What does it cost you to go to the movies? If you answered eight or nine dollars, because that is the price of a movie ticket, then you are leaving out a lot. Most of us are used to thinking of “cost” as the money we must pay for something. A Big Mac costs $2.50, a new Toyota Corolla costs $15,000, and the baby-sitter costs $8.00 an hour. Certainly, the money we pay for a good or service is a part of its cost. But economics takes a broader view of costs, recognizing monetary as well as nonmonetary components.

THE CONCEPT OF OPPORTUNITY COST

The total cost of any choice we make—buying a car, producing a computer, or even reading a book—is everything we must give up when we take that action. This cost is called the opportunity cost of the action, because we give up the opportunity to have other desirable things.

Opportunity cost is the most accurate and complete concept of cost—the one we should use when making our own decisions or analyzing the decisions of others.

OPPORTUNITY COST FOR INDIVIDUALS

Virtually every action we take as individuals uses up scarce money, scarce time, or both. Hence, every action we choose requires us to sacrifice other enjoyable goods and activities for which we could have used our money and time. For example, it took a substantial amount of the authors’ time to write this textbook. Suppose that the time devoted to writing the book could instead have been used by one of the authors to either (1) go to law school, (2) write a novel, or (3) start a profitable business.

Do all three of these alternatives combined make up the opportunity cost of writing this book? Not really. Choosing not to write the book would have released some time but not enough time to pursue all three activities. To measure opportunity cost, we look only at the activity or activities that would have been chosen—

Opportunity cost What is given up when taking an action or making a choice.

The opportunity cost of any choice is what we forego when we make that choice.

http://www.cba.uiuc.edu/CollegeChoice/.

Is college worth the opportunity cost for you? Find out by trying Professor Jane Leuthold’s COLLEGE CHOICE program at http://www.cba.uiuc.edu/CollegeChoice/.
the ones that make up the next best alternative—because that is what will actually be given up. Suppose that for one of the authors the next best alternative to writing this book was to start a profitable business. Then the opportunity cost of co-authoring this book was the foregone opportunity to start the business. Since the other, less valuable alternatives would not have been chosen anyway, they are not part of the cost of writing the book.

To explore this notion of opportunity cost further, let’s go back to the earlier question: What does it cost to see a movie? That depends on who is seeing the movie. Suppose some friends ask Jessica, a college student, to go with them to a movie located 10 minutes from campus. To see the movie, Jessica will use up scarce funds to buy the movie ticket. She will also use up scarce time traveling to and from the movie and sitting through it. Suppose the money she uses for the movie ticket would otherwise have been spent on a long-distance phone call to a friend in Italy—Jessica’s next best use of the money—and the time would otherwise have been devoted to studying for her economics exam—her next best use of time. For Jessica, then, the opportunity cost of the movie consists of two things given up: (1) a phone call to her friend and (2) a higher score on her economics exam. Seeing the movie will require Jessica to sacrifice both of these valuable alternatives, since the movie will cost Jessica both money and time.

Now consider Samantha, a highly paid consultant who lives in New York City a few miles from the movie theater, and who has a backlog of projects to work on. As in Jessica’s case, seeing the movie will use scarce funds and scarce time. But for Samantha, both costs will be greater. First, the direct money costs: There is not only the price of the movie ticket, but also the round-trip cab fare, which could bring the direct money cost to $20. However, this is only a small part of Samantha’s opportunity cost. Let’s suppose that the time it takes Samantha to find out when and where the movie is playing, hail a cab, travel to the movie theater, wait in line, sit through the previews, watch the movie, and travel back home is three hours—not unrealistic for seeing a movie in Manhattan. Samantha’s next best alternative for using her time would be to work on her consulting projects, for which she would earn $150 per hour. In this case, we can measure the entire opportunity cost of the movie in monetary terms: first, the direct money costs of the movie and cab fare ($20), and second, the foregone income associated with seeing the movie: ($150 × 3 hours = $450)—for a total of $470!

At such a high price, you might wonder why Samantha would ever decide to see a movie. Indeed, the same reasoning applies to almost everything Samantha does besides work: It is very expensive for Samantha to talk to a friend on the phone, eat dinner, or even sleep. Each of these activities requires her to sacrifice the direct money costs plus another $150 per hour of foregone income. Would Samantha ever choose to pursue any of these activities? The answer for Samantha is the same as for Jessica or anyone else: yes—if the activity is more highly valued than what is given up. It is not hard to imagine that, after putting in a long day at work, leisure activities would be very important to Samantha—worth the money cost and the foregone income required to enjoy them.

Our examples point out an important lesson about opportunity cost:

The direct money cost of a choice may only be a part of the opportunity cost of that choice.

Once you understand the concept of opportunity cost and how it can differ among individuals, you can understand some behavior that might otherwise appear strange. For example, why do high-income people rarely shop at discount stores like Kmart or Target and instead shop at full-service stores where the same items sell for much higher prices? It’s not that high-income people like to pay more for their purchases.
Measuring Opportunity Cost  In some cases, the entire opportunity cost of a decision can be expressed as a dollar figure. For example, Samantha’s ticket, cab fare, and even the time spent at the movie are all easy to value in dollars (the value of the time is equal to the dollars Samantha could have earned at the next best alternative—working). But what if some part of opportunity cost cannot be easily measured in dollars? Then we simply express the opportunity cost as several different things, rather than a single number. For example, suppose that Samantha’s next best alternative to the movie was not working, but attending a friend’s birthday party instead. Then the opportunity cost of the movie would consist of both the direct dollar cost of the movie (ticket plus cab fare) and the missed birthday party.

But discount stores are generally understaffed and crowded with customers, so shopping there takes more time. While discount stores have lower money cost, they impose a higher time cost. For high-income people, discount stores are actually more costly than stores with higher price tags.

We can also understand why the most highly paid consultants, entrepreneurs, attorneys, and surgeons often lead such frenetic lives, doing several things at once and packing every spare minute with tasks. Since these people can earn several hundred dollars for an hour of work, every activity they undertake carries a correspondingly high opportunity cost. Brushing one’s teeth can cost $10, and driving to work can cost hundreds! By combining activities—making phone calls while driving to work, thinking about and planning the day while in the shower, or reading the morning paper in the elevator—the opportunity cost of these routine activities is reduced.

And what about the rest of us? As our wages rise, we all try to cram more activities into little bits of free time. Millions of Americans now carry cell phones and use them while waiting for an elevator or walking their dogs. Books on tape are becoming more popular and are especially favored by runners. (Why just exercise when you can also “read” a book?) And for some, vacations have become more exhausting than work, as more and more activities are crammed into shorter and shorter vacation periods.

OPPORTUNITY COST AND SOCIETY

For an individual, opportunity cost arises from the scarcity of time or money. But for society as a whole, opportunity cost arises from a different source: the scarcity of society’s resources. Our desire for goods is limitless, but we have limited resources to produce them. Therefore,

\[ \text{all production carries an opportunity cost: To produce more of one thing, society must shift resources away from producing something else.} \]

Let’s discuss a goal on which we can all agree: better health for our citizens. What would be needed to achieve this goal? Perhaps more frequent medical check-ups for more people and greater access to top-flight medicine when necessary. These, in turn, would require more and better-trained doctors, more hospital buildings and laboratories, and more high-tech medical equipment such as PET scanners and surgical lasers. In order for us to produce these goods and services, we would have to pull resources—land, labor, and capital—out of producing other things that we also enjoy. The opportunity cost of improved health care, then, consists of all the other goods and services we would have to do without.

PRODUCTION POSSIBILITIES FRONTEIRS

Let’s build a simple model to help us understand the opportunity cost we must pay for improved health care. To be even more specific, we’ll measure production of health care by the number of lives saved. This variable is plotted along the horizon-
The Concept of Opportunity Cost

The vertical axis in Figure 1. To measure the opportunity cost of health care, we'll make a simplifying assumption: that all goods other than life-saving health care can be lumped into a single category, and that we can measure how many units of these “other goods” we're producing. In Figure 1, the quantity of “other goods” is measured on the vertical axis.

Now look at the curve drawn in Figure 1. It is society’s production possibilities frontier (PPF), giving the different combinations of goods that can be produced with the resources and technology currently available. More specifically, this PPF tells us the maximum quantity of all other goods we can produce for each number of lives saved and the maximum number of lives saved for each different quantity of other goods. Positions outside the frontier are unattainable with the technology and resources at the economy’s disposal. Society’s choices are limited to points on or inside the PPF.

Let’s take a closer look at the PPF in Figure 1. Point A represents one possible choice for our society: to devote all resources to the production of “other goods” and none to health care. In this case, we would have 1,000,000 units of other goods, but we would have to forego every opportunity to save lives. Point F represents the opposite extreme: all available resources devoted to life-saving health care. In that case, we’d save 500,000 lives, but we’d have no other goods.

If points A and F seem absurd to you, remember that they represent two possible choices for society but choices we would be unlikely to make. We want life-saving health care to be available to those who need it, but we also want housing, clothing, entertainment, cars, and so on. So a realistic choice would include a mix of health care and movies.

Suppose we desire such a mix, but the economy, for some reason, is currently operating at the undesirable point A—no health care, but maximum production of everything else. Then we need to shift some resources from other goods to health care. For example, we could move from point A to point B, where we’d be saving...
100,000 lives. But as a consequence, we’d have to cut back on other goods, producing 50,000 fewer units. The opportunity cost of saving 100,000 lives, then, would be 50,000 units of all other goods.

**Increasing Opportunity Cost.** Suppose we are at point $B$, and now we want to save even more lives. Once again, we shift enough resources into health care to save an additional 100,000 lives, moving from point $B$ to point $C$. This time, however, there is an even greater cost: Production of other goods falls from 950,000 units to 850,000 units, or a sacrifice of 100,000 units. The opportunity cost of saving lives has risen. You can see that as we continue to save more lives—by increments of 100,000, moving from point $C$ to point $D$ to point $E$ to point $F$—the opportunity cost of producing other goods keeps right on rising, until saving the last 100,000 lives costs us 400,000 units of other goods.

The behavior of opportunity cost described here—the more health care we produce, the greater the opportunity cost of producing still more—applies to a wide range of choices facing society. It can be generalized as the *law of increasing opportunity cost*.

The law of increasing opportunity cost causes the PPF to have a *concave* shape, becoming steeper as we move rightward and downward. To understand why, remember (from high school math) that the slope of a line or curve is just the change along the vertical axis divided by the change along the horizontal axis. Along the PPF, as we move rightward, the slope is the change in the quantity of other goods divided by the change in the number of lives saved. This is a negative number, because a positive change in lives saved means a negative change in other goods. The absolute value of this slope is the opportunity cost of saving another life. Now—as we’ve seen—this opportunity cost increases as we move rightward. Therefore, the absolute value of the PPF’s slope must rise as well. The PPF gets steeper and steeper, giving us the concave shape we see in the Figure 1.1.

Why should there be a law of increasing opportunity cost? Why must it be that the more of something we produce, the greater the opportunity cost of producing still more?

Because most resources—*by their very nature*—are better suited to some purposes than to others. If the economy were operating at point $A$, for example, we’d be using all of our resources to produce other goods, including resources that are much better suited for health care. A hospital might be used as a food cannery, a surgical laser might be used for light shows, and a skilled surgeon might be driving a cab or trying desperately to make us laugh with his stand-up routine.

As we begin to move rightward along the PPF, say from $A$ to $B$, we shift resources out of other goods and into health care. But we would *first* shift those resources *best suited to health care*—and *least* suited for the production of other things. For example, the first group of workers we’d use to save lives would be those who already have training as doctors and nurses. A surgeon—who would probably not make the best comedian—could now go back to surgery, which he does very well. Similarly, the first buildings we would put to use in the health care industry would be those that were

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1 You might be wondering if the law of increasing opportunity cost applies in both directions. That is, does the opportunity cost of producing “other goods” increase as we produce more of them? The answer is yes, as you’ll see when you do Problem 2 at the end of this chapter.
originally built as hospitals and medical offices, and weren’t really doing so well as manufacturing plants, retail stores, or movie studios. This is why, at first, the PPF is very flat: We get a large increase in lives saved for only a small decrease in other goods.

As we continue moving rightward, however, we shift away from other goods those resources that are less and less suited to life-saving. As a result, the PPF becomes steeper. Finally, we arrive at point E, where all resources—no matter how well suited for other goods and services—are used to save lives. A factory building is converted into a hospital, your family car is used as an ambulance, and comedic actor Jim Carrey is in medical school, training to become a surgeon.

The principle of increasing opportunity cost applies to all of society’s production choices, not just that between health care and other goods. If we look at society’s choice between food and oil, we would find that some land is better suited to growing food and some land to drilling for oil. As we continue to produce more oil, we would find ourselves drilling on land that is less and less suited to producing oil, but better and better for producing food. The opportunity cost of producing additional oil will therefore increase. The same principle applies in choosing between civilian goods and military goods, between food and clothing, or between automobiles and public transportation: The more of something we produce, the greater the opportunity cost of producing still more.

THE SEARCH FOR A FREE LUNCH

This chapter has argued that every decision to produce more of something requires us to pay an opportunity cost by producing less of something else. Nobel Prize-winning economist Milton Friedman summarized this idea in his famous remark, “There is no such thing as a free lunch.” Friedman was saying that, even if a meal is provided free of charge to someone, society still uses up resources to provide it. Therefore, a “free lunch” is not really free: Society pays an opportunity cost by not producing other things with those resources. The same logic applies to other supposedly “free” goods and services. From society’s point of view, there is no such thing as a free airline flight, a free computer, or free medical care. Providing any of these things requires us to sacrifice other things, as illustrated by a movement along society’s PPF.

But what if an economy is not living up to its productive potential, but is instead operating inside its PPF? For example, in Figure 1, suppose we are currently operating at point W, where the health care system is saving 200,000 lives and we are producing 400,000 units of other goods. Then we can move from point W to point E and save 200,000 more lives with no sacrifice of other goods. Or, starting at point W, we could move to point C (more of other goods with no sacrifice in lives saved) or to a point like D (more of both health care and other goods).

As you can see, if we are operating inside the PPF, Friedman’s dictum does not apply—there can be such a thing as a free lunch! But why would an economy ever be operating inside its PPF? There are two possibilities.

Productive Inefficiency. One reason an economy might be operating inside its PPF is that resources are being wasted. Suppose, for example, that many people who could be outstanding health care workers are instead producing other goods, and many who would be great at producing other things are instead stuck in the health care industry. Then switching people from one job to the other could enable us to have more of both health care and other goods. That is, because of the mismatch of workers and jobs, we would be inside the PPF at a point like W. Creating better job matches would then move us to a point on the PPF (such as point E).

Economists use the phrase productive inefficiency to describe the type of waste that puts us inside our PPF.
Productive efficiency. A firm, an industry, or an entire economy is **productively inefficient** if it could produce more of at least one good without pulling resources from the production of any other good.

The phrase *productive efficiency* means the absence of any productive inefficiency. For example, if the computer industry is producing the maximum possible number of computers with the resources it is currently using, we would describe the computer industry as productively efficient. In that case, there would be no way to produce any more computers without pulling resources from the production of some other good. In order for an entire economy to be productively efficient, there must be no way to produce more of any good without pulling resources from the production of some other good.

Although no firm, industry, or economy is ever 100 percent productively efficient, cases of gross inefficiency are not as common as you might think. When you study microeconomics, you’ll learn that business firms have strong incentives to identify and eliminate productive inefficiency, since any waste of resources increases their costs and decreases their profit. When one firm discovers a way to eliminate waste, others quickly follow.

For example, empty seats on an airline flight represent productive inefficiency. Since the plane is making the trip anyway, filling the empty seat would enable the airline to serve more people with the flight (produce more transportation services) without using any additional resources (other than the trivial resources of the airline meal). Therefore, more people could fly without sacrificing any other good or service. When American Airlines developed a computer model in the late 1980s to fill its empty seats by altering schedules and fares, the other airlines followed its example very rapidly. And when—in the late 1990s—a new firm called Priceline.com enabled airlines to auction off empty seats on the Internet, several airlines jumped at the chance, and others quickly followed. As a result of this—and similar efforts to eliminate waste in personnel, aircraft, and office space—many cases of productive inefficiency in the airline industry were eliminated.

The same sorts of efforts have eliminated some easy-to-identify cases of productive inefficiency in all types of industries: banking, telephone service, Internet service providers, book publishers, and so on. There are certainly instances of inefficiency that remain (an example appears at the end of this chapter). But on the whole, if you search the economy for a free lunch due to productive inefficiency, you won’t find as many hearty meals as you might think.

**Recessions.** Another situation in which an economy operates inside its PPF is a **recession**—a slowdown in overall economic activity. During recessions, many resources are idle. For one thing, there is widespread **unemployment**—people want to work but are unable to find jobs. In addition, factories shut down, so we are not using all of our available capital or land either. An end to the recession would move the economy from a point inside its PPF to a point **on** its PPF—using idle resources to produce more goods and services without sacrificing anything.

This simple observation can help us understand, in part, why the United States and the Soviet Union had such different economic experiences during World War II. In the Soviet Union, the average standard of living deteriorated considerably as the war began, but when the United States entered the war, living standards improved slightly. Why?

Figure 2 helps to solve this puzzle. The PPF in Figure 2 is like the PPF in Figure 1. But this time, instead of pitting “health care” against “all other goods,” we look at society’s choice between **military** goods and **civilian** goods. When the United States
At the onset of World War II, the U.S. economy was in a recession with high unemployment. This is shown by point A in panel (a), which is inside the production possibilities frontier. War production eliminated the unemployment as the United States moved onto its PPF at point B with more military goods and more civilian goods. The Soviet Union, by contrast, began the war with fully employed resources. It could increase military production only by sacrificing civilian goods and moving along its PPF from point C to point D.

2 Entering the war—which meant an increase in military production—required a movement along its PPF, to a point like B, on the frontier. Military production increased, but so did the production of civilian goods. Although there were shortages of some consumer goods, the overall result was a rise in the material well-being of the average U.S. citizen.

In the Soviet Union, things were very different. In the 1930s, the Soviet economy—which was internationally isolated—was able to escape entirely the effects of the depression that plagued the rest of the world. Thus, before the war, it was already operating on or near its PPF, at a point like C. Entering the war—which meant an increase in military production—required a movement along its PPF, to a point like D. For the Soviet Union, the drop in civilian production—and the resulting drop in living standards—was the opportunity cost that had to be paid in order to fight the war.

2 Because its economic system caused major productive inefficiencies, some would argue that the Soviet Union was never actually on or even near its PPF. In Figure 2, however, we take the Soviet economic system as a given. Being on the PPF means the economy is producing the maximum civilian output for any given quantity of military output and for the given Soviet economic system.

3 There is another explanation for the decline in living standards in the Soviet Union, and it, too, can be illustrated with PPFs. Unlike the United States, large parts of the Soviet Union were decimated during World War II, decreasing the land and capital available for production of any kind. Similarly, the Soviet loss of human life was staggering—about 20 times greater than the loss of American lives. These huge decreases in land, labor, and capital shifted the Soviet PPF significantly inward—with fewer resources, civilian production would have to be smaller for any given level of military production.
An economic downturn, such as the Great Depression of the 1930s, does seem to offer a clear-cut free lunch. But eliminating a recession is not entirely costfree. When you study macroeconomics, you will see that while a variety of government policies can help to cure or avoid recessions, these same policies risk creating other problems of their own. Of course, we may feel that it is worth paying the cost to end a recession, but there is, nevertheless, a cost. Once again, a truly free lunch is not so easy to find.

**ECONOMIC SYSTEMS**

As you read these words—perhaps sitting at home or in the library—you are experiencing a very private moment. It is just you and this book; the rest of the world might as well not exist. Or so it seems. . . .

Actually, even in this supposedly private moment, you are connected to the rest of the world in ways you may not have thought about. In order for you to be reading this book, the authors had to write it. Someone had to edit it, to help make sure that all necessary material was covered and explained as clearly as possible. Someone else had to prepare the graphics. Others had to run the printing presses and the binding machines, and still others had to pack the book, ship it, unpack it, put it on a store shelf, and then sell it to you.

And there’s more. People had to manufacture all kinds of goods: paper and ink, the boxes used for shipping, the computers used to keep track of inventory, and so on. It is no exaggeration to say that thousands of people were involved in putting this book in your hands.

And there is still more. The chair or couch on which you are sitting, the light shining on the page, the heat or the air conditioning in the room, the clothes you are wearing—all these things that you are using right now were produced by somebody else. So even now, as you sit alone reading this book, you are economically linked to others in hundreds—even thousands—of different ways.

Take a walk in your town or city, and you will see even more evidence of our economic interdependence: People are collecting garbage, helping schoolchildren cross the street, transporting furniture across town, constructing buildings, repairing roads, painting houses. Everyone is producing goods and services for other people.

Why is it that so much of what we consume is produced by other people? Why are we all so heavily dependent on each other for our material well-being? Why doesn’t each of us—like Robinson Crusoe on his island—produce our own food, clothing, housing, and anything else we desire? And how did it come about that you—who did not produce any of these things yourself—are able to consume them?

These are all questions about our economic system—the way our economy is organized. Ordinarily, we take our economic system for granted, like the water that runs out of our faucets. But now it’s time to take a closer look at the plumbing—to learn how our economy serves so many millions of people, enabling them to survive and prosper.

**SPECIALIZATION AND EXCHANGE**

If we were forced to, most of us could become economically self-sufficient. We could stake out a plot of land, grow our own food, make our own clothing, and build our own homes. But in no society is there such extreme self-sufficiency. On the contrary, every economic system over the past 10,000 years has been characterized by two features: (1) specialization, in which each of us concentrates on a limited number of pro-
ductive activities, and (2) exchange, in which most of what we desire is obtained by trading with others, rather than producing for ourselves.

Specialization and exchange enable us to enjoy greater production, and higher living standards, than would otherwise be possible. As a result, all economies exhibit high degrees of specialization and exchange.

There are three reasons why specialization and exchange enable us to enjoy greater production. The first has to do with human capabilities: Each of us can learn only so much in a lifetime. By limiting ourselves to a narrow set of tasks—fixing plumbing, managing workers, writing music, or designing Web pages—we are each able to hone our skills and become experts at one or two things, instead of remaining amateurs at a lot of things. It is easy to see that an economy of experts will produce more than an economy of amateurs.

A second gain from specialization results from the time needed to switch from one activity to another. When people specialize, and thus spend more time doing one task, there is less unproductive “downtime” from switching activities.

Before considering the third gain from specialization, it is important to note that these first two gains—acquiring expertise and minimizing downtime—would occur even if all workers were identical. To see why, let’s consider an extreme example. Suppose that three identical triplets—Sheri, Gerri, and Keri—decide to open up their own photocopy shop. They quickly discover that there are three primary tasks to be accomplished each day: making photocopies, dealing with customers, and servicing the machines.

Suppose first that the triplets decide not to specialize. Each time a customer walks in, one triplet will take the order, make the copies, collect the money, make the change, and give a receipt. In addition, each time a machine runs out of paper or ink, the triplet who is using the machine must remedy the problem. You can see that there will be a great deal of time spent going back and forth between the counter, the copy machines, and the supply room. Moreover, none of the triplets will become an expert at servicing the machines, dealing with customers, or making photocopies. As a result of the downtime between tasks and the lack of expertise, the triplets will not be able to make the maximum possible number of copies or handle the maximum possible number of customers each day.

Now, let’s rearrange production to take advantage of specialization. We’ll put Sheri at the counter, Gerri at the photocopy machine, and Keri keeping the machines in working order. Suddenly, all of that time spent going back and forth is now devoted to more productive tasks. Moreover, Sheri becomes an expert at working the cash register, since she does this all day long. Gerri becomes an expert at making copies, figuring out the quickest ways to select the proper settings, position originals, and turn pages. And Keri learns how to quickly diagnose and even anticipate problems with the machines. Each task is now performed by an expert. You can see that specialization increases the number of copies and customers that the triplets can handle each day, even though there is no difference in their basic abilities or talents.

Adam Smith first explained these gains from specialization in his book An Inquiry into the Nature and Causes of the Wealth of Nations, published in 1776. Smith explained how specialization within a pin factory dramatically increased the number of pins that could be produced there. In order to make a pin . . .

One man draws out the wire, another straightens it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires three distinct operations; to put it on is a [separate] business, to
Labor Required for:

<table>
<thead>
<tr>
<th></th>
<th>1 Quart of Berries</th>
<th>1 Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maryanne</td>
<td>1 hour</td>
<td>1 hour</td>
</tr>
<tr>
<td>Gilligan</td>
<td>1 1/2 hours</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

TABLE 1

Absolute advantage: The ability to produce a good or service, using fewer resources than other producers use.

Smith went on to observe that 10 men, each working separately, might make 200 pins in a day, but through specialization, they were able to make 48,000! What is true for a pin factory or a photocopy shop can be generalized to the entire economy: Even when workers are identically suited to various tasks, total production will increase when workers specialize.

Of course, in the real world, workers are not identically suited to different kinds of work. Nor are all plots of land, all natural resources, or all types of capital equipment identically suited for different tasks. This observation brings us to the third source of gains from specialization.

Further Gains to Specialization: Comparative Advantage. Imagine a shipwreck in which there are only two survivors—let’s call them Maryanne and Gilligan—who wash up on opposite shores of a deserted island. Initially they are unaware of each other, so each is forced to become completely self-sufficient.

On one side of the island, Maryanne finds that it takes her one hour to pick one quart of berries or to catch one fish, as shown in the first row of Table 1. On the other side of the island, Gilligan—who is less adept at both tasks—requires an hour and a half to pick a quart of berries and three hours to catch one fish, as listed in the second row of the table. Since both castaways would want some variety in their diets, we can assume that each would spend part of the day catching fish and part picking berries.

Suppose that, one day, Maryanne and Gilligan discover each other. After rejoicing at the prospect of human companionship, they decide to develop a system of production that will work to their mutual benefit. Let’s rule out any gains from specialization that might arise from minimizing downtime or from becoming an expert, as occurred in the photocopy shop example. Will it still pay for these two to specialize? The answer is yes, as you will see after a small detour.

Absolute Advantage: A Detour. When Gilligan and Maryanne sit down to figure out who should do what, they might fall victim to a common mistake: basing their decision on absolute advantage. An individual has an absolute advantage in the production of some good when he or she can produce it using fewer resources than another individual can. On the island, the only resource being used is labor time, so the reasoning might go as follows: Maryanne can pick one quart of berries more quickly than Gilligan (see Table 1), so she has an absolute advantage in berry picking. It seems logical, then, that Maryanne should be the one to pick the berries.

But wait! Maryanne can also catch fish more quickly than Gilligan, so she has an absolute advantage in fishing as well. If absolute advantage is the criterion for
assigning work, then Maryanne should do both tasks. This, however, would leave Gilligan doing nothing, which is certainly not in the pair’s best interests. What can we conclude from this example? That absolute advantage is an unreliable guide for allocating tasks to different workers.

**Comparative Advantage.** The correct principle to guide the division of labor on the island is comparative advantage:

> A person has a **comparative advantage** in producing some good if he or she can produce it with a smaller opportunity cost than some other person can.

Notice the important difference between absolute advantage and comparative advantage: You have an absolute advantage in producing a good if you can produce it using fewer resources than someone else can. But you have a comparative advantage if you can produce it with a smaller opportunity cost. As you’ll see, these are not necessarily the same thing.

Table 2 shows the opportunity cost for each of the two castaways to produce berries and fish. For Maryanne, catching one fish takes an hour, time that could instead be used to pick one quart of berries. Thus, for her, the opportunity cost of one fish is one quart of berries. Similarly, her opportunity cost of one quart of berries is one fish. These opportunity costs are listed in the first row of Table 2. For Gilligan, catching one fish takes three hours, time that he could instead use to pick two quarts of berries. The opportunity cost of one fish for Gilligan, then, is two quarts of berries, and the opportunity cost of one quart of berries is one-half of a fish. (Of course, no one catches half a fish unless they are fishing with a machete, but we can still use this number to represent a rate of opportunity cost.) Comparing the two numbers, we see that Maryanne has the lower opportunity cost for one fish, so she has a comparative advantage in catching fish. But when we turn our attention to berry picking, we see that it is Gilligan who has the lower opportunity cost—half a fish. Therefore, Gilligan—who has an absolute advantage in nothing—has a comparative advantage in berry picking.

Let’s see what happens as the two decide to move toward specializing according to comparative advantage. What happens each time Gilligan decides to catch one fewer fish? Table 2 tells us that he frees up enough time to pick 2 quarts of berries. We can write the results for Gilligan’s production this way:

**Gilligan: Fish ↓ 1 ⇒ Berries ↑ 2**

Table 2 also tells us that each time Maryanne decides to catch one additional fish, she must sacrifice shift time away from berry picking, sacrificing 1 quart of berries:

**Maryanne: Fish ↑ 1 ⇒ Berries ↓ 1**

<table>
<thead>
<tr>
<th>Opportunity Cost of:</th>
<th>1 Quart of Berries</th>
<th>1 Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Maryanne</td>
<td>1 fish</td>
<td>1 quart of berries</td>
</tr>
<tr>
<td>For Gilligan</td>
<td>½ fish</td>
<td>2 quarts of berries</td>
</tr>
</tbody>
</table>
Now, what happens to total production on the island each time the pair moves toward producing according to comparative advantage? As you can see, Maryanne makes up for the fish that Gilligan is no longer catching. But Gilligan more than makes up for the quart of berries that Maryanne isn’t picking. In fact, each time the two move toward specialization, fish production remains unchanged, whereas berry production increases. The gains continue until Maryanne is spending all of her work time fishing, and Gilligan is spending all of his work time picking berries.

Since—by producing according to comparative advantage—total production on the island increases, total consumption can increase, too. Gilligan and Maryanne can figure out some way of trading fish for berries that makes each of them come out ahead. In the end, each of the castaways will enjoy a higher standard of living when they specialize and exchange with each other, compared to the level they’d enjoy under self-sufficiency.

What is true for our shipwrecked island dwellers is also true for the entire economy:

**Total production of every good or service will be greatest when individuals specialize according to their comparative advantage. This is another reason why specialization and exchange lead to higher living standards than does self-sufficiency.**

When we turn from our fictional island to the real world, is production, in fact, consistent with the principle of comparative advantage? Indeed, it is. A journalist may be able to paint her house more quickly than a housepainter, giving her an absolute advantage in painting her home. Will she paint her own home? Except in unusual circumstances, no, because the journalist has a comparative advantage in writing news articles. Indeed, most journalists—like most college professors, attorneys, architects, and other professionals—hire house painters, leaving themselves more time to practice the professions in which they enjoy a comparative advantage.

Even comic book superheroes seem to behave consistently with comparative advantage. Superman can no doubt cook a meal, fix a car, chop wood, and do virtually anything faster than anyone else on the earth. Using our new vocabulary, we’d say that Superman has an absolute advantage in everything. But he has a clear comparative advantage in catching criminals and saving the known universe from destruction, which is exactly what he spends his time doing.

**Specialization in Perspective.** The gains from specialization, whether they arise from developing expertise, minimizing downtime, or exploiting comparative advantage, can explain many features of our economy. For example, college students need to select a major and then, upon graduating, to decide on a specific career. Those who follow this path are rewarded with higher incomes than those who dally. This is an encouragement to specialize. Society is better off if you specialize, since you will help the economy produce more, and society rewards you for this contribution with a higher income.

The gains from specialization can also explain why most of us end up working for business firms that employ dozens, or even hundreds or thousands, of other employees. Why do these business firms exist? Why isn’t each of us a self-employed expert, exchanging our production with other self-employed experts? Part of the answer is that organizing production into business firms pushes the gains from specialization still further. Within a firm, some people can specialize in working