "true cost" of things stems from a failure to recognize that only actions have costs, and that actions can entail different costs for different people.

What Do I Do Now? The Irrelevance of "Sunk Costs"

You learned in Chapter 3 that the value of goods is always determined *at the margin*. The value of water, for example, is not what people would sacrifice to obtain it if their only alternative was to do without water altogether. The value of water to people is what they would be willing to pay for an additional amount in the actual situation in which they find themselves. The same marginal principles apply to costs. In the case of goods or benefits, most people who go astray do so by confusing the total value of a good or benefit with its marginal value. In the case of costs, the most common error is confusing costs *previously* incurred with additional or marginal costs. The proper stance for making cost calculations is not looking back to the past, for the past is filled with sunk costs, irretrievable costs. The proper stance is looking forward to current opportunities.

Mary's parents put up a \$5,000 nonrefundable deposit for her wedding reception. Two weeks later, Mary and her parents discover that her fiancé is a cheater and a louse. They cancel the wedding and the reception. Did the family therefore *lose* \$5,000

There are no "objective" costs. All costs are costs to someone who places value on forgone opportunities.

by canceling the reception? Common sense leads us to say yes. But would they have gotten that deposit *back* if they had decided to have the reception without the wedding? No. That deposit represented an exchange of property rights. It was no longer the parents' from the moment it was paid.

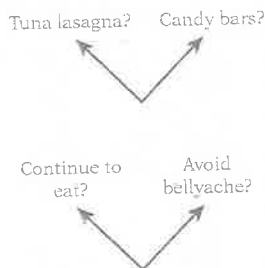
Suppose you pass through the cafeteria line, pick up the tuna lasagna, and pay the cashier \$5. You are willing to pay that cost because you expect the satisfaction obtained to be greater than the satisfaction from spending the \$5 on anything else. Then you take your first bite and realize you have made a serious mistake. The tuna lasagna is *awful*. What will it cost you to leave the lasagna on your plate?

It will not be \$5. The cash you gave to the cashier is no longer yours; it's the cafeteria's. It's gone, and it won't come back if you continue to eat all your lasagna and claim to "get your money's worth." Instead, once the cash is the cafeteria's and the lasagna is yours, *you confront a new set of choices*. Do you now wish to dispense with your next class (should eating this meal make you sick)? Do you wish to dispense with your life (should you fear getting struck by a lightning bolt if you don't finish your meal)? Or do you wish to dispense with the lasagna, feel somewhat guilty for not cleaning your plate, but at least reduce your chance of getting ill? The choice is all yours. But that's the point—you now face new choices, and no matter what you do, your \$5 is gone for good.

The price you paid is what economists dismiss as a *sunk cost*. Sunk costs are irrelevant to economic decisions. Bygones are bygones. The only costs that matter in decision making are marginal costs—additional costs—and *marginal costs always lie in the future*. Like your \$5, the \$5,000 nonrefundable deposit for Mary's wedding reception is also a sunk cost *after it has been paid*. Chalk that up as one of life's important lessons. You now stand at a new fork in the road.

Of course, we must be certain that a cost is really sunk, or fully sunk, before we decide to regard it as irrelevant to decision making. The student who paid \$100 for the calculus textbook and drops the course after the midterm cannot get his "money's worth" by trying to *read* the entire book. He might, however, be able to sell it back to the campus bookstore for \$20. *That's the choice he now faces*—continue to own the book versus transferring ownership back to the bookstore. The student hasn't sunk \$100; \$20 is recoverable. His sunk cost is \$80.

In the economist's way of thinking, sunk cost is a piece of history, for it represents no opportunity for future choice. It may be cause for bitter regret (at the calculus professor, the bookstore, college life), but it is no longer a cost in any sense relevant to the economics of present decisions. It is a piece of information, a lesson in life. Don't get us wrong—the lesson is certainly not irrelevant, only the cost is. The question is what do you do now?



(New fork in road: new margin)

Producers' Costs as Opportunity Costs

When we think about producers' costs—asking ourselves, for example, why it costs more to manufacture a mountain bike than a redwood picnic table—we tend to think first of what goes into the production of each. We think of the raw materials, of the labor time required, perhaps also of the machinery or tools that must be used. We express the value of the inputs in monetary terms and assume that the cost of the bike or the table is the sum of these values. That isn't wrong, but it leaves two questions unanswered. Why did the producers of the bike or the table choose to use precisely these inputs in just this combination? And why did it cost the producers whatever it did cost, in monetary terms, to use these inputs?

There are substitutes for everything in production as well as in consumption. Technology creates possibilities and sets limits to what we can do; but it does not decree a single, uniquely correct process for producing anything. In New Delhi, men using short-handled hoes dig the foundations for highway overpasses and women haul the dirt away in baskets on their heads. Imagine that. *Why do they do it in that way?* Contractors choose this technology because they believe it's the least costly way to dig and haul the dirt they want to remove. Human labor moves dirt in India at a lower cost than heavy machinery can do the job, because human labor can be hired in India at a very low wage. It is too costly to devote heavy machinery to that particular activity.

Why is the wage rate for unskilled labor in India so low? It's low because so many potential workers in that country have no opportunity to employ their labor in any manner that would produce something of substantial value to others. The concept of opportunity cost asserts that the amount of money a producer must pay for any resource, human or physical, will depend on what the owner of that resource can obtain from *someone else*, and that this will depend on the value of what that resource can create for someone else.

So manufacturers' costs of producing a bike will be determined by what they must pay to obtain the appropriate resources. And, because these resources have other opportunities for employment, the manufacturers must pay a price that matches the "best opportunity" value. The value of forgone opportunities thus becomes the opportunity cost of manufacturing a mountain bike.

Consider the example of the picnic table. Part of its cost of production is the price of redwood. Assume that the demand for new housing has increased recently, and that building contractors have consequently been purchasing a lot more redwood lumber. If this causes the price of lumber to rise, the cost of manufacturing a picnic table will go up. Nothing has happened to affect the physical inputs that go into the table, but its cost of production has risen. Because houses containing redwood lumber are now more valuable

All costs relevant to decisions to supply lie in the future.

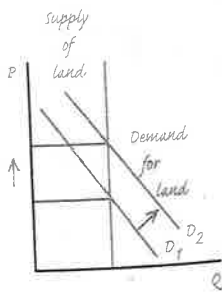
than formerly, table manufacturers must pay a higher opportunity cost for the lumber they want to put into their picnic tables.

A skilled worker will be paid more than an unskilled worker because and only insofar as those skills make the skilled worker more valuable somewhere else. Workers who can install wheel spokes while standing on their heads and whistling "Dixie" are marvelously skilled. But our mountain bike manufacturer will not have to pay them additional compensation for that skill unless their unusual talent makes them more valuable somewhere else. That could happen. A circus might bid for their talents. If the circus offers them more than they can obtain as bike producers, their opportunity cost to the manufacturer rises. In that case, the manufacturer will probably wish them good-bye and good luck and replace them with other workers whose opportunity cost is lower.

When the National Basketball Association and the American Basketball Association merged into one league, what happened to the opportunity cost of hiring physically coordinated seven-footers? With two leagues, each player had two teams bidding for his services. What either team was compelled to pay to get him was determined by what the other team was willing to pay, and both were willing to pay a lot if they thought he would make a big difference in ticket sales. When the leagues merged, however, the right to hire a particular player was assigned to a single team, and the opportunity cost of hiring a well-coordinated seven-footer fell. When the players' union subsequently secured the right of players (under certain circumstances) to switch to another team if they chose, the opportunity cost of hiring basketball stars rose again. It's not surprising that owners of professional athletic teams prefer one league to two, and vehemently argue that giving players the right to switch teams will destroy balance, and hence the quality of the game.

Let's take a more ordinary case. If a large firm employing many people (such as a Wal-Mart or Target) moves into a small town, the cost of hiring grocery clerks, bank tellers, secretaries, and gasoline station attendants in the town will tend to go up. Why? Because grocery stores, banks, offices, and gasoline stations must all pay the opportunity cost of the people they employ, and these people might find better opportunities for employment in the new firm. It might be better wages, better conditions, better health care plans. The new firm might attract potential employees in this manner. Owners of gasoline stations, for example, will tend to find it more difficult to retain their workers, or attract new replacements at the same old wage, as workers find more valuable opportunities elsewhere. If a military recruitment office moves into town and cannot attract people away from their current employers, it might indeed face very real recruitment challenges.

The resource that most clearly illustrates the opportunity-cost concept is probably land. Suppose you want to purchase an acre of land to build a house. What will you have to pay for the land? It will depend on the value of that land in alternative uses.



How demand affects the cost of buying land

Do other people view the acre as a choice residential site? Does it have commercial or industrial potentialities? Would it be used for pasture if you did not purchase it? The cost you pay for the land will be determined by the alternative opportunities that people perceive for its use.

Marginal Opportunity Costs

If you are wondering at this point about the relationship between opportunity cost and marginal cost, you are wondering about the appropriate question. *All opportunity costs are marginal costs and all marginal costs are opportunity costs.* Opportunity cost and marginal cost are the same thing, viewed from different angles. Opportunity cost calls attention to the value of the opportunity forgone by an action; marginal cost calls attention to the change in the existing situation that the action entails. The full name for any cost that is relevant to decision making is *marginal opportunity cost*.

All such costs are costs of actions or decisions, all are attached to particular persons, and all lie in the future.

Mantra on costs: Only actions have costs; all costs are costs to someone; all costs lie in the future.

Costs and Supply

And now we get to the heart of the chapter—using our notion of marginal opportunity cost to explain the decisions to supply goods and services on the market. Just as demand curves indicate the marginal costs or sacrifices that people are willing to incur in order to obtain particular goods, so supply curves show the marginal costs that must be covered to induce potential suppliers to make particular goods available. We can use our familiar production possibilities frontier in Figure 4-1 to illustrate our logic.

A small Iowa farmer, let's call him Smith, considers producing soybeans and corn this season. If he devotes all his acreage to soybean production, he can produce 14.5 units. If he produces only corn instead, he can produce 10 units. His production possibilities frontier represents those two combinations, as well as all other possible combinations, given his acreage, the suitability of the soil for either crop, farm machinery, talents, and so on. Table 4-1 (below) shows the actual combinations on Smith's frontier. (You might notice that the frontier in Figure 4-1 is a curve, not a line. This illustrates that Smith faces increasing opportunity costs of producing each good. Were he to consider expanding his corn production, he sacrifices, of course, the opportunity to produce and harvest soybeans. Moreover, he uses portions of his farm that are successively less suited for corn production. The movement along the frontier represents the trade-offs—the opportunity costs—that Smith faces.)

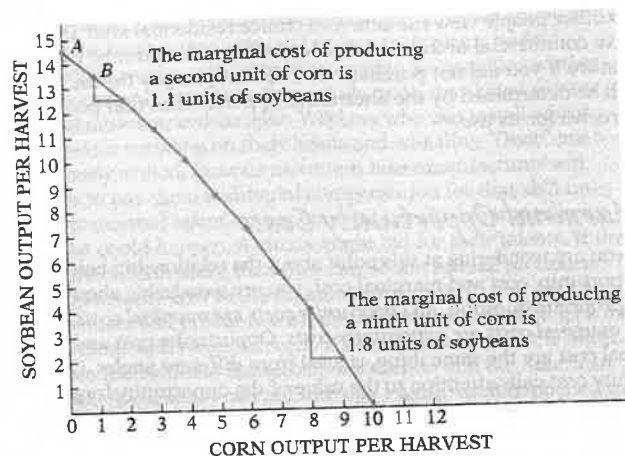


Figure 4-1 The production possibilities frontier with rising marginal cost

Smith's production possibilities frontier for corn and soybeans. He can produce at most 14.5 units of soybeans (and 0 units of corn) or 10 units of corn (and 0 units of soybeans), or any combination of the two on the frontier. Notice the bend to this particular frontier. It illustrates that corn can be produced only at higher and higher marginal cost

Table 4-1

Soybean Output per Harvest	Corn Output per Harvest
14.5	0
13.5	1
12.4	2
11.2	3
9.9	4
8.5	5
7.0	6
5.4	7
3.7	8
1.9	9
0	10

Suppose—keeping our numbers simple—the price of soybeans is \$1 per unit (we will hold that constant throughout our story). Smith could use more information than just that. What matters to Smith is the *relative price* of soybeans compared to corn. He uses

Cost and choice:
The concept of supply

Market prices help us
economize more effectively.

that information to judge against his marginal opportunity costs of production, in order to determine how much of soybeans and corn to produce. Here's an easy example. Suppose corn sells for \$0 per unit. Smith would then clearly produce say, only 14.5 units of soybeans. Why? If he produces 1 unit of corn, he can produce only 13.5 units of soybeans (we move downward along the frontier). His marginal cost would be \$1 (the sacrificed market value of 1 unit of soybeans). *What would he gain?* A unit of corn, with a *zero* market value. What's important is that the *marginal cost* of producing the first unit of corn is \$1. What if, instead, corn were priced at 90 cents per unit? If Smith willingly produced 1 unit of corn, he would gain an additional 90 cents, but at an additional cost of \$1—the value of his sacrificed unit of soybeans. Smith wouldn't be enticed to produce corn at *that* relative price.

Suppose, instead, that the price of corn were also \$1 per unit. Then Smith would be inclined to produce *up to but no more than* 1 unit of corn. At most, he would plan to harvest 13.5 units of soybeans and 1 unit of corn. He would move downward along the frontier, from point A to B. He would sacrifice \$1 worth of soybeans and gain \$1 worth of corn.

What is Smith's marginal cost of producing a second unit of corn? He'd have to reduce soybean output from 13.5 to 12.4 units. That's a difference of 1.1 units, with a market value of \$1.10 (again, holding the price of soybeans constant at \$1.00 per unit). *Smith would consider producing a second unit of corn only if the market price of corn were to compensate for his marginal opportunity cost of producing corn—in this case if the price of corn were \$1.10 per unit.* What is Smith's marginal cost of producing a third unit of corn? He'd sacrifice 1.2 units of soybeans, with a market value of \$1.20. Smith would be willing to increase corn output to 3 units only if he were compensated for *that* additional cost. *Smith would consider producing a third unit of corn only if the market price of corn were \$1.20 per unit.*

We can summarize all of this in Table 4-2 in the next page.

We're now ready to draw three important conclusions. First, producers consider marginal costs of production when deciding upon which outputs, and which levels of output, to produce. Second, relative prices further inform producers of the marginal costs, and marginal benefits, of their alternative production plans.

The Supply Curve

Our third conclusion is best represented by the information in Figure 4-2, which simply plots the information from our Table 4-2. The bars in the graph show Smith's marginal opportunity costs of producing corn, measured in market values when the price of soybeans is given at \$1.00 per unit. (The height of the first bar is \$1.00, the second is \$1.10, the third is \$1.20, and this continues

Table 4-2

Corn Output (units)	Marginal Opportunity Cost (holding price of soybeans = \$1.00) (\$)
1	1.00
2	1.10
3	1.20
4	1.30
5	1.40
6	1.50
7	1.60
8	1.70
9	1.80
10	1.90

to the tenth, which has a height of \$1.90.) We've seen how Smith would supply 0 units of corn if the relative price of corn were under \$1.00 per unit; he'd supply 1 unit only if the price rose to \$1.00 per unit; he'd supply 2 units if the price were \$1.20. The upward-sloping line illustrates Smith's *supply curve for corn*. Each bar represents the marginal cost of producing corn. The total area underneath the supply curve represents Smith's *total costs of production* (the adding up of all the marginal costs of production).

The supply curve illustrates the alternative amounts of a good supplied at alternative prices. In our story, they represent Smith's planned outputs at different corn prices. Because he faces higher marginal opportunity costs of production, Smith would plan to increase corn production only if he expected to be compensated by higher corn prices. Smith would produce up to 10 units of corn if he expected to receive \$1.90 per unit.

This story about farming tells in a simplified way what underlies all supply curves. Supply curves are the marginal opportunity cost curves of making various quantities of a good available. As the price people are willing to pay for a good rises, that price persuades people with a marginal opportunity cost of supplying the good that is less than the price to shift the resources they own or control into supplying the good in question. Other things being constant, a change in price of the output increases quantity supplied, not the overall supply curve.

Supply Itself Can Change

But the supply curve itself can change. Anything that changes the marginal cost of production will tend to change (or shift) the overall supply curve, too. A rise (or fall) in the price of a factor

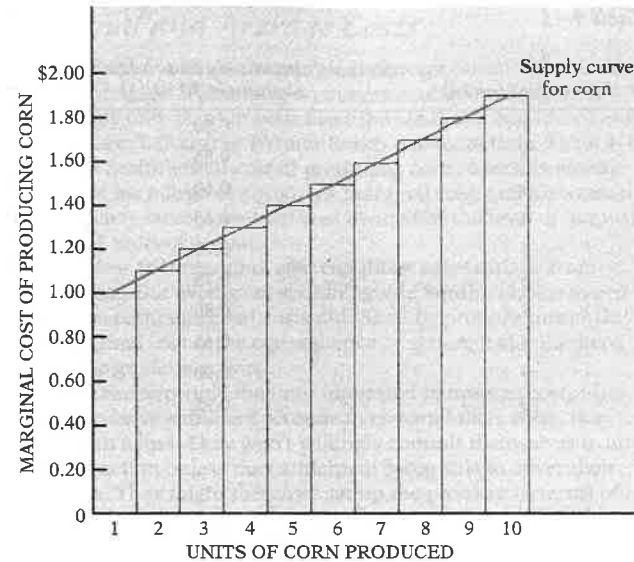


Figure 4-2 The supply curve is the marginal opportunity cost curve of making various quantities of a good available

The bars in the graph depict the marginal cost (measured in dollars) of producing each unit of corn. Smith will want to ensure that the price he can receive compensates him for his last unit produced. Therefore, if the price is \$1.10, he'll produce 2 units. A price of \$1.80 will encourage him to produce 9 units. In this way, we derive an upward-sloping supply curve for corn. The higher prices increase his quantity supplied, reflecting the law of supply.

of production would raise (or lower) marginal costs, and thereby lead to a shift of the overall supply curve. Higher marginal costs would shift the supply curve upward and to the left; lower marginal costs would shift it downward and to the right. Technological changes, such as new innovations that reduce marginal costs, would tend to increase overall supply. Resource deterioration, on the other hand, would likely decrease overall supply.

Notice from our tables and graphs that a change in the relative price of an alternative product will tend to generate a change in the supply curve. It will provide the producer an incentive to reconsider his options. Suppose, for example, that the price of soybeans alone falls from \$1.00 (as in our original example) to \$0.50 per unit. The lower market value of soybeans reduces the farmer's marginal opportunity cost of growing corn, as shown in Table 4-3. It will be cut in half for each unit of corn output. That

Table 4-3

Corn Output (units)	Marginal Opportunity Cost (holding price of soybeans = \$0.50)(\$)
1	0.50
2	0.55
3	0.60
4	0.65
5	0.70
6	0.75
7	0.80
8	0.85
9	0.90
10	0.95

would shift the supply curve for corn downward and to the right. That's an increase in overall supply. The corn farmer will now be willing to deliver any given unit of corn at a lower price than before. We can view it in another way as well: The farmer will be willing to supply a larger quantity of corn at any given price. If you would like to practice graphing this increase in the supply of corn, plot the quantities shown onto Figure 4-2.

Do you recall from the previous chapter how consumer demand may change if consumers expect higher or lower prices in the future? The same holds true for producers. We all act on our expectations. *A change in the expected price of the producer's output will tend to change the overall supply of that output.* If producers expect lower prices for their outputs six months from now, they may strive to *increase* deliveries of their present output to the market, attempting to "supply more while the price is still high." Likewise, if they expect more favorable prices six months from now, they may choose to supply *less today*, which would shift the supply curve upward and to the left. By postponing their present supply, they are not necessarily reducing their *current production*. In anticipation of the higher future price, they are reducing the *current quantities that they plan to deliver to today's market*.

And finally, a change in the overall number of suppliers tends to shift the market supply curve. The entry of more competitors would tend to increase overall supply, whereas exit would tend to decrease overall supply. Typically, expected profits will encourage entry and thereby increase market supply. Expected losses will encourage exit and reduce market supply, as producers search for more profitable uses of their resources. We shall discuss the role of profit and loss quite extensively in Chapter 7.

Marginal and Average Costs

It's important not to get the marginal concept mixed up with the notion of *average*. If you have no intention of doing that, what follows may only plant in your head the seeds of a bad idea. Let's hope it doesn't. Consider Farmer Smith one more time. Table 4-4 illustrates Smith's total cost of producing corn (which is merely the sum of his marginal costs), his marginal cost, and his average cost (which is merely the total cost divided by the level of output) for up to 3 units of output.

It is clear that marginal cost can differ substantially from average cost. But average cost didn't guide Smith's choice to produce more corn; marginal costs did. Shall he produce more? Or less? Marginal cost is the consequence of action; it should therefore be the guide to action.

Are businesspeople then not interested in average costs? Unless they receive sufficient revenue to cover all their costs, they will sustain a loss. They won't willingly commit themselves to any course of action unless they anticipate being able to cover their total costs. They might therefore set up the problem in terms of anticipated production cost per unit against anticipated selling price per unit. But notice that the *anticipated* costs of any decision are really *marginal* costs. Marginal cost need not refer to the additional cost of a single unit of output. It could also refer to the additional cost of a batch of output, or the addition to cost expected from a decision regarding an entire process. Decisions are often made in this "lumpy" way.

For example, no one plans to build a soda-bottling factory expecting to bottle only one case of soda. There are important economies of size in most business operations, so that unless businesspeople see their way clear to producing a large number of units, they won't produce any. They won't enter the business. They won't build the bottling factory at all. The entire decision—build or don't build, build this size plant or that, build in this way or some other way—is a marginal decision at the time it is made. Remember that additions can be very large as well as very small. The lump of output could even be the sales your favorite hangout would enjoy if it stayed open until 2:00 a.m. instead of closing an hour earlier.

Table 4-4

Units of Corn Produced	Total Cost of Producing Corn (\$)	Marginal Cost (\$)	Average Cost (\$)
0	0	0	0
1	1.00	1.00	1.00
2	2.10	1.10	1.05
3	3.30	1.20	1.10

Whether or not businesspeople cast their thinking in terms of averages, it is expected marginal costs that should guide their decisions. Averages can be looked at after the fact to see how well or poorly things went, and maybe even to learn something about the future, if the future can be expected to resemble the past. But this is history—admittedly an instructive study—whereas economic decisions are always made in the present with an eye to the future.

The Cost of a Volunteer Military Force

Let's consider the supply of something very different from corn. Here's a timely example. The U.S. military faced recruitment and reenlistment difficulties and shortages in the late 1990s (the 1990s were economically prosperous times!). In 1999, Floyd Spence, the House Armed Services Committee chairman, argued that the military confronted "a desperate situation that keeps getting worse." He favored the possible abandoning of the all-volunteer forces for some form of military draft—compulsion. That's something the people of the United States hadn't practiced since the early 1970s. After the attack on the World Trade Center and the Pentagon in 2001, the call for a renewal of the military draft gained momentum.

Perhaps a draft—simply forcing able-bodied young men and women to serve in the military—is a "cheaper" way to get the number of personnel that we need. (Need?) Of course, outright compulsion often works, but is it necessarily a less costly way to organize a military force?

There may be good arguments for the draft, but the familiar argument that an adequate volunteer army¹ costs too much is not one of them. The Department of Defense and others who worry about the relative costs of a conscripted and a volunteer military are conveniently bypassing the question of cost to whom. Are we talking about the cost to taxpayers, enlisted personnel, Congress, or the Pentagon? They are very different.

What is the cost to a young person of becoming a soldier? The best way to find out would be to offer a bribe and to keep raising it until it was accepted. If Marshall would enlist for \$5,000 per year, Carol for \$8,000, and Philip for no less than \$60,000, these represent the opportunity costs of Marshall, Carol, and Philip. The cost of drafting all three, to them, would then be \$73,000, even though the government can conceal this fact by offering far less in wages and then compelling each to serve.

¹In some contexts, a volunteer means a person who works without pay. That is not the case with the volunteer military force, where payment of an attractive wage is the key to its success.

You may be called to serve!

The opportunity cost is a function of forgone alternative employment opportunities and all sorts of other values: preferences with respect to lifestyle, attitude toward war, degrees of cowardice or bravery, and so on. When the government bids for military personnel, raising its offer until it can attract exactly the desired number of enlistments, the government in an important sense actually minimizes the cost of its program, for it pulls in those with the lowest opportunity costs of service—everyone like Marshall, but no one like Philip. Under a draft, this could occur only through the most unlikely of coincidences. Figure 4-3 provides a simple way to grasp the argument.

The graph depicts a supply curve of military volunteers. It summarizes the number or quantity that would be supplied at various prices. The argument that people won't voluntarily risk their lives is refuted by the fact that people do—not only military volunteers, but also police, steeplejacks, and even skiers. Whatever its precise position and slope, the supply curve will certainly incline upward to the right. Some people (those who assign low value to their available alternatives) will volunteer at a very low wage. But 3 million volunteers can be secured, on our assumptions, only if the wage offer is at least \$16,000 per year. That would mean a wage bill of \$48 billion annually. But because taxpayers don't like to have their taxes raised, Congress is reluctant to approve such a huge appropriation. And the people in the

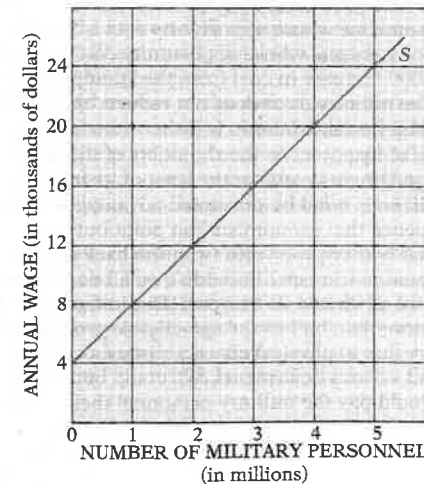
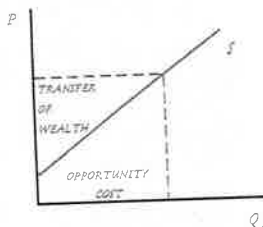


Figure 4-3 Supply curve of military volunteers



Department of Defense care very much about the likes and dislikes of the people in Congress. They can cut that upsetting bill in half by offering only \$8,000 and compelling enlistments. The published cost will now be only \$24 billion. Hurrah for cost savings!

But what about the costs to those who make up the armed forces? The cost of the volunteer army to the volunteers under our assumptions would be \$30 billion. That is the value of the area under the supply curve up to 3 million men and women, or the sum of the values of the opportunities forgone by those who enlisted. The other \$18 billion paid out by the government is a transfer of wealth from taxpayers to members of the military who would have enlisted at a lower wage, but who nonetheless receive the higher wage that is required to induce the enlistment of the 3-millionth volunteer.

What will be the cost of a conscripted army to those who are drafted? We can't say, except that it will certainly be larger. Only if the draft happened to hit exactly those and only those who would have enlisted under a volunteer system would the cost be as low as \$30 billion. That is most unlikely. The more draftees who are grabbed from the upper, rather than the lower, end of the supply curve, the higher will be the cost to the conscripts. For example, a man who would have volunteered at a wage of \$9,000 is offered only \$8,000. He rejects the offer, and he is subsequently not drafted. Instead, a person who would have volunteered only at \$24,000 is drafted—and paid \$8,000. The net result is that taxpayers save \$16,000 by obtaining for only \$8,000 services for which they would have had to pay \$24,000 under an all-volunteer system. But someone whose opportunity cost was only \$9,000. That's a \$15,000 increase in cost from the standpoint of those who serve. The military draft does not reduce "the cost" of maintaining a military establishment. It rather transfers that cost from the shoulders of taxpayers to the shoulders of the draftees. That may in your judgment be one of the least of its faults, or it may be outweighed in your mind by presumed advantages. But at least it's a consequence that economists can point out.

Again, that bothersome voice from the back of the room asks, "But what about patriotism? Shouldn't we all do our part?"

Perhaps we all should do our part. But in fact we don't. Even in wartime more than half of the age-eligible group never serves in the military due to physical characteristics, occupational exemptions, and various deferments. We could better "all do our part" if we would pay the military personnel their opportunity costs, just as industry does. And the fact is most of us do have feelings of patriotism. If there were enough patriotism, we could attract volunteers who would see service as a patriotic duty and serve at zero or nominal cost. There undoubtedly are many such persons but far fewer than "needed" to staff our military. But all is not lost in this respect. Recall that a few paragraphs back we

said that opportunity cost is a function of alternatives "and all sorts of other values," one of which is patriotism. The greater the degree of patriotic feeling, the lesser the monetary wage it would take to induce voluntary enlistments.

Price Elasticity of Supply

The concept of elasticity is every bit as important in the case of supply as it is in the case of demand. The formal definitions are the same. *Price elasticity of supply is the percentage change in the quantity supplied divided by the percentage change in the price.* In the case of supply, price and quantity will vary in the same direction, reflecting the fact that it takes a higher price to induce suppliers to offer for sale a larger quantity. The supply is relatively elastic if the percentage change in the quantity supplied is greater than the percentage change in the price, and it is relatively inelastic if the percentage change in the quantity supplied is less than the percentage change in the price.

This book puts completely inelastic demand curves in the same family as unicorns: the family of nonexistent phenomena. Completely inelastic supply curves are another matter. Although it takes no time to start demanding less when the price of a good rises, it does take time, and often quite a bit of time to start supplying more when the price of a good rises. Even a significant increase in the price of a good may consequently produce no increase at first in the quantity of the good supplied. With time, however, potential suppliers will reorganize the resources available to them and will eventually be able to supply a larger quantity in response to a higher price.

If additional quantities of the resources required to produce a particular good can be readily obtained at no higher cost, the supply curve for the good will be close to completely elastic. In such a case, a very modest rise in the price will induce suppliers to increase by a very large amount the quantity offered for sale.

The supply curve of military volunteers portrayed in Figure 4-3 is an in-between case. The price elasticity varies along the curve, decreasing steadily from 2.0 between \$7 and \$9 to 1.2 between \$23 and \$25. (If you want to check these numbers for yourself, use as the base in calculating percentage changes the average of the two prices and quantities between which the change is occurring.)

Pause for a moment to be sure you have understood the concept of price elasticity of supply. As we shall see in the next chapter, it is the relative elasticities of supply curves and demand curves that determine what effects changing circumstances will have on the quantities of goods exchanged and the prices at which they are exchanged.

$$\text{Price elasticity of supply} = \frac{\% \text{ change in quantity}}{\% \text{ change in price}}$$

Cost as Justification

The economic analysis of costs is an especially treacherous enterprise for the unwary, because costs often have an ethical and political, as well as an economic dimension. Many people seem to believe that sellers have a right to cover their costs, have no right to any price that is significantly above their costs, and are almost surely pursuing some unfair advantage if they price above or below cost. This way of thinking, in which cost functions as *justification*, has even infiltrated our laws. Legislated price controls, for example, usually allow for price increases when costs go up, but refuse to permit any price hikes that are not justified by higher costs. And foreign firms selling in the United States can be penalized for "dumping" if a government agency determines that they sold in this country at prices "below cost." In circumstances such as these, when costs become a rationalization rather than a genuine reason for decisions, all statements about costs must be inspected for evidence of special pleading.

Prices ought to be closely related to costs, in popular thought, because costs supposedly represent something real and unavoidable. The most enthusiastic advocates of rent control will agree, at least in principle, that landlords should be allowed to increase their rents when the cost of heating fuel goes up. They will never agree—if they did, they wouldn't advocate rent controls—that landlords should be allowed to raise rents merely because the demand for apartments has increased faster than the supply. That would be "gouging," "profiteering," or "a rip-off," because it is unrelated to cost. But such a rental increase is just as surely related to cost as is an increase in response to higher heating bills. When the demand for rental apartments increases, tenants bid against one another for available space, thereby raising the cost to the landlord of renting to any particular tenant. What another tenant would be willing to pay for the third-floor apartment in the Hillcrest Arms is the landlord's marginal opportunity cost of continuing to rent to the present occupant. The case seems to be different with higher heating-fuel prices but really is not. The cost of fuel oil is also determined ultimately by the bids of competing users in relationship to the offers of suppliers. Cost is always the product of demand and supply. That will be the continuing theme of the next two chapters.

Costs are never independent of demand.

Once Over Lightly

Supply curves as well as demand curves reflect people's estimates of the value of alternative opportunities. Both the quantities of any good that are supplied, and the quantities that are demanded depend on the economizing choices people make after assessing the opportunities available to them.

*Cost and choice:
The concept of supply*

Costs are always the value of the opportunities that particular people sacrifice. Conflicting assertions about the costs of alternative decisions can often be reconciled by agreement on whose costs are under consideration.

Past expenditures cannot be affected by present decisions: They are sunk costs and hence irrelevant to decision making. All costs relevant to decision making therefore lie in the future.

Opportunity costs are necessarily marginal costs: They are the additional costs that an action or a decision entails.

Supply depends on cost. (What doesn't?) But the cost of supplying is the value of the opportunities forgone by the act of supplying. This concept of cost is expressed in economic theory by the assertion that all costs relevant to decisions are opportunity costs—the value of the opportunities forsaken in choosing one course of action rather than another.

Supply curves slope upward to the right because higher prices must be offered to resource owners to persuade them to transform a current activity into an opportunity they are willing to sacrifice.

Anything that alters the marginal cost of production would tend to shift the supply curve. The market supply curve is also subject to shift if the producers' price expectations change, or if the overall number of producers within an industry changes.

Price elasticity of supply is the percentage change in the quantity supplied divided by the percentage change in the price.

Many disagreements about what something "really" costs could be resolved by the recognition that "things" cannot have costs. Only actions entail sacrificed opportunities, and therefore only actions can have costs.

Never forget to ask yourself "cost to whom?" "cost of doing what?" By so doing, you'll be well on your way to thinking like an economist.

QUESTIONS FOR DISCUSSION

1. What is the true cost of an Old Navy T-shirt, an Adele concert ticket, or your *Economic Way of Thinking* textbook?
2. While fishing in your favorite stream, you find a 1-ounce nugget of gold. What price would you ask for it? Why? What did it *cost* you?
3. The acres of grass surrounding the Taj Mahal in Agra, India, are often cut by young women who slice off handfuls with short kitchen blades. Is this a low- or high-cost way to keep a lawn mowed?
4. By taking an airplane, one can go from D to H in one hour. The same trip takes five hours by bus. If the airfare is \$120 and the bus fare is \$30, which would be the cheaper mode of transportation for someone who could earn \$6 an hour during this time? For someone who could earn \$30 an hour?

5. The photocopy machine in the library costs \$295 per month to rent. The rental fee covers repair service, toner, developer, and 20,000 copies per month. The library also pays 1 cent for every copy beyond 20,000, plus 1/2 cent for every sheet of paper used.
- Harriet Martineau has to read a 20-page journal article for tomorrow's class. She is willing to pay 50 cents for a photocopy of the article, but she will read it in the library if she has to pay more than that.
- What is the highest price per page Harriet will be willing to pay to use the copier?
 - What is the lowest price per page the library should be willing to accept? What additional information must you have in order to answer?
 - Harriet just found out she is supposed to read a second article for tomorrow's class, an article full of complex graphs. Harriet badly wants her own copy of this article and will pay whatever she has to pay to get one. What is now the highest price Harriet will be willing to pay to use the library copier? (You must supply some information from your own experience to answer.)
 - How does the \$295 monthly rental fee affect the price the library will want to charge users of its copier?
6. If the firm for which you work pays you 20 cents for every mile you drive your own car on company business, should you use your own car or a company car? Which of the following costs are relevant to your decision?
- Purchase price of your car
 - Vehicle license fee
 - Insurance premiums
 - Depreciation
 - Gasoline
7. Should the casualties already incurred in a war be taken into account by a government in deciding whether it is in the national interest to continue the war? This is obviously not a trivial question. And it is a much more difficult question than you might at first suppose, especially for a government depending on popular support.
8. The economist's rule, "sunk costs are irrelevant," is like a string around your finger. It reminds you to consider only marginal costs, but it cannot identify the marginal costs. That requires informed judgment. You could sharpen your judgment by trying to enumerate and assess the marginal costs of retaining or not retaining your college apartment over the summer vacation. Try to calculate the minimum rental from subleasing that would persuade you to retain it for fall reoccupancy.
9. Here is a statement from the textbook by Francis Wayland that was the most widely used economics text in American colleges before 1860:

The qualities and relations of natural agents are the gift of God, and, being His gift, they cost us nothing. Thus, in order to avail ourselves of the momentum produced by a waterfall, we have only to construct the water-wheel and its necessary appendages, and place them in a proper position. We then have the use of the falling water, without further expense. As, therefore, our only outlay is the cost of the instrument

by which the natural agent is rendered available, this is the only expenditure which demands the attention of the political economist.

- What was the cost to a nineteenth-century mill owner of using a waterfall to power his mill if he owned the site of the waterfall?
 - What was the cost to the mill owner if someone else owned the site?
 - Under what circumstances would use of a waterfall to power a mill actually have cost nothing?
 - Why do modern "political economists" disagree with Francis Wayland and pay attention to the cost of using "natural agents?"
10. Explain the following statement by a military recruiter: "There's nothing like a good recession to cure our recruiting problems."
11. It has been argued that a volunteer army would discriminate against poor people, because they tend to have the lowest-value alternatives to military service and hence would dominate the ranks of volunteers.
- Do you agree with the analysis and the objection?
 - Some critics have argued that if the military relied exclusively on volunteers, the armed forces would be filled with people of such low intelligence and skills that they could not operate sophisticated weapons. International Business Machines relies exclusively on "volunteers," and its employees are not predominantly people of low intelligence and skills. What's the difference between the armed forces and IBM? How would you reply to the argument of these critics?
 - Another frequent criticism of a volunteer military is that we don't want "an army of mercenaries." How high does the military wage have to be before the recipient becomes a mercenary? Are officers compelled to remain in the armed services? Why do they stay in? Are they mercenaries? Is your teacher a mercenary? Your physician? Your minister?
12. In recent years, more and more Americans have begun to evade jury duty, creating a serious problem in some courts, which have been forced to postpone trials because an adequate number of jurors was not available.
- What is the cost to a citizen of serving as a juror?
 - For whom will the net cost be very low or even negative? For whom will the net cost be very high, perhaps even prohibitively high?
 - Can you think of any simple system for reducing the average cost to citizens of jury service?
 - What consequences would you predict if we moved to a completely volunteer jury system, under which the courts paid jurors a daily wage sufficient to obtain the services of as many qualified jurors as the court required?
 - Many citizens who faithfully answer every summons to jury duty have complained of their treatment at the hands of court officials who behave as if the time of jurors had no value whatsoever. For example, prospective jurors may be required to sit for days in a waiting room without ever seeing the inside of a courtroom. What is the cost to court officials of behaving inconsiderately toward jury candidates?

13. Why might a multinational corporation with identical plants in different countries pay different wage rates to workers in the two countries even though their skill levels are the same? Does this strike you as unjust? Why might the *higher-paid workers* object?
14. Rising commercial rents in San Francisco in recent years have induced many corporations to move their offices out of the city. Can a San Francisco firm that owns its own office building simply ignore rising rents?
15. Why do parking lot fees vary so widely from city to city in the United States? The all-day rate in Manhattan, for example, is often \$50. In Atlanta, it is likely to be less than \$20. Does this difference reflect the greater greed of New York City parking-garage owners?
16. If people are offering to pay \$100 for \$10 (face-value) tickets to the Big Game, and someone gives you a ticket, what does it cost you to attend the game? Would you be more likely to attend if someone gave you a ticket than if you had to purchase one for \$100? Would you be more likely to attend if someone gave you a ticket than if you had to purchase one that you could buy (through an inside source) for \$10?
17. From the opportunity-cost perspective, there is no difference between paying money and forgoing an opportunity to receive money. That does not fully accord, however, with a lot of our intuitions. Consider the following cases:
 - (a) Dave and Pete are friends. Dave asks Pete to lend him \$1,000 for a year and Pete does so. Would it be proper for Pete to charge Dave interest on the loan if Pete himself had to borrow the money and pay interest? Would it be any less proper for Pete to charge Dave interest if he obtained the funds by cashing a certificate of deposit on which he had been earning interest?
 - (b) Friedrich bought a large painting by Turner that was on display at a major exhibition, but he had to agree not to take possession until the show ended six months later. When the show finally ended and Friedrich brought the painting home, he made two discoveries: The show had so increased Turner's prestige that the painting was now worth twice what he had paid for it, and the painting was too large to fit on any of his walls. Karl has larger walls in his home and would like to purchase the painting from his friend Friedrich. What is the proper price for Friedrich to charge Karl? What he himself paid for the painting or what he could now get for it if he put it on the market?
18. What does it cost you to sleep through one of 30 lectures in a course for which you paid \$2,100 in tuition? What does it cost you to attend?
19. Do students put more effort into courses when they have to pay higher tuition to take the courses?
20. In order to decide whether or not to drop intercollegiate football, your school undertakes a study of the program's cost. To what extent do you think the following budget items represent genuine costs?
 - (a) Tuition scholarships to players
 - (b) Payments on the stadium mortgage
 - (c) Free tickets to all full-time students
 - (d) Salaries of the athletic director, ticket manager, and trainer

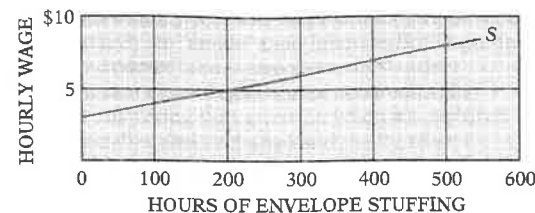


Figure 4-4 Supply curve for envelope stuffing

21. The supply curve on the graph in Figure 4-4 shows the wage rates that would have to be offered by business firms to obtain various quantities of hours of envelope stuffing on any given day.
 - (a) What wage rate will firms have to offer if they want to hire 400 hours of envelope stuffing?
 - (b) What will be the firms' total expenditure on the wages of envelope stuffers?
 - (c) What will be the total opportunity cost to the envelope stuffers of stuffing envelopes? (*Hint: Each square represents \$20: 20 hours times \$1.*)
 - (d) What is the price elasticity of supply between \$4 and \$6? Between \$6 and \$8?
22. When does it make sense to give up?
 - (a) How long will you search for a \$20 bill that you lost if you value your time at \$5 an hour? Suppose you know that you lost it somewhere in your bedroom. Would it ever be rational for you to search more than four hours? Use the concepts of expected marginal benefit and expected marginal cost to explain how a rational person who values time at \$5 an hour could *search indefinitely* for a lost \$20 bill.
 - (b) A dispute between a tenant in a Manhattan apartment cooperative and the cooperative's board over who should pay the \$909 cost of installing childproof window guards was taken to court in 1987. Seven years later, the dispute had not yet been resolved, but the lawyers' fees exceeded \$100,000. Do you think this reflects stubborn stupidity? Under what circumstances could people rationally run up legal fees of more than \$100,000 in trying to settle a \$909 dispute?

Supply and Demand: A Process of Coordination

LEARNING OBJECTIVES

- Describe the market as a process that coordinates the plans of millions of people involved in the production of a single good.
- Analyze markets using the supply and demand model.
- Distinguish between shortages and surpluses, and explain the way free-market prices adjust to generate market-clearing outcomes.
- Describe how free-market prices transmit scarce information.
- Explain how money reduces transaction costs.
- Analyze the role that interest rates play in coordinating economic activity.

Specialization is what distinguishes every wealthy society the world has ever known. As Adam Smith observed when reflecting on the economic growth that had occurred in Britain during the eighteenth century:

It is the great multiplication of the productions of all the different arts, in consequence of the division of labour, which occasions, in a well-governed society, that universal opulence which extends itself to the lowest ranks of the people.

A society becomes wealthy when its members acquire the ability to specialize effectively, to “divide” their labor, as Smith put it.

How does the division of labor—specialization—arise? Chapter 1 posed that as a central question of economics. In Chapter 2 we began answering that question when we explored the incentives to specialize and exchange and the increase in opportunities or wealth that specialization generates. We called that the “law of comparative advantage.” But how exactly do the people in a wealthy, highly specialized commercial society encourage one another to take those interconnected actions that wind up producing the incredible array of goods and services that they enjoy?

The basic problem is massive ignorance. Specialists, by their very nature, don’t know how to do everything. (Can you name one person, specialist or otherwise, who *does* know how to do everything, or at least can productively *order* everybody to produce goods and services efficiently?) The fact is, people *do* have some skills and abilities *and* they remain genuinely ignorant of countless other skills and abilities. Consider this incredible example, one thoroughly rooted in the real world: Probably no single person anywhere in the world knows how to produce something as simple as an ordinary no. 2 pencil.

That sounds crazy at first, but go outside the box and think about it. Lots of specialists know how to assemble a pencil *once* the wood, graphite, rubber, paint, glue, tin ferrule, appropriate tools, and machinery are all in the pencil factory. But specialists in pencil assembly don’t know how to produce *those* essential inputs. That’s not their own comparative advantage. Consider the wood itself. It took loggers to fell the trees. And the loggers depend on specialized, high-tech equipment, as well as coffee, meals, clothing, health care, and countless other goods and services to do their job adequately. The logging equipment is made, in part, from steel. So steelworkers had a hand in the making of pencils, too, whether they know it or not. The steel is made from iron ore—which was probably mined in Michigan’s Upper Peninsula, and sent first by rail on the Lake Superior & Ishpeming Railroad and the CN Railroad, and then by hundreds of ships down Lakes Superior and Michigan to ports all around the Great Lakes. Who made the trains, the tracks, the ships, the varieties of food that fed the crews (let alone the clothing, toiletries, and so on)? Who contributed to producing the fuel, the ports, or the sophisticated communications systems that guided the ships? The answer is countless *other* specialists, people pursuing their comparative advantage, acting on *their* limited knowledge and skills, and cooperating with still other specialized input providers.

Imagine the number of different people, from different races, colors, and creeds, with different opinions, skills, and goals, within the country and abroad, whose goods and services contributed to the production of a simple no. 2 pencil. All those people cannot

Supply and demand:
A process of coordination

Knowledge and information are scarce goods—for everybody.

How is it all coordinated?

possibly know one another, they may not even speak the same language, yet no. 2 pencils get produced. And we consumers generally know where to find them, cheap.

The miracle of the market, as some have quite properly described it, is that millions of people who don't even know of one another's existence, manage to cooperate and produce not only no. 2 pencils, but also innumerable other goods of *much* greater complexity, and to do so in ways that make them readily and abundantly available. And people are encouraged to cooperate not by obeying the orders of some comprehensive, national economic plan issued in part, say, from a government Writing Implement Bureau. The government's role is much more limited. Recall what Adam Smith said, "in a well-governed society." The government plays an important role in all of this, especially in monitoring and enforcing private property rights and contracts—the overall rules of the game—that allow for these countless exchanges to take place.

People often tend to take this orderly, nonchaotic network of exchanges for granted ("What do you mean you're *out* of pencils?"). Surely a market system is much more complex than the smooth flow of traffic (also taken for granted) that we discussed in Chapter 1. While the orderly nature of markets might appear miraculous, it is not, however, mysterious. What are the key signals, the traffic lights, if you will, that help people in a commercial society coordinate their varied production and consumption plans? The answer is prices. Millions of people receive important information and signals, as well as incentives to act on those signals, from prices formed in the market. Market prices emerge through the interplay of supply and demand, which we introduced separately in Chapters 3 and 4. In this chapter we put supply and demand together and describe the principles of the market process itself.

The Market Is a Process of Plan Coordination

Many people often think of "the market" as a *place* or forum, such as a baseball card and collectible show at Gateway Center in St. Louis, or a cattle auction at the fairgrounds in Kansas City, or the New York Stock Exchange in the Wall Street district. But all of these are really elements of markets that stretch across regions, around the globe, and even into cyberspace. Formal markets might have emerged with town fairs during the Middle Ages, but it makes little economic sense to view markets as mere places or forums today.

Journalists and those in the financial community use many mixed metaphors to describe markets, often making it sound as if

Market prices convey useful information.

a market is a *person*. How many times have we heard some expert on the evening news or the financial channels say that Wall Street was "excited" or "nervous" about the latest economic data, or that the stock market "hopes" or "expects" that Ben Bernanke at the Federal Reserve will engage in yet another round of quantitative easing? Perhaps someday when the conditions are right, one of those experts will report that "the stock market has awakened bloated, with terrible cramps and a bad headache, and has called in sick today." Although that kind of statement might make the news more interesting, the economic way of thinking recognizes that *individuals* have hopes, expectations, cramps, and headaches; *markets* don't.

Even economists themselves use misleading metaphors. They often refer to market systems as "automatic" or "self-adjusting," giving the impression that markets function without the intervention of human beings! Many economists make it sound as if the market is some kind of mechanical *thing*, like a thermostat. That's wrong. Market systems are *entirely composed* of demanders and suppliers, who are real human beings pursuing the projects that interest them, economizing on the basis of the relative scarcities that they confront, and negotiating arrangements to secure what they want from others by offering others what they in turn want to obtain.

It is best to avoid these common but misleading interpretations of markets. The market is not a person, place, or thing. *The market is a process of plan coordination among sellers and buyers.* When economists use the terms *supply* and *demand*, they are really talking about these kinds of continual, ongoing negotiations among individuals.

The Basic Process

We're now ready to consider, with the help of a graph, the supply and demand process. Let's consider the market for relatively inexpensive acoustic guitars, the kinds bought by beginning and intermediate pickers throughout the country. Figure 5-1 depicts the market. Notice the downward-sloping market demand curve. That reflects an essential point from Chapter 3—the law of demand. People would plan to purchase more guitars as the relative price falls, and plan to purchase fewer guitars as the relative price increases. The *quantity demanded* increases or decreases, not the overall demand curve, when only the price of guitars changes. Next, notice the upward-sloping supply curve. Recall from Chapter 4 that supply curves generally slope upward, which reflects the increasing marginal opportunity costs of producing more guitars. Making more acoustic guitars requires many specialized resources, from specific grades of spruce and mahogany to the

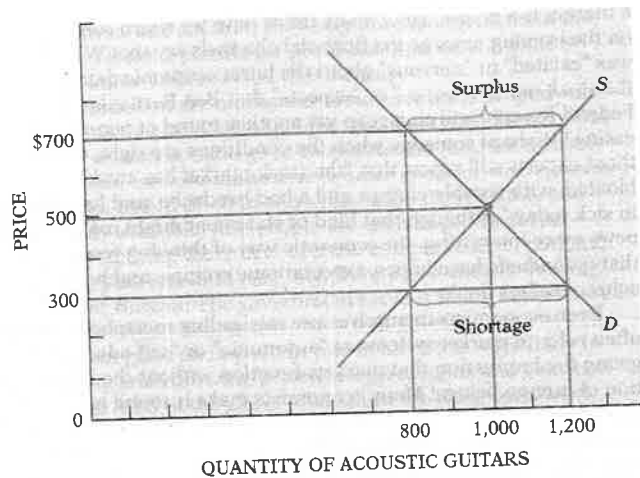


Figure 5-1 Supply and demand in the acoustic guitar market

The market clears at \$500. A surplus of 400 guitars exists at the \$700 price, and a shortage of 400 guitars occurs at the \$300 price.

highly skilled labor of the workers. For guitar producers to obtain spruce and mahogany, they must *bid* those resources away from other productive uses, such as Christmas trees, fine cabinets, incense holders, and the many other goods that people desire that can also be made from those materials. Higher prices for the guitars will induce producers to make more guitars.

Notice where the supply and demand curves intersect. There, the market price is \$500 per guitar and the market output is 1,000 guitars. At the \$500 price, note that the quantity demanded is 1,000 guitars, which is exactly equal to the quantity supplied. In this event, the plans of guitar buyers are *fully coordinated* with the plans of guitar producers.

In a free market, of course, producers can charge any price they wish, and consumers can offer any price they wish. So let's suppose that the market price were substantially higher than \$500. Say it's \$700. If guitar producers plan to receive \$700 per guitar, how would they respond? The upward-sloping supply curve helps illustrate the answer. At \$700, the quantity supplied would increase well beyond 1,000 guitars, to 1,200. (Supply doesn't increase—only the quantity supplied!) But never forget that the market is made up of two sides, sellers and buyers. While sellers would increase output at the higher price, how would potential buyers respond? The demand curve helps illustrate that answer: At the \$700 price, people would reduce their planned

Full market coordination: X marks the spot.

purchases of guitars. Quantity demanded (not overall demand!) would decrease to only 800 guitars.

Who would be able to fulfill their plans, and whose plans would become frustrated? Consumers, as a whole, would be able to purchase all the guitars they wish at \$700 apiece (the quantity demanded is 800), but producers would find that they have overproduced. They made and planned to sell 1,200 guitars (the quantity supplied). That's a difference of 400 guitars, guitars that are undesirably piling up in the manufacturers' inventories. Here, the market is not fully coordinated. A *surplus* of guitars has emerged. A *surplus occurs when the quantity supplied is greater than the quantity demanded*. In our example, there is a surplus of 400 guitars. Sellers often become aware of a surplus—aware of their own errors—by the unplanned piling up of their inventories. They simply aren't selling as much as they had counted on.

How can producers unload their unplanned inventories of guitars? Perhaps they can point guns to the heads of terrified people and force them to purchase the remaining guitars for \$700 apiece. But that goes against the *rules* of the free market. Perhaps one manufacturer can sell more guitars by burning down another competitor's guitar-making facilities. But that, too, breaks the rules of the game. Perhaps they can seek legislation requiring children to learn how to play guitars, which might improve demand and sales. That is an effort of manipulating and changing the rules of the game in their favor, but that takes quite a lot of time and political maneuvering and is a costly activity. What they can do, and what generally happens in free markets, is that producers will *cut their own prices*.

Indeed, we would predict that the market price of guitars would fall from \$700 to \$500. As the price falls, potential buyers would be more receptive: The quantity demanded (not the overall demand!) would increase from 800 to 1,000 guitars. At the same time, quantity supplied (not the overall supply!) would decrease from 1,200 to 1,000. Then the surplus would disappear: The plans of both buyers and sellers would fully mesh; the market would become fully coordinated at the \$500 price. Sellers would have no further incentive to compete against other sellers by lowering their prices.

Finally, consider the opposite case. Suppose the current market price were well *below* \$500. At a price of \$300 per guitar, people would eagerly plan to purchase a total of 1,200 guitars (the quantity demanded), but producers would produce and plan to sell only 800 guitars (the quantity supplied). While the plans of the producers would be achieved, many customers would be frustrated as they try to purchase a guitar, but find them sold out. Here we have a *shortage*, which is the opposite of a surplus. A *shortage occurs when the quantity demanded is greater than the quantity supplied*. Customers might sense a shortage by facing unusually long lines or finding items out of stock. Sellers might

Supply and demand:
A process of coordination

Surplus: $Q_s < Q_d$
(frustrated sellers).

Sellers compete with sellers.

Question: Does "surplus" mean no more scarcity for this good?

Shortage: $Q_d > Q_s$
(frustrated buyers).

Buyers compete with buyers.

Substitutes for everything!

have to unexpectedly dip into their planned inventories, discovering that they are selling more than they originally expected.

What can a frustrated buyer do? Breaking into the shop and stealing is a violation of the law. So is putting sand in the gas tank of another customer who might race out before you to purchase the last remaining guitar in stock. People are, however, free to offer a higher price for a guitar. If consumers begin bidding up the price of guitars, how will sellers respond? By producing more guitars. As the market price rises from \$300 to \$500, notice that the quantity supplied will increase, from 800 to 1,000 guitars. At the same time, the increased price will reduce quantity demanded from 1,200 to 1,000 guitars. Whether people actually begin to bid the price up, or sellers find that they can substitute for the consumer bidding process by raising their own prices and selling more guitars, there are tendencies for the market price to rise and the overall shortage to disappear.

Competition, Cooperation, and Market Clearing

People often argue that buyers compete with sellers in the market economy. Is this true? Back in Chapter 2 Brown and Jones cooperated with each other by exchanging stouts and lagers. Does the exchange for money alter that cooperative relationship between two trading parties? No. If you voluntarily purchase a guitar for \$20, \$200, \$500, or whatever, you and the seller have found a way to cooperate with each other—that's the essence of mutually beneficial exchange, whether the exchange takes place through money or barter. Money facilitates the ability to induce these acts of cooperation.

Competition does, of course, occur, and like cooperation, competition is rampant throughout the market process. Rather than competition between buyer and seller, however, buyers tend to compete with other buyers, and sellers tend to compete with other sellers.

Consider the case of a shortage. Frustrated guitar shoppers compete with one another by offering higher money prices or by demonstrating their own willingness to pay the higher posted price. The bidding process eliminates the shortage. The sellers of guitars would like, of course, the highest prices they can receive, and will eagerly try to accommodate buyers who are offering more money. In the opposite case of a surplus, sellers compete among themselves by trying to attract customers and move excess inventories. It is not a rivalry between buyer and seller; it's a rivalry between guitar sellers. The rivalry works itself out not through violence and mayhem—as long as the rules of the game are respected and enforced!—but by price reductions. "Every other shop is charging \$700 for this guitar. Because I see you love this guitar, I'll give you a break. \$595. And I'll even throw in

Sellers cooperate with buyers.

free strings." The seller is finding a way to compete against other sellers and cooperate with you. The competitor who was only offering free strings with her \$700 guitar will soon find that's not enough. She will soon lower her price as well. (When you shop for a car, is the seller intent on competing with you or the dealer down the street? You want a low price, but do you fear the seller, or do you fear that your offer may be too low, and the car may be sold to a buyer who offered \$750 more than you did?)

Therefore, the price tends to rise during times of shortages and fall during times of surpluses. The competitive bidding process runs its course once the shortage or surplus is alleviated. In our example, that ends at the \$500 price. Individual buyers will have no incentive to increase their bids without the shortage. Individual sellers will have no incentive to lower their price without the surplus. Economists typically refer to that price as an *equilibrium price*, as the "forces" of supply and demand have worked themselves out, and there is no further tendency for the price to change. But again, that sounds a bit too mechanical, as if the market were a thing. The authors instead prefer the term *market-clearing price*. To say that the market is clear is to say there is neither a shortage nor a surplus. The plans of buyers have become fully coordinated with the plans of sellers.

The economic way of thinking emerged in part to explain the phenomenon of market clearing. It's not only the market for guitars that tends to clear. *Free markets for any good or service show a tendency to clear.* The "laws" or principles of supply and demand help us explain *why* and *how* markets generally tend to clear, how people with limited information nevertheless find ways to accomplish many of their plans.

One final but crucial point. A commercial society doesn't require expert economists to clear markets. It instead requires that there are effective rules of the game that allow people to buy, sell, and trade their property—to coordinate their own plans—as they best see fit. Economists are useful in explaining how market processes coordinate people's plans and generate wealth and economic growth, something that a lot of people still don't understand. People often fail to see that market clearing is an unintended consequence of the specific choices that individuals make. Guitar buyers couldn't care less about the overall state of the market. They want guitars at an acceptable price. They can't possibly know everything there is to know about the state of the guitar industry. Same for guitar sellers. They pursue their own goals, too, geared toward making a living and a profit. The tendency for market clearing is not planned and engineered by economists, government agencies, nor even producers or consumers. Markets tend to clear as an *unintended* consequence of people competitively bidding and cooperatively exchanging, following their own projects, plans, and goals, with inescapably limited information and knowledge.

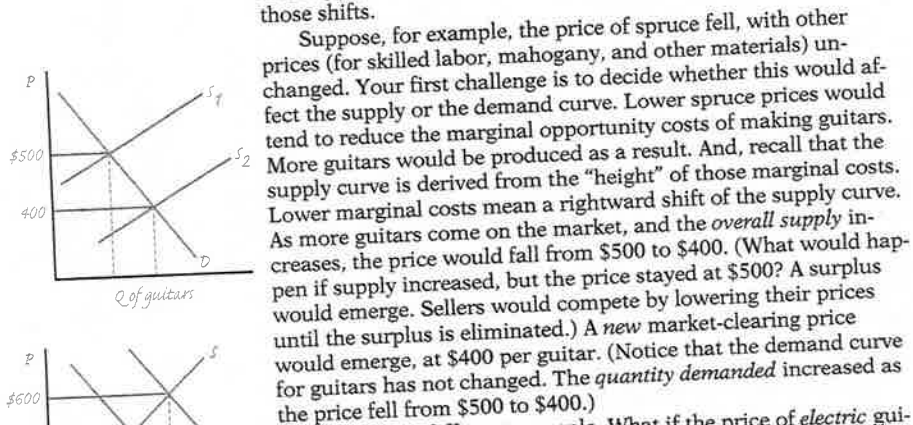
*Market clearing: $Q_d = Q_s$
(plans of buyers and sellers
are fully coordinated).*

No need for experts!

*Supply and
demand:
A process of
coordination*

Changing Market Conditions

And now for a little further practice. Our discussion centered around the tendency for the market to clear with *given* supply and demand curves. But, as you learned in Chapters 3 and 4, demand and supply curves themselves can shift. Let's practice a couple of those shifts.



Suppose, for example, the price of spruce fell, with other prices (for skilled labor, mahogany, and other materials) unchanged. Your first challenge is to decide whether this would affect the supply or the demand curve. Lower spruce prices would tend to reduce the marginal opportunity costs of making guitars. More guitars would be produced as a result. And, recall that the supply curve is derived from the "height" of those marginal costs. Lower marginal costs mean a rightward shift of the supply curve. As more guitars come on the market, and the overall supply increases, the price would fall from \$500 to \$400. (What would happen if supply increased, but the price stayed at \$500? A surplus would emerge. Sellers would compete by lowering their prices until the surplus is eliminated.) A new market-clearing price would emerge, at \$400 per guitar. (Notice that the demand curve for guitars has not changed. The quantity demanded increased as the price fell from \$500 to \$400.)

Consider a different example. What if the price of electric guitars were to increase? How would this initially affect the market for acoustics? Electric and acoustic guitars are generally considered good substitutes. People who planned to buy electric guitars would revise their plans in light of the higher price. Some would switch to acoustic guitars instead, while a couple of others would consider trombones, accordions, or other things to purchase with their money. Nevertheless, this raises the overall demand for acoustic guitars. We could depict that with a rightward shift of the demand curve in the market for acoustic guitars. A new market-clearing price would emerge, at \$600 per acoustic guitar.

Learning from Free-Market Prices

No one blames the thermometer for low temperatures, or seriously proposes to warm up the house on a cold day by holding a candle under the furnace thermostat. That's because they have a more-or-less correct understanding of how those things work. People do, however, often blame high prices for the scarcity of certain goods, and act as if scarcity could be eliminated by enforcing price controls. We will discuss price controls in the next chapter.

For now, let it be understood that scarcity is a relationship between desirability and availability, or between demand and supply.

A good is scarce whenever people cannot obtain as much of it as they would like without being required to sacrifice something else of value. Market prices inform us of relative scarcities. But don't confuse scarcity with rarity. Something is *rare* if it is available in a relatively small quantity. Eight-track cassette tapes, therefore, are rarer than compact discs. *Desirability is not a component of rarity.* Who really wants eight tracks anymore? The demand just isn't there. Old eight tracks sell for a buck or two at urban flea markets. The same music on compact discs fetches much higher prices. People are willing to sacrifice more cash for the disc. It is therefore more scarce than an eight track. (If you still can't see it, consider this. Suppose one of the authors—Prychitko—autographs a baseball. It will be much rarer than an Alex Rodriguez ball, because there would be only one in existence, whereas A-Rod has signed hundreds, if not more. But nobody wants to pay as much for a Prychitko as for Rodriguez. In fact, Prychitko's signature probably reduces the value of the ball close to zero. It is therefore nowhere near as scarce as a Rodriguez.)

Now it follows immediately, as Chapter 3 insisted, that if a good is scarce, some selection process, criteria of some kind, must be established for discriminating among claimants to determine who will get how much. The criterion could be age, eloquence, swiftness, public esteem, willingness to pay money, or almost anything else. In commercial society it's most commonly on the basis of willingness to pay money. But sometimes we use other criteria.

For example, Harvard University each year has many more applicants than it can place in the freshman class, so Harvard discriminates on the basis of high school grades, test scores, recommendations, relationship to important alumni, and other criteria. Joe College is the most popular man on campus, and has young women clamoring for his favor. He must therefore direct his attentions. Whether he employs the criterion of beauty, intelligence, geniality, or something else, he must and will discriminate in some fashion.

Once Harvard announces its criteria for discrimination, freshman applicants will compete to meet them. If the women eager to date Joe College believe that beauty is his main criterion, they will compete with one another to seem more beautiful.

Competition is obviously not confined to capitalist societies, or to societies that use money. *Competition results from scarcity, and can be eliminated only with the elimination of scarcity—it occurs when people strive to meet the criteria that are being used to determine who gets what.*

The criteria that are used make a difference, sometimes a huge and important difference. If a society coordinates economic plans on the basis of willingness to pay money, members of that society will strive to make money. If it uses physical strength as a primary criterion, members of the society will do bodybuilding

Supply and demand:
A process of coordination

For Sale: A-Rod autographed baseball, \$600.

For Sale: Dave Prychitko autographed baseball, 50 cents.

Scarcity makes competition inevitable.

exercises. If it coordinates on the basis of people's ability to play brass instruments, members will try to learn how to play bugles. If the better colleges and universities use high school grades as an important criterion for selection, high school students will compete for grades. They might be competing for grades to acquire other goods as well (status among classmates, compliments from teachers, use of the family car, or the old man's credit card), but the discriminatory criteria used by these schools will certainly encourage students to compete for higher grades.

Central Planning and the Knowledge Problem

The economic task for a society is to secure coordination among people in using what is available to obtain what is wanted. Effective plan coordination among large numbers of people who barely know each other requires that the terms of exchange be clear, simple, and standardized, so that transaction costs can be kept down.

We live in a world of people with highly diverse skills, interests, values, and preferences; where resources have many different potential uses, and opportunity costs vary infinitely; where continual change and constant discovery are the features of everyday life. Imagine an alternative economic system of socialist central planning, in which all the means of production—resources, machinery, factories, and so on—are not owned privately, but by society as a whole, with decisions about the best uses of these scarce goods deposited in the hands of a group of expert economists, sociologists, chemists, and so on, who would form a central planning board and decide what to produce, how to produce, and for whom to produce. The entire socialist economy would be run like a huge state post office. Markets would be abolished. So, too, would the use of money. *What information and signals would central planners use to effectively and efficiently produce and distribute the massive array of goods and services desired by millions of citizens?*

After all, the engineers on the planning committee could announce that it is physically possible to make buses out of gold, to make train tracks out of platinum, and to make wedding rings out of tin. In a free-market system, bus producers, railroad builders, and jewelers are both politically and economically free to make these goods in this way.

So why don't they commonly do that in a market economy? *Because it would be ridiculously unprofitable to do so.* The market prices of those resources, compared to the prices people are willing to pay for the final goods, help inform producers that these will likely generate losses in advance of actually undertaking the

activity. That's what monetary calculation is all about. Those same prices emerge by millions of people's daily acts of voluntary exchange and negotiation in the market process. But socialist central planning abolishes that process. What signals and information will be readily available to the planners? They might enjoy reams of engineering principles and equations, huge warehouses stockpiled with material resources, an eager and fit-for-work population, and sophisticated computer systems tracking all the data, but will the data be economically useful? The data show that tin wedding rings are remarkably rare. Should more be produced? Or less? At what cost? *Just how scarce are tin wedding rings?* Platinum provides less friction than steel, but does that inform planners that platinum is best used to make railroad tracks? What are all the *alternative uses of platinum and the associated costs of using platinum for medical equipment, railroad tracks, or whatever?* Indeed, what are the associated costs of producing a railroad track when those materials and workers could be devoted to producing hospitals, toasters, pencils, and countless other scarce goods and services? Without money and market pricing, planners cannot effectively engage in economic calculation.

The demise of central planning in China, and in the former USSR and its client states illustrated what economic theory has long suggested: Central economic planners, even if they are brilliant and loving people, don't even begin to know enough to manage effectively the day-to-day business of a commercial society. The issue is not getting better people to plan our way to economic growth; it's getting more effective institutions and rules of the game that encourage people to discover their own comparative advantage, and make the most effective use of their limited knowledge, information, and resources.

Lack of market pricing also creates significant transaction costs and failures of cooperation among suppliers and demanders. As the system of central economic planning in the USSR disintegrated, news reports regularly told about unharvested food rotting in rural areas, while grocery store shelves stood empty in the cities. How could a thing like this occur? Why didn't someone transport that food to the cities where it was so much in demand? Collapse of the system of bureaucratic control does not provide an adequate explanation. People should be able to move food out of the fields and into the hands of hungry people without explicit orders from above.

Or so one would suppose. But think more carefully and concretely. Who owned the food that was going to waste? Who had authority to harvest it? Who owned harvesting equipment? Who could authorize the use of the equipment? Who owned trucks to transport the food to the cities? Who had fuel for the trucks? How was the food to be distributed once it arrived in the cities? The mere fact that food is going to waste in the fields while people are hungry in the cities is not enough to get food actually moving

Supply and demand:
A process of coordination

Economic calculation informs people of the relative scarcity of goods and services.

A socialist economy abolishes economic calculation and the information that it provides.

from farms to urban pantries. The right people must first acquire the appropriate information and incentives.

Transaction costs explain that "wasteful" situation. The word *wasteful* is set within quotation marks because it's not at all clear that what happened really was wasteful. It's not wasteful to let food rot rather than consume it if the costs of getting the food to consumers exceed the value of the food. And that was apparently the case. Transaction costs are just as real, and no less important than the costs of harvesting and transporting.

Property Rights and Institutions

Such a situation would be much less likely to develop in the United States, where fields, food, farm machinery, trucks, warehouses, and retail stores are privately owned. The rules of the game are different. Under a system of clearly defined property rights, people with information about the situation would have strong incentives to acquire control of whatever resources were needed to move the food from where it had no use to where it did. And within a system that allows for free exchange among property owners, the necessary resources will quickly and at low cost come together under the control of those who can put them to valuable uses.

Contrast the frustrating situation in the former USSR with the way that people, tractors, construction equipment, and everything else needed for emergency relief and reconstruction moves into hurricane-torn regions in the U.S. The crucial difference is the well-established system of clearly defined property rights in the United States, along with the extensive freedom that people have to trade those rights as they choose. This has produced over the years a vast network of institutions—profit and not-for-profit—in the United States that keeps transaction costs low for almost all the exchanges in which people engage with any frequency or regularity. (The thoughtful reader will shrewdly note that people frequently and regularly engage in particular transactions only *because* the transaction costs are low.)

Think again about how easy it usually is to obtain the precise pizza on which your hungry heart is set. The many transactions that make your pizza possible—that constructed the pizzeria, grew the peppers, shipped the olives, milked the cows, and arranged the requisite lines of credit for all these activities—all had to be negotiated. These negotiations succeeded because the transaction costs were sufficiently low. And the transaction costs were low because the transactions occurred within an extensive set of institutions that evolved over time as market participants worked to lower the costs of the transactions in which they wanted to engage. Think of specialized manufacturers, specialized Internet retailers, specialized providers of every kind of service; the

• Clearly defined property rights

• The ability to exchange rights

*Supply and demand:
A process of coordination*

principles of financial accounting, the rules of the road, the customs of the trade in varied lines of business; banks, credit reporting agencies, highly organized stock exchanges; the classified sections of daily newspapers, the telephone companies' Yellow Pages, lists of brokers and suppliers that can be obtained on a moment's notice; the rules of the common law, police to enforce these rules, and courts to resolve disputed issues, plus private systems of arbitration to supplement the system of public law.

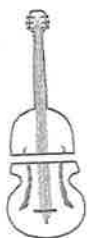
In those nations where central planning has failed, market systems have been evolving. Achievement of those market systems faces the enormous obstacle of high transaction costs at almost every turn, precisely because many of the institutions that are crucial are still lacking. Can individual transactors (ordinary people) in these nations now create by design what evolved without design in long-established market economies? Can they create quickly the complex institutions that have elsewhere come into existence through a slow, evolutionary process? Can they overcome the problem of high transaction costs rapidly enough to satisfy the aspirations of their citizens, who are impatient to enjoy the promised rewards of a market system? The success of the reform programs in many of the nations of the former Soviet bloc depends largely on the answers to these questions.

An Appendix: THE COORDINATING ROLES OF MONEY AND INTEREST

Money: The General Medium of Exchange

Why do almost all the exchanges in a market system take place for money? Why don't more people engage in barter, trading what they produce directly for what they want? Why do business owners sell goods and services for money, and workers accept payment in money, even though money is of little use in itself.

The answer is that money lowers transaction costs. *Money is a general medium of exchange.* It pervades all markets, licit and illicit. The advantages of using money rather than relying solely on a barter system are enormous. The cost of arranging exchanges would be far greater, and our wealth as a consequence far less, if there were no money in our society to facilitate the process. (Don't forget, wealth is not defined as money or material things; wealth is *whatever* people value.) In an economic system limited to barter, people would have to spend a tremendous amount of time searching for others with whom they could make a trade. A guitar maker would have to find a farmer, toilet paper manufacturer, logging mill owner, toolmaker, glue supplier, building contractor, among many others, each willing to accept guitars in



Two halves do not equal
a whole.

return for the goods that he or she produces. All that time spent on searching would be time not available for guitar making, and the production of guitars would decline steeply. So, too, would the production of all those *other* goods whose owners must also search for the right people to barter with.

Aware of the high transaction costs attached to almost every exchange, people would increasingly try to produce for themselves most of whatever they wanted. Specialization would decline dramatically in a society confined to barter, an exchange system without the facility of money, and everyone would be much poorer. The evolution of some kind of money system in almost every known society, even when conditions were extremely unfavorable to it, is eloquent testimony to the advantages of using money.

Money has another important advantage. The amount of money offered in exchange can be adjusted up or down by very small or very large amounts. Imagine the guitar maker wanting one concert ticket in a pure barter economy. Can he offer only 1/10 of a guitar for the ticket and trade the remaining portions of his guitar for a six-pack, Big Mac and fries, gasoline, and the many other things he values? Or must he trade a whole guitar for, say, 10 concert tickets, and *then* find ways to exchange the extra tickets for the six-pack, burger, and so on? Think of the ridiculously large transaction costs! No wonder Buddha gave it all up. But if the guitar maker sells guitars for money, he can buy a little bit more, or a little bit less of what he wants with no trouble at all. And he can raise the exchange value—the money price—of his guitars by a small amount if he senses that his customers are willing to pay more for them than before, or lower their exchange value by just a little if he thinks this would secure some sales that he wouldn't otherwise get.

The ability to make small adjustments is essential to the coordination of a commercial society. Consider a gallon of gasoline. If we are to be able to fill our tanks at the station on Tuesday evening at 5:30, just the right number of people with just the right abilities and command over just the right physical resources must cooperate at just the right times, and in just the right ways to explore, drill, pump, pipe, refine, truck, and store. That intricate system is coordinated basically by means of the responses people make to adjustments in money prices. The people who regularly accomplish this spectacular feat of coordination don't do it because they love us and know how much we want gasoline, but to further the innumerable and diverse projects in which they themselves happen to be interested. Their efforts mesh because those efforts are coordinated by the continually changing signals that money prices emit.

We must insist once again that the crucial importance of money prices to the working of our society implies *nothing* about the character or morality of our citizens. People pay attention

to money prices insofar as they want to economize, that is, to get as much as possible of what they value from the resources they command. Money prices help consumers establish budgets and clarify their options. Money prices help producers calculate expected costs and expected revenues. People don't pay attention *exclusively* to money prices, of course; that wouldn't make sense. They do, however, change their behavior when prices change, in order to "take advantage" of the new situation signaled by the new prices. This is what causes coordination to occur and self-interested (again, not necessarily selfish) behavior to become cooperative action.

Money and Interest

Recently a financial journalist wrote, "If Ben Bernanke at the Federal Reserve raises interest rates the price of money will go up." Unfortunately, statements like this are entirely wrong from the perspective of the economic way of thinking. Interest is not the price of money. Nor is it a payment made to use money. Interest is paid not for using money, but for *borrowing* money. *Borrowing is a matter of obtaining purchasing power that we have not yet earned.* Borrowers, through the channels of banks, persuade lenders to provide them with credit *now*, by promising to pay back the principle plus interest later. They enter a mutually agreed-upon contract. The interest rate reflects the price of credit, the terms of the deal.

Think of a student loan. Why are you willing to pay interest? Current resources are generally more valuable than future resources because having them usually expands one's opportunities—enabling us to do things that cause our earning capacity to increase over time, so that we might have more resources at some future date. When we see such a prospect, we want to borrow—invest in our own education in this case. And we are willing to pay, if we have to, a premium—interest—as long as the interest is less than what we expect to gain as a result of borrowing. Businesses do the same.

Time Preference

Interest is the difference in value between present and future goods. Many economists over the decades argued that the difference between the two might be explained by the expected productivity of capital. But more than that, people display a *positive rate of time preference*: we tend to place a higher value on present enjoyment than on enjoyment in the distant future. We often discount the future, if only a bit.

Supply and
demand:
A process of
coordination

The role of monetary
calculation

Interest is not "the price
of money."

If you place the same value on \$1,000 now as on \$1,250 a year from now, then you have a 25% rate of time preference.

Here are a couple of little tests you might use to find out whether you have a positive rate of time preference. You're hungry. You have the choice of either eating an hour from now, or having the same meal a few hours from now. If you prefer to eat sooner rather than later, then you are displaying a positive rate of time preference. Or imagine your grandmother surprises you with a check in the mail for \$100. You're naturally thrilled by the gift. But then you notice it is dated to be cashed next month. If that disappoints you a little, if you'd prefer to be able to cash the check today, you are displaying a positive rate of time preference.

It then becomes a matter of trade-offs. You might be more than willing to postpone a present consumption opportunity if you can be compensated with a larger opportunity in the future. For example, you might choose to go without lunch if you can have a tastier meal for supper. Or, as a student, you might be willing to live with a smaller income today as long as you believe your degree will provide a larger flow of income in the future.

Saving Creates Credit Opportunities

Getting back to the financial aspect of interest. Interest is paid to induce people to give up present enjoyment of goods. After all, lenders face trade-offs, too. A promised return of interest on a loan compensates for the lender's own opportunity cost so that she can enjoy more goods and services in the future.

And that's an important reason why households are willing to save money. They are willing to give up some present consumption for future consumption opportunities. While we see banks themselves lending money to their customers, the flow of savings from households actually creates the credit opportunities made available to borrowers. (We will delay an important discussion of additional credit creation through the Federal Reserve until Chapter 14.) Savings dollars that are deposited in banks, promising a particular interest return to households, are then lent out by banks who charge a higher rate to the borrowers, keeping any difference as a potential profit opportunity.

The supply of credit, provided by banks, but channelled from household savings, is an upward-sloping function of the interest rate. A higher interest rate, other things constant, encourages a larger quantity of credit supplied. The demand for credit among borrowers—households and businesses—is, like all demand curves, downward-sloping. Other things constant, people are more inclined to borrow at lower rates of interest as opposed to higher rates. The market rate of interest, say, 5% (you may think of it as the price of credit, the price of the loan) emerges where supply meets demand. This is depicted in Figure 5-2.

If households were willing to save more at the prevailing rate of interest (if their rate of time preference were to fall) the entire

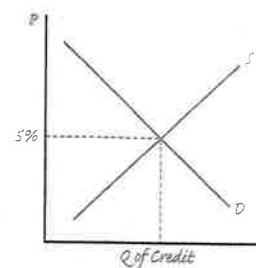


Figure 5-2 Supply and demand in the market for credit

The 5% market rate of interest is determined by saving and investment decisions. Should households wish to save more, the supply of credit will increase, the interest rate will fall, and more borrowing will occur.

supply of credit curve would shift left. That would lower the market rate of interest from r_1 to r_2 , and allow more opportunities to borrow among other households and—importantly—investors. We can think of the greater savings as giving the green light to businesses to borrow and undertake more time-sensitive and lengthier production processes. Those investments will provide households with greater consumption opportunities in the future.

The Risk Factor in Interest Rates

The market rate of interest of which we speak reflects the rate of time preferences, but it also includes risk premiums of various sizes. Highly credit-worthy customers generally pay lower interest rates compared to those with a weaker credit record. Think of it as a kind of insurance premium that the bank collects from the borrower in anticipation of losses through costs of collection and defaults. If the bank could not charge this risk premium, it would refuse to make loans to customers in higher-risk categories.

Real and Nominal Interest Rates

The quoted interest rates that you see in credit contracts also include one other component. They incorporate an additional amount to compensate the lender for any expected decrease in the purchasing power of money (inflation). If a lender wishes to earn 3% annually, and expects zero inflation (a constant purchasing power of money), then he will charge borrowers a 3% "nominal" rate of interest. ("Nominal" is the actual, quoted rate of interest spelled out in the loan, the rate that you see posted on

the wall behind the bank tellers.) And he will "really" earn 3% as long as the terms of the loan are met. But if the lender expects a 2% rate of inflation that lowers the purchasing power of money, or whittles away at its value, then he would charge an inflationary premium, and raise his nominal rate to 5%. If the lender receives 5% annually during the course of a 2% inflation, then he is "really" earning 3% after the inflation is taken into account.

The formula for calculating the real interest rate is straightforward:

$$\begin{aligned} \text{The real interest rate} &= \text{the nominal rate} \\ &\quad - \text{the rate of inflation} \end{aligned}$$

In our preceding example, we determined the real interest rate by subtracting the expected rate of inflation, 2%, from the nominal rate of interest, 5%, leaving us with a real rate of 3%.

Once Over Lightly

The coordination of decisions in a society characterized by extensive division of labor is a task of enormous complexity, requiring the continuous daily negotiation, renegotiation, and monitoring of millions of agreements to exchange.

The market is best thought of as a process of plan coordination, rather than being depicted as a person, place, or thing. Supply and demand is the process of interaction through which relative prices are determined. It is a process of mutual adjustment and accommodation.

Markets clear when the plans of buyers are coordinated with the plans of sellers, in other words, when quantity demanded equals quantity supplied. When a price is below its market-clearing level, a shortage occurs, defined as quantity demanded exceeding quantity supplied. The market price will tend to increase, thereby reducing the shortage. When a price is above its market-clearing level, a surplus occurs, defined as quantity supplied exceeding quantity demanded. The market price will tend to decrease, thereby reducing the surplus. Market clearing is an unintended outcome of buyers and sellers pursuing their own objectives. Economists are helpful in explaining how this process works; economists aren't necessary, however, for free markets to work effectively.

Exchange is a cooperative activity. Buyers and sellers cooperate with one another by agreeing to the terms of trade. Buyers compete with buyers by bidding up prices, or finding other nonmonetary ways to gain access to scarce goods, which is evident during a shortage. Sellers compete with sellers in their search for profit. During shortages they typically compete by reducing their prices.

Rarity shouldn't be confused with scarcity. Something is rare if it exists in relatively small quantities, such as a Prychitko autographed baseball or a Boettke autographed tennis racket.

Scarcity is a relationship between availability and desirability, or between supply and demand. A good ceases to be scarce only when people can obtain all they want at a zero opportunity cost to themselves.

In a world of scarcity, rules of the game, including discriminatory criteria, must evolve or be designed to determine who gets what. Competition is the attempt to satisfy whatever discriminatory criteria are being used.

Prices established in an open market process transmit important information regarding the relative scarcities of goods and services. By attempting officially to abolish private ownership, money, and markets, centrally planned economies also destroyed precisely those market signals that allow people to discover their comparative advantage and effectively coordinate their production and consumption plans.

An effective market economy features numerous institutions that have evolved to reduce transaction costs and thus facilitate voluntary exchange. Transaction costs are the costs of arranging contracts or transaction agreements between suppliers and demanders. Money is a general medium of exchange that reduces transaction costs. A corresponding system of money prices that change readily in response to changing conditions of supply and demand transmits the kind of information that allows for people to coordinate their plans efficiently in highly specialized economic systems.

In its most general sense, interest represents the difference in value between present and future goods. Another way of stating this is that people display a positive rate of time preference: other things constant, an individual would prefer enjoyment of a good sooner rather than later in time. This is one reason why people are willing to pay interest to borrow money from others, to gain present command of goods. It's also the reason why people will ask for an interest return—for they will be induced to give up some present command of goods if they can be compensated with more in the future.

Market rates of interest are determined by the supply and demand for credit. The interest rate itself is not the price of money, but rather the terms of the loan. The specific terms will include a premium for the risk-factor of the loan, and a premium for the expected rate of inflation. The real rate of interest is calculated by subtracting that expected rate of inflation from the nominal rate of interest.

QUESTIONS FOR DISCUSSION

1. Here is a good question to get you thinking about supply and demand as a process of coordination. Millions of Americans change their residences each year, many moving long distances to new and strange areas. How do they all find places to live?

- (a) Who sees to it that every individual or family moving to a new state finds someone in that state willing to sell or rent them a house or apartment that suits their tastes and circumstances?
 - (b) Who oversees construction planning so that those states that are growing most rapidly manage to expand their stock of housing at a rate that matches their population growth?
 - (c) List some of the institutions that lower transaction costs for Americans who must sell a house and buy another house in order to move from one city to another.
 - (d) During the years when the communist government of China claimed ownership of all housing in the nation, it also maintained housing-exchange stations in all the major cities. Why would transaction costs be much higher with a housing exchange than with a system of private ownership and changing prices when it comes to facilitating trades among millions of people who want to move?
2. The deputy chairman of the Russian Red Cross complained in the 1990s that food aid sent to the country by Western nations was being stolen. "Russian swindlers are the most experienced in the world," he said. The deputy director of the Russian aid commission expressed the need for a centralized system to ensure proper distribution. Which do you think is likely to get into the mouths of hungry people faster and with less loss through spoilage: food that is distributed through government agencies and charity organizations or food that has been stolen? Why?
 3. If the desire for more money is an indication of a selfish and materialistic attitude, as many people seem to think, why do churches and charitable organizations work so hard to acquire more of it? (If your first response is "they're just as greedy as anyone else," you might want to think again.)
 4. Explain how, in a barter economy, a toilet paper manufacturer would have a little easier time bartering compared to a guitar maker.
 5. It might take only one person to screw in a lightbulb, but how many people does it take to eventually produce lightbulbs?
 6. Mastering the economic way of thinking means learning to reason in terms of supply and demand. Here are additional questions on which you can practice. Some are harder than others. You should probably begin in each case by sketching a small supply and demand graph. Then ask yourself whether the event described would affect the supply curve or the demand curve, in which direction the curve would move, and what effect that would have on the price and the quantity exchanged. Don't be content merely to conclude that the price will rise or the price will fall. Would you expect a large or a small change in price or in the quantity exchanged? You will usually have to supply some information from your own experience. Keep in mind that the answer will often depend on the length of time you are allowing for adjustments to occur. Are you predicting a very short-run effect or are you thinking about the long-run effect?
- (a) What would happen to the market-clearing price of acoustic guitars in Figure 5-1 if
 - (i) People turned on to some accordion craze and started losing interest in learning to play the guitar?

- (ii) The price of electric guitars were to fall substantially?
 - (iii) A number of acoustic guitar makers decide to exit the market and make violins instead?
- (b) Suppose scientists discover that eating soybeans prevents cancer and heart disease.
 - (i) What effect would you predict on the price of soybeans?
 - (ii) What effect would you predict on the price of *feed corn* (which can usually be grown on land suitable for growing soybeans)?
 - (c) What effect would you expect each of the following to have (or to have had) on the market for domestically grown cotton?
 - (i) Nylon is invented.
 - (ii) The cotton gin is invented.
 - (iii) The boll weevil (a crop killer) becomes extinct.
 - (iv) Foreign cotton growers bring in an exceptionally large harvest.
 - (d) Suppose that all states adopt a serious no-fault rule to cover automobile accidents, so that it becomes impossible to sue for damages after an accident.
 - (i) What effect would you predict on the cost of hiring a lawyer to draw up a will?
 - (ii) If only *one state* moves to no-fault, what effect would you predict on the cost of hiring lawyers to draw up wills in *that state*? Would you expect a larger or smaller effect than in the preceding question?
 - (e) Suppose the dental hygienists of the country persuade everyone to floss at least three times each day. What effect would you predict on the price of dental floss?
 - (f) If it takes five times as much grain to provide a nourishing diet to people who run that grain through beef cattle before eating it than it takes to provide a nourishing diet to those who eat the grain directly, do those who eat beef cause hunger among poor people in the world?
 - (g) Here is a somewhat different kind of question, one for which you obviously can't supply information from your own experience. Suppose you discover that consumers are currently purchasing 20 times as many widgets as they were purchasing 10 years ago. Would you expect the price of a widget to be higher or lower today than it was 10 years ago? Under what circumstances would you expect it to be higher? Under what circumstances would you expect it to be lower?
 - (h) What effect would you predict on the price of rental housing in an area if several major new employers set up operations in the area?
 - (i) If the city council passes an ordinance requiring all apartment owners in a particularly congested area to provide one off-street parking place for each apartment that they rent out, what effect would you predict on the level of rents in that area and on the number of apartment units being rented?
 - (j) If the city council did not require provision of parking spaces, but simply prohibited all on-street parking on the streets in this congested area, what effect would you predict on the level of rents in the area and on the number of apartment units being rented?

- (k) What effect would you predict on the price of gasoline if automobile manufacturers succeeded in doubling the number of miles that drivers can obtain per gallon?
- (l) As colleges and universities adopt more online testing programs, what effect would this have on the price of old-fashioned no. 2 pencils? Would you expect the price change to be small or quite large? What does that say about the price elasticity of supply of no. 2 pencils?
7. "When the price of apples falls, the supply falls and the demand increases." Evaluate this statement.
 8. "If there is a shortage of platinum, its price will rise. The shortage will eventually disappear because the higher price will reduce demand and increase supply." Evaluate this statement.
 9. If gasoline prices continue above \$4.00 a gallon, what would tend to happen to the demand for eight-cylinder SUVs? What would that tend to do to the market price of those SUVs?
 10. Many people believe that in the event of another oil crisis brought on by war in the Middle East or elsewhere, gasoline should be rationed by the government by the criterion of need. How would you propose that the rationing authorities determine need?
 11. There are no toll charges for driving on many urban expressways during the rush hour. How is it determined who gets to drive on the roadway?
 12. Parking space is sometimes made available on college campuses at a zero price even when parking space is quite scarce.
 - (a) What exactly does it mean that parking space is scarce? Does it mean that parking spaces are not available?
 - (b) How is scarce parking space rationed in the absence of parking fees?
 - (c) If a college charged all students who wanted to park on campus \$200 for a yearly parking permit, would that fee effectively ration scarce parking space?
 - (d) Suppose the college placed parking meters along all the campus streets. How could these be used to ration scarce parking space effectively? Keep in mind that some parking spaces will be in much greater demand than others.
 13. Concert tickets are often initially sold on a first-come, first-served basis. Back in the day, before there were ticket sites on the Internet, kids skipped school, camped out in overnight lines, and did who knows what else to try to obtain tickets before they sold out.
 - (a) Who were they competing against? The performers? The managers and promoters? Sponsors? The ticket agency? The concert hall? Were they competing at all?
 - (b) Today people can purchase tickets through Internet ticket brokers and sites such as eBay. What criterion is being used there to determine who gets the tickets?
 14. Far fewer babies are currently offered for adoption in the United States than couples want to adopt. Would you be willing to let the available children go to the highest bidder? What consequences would you predict from such a system? By what criteria are scarce babies currently assigned to prospective adopters?

15. Federal law currently prohibits the sale of human organs for transplant purposes. At the present time, people are dying while waiting for suitable organs to become available. 2012 Nobel Prize winner in economics Alvin Roth has suggested designing a barter-like market for organs. But what about outright buying and selling of organs? It seems almost certain that more organs would become available if financial incentives were offered to prospective donors. Roth contends too many people find the idea repugnant. Would you be in favor of allowing this? What consequences would you predict?
16. Some years ago Utah annually sold 27 licenses to hunt buffalo in a 1,500-square-mile area of the state. The fee was \$200 for residents and \$1,000 for nonresidents. Because the state received more than a thousand applications each year, it held a drawing to decide who will get the 27 licenses.
 - (a) Why do you suppose Utah didn't sell the licenses to the highest bidder?
 - (b) Do you think people who receive a license should be allowed to sell it to someone else?
 - (c) What effects do you think a lottery system with *freely transferable licenses* would have?
17. If the supply of turkeys in a particular November turned out to be unusually small, do you think a turkey shortage would result? Why or why not?
18. If you travel through the western United States in the summer, you are much more likely to encounter a shortage of camping spaces than of motel rooms. Why?
19. Here's one about competition on the supply side. In 2011, two managers of a Domino's pizza franchise in Lake City, Florida, burned down the building of a newly-established Papa John's pizzeria a couple blocks away. They said they were tired of watching cars drive past their store and into the Papa John's parking lot. While such violent activity is rare in the fast food industry, your authors know of another market where the elimination of one's competitors through violence is practically a daily occurrence. Can you guess which one it is?
20. Which is more scarce, an ounce of gold or an ounce of plastic? What information did you use to reach your conclusion?
21. "Central planners were more effective than your free market-loving textbook authors let on. Planners in the former Soviet Union never even considered making railroad tracks out of platinum or ships out of gold. They already knew that would be a waste of those scarce resources. They were informed by the world market prices for platinum and gold." We never said ships. We said buses. But anyway, how would you respond to that statement? What does it actually say about the importance of market processes and market prices?
22. In the United States today, the largest denomination note is the \$100 bill. The \$500 bills no longer circulate as money. Can you explain why authorities might abolish larger-denomination notes as part of their effort to fight organized crime?
23. If interest rates are largely determined by the time preferences of savers and borrowers, what does it mean when we say that the Federal Reserve is raising or lowering interest rates?