

The Fundamental Economic Problem: Scarcity and Choice

Understanding what the market system does well and what it does badly is this book's central task. But to address this complex question, we must first answer a simpler one: What do economists expect the market to accomplish?

The most common answer is that the market resolves what is often called *the* fundamental economic problem: how best to manage the resources of society, doing as well as possible with them, despite their scarcity. All decisions are constrained by the scarcity of available resources. A dreamer may envision a world free of want, in which everyone, even in Africa and Central America, drives a BMW and eats caviar, but the earth lacks the resources needed to make that dream come true. Because resources are scarce, all economic decisions involve *trade-offs*. Should you use that \$5 bill to buy pizza or a new notebook for Econ class? Should General Motors invest more money in assembly lines or in research? A well-functioning market system facilitates and guides such decisions, assigning each hour of labor and each kilowatt-hour of electricity to the task where, it is hoped, the input will best serve the public.

This chapter shows how economists analyze choices like these. The same basic principles, based on the concept of *opportunity cost*, apply to the decisions made by business firms, governments, and society as a whole. Many of the most basic ideas of economics, such as *efficiency*, *division of labor*, *comparative advantage*, *exchange*, and *the role of markets* appear here for the first time.

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ISSUE: *What to Do about the Budget Deficit?*

For roughly 15 years, from the early 1980s until the late 1990s, the top economic issue of the day was how to reduce the federal budget deficit. Presidents Ronald Reagan, George H. W. Bush, and Bill Clinton all battled with Congress over tax and spending *priorities*. Which programs should be cut? What taxes should be raised?

Then, thanks to a combination of strong economic growth and deficit-reducing policies, the budget deficit melted away like springtime snow and actually turned into a budget *surplus* for a few fiscal years (1998 through 2001). For a while, the need to make agonizing *choices* seemed to disappear—or so it seemed. But it was an illusion. Even during that brief era of budget surpluses, hard choices still had to be made. The U.S. government could not afford *everything*. Then, as the stock market collapsed, the economy slowed, and President George W. Bush pushed a series of tax cuts through Congress, the budget surpluses quickly turned back into deficits again—the largest deficits in our history.

The fiscal questions in the 2004 Presidential campaign were the familiar ones of the 1980s and 1990s. Which spending programs should be cut and which ones should be increased? Which, if any, of the Bush tax cuts should be repealed? Even a government with an annual budget of over \$2 *trillion* was forced to set priorities and make hard choices.

Even when resources are quite generous, they are never unlimited. So everyone must still make tough choices. An *optimal* decision is one that chooses the most desirable alternative *among the possibilities permitted by the available resources*, which are always scarce in this sense.



SOURCE: ©Photodisc Green/Getty Images

SCARCITY, CHOICE, AND OPPORTUNITY COST

Resources are the instruments provided by nature or by people that are used to create goods and services. Natural resources include minerals, soil, water, and air. Labor is a scarce resource, partly because of time limitations (the day has only 24 hours) and partly because the number of skilled workers is limited. Factories and machines are resources made by people. These three types of resources are often referred to as *land, labor, and capital*. They are also called *inputs* or *factors of production*.

One of the basic themes of economics is scarcity: the fact that **resources** are always limited. Even Philip II, of Spanish Armada fame and ruler of one of the greatest empires in history, had to cope with frequent rebellions in his armies when he could not meet their payrolls or even provide basic provisions. He is reported to have undergone bankruptcy an astonishing eight times during his reign. In more recent years, the U.S. government has been agonizing over difficult budget decisions even though it spends more than two trillion dollars—that's \$2,000,000,000,000—annually.

But the scarcity of *physical resources* is more fundamental than the scarcity of funds. Fuel supplies, for example, are not limitless, and some environmentalists claim that we should now be making some hard choices—such as keeping our homes cooler in winter and warmer in summer and living closer to our jobs. Although energy may be the most widely discussed scarcity, the general principle applies to all of the earth's resources—iron, copper, uranium, and so on. Even goods produced by human effort are in limited supply because they require fuel, labor, and other scarce resources as inputs. We can manufacture more cars, but the increased use of labor, steel, and fuel in auto production will mean that we must cut back on something else, perhaps the pro-

duction of refrigerators. This all adds up to the following fundamental principle of economics, which we will encounter again and again in this text:

Virtually all resources are scarce, meaning that humans have less of them than we would like. Therefore, choices must be made among a limited set of possibilities, in full recognition of the inescapable fact that a decision to have more of one thing means that we will have less of something else.

In fact, one popular definition of economics is the study of how best to use *limited* means to pursue *unlimited* ends. Although this definition, like any short statement, cannot possibly cover the sweep of the entire discipline, it does convey the flavor of the economist's stock in trade.

To illustrate the true cost of an item, consider the decision to produce additional cars, and therefore to produce fewer refrigerators. Although the production of a car may cost \$15,000 per vehicle, or some other money amount, *its real cost to society is the refrigerators that society must forgo to get an additional car*. If the labor, steel, and energy needed to manufacture a car are sufficient to make 30 refrigerators, the **opportunity cost** of a car is 30 refrigerators. The principle of opportunity cost is so important that we will spend most of this chapter elaborating on it in various ways.

HOW MUCH DOES IT REALLY COST? The Principle of Opportunity Cost Economics examines the options available to households, businesses, governments, and entire societies, given the limited resources at their command. It studies the logic of how people can make **optimal decisions** from among competing alternatives. One overriding principle governs this logic—a principle we introduced in Chapter 1 as one of the *Ideas for Beyond the Final Exam*: With limited resources, a decision to have *more* of one thing is simultaneously a decision to have *less* of something else. Hence, the relevant *cost* of any decision is its *opportunity cost*—the value of the next best alternative that is given up. **Optimal decision making** must be based on opportunity-cost calculations.

The **opportunity cost** of any decision is the value of the next best alternative that the decision forces the decision maker to forgo.

An **optimal decision** is one that best serves the objectives of the decision maker, whatever those objectives may be. It is selected by explicit or implicit comparison with the possible alternative choices. The term *optimal* connotes neither approval nor disapproval of the objective itself.



■ Opportunity Cost and Money Cost

Because we live in a market economy where (almost) everything has its price, students often wonder about the connection or difference between an item's *opportunity cost* and its *market price*. What we just said seems to divorce the two concepts: The true opportunity cost of a car is not its market price but the value of the other things (like refrigerators) that could have been made or purchased instead.

But isn't the opportunity cost of a car related to its money cost? The normal answer is yes. The two costs are usually closely tied because of the way in which a market economy sets prices. Steel, for example, is used to manufacture both automobiles and refrigerators. If consumers value items that can be made with steel (such as refrigerators) highly, then economists would say that the *opportunity cost* of making a car is high. But, under these circumstances, strong demand for this highly valued resource will bid up its market price. In this way, a well-functioning price system will assign a high price to steel, which will therefore make the *money cost* of manufacturing a car high as well. In summary:

If the market functions well, goods that have high opportunity costs will also have high money costs. In turn, goods that have low opportunity costs will also have low money costs.

Yet it would be a mistake to treat opportunity costs and explicit monetary costs as identical. For one thing, sometimes the market does not function well, and hence assigns prices that do not accurately reflect opportunity costs.

Moreover, some valuable items may not bear explicit price tags at all. We encountered one such example in Chapter 1, where we noted that the opportunity cost of a

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"O.K., who can put a price on love? Jim?"

college education may differ sharply from its explicit money cost. Why? Because one important item is typically omitted from the money-cost calculation: the *market value of your time*, that is, the wages you could earn by working instead of attending college. Because you give up these potential wages, which can amount to \$15,000 per year or more, so as to acquire an education, they must be counted as a major part of the opportunity cost of going to college.

Other common examples where money costs and opportunity costs diverge are goods and services that are given away “free.” For example, some early settlers of the American West destroyed natural amenities such as forests and buffalo herds, which had no market price, leaving later generations to pay the opportunity costs in terms of lost resources. Similarly, you incur no explicit monetary cost to acquire an item that is given away for free. But if you must wait in line to get the “free” commodity, you incur an opportunity cost equal to the value of the next best use of your time.

■ *Optimal Choice: Not Just Any Choice*

How do people and firms make decisions? There are many ways, some of them based on hunches with little forethought; some are even based on superstition or the advice of a fortune teller. Often, when the required information is scarce and the necessary research and calculations are costly and difficult, the decision maker will settle on the first possibility that he can “live with”—a choice that promises to yield results that are not too bad, and that seem fairly safe. The decision maker may be willing to choose this course even though he recognizes that there might be other options that are better, but are unknown to him. This way of deciding is called “satisficing.”

In this book, like most books on economic theory, we will assume that decision makers seek to do better than mere satisficing. Rather, we will assume that they seek to reach decisions that are optimal, in other words, decisions that do better in achieving the decision maker’s goals than any other possible choice. We will assume that the required information is available to the decision maker and study the procedures that enable her to determine which of the possible choices is optimal to her.

An optimal decision is one that is selected after implicit or explicit comparison of the consequences of each of the possible choices and that is shown by analysis to be the one that most effectively promotes her goals.

We will study optimal decision making by various parties: by consumers, by producers, and by sellers, in a variety of situations. The methods of analysis for determining what choice is optimal in each case will be remarkably similar. So, if you understand one of them, you will already be well on your way to understanding them all. A technique called “marginal analysis” will be used for this purpose. But one fundamental idea underlies any method used for optimal decision making: To determine whether a possible decision is or is not optimal, its consequences must be compared with those of each of the other possible choices.

■ SCARCITY AND CHOICE FOR A SINGLE FIRM

The **outputs** of a firm or an economy are the goods and services it produces.

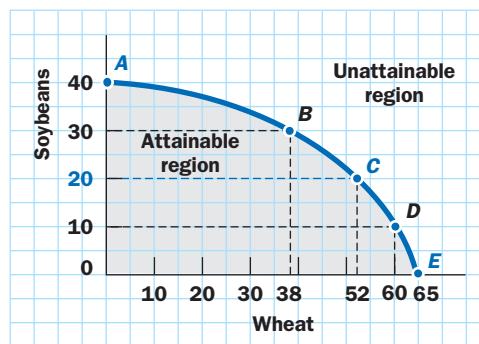
The **inputs** used by a firm or an economy are the labor, raw materials, electricity and other resources it uses to produce its outputs.

The nature of opportunity cost is perhaps clearest in the case of a single business firm that produces two **outputs** from a fixed supply of **inputs**. Given current technology and the limited resources at its disposal, the more of one good the firm produces, the less of the other it will be able to make. Unless managers explicitly weigh the desirability of each product against the other, they are unlikely to make rational production decisions.

Consider the example of Jones, a farmer whose available supplies of land, machinery, labor, and fertilizer are capable of producing the various combinations of soybeans and wheat listed in Table 1. Obviously, devoting more resources to soybean production means that Jones will produce less wheat.

Bushels of Soybeans	Bushels of Wheat	Label in Figure 1
40,000	0	A
30,000	38,000	B
20,000	52,000	C
10,000	60,000	D
0	65,000	E

FIGURE 1 Production Possibilities Frontier for Production by a Single Farmer



Note: Quantities are in thousands of bushels per year.

Table 1 indicates, for example, that if Jones grows only soybeans, the harvest will be 40,000 bushels. But if he reduces his soybean production to 30,000 bushels, he can also grow 38,000 bushels of wheat. Thus, *the opportunity cost of obtaining 38,000 bushels of wheat is 10,000 fewer bushels of soybeans*. Put another way, the opportunity cost of 10,000 more bushels of soybeans is 38,000 bushels of wheat. The other numbers in Table 1 have similar interpretations.

■ The Production Possibilities Frontier

Figure 1 presents this same information graphically. Point *A* indicates that one of the options available to the farmer is to produce 40,000 bushels of soybeans and zero wheat. Thus, point *A* corresponds to the first line of Table 1, point *B* to the second line, and so on. Curves similar to *AE* appear frequently in this book; they are called **production possibilities frontiers**. Any point *on or inside* the production possibilities frontier is attainable. Points *outside* the frontier cannot be achieved with the available resources and technology.

Because resources are limited, the production possibilities frontier always slopes downward to the right. The farmer can *increase* wheat production (move to the right in Figure 1) only by devoting more land and labor to growing wheat. But this choice simultaneously *reduces* soybean production (the curve must move downward) because less land and labor remain available for growing soybeans.

Notice that, in addition to having a negative slope, our production possibilities frontier *AE* has another characteristic; it is “bowed outward.” What does this curvature mean? In short, as larger and larger quantities of resources are transferred from the production of one output to the production of another, the additions to the second product decline.

Suppose farmer Jones initially produces only soybeans, using even land that is comparatively most productive in wheat cultivation (point *A*). Now he decides to switch some land from soybean production into wheat production. Which part of the land will he switch? If Jones is sensible, he will use the part relatively most productive in growing wheat. As he shifts to point *B*, soybean production falls from 40,000 bushels to 30,000 bushels as wheat production rises from zero to 38,000 bushels. A sacrifice of only 10,000 bushels of soybeans “buys” 38,000 bushels of wheat.

Imagine now that this farmer wants to produce still more wheat. Figure 1 tells us that the sacrifice of an additional 10,000 bushels of soybeans (from 30,000 bushels to 20,000 bushels) will yield only 14,000 more bushels of wheat (see point *C*). Why? The main reason is that *inputs tend to be specialized*. As we noted at point *A*, the farmer was using resources for soybean production that were relatively more productive in growing

A **production possibilities frontier** shows the different combinations of various goods that a producer can turn out, given the available resources and existing technology.

wheat. Consequently, their relative productivity in soybean production was low. When these resources are switched to wheat production, the yield is high.

But this trend cannot continue forever, of course. As more wheat is produced, the farmer must utilize land and machinery with a greater productivity advantage in growing soybeans and a smaller productivity advantage in growing wheat. This is why the first 10,000 bushels of soybeans forgone “buys” the farmer 38,000 bushels of wheat, whereas the second 10,000 bushels of soybeans “buys” only 14,000 bushels of wheat. Figure 1 and Table 1 show that these returns continue to decline as wheat production expands: The next 10,000-bushel reduction in soybean production yields only 8,000 bushels of additional wheat, and so on.

As we can see, the *slope* of the production possibilities frontier graphically represents the concept of *opportunity cost*. Between points *C* and *B*, for example, the opportunity cost of acquiring 10,000 additional bushels of soybeans is shown on the graph to be 14,000 bushels of forgone wheat; between points *B* and *A*, the opportunity cost of 10,000 bushels of soybeans is 38,000 bushels of forgone wheat. In general, as we move upward to the left along the production possibilities frontier (toward more soybeans and less wheat), the opportunity cost of soybeans in terms of wheat increases. Looking at the same thing the other way, as we move downward to the right, the opportunity cost of acquiring wheat by giving up soybeans increases—more and more soybeans must be forgone per added bushel of wheat and successive addition to wheat output occur.

■ The Principle of Increasing Costs

The **principle of increasing costs** states that as the production of a good expands, the opportunity cost of producing another unit generally increases.

We have just described a very general phenomenon with applications well beyond farming. The **principle of increasing costs** states that as the production of one good expands, the opportunity cost of producing another unit of this good generally increases.

This principle is not a universal fact—exceptions do arise. But it does seem to be a technological regularity that applies to a wide range of economic activities. As our farming example suggests, the principle of increasing costs is based on the fact that resources tend to be at least somewhat specialized. So we lose some of their productivity when those resources are transferred from doing what they are relatively *good* at to what they are relatively *bad* at. In terms of diagrams such as Figure 1, the principle simply asserts that the production possibilities frontier is bowed outward.

Perhaps the best way to understand this idea is to contrast it with a case in which no resources are specialized so costs do not increase as output proportion changes. Figure 2 depicts a production possibilities frontier for producing black shoes and brown shoes. Because the labor and machinery used to produce black shoes are just as good at producing brown shoes, the frontier is a straight line. If the firm cuts back its production of black shoes by 10,000 pairs, it can get 10,000 additional pairs of brown shoes, no matter how big is the shift between these two outputs. It loses no productivity in the switch because resources are not specialized.

FIGURE 2 Production Possibilities Frontier with No Specialized Resources



Note: Quantities are in thousands of pairs per week.

More typically, however, as a firm concentrates more of its productive capacity on one commodity, it is forced to employ inputs that are better suited to making another commodity. The firm is forced to vary the proportions in which it uses inputs because of the limited quantities of some of those inputs. This fact also explains the typical curvature of the firm's production possibilities frontier.

SCARCITY AND CHOICE FOR THE ENTIRE SOCIETY

Like an individual firm, the entire economy is also constrained by its limited resources and technology. If the public wants more aircraft and tanks, it will have to give up some boats and automobiles. If it wants to build more factories and stores, it will have to build fewer homes and sports arenas. In general:

The position and shape of the production possibilities frontier that constrains society's choices are determined by the economy's physical resources, its skills and technology, its willingness to work, and how much it has devoted in the past to the construction of factories, research, and innovation.

Because so many nations have so long debated whether to reduce or augment military spending, let us illustrate the nature of society's choices by the example of deciding between military might (represented by missiles) and civilian consumption (represented by automobiles). Just like a single firm, the economy as a whole faces a production possibilities frontier for missiles and autos, determined by its technology and the available resources of land, labor, capital, and raw materials. This production possibilities frontier may look like curve *BC* in Figure 3. If most workers are employed in auto plants, car production will be large, but the output of missiles will be small. If the economy transfers resources out of auto manufacturing when consumer demand declines, it can, by congressional action, alter the output mix toward more missiles (the move from *D* to *E*). However, something is likely to be lost in the process because physical resources are specialized. The fabric used to make car seats will not help much in missile production. The principle of increasing costs strongly suggests that the production possibilities frontier curves downward toward the axes.

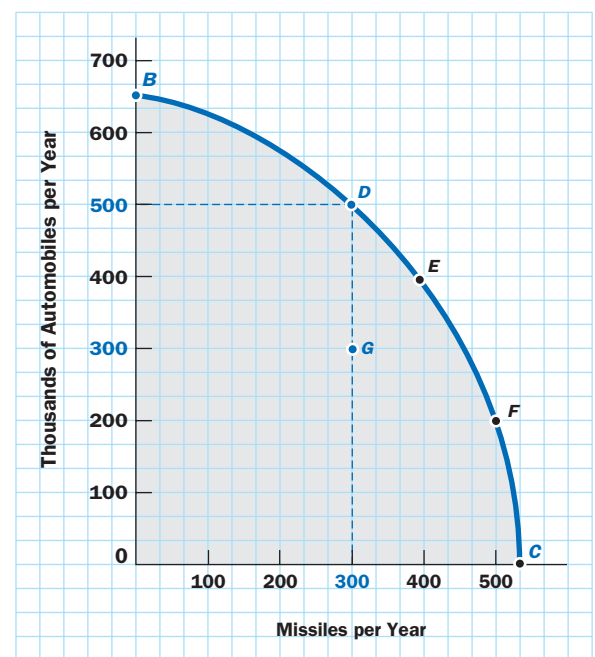
We may even reach a point where the only resources left are not very useful outside of auto manufacturing. In that case, even a large sacrifice of automobiles will get the economy few additional missiles. That is the meaning of the steep segment, *FC*, on the frontier. At point *C*, there is little additional output of missiles as compared to point *F*, even though at *C* automobile production has been given up entirely.

The downward slope of society's production possibilities frontier implies that hard choices must be made. Civilian consumption (automobiles) can be increased only by decreasing military expenditure, not by rhetoric or wishing. The curvature of the production possibilities frontier implies that, as defense spending increases, it becomes progressively more expensive to "buy" additional military strength ("missiles") in terms of the resulting sacrifice of civilian consumption.

Scarcity and Choice Elsewhere in the Economy

We have emphasized that limited resources force hard choices on business managers and society as a whole. But the same type of choices arises elsewhere—in households, universities, and other nonprofit organizations, as well as the government.

FIGURE 3 Production Possibilities Frontier for the Entire Economy



Hard Choices in the Real World

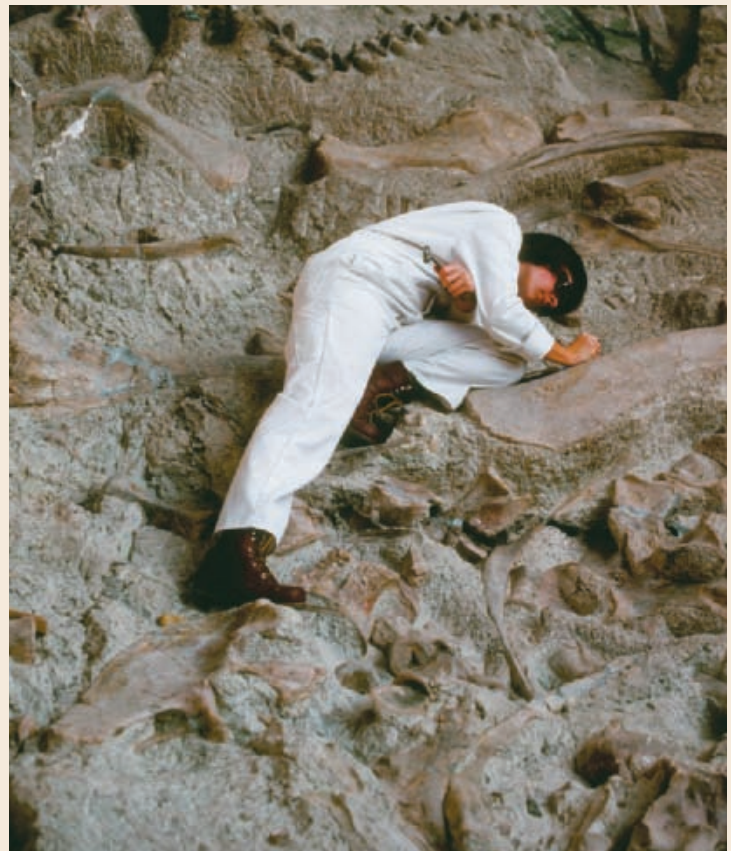
Two excerpts from recent newspaper stories bring home the realities of scarcity and choice:

"Bush Offers Budget Stressing Military and Security Spending," Washington, Feb. 2—President Bush proposed a \$2.4 trillion budget for 2005 today, calling for big increases in military and domestic-security spending and for trims in many domestic programs. The budget for the fiscal year that begins on Oct. 1 proposes a 7 percent increase in military spending, a 10 percent increase in domestic security spending, and a hold-the-line increase of just one-half percent for a vast array of domestic programs....

(Source: David Stout, *New York Times*, February 2, 2004, available at <http://www.nytimes.com>).

"National Parks to Cut Back Services; More Volunteers, Higher Fees Expected," April 18—Visitors to national parks and monuments this summer could see higher fees, fewer educational programs and more volunteers doing what once was park rangers' work. That's because the parks are killing some programs while straining to keep others running in the face of stagnant operating budgets and cutbacks in staff nationwide.

..."That's the job, to try and do the very best with what you've got," said Chas Cartwright, superintendent of Dinosaur National Monument in northwestern Colorado. ...As at other national parks, job vacancies at Dinosaur are going unfilled. The fossil-rich park has only three law-enforcement officers and three nature interpreters—far short of ideal—and the budget has remained flat at \$2.7 million since 2002. Dinosaur officials also have cut their vehicle fleet, ratcheted down utility use and trimmed construction materials and office supplies. (Source: Monte Whaley, *Times-Picayune*, April 18, 2004, available at <http://web.lexis-nexis.com>).



SOURCE: © James L. Amos/Corbis

This photo shows a Park Service staff member excavating dinosaur bones at Dinosaur National Monument in Colorado.

The nature of opportunity cost is perhaps most obvious for a household that must decide how to divide its income among the goods and services that compete for the family's attention. If the Simpson family buys an expensive new car, it may be forced to cut back sharply on some other purchases. This fact does not make it unwise to buy the car. But it does make it unwise to buy the car until the family considers the full implications for its overall budget. If the Simpsons are to utilize their limited resources most effectively, they must recognize the opportunity costs of the car—the things they will forgo as a result—perhaps a vacation and an expensive new TV set.



ISSUE REVISITED: *Coping with the Budget Deficit*

As already noted, even a rich and powerful nation like the United States must cope with the limitations implied by scarce resources. The necessity for choice imposed on governments by the limited amount they feel they can afford to spend is similar in character to the problems faced by business firms and households. For the goods and services that it buys from others, a government must prepare a budget similar to that of a very large household. For the items it produces itself—education, police protection, libraries, and so on—it faces a production possibilities frontier much like a business firm does. Even though the U.S. government

spent over \$2.3 trillion in 2004, some of the most acrimonious debates between President Bush and his critics arose from disagreements about how the government's limited resources should be allocated among competing uses. Even if unstated, the concept of opportunity cost is central to these debates.

THE CONCEPT OF EFFICIENCY

So far, our discussion of scarcity and choice has assumed that either the firm or the economy always operates on its production possibilities frontier rather than *below* it. In other words, we have tacitly assumed that, whatever the firm or economy decides to do, it does so **efficiently**.

Economists define efficiency as the absence of waste. An efficient economy wastes none of its available resources and produces the maximum amount of output that its technology permits.

To see why any point on the economy's production possibilities frontier in Figure 3 represents an efficient decision, suppose for a moment that society has decided to produce 300 missiles. The production possibilities frontier tells us that if 300 missiles are to be produced, then the maximum number of automobiles that can be made is 500,000 (point *D* in Figure 3). The economy is therefore operating efficiently only if it produces 500,000 automobiles rather than some smaller amount such as 300,000 (as at point *G*).

Point *D* is efficient, but point *G* is not, because the economy is capable of moving from *G* to *D*, thereby producing 200,000 more automobiles without giving up any missiles (or anything else). Clearly, failure to take advantage of the option of choosing point *D* rather than point *G* constitutes a wasted opportunity—an inefficiency.

Note that the concept of efficiency does not tell us which point on the production possibilities frontier is *best*. Rather, it tells us only that any point *below* the frontier cannot be best, because any such point represents wasted resources. For example, should society ever find itself at a point such as *G*, the necessity of making hard choices would (temporarily) disappear. It would be possible to increase production of *both* missiles *and* automobiles by moving to a point such as *E*.

Why, then, would a society ever find itself at a point below its production possibilities frontier? Why are resources wasted in real life? The most important reason in today's economy is *unemployment*. When many workers are unemployed, the economy must be at a point such as *G*, below the frontier, because by putting the unemployed to work, some in each industry, the economy could produce both more missiles *and* more automobiles. The economy would then move from point *G* to the right (more missiles) and upward (more automobiles) toward a point such as *E* on the production possibilities frontier. Only when no resources are wasted is the economy operating on the frontier.

Inefficiency occurs in other ways, too. A prime example is assigning inputs to the wrong task—as when wheat is grown on land best suited to soybean cultivation. Another important type of inefficiency occurs when large firms produce goods that smaller enterprises could make better because they can pay closer attention to detail, or when small firms produce outputs best suited to large-scale production. Some other examples are the outright waste that occurs because of favoritism (for example, promotion of an incompetent brother-in-law to a job he cannot do very well) or restrictive labor practices (for example, requiring a railroad to keep a fireman on a diesel-electric locomotive where there is no longer a fire to tend).

A particularly deplorable form of waste is caused by discrimination against African-American, Hispanic, native American or female workers. When a job is given, for example, to a white male in preference to an African-American woman who is more qualified, society sacrifices potential output and the entire community is apt to be affected adversely. Every one of these inefficiencies means that the community obtains less output than it could have, given the available inputs.

A set of outputs is said to be produced **efficiently** if, given current technological knowledge, there is no way one can produce larger amounts of any output without using larger input amounts or giving up some quantity of another output.

THE THREE COORDINATION TASKS OF ANY ECONOMY

Allocation of resources refers to the society's decisions on how to divide up its scarce input resources among the different outputs produced in the economy and among the different firms or other organizations that produce those outputs.

In deciding how to **allocate its scarce resources**, every society must somehow make three sorts of decisions:

- First, as we have emphasized, it must figure out *how to utilize its resources efficiently*; that is, it must find a way to reach its production possibilities frontier.
- Second, it must decide *which of the possible combinations of goods to produce*—how many missiles, automobiles, and so on; that is, it must select one specific point on the production possibilities frontier.
- Third, it must decide *how much of the total output of each good to distribute to each person*, doing so in a sensible way that does not assign meat to vegetarians and wine to teetotalers.

There are many ways in which societies can and do make each of these decisions— to which economists often refer as *how, what, and to whom?* For example, a central planner may tell people how to produce, what to produce, and what to consume, as the authorities used to do, at least to some extent, in the former Soviet Union. But in a market economy, no one group or individual makes all such resource allocation decisions explicitly. Rather, consumer demands and production costs allocate resources *automatically* and *anonymously* through a system of prices and markets. As the formerly socialist countries learned, markets do an impressively effective job in carrying out these tasks. For our introduction to the ways in which markets do all this, let's consider each task in turn.

SPECIALIZATION FOSTERS EFFICIENT RESOURCE ALLOCATION

Production efficiency is one of the economy's three basic tasks, and societies pursue it in many ways. But one source of efficiency is so fundamental that we must single it out for special attention: the tremendous productivity gains that stem from *specialization*.

The Wonders of the Division of Labor

Division of labor means breaking up a task into a number of smaller, more *specialized* tasks so that each worker can become more adept at a particular job.

Adam Smith, the founder of modern economics, first marveled at how **division of labor** raises efficiency and productivity when he visited a pin factory. In a famous passage near the beginning of his monumental book, *The Wealth of Nations* (1776), he described what he saw:

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 two or three distinct operations; to put it on is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper.¹

Smith observed that by dividing the work to be done in this way, each worker became quite skilled in a particular specialty, and the productivity of the group of workers as a whole was greatly enhanced. As Smith related it:



SOURCE: © Bettmann/Corbis

¹ Adam Smith, *The Wealth of Nations* (New York: Random House, 1937), p. 4.

I have seen a small manufactory of this kind where ten men only were employed. . . . Those ten persons . . . could make among them upwards of forty-eight thousand pins in a day. . . . But if they had all wrought separately and independently . . . they certainly could not each of them have made twenty, *perhaps not one pin in a day*.²

In other words, through the miracle of division of labor and specialization, ten workers accomplished what might otherwise have required thousands. This was one of the secrets of the Industrial Revolution, which helped lift humanity out of the abject poverty that had been its lot for centuries.

■ The Amazing Principle of Comparative Advantage

But specialization in production fosters efficiency in an even more profound sense. Adam Smith noticed that *how* goods are produced can make a huge difference to productivity. But so can *which* goods are produced. The reason is that people (and businesses, and nations) have different abilities. Some can repair automobiles, whereas others are wizards with numbers. Some are handy with computers, and others can cook. An economy will be most efficient if people specialize in doing what they do best and then trade with one another, so that the accountant gets her car repaired and the computer programmer gets to eat tasty and nutritious meals.

This much is obvious. What is less obvious—and is one of the great ideas of economics—is that two people (or two businesses, or two countries) can generally gain from trade *even if one of them is more efficient than the other in producing everything*. A simple example will help explain why.

Some lawyers can type better than their administrative assistants. Should such a lawyer fire her assistant and do her own typing? Not likely. Even though the lawyer may type better than the assistant, good judgment tells her to concentrate on practicing law and leave the typing to a lower-paid assistant. Why? Because the *opportunity cost* of an hour devoted to typing is an hour less time spent with clients, which is a far more lucrative activity.

This example illustrates the principle of **comparative advantage** at work. The lawyer specializes in arguing cases despite her advantage as a typist because she has a *still greater* advantage as an attorney. She suffers some direct loss by leaving the typing to a less efficient employee, but she more than makes up for that loss by the income she earns selling her legal services to clients.

Precisely the same principle applies to nations. As we shall learn in greater detail in Chapter 22, comparative advantage underlies the economic analysis of international trade patterns. A country that is particularly adept at producing certain items—such as aircraft manufacturing in the United States, coffee growing in Brazil, and oil extraction in Saudi Arabia—should specialize in those activities, producing more than it wants for its own use. The country can then take the money it earns from its exports and purchase from other nations items that it does not make for itself. And this is still true if one of trading nations is the most efficient producer of almost everything.

The underlying logic is precisely the same as in our lawyer-typist example. The United States might, for example, be better than South Korea at manufacturing both computers and television sets. But if the United States is vastly more efficient at producing computers, but only slightly more efficient at making TV sets, it pays for the United States to specialize in computer manufacture, for South Korea to specialize in TV production, and for the two countries to trade.

This principle, called the *law of comparative advantage*, was discovered by David Ricardo, one of the giants in the history of economic analysis, almost 200 years ago. It is one of the *Ideas for Beyond the Final Exam* introduced in Chapter 1.

One country is said to have a **comparative advantage** over another in the production of a particular good *relative to other goods* if it produces that good less inefficiently than it produces other goods, as compared with the other country.

² Ibid., p. 5.

³ This particular example is considered in detail in Chapter 22, which examines international trade.



THE SURPRISING PRINCIPLE OF COMPARATIVE ADVANTAGE Even if one country (or one worker) is worse than another country (or another worker) in the production of every good, it is said to have a *comparative advantage* in making the good at which it is *least inefficient*—compared to the other country. Ricardo discovered that two countries can gain by trading even if one country is more efficient than another in the production of every commodity. Precisely the same logic applies to individual workers or to businesses.

In determining the most efficient patterns of production and trade, it is comparative advantage that matters. Thus, a country can gain by importing a good from abroad even if that good can be produced more efficiently at home. Such imports make sense if they enable the country to specialize in producing those goods at which it is *even more efficient*.

SPECIALIZATION LEADS TO EXCHANGE

The gains from specialization are welcome, but they create a problem: With specialization, people no longer produce only what they want to consume themselves. The workers in Adam Smith’s pin factory had no use for the thousands of pins they produced each day; they wanted to trade them for things like food, clothing, and shelter. Similarly, the administrative assistant has no personal use for the legal briefs she types. Thus, specialization requires some mechanism by which workers producing pins can *exchange* their wares with workers producing such things as cloth and potatoes, and office workers can turn their typing skills into things they want to consume.

Without a system of exchange, the productivity miracle achieved by comparative advantage and the division of labor would do society little good. With it, standards of living have risen enormously. As we observed in Chapter 1, such exchange benefits *all* participants.



TRADE IS A WIN-WIN SITUATION Mutual Gains from Voluntary Exchange Unless someone is deceived or misunderstands the facts, a *voluntary* exchange between two parties must make both parties better off—or else why would each party agree? Trading increases production by permitting specialization, as we have just seen. But even if no additional goods are produced as a result of the act of trading, the welfare of society is increased because each individual acquires goods that are more suited to his or her needs and tastes. This simple but fundamental precept of economics is another of our *Ideas for Beyond the Final Exam*.

Although people can and do trade goods for other goods, a system of exchange works better when everyone agrees to use some common item (such as pieces of paper with unique markings printed on them) for buying and selling things. Enter *money*. Then workers in pin factories, for example, can be paid in money rather than in pins, and they can use this money to purchase cloth and potatoes. Textile workers and farmers can do the same.

These two phenomena—specialization and exchange (assisted by money)—working in tandem led to vast improvements in humanity’s well-being. But what forces induce workers to join together so that society can enjoy the fruits of the division of labor? And what forces establish a smoothly functioning system of exchange so that people can first exploit their comparative advantages and then acquire what they want to consume? One alternative is to have a central authority telling people what to do. Adam Smith explained and extolled yet another way of organizing and coordinating economic activity—markets and prices can coordinate those activities.

A **market system** is a form of economic organization in which resource allocation decisions are left to individual producers and consumers acting in their own best interests without central direction.

MARKETS, PRICES, AND THE THREE COORDINATION TASKS

Smith noted that people are adept at pursuing their own self-interests, and that a **market system** harnesses this self-interest remarkably well. As he put it—with clear religious overtones—in doing what is best for themselves, people are “led by an invisible hand” to promote the economic well-being of society as a whole.

Those of us who live in a well-functioning market economy like that found in the United States tend to take the achievements of the market for granted, much like the daily rising and setting of the sun. Few bother to think about, say, what makes Hawaiian pineapples show up daily in Vermont supermarkets. Although the process by which the market guides the economy in such an orderly fashion is subtle and complex, the general principles are well known.

The market deals with efficiency in production through the profit motive, which discourages firms from using inputs wastefully. Valuable resources (such as energy) command high prices, giving producers strong incentives to use them efficiently. The market mechanism also guides firms' output decisions, matching quantities produced to consumer preferences. A rise in the price of wheat because of increased demand for bread, for example, will persuade farmers to produce more wheat and devote less of their land to soybeans.

Finally, a price system distributes goods among consumers in accord with their tastes and preferences, using voluntary exchange to determine who gets what. Consumers spend their incomes on the things they like best (among those they can afford). But the ability to buy goods is hardly divided equally. Workers with valuable skills and owners of scarce resources can sell what they have at attractive prices. With the incomes they earn, they can purchase generous amounts of goods and services. Those who are less successful in selling what they own receive lower incomes and so can afford to buy less. In extreme cases, they may suffer severe deprivation.

This, in broad terms, is how a market economy solves the three basic problems facing any society: how to produce any given combination of goods efficiently, how to select an appropriate combination of goods to produce, and how to distribute these goods sensibly among people. As we proceed through the following chapters, you will learn much more about these issues. You will see that they constitute the central theme that permeates not only this text, but the work of economists in general. As you progress through this book, keep in mind two questions:

- What does the market do well?
- What does it do poorly?

There are numerous answers to both questions, as you will learn in subsequent chapters.

Society has many important goals. Some of them, such as producing goods and services with maximum efficiency (minimum waste), can be achieved extraordinarily well by letting markets operate more or less freely.

Free markets will not, however, achieve all of society's goals. For example, they often have trouble keeping unemployment low. In fact, the unfettered operations of markets may even run counter to some goals, such as protection of the environment. Many observers also believe that markets do not necessarily distribute income in accord with ethical or moral norms.

But even in cases in which markets do not perform well, there may be ways of harnessing the power of the market mechanism to remedy its own deficiencies, as you will learn in later chapters.



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LAST WORD: DON'T CONFUSE ENDS WITH MEANS

Economic debates often have political and ideological overtones. So we will close this chapter by emphasizing that the central theme we have just outlined is neither a *defense of* nor an *attack on* the capitalist system. Nor is it a “conservative” position. One does not have to be a conservative to recognize that the market mechanism can be an extraordinarily helpful instrument for the pursuit of economic goals. Most of the formerly socialist countries of Europe have been working hard to “marketize” their economies, and even the communist People’s Republic of China has made huge strides in that direction.

The point is not to confuse ends with means in deciding how much to rely on market forces. Liberals and conservatives surely have different goals. But the means chosen to pursue these goals should, for the most part, be chosen on the basis of how effective the selected means are, not on some ideological prejudgments.

Even Karl Marx emphasized that the market is remarkably efficient at producing an abundance of goods and services that had never been seen in precapitalist history. Such wealth can be used to promote conservative goals, such as reducing tax rates, or to facilitate goals favored by liberals, such as providing more generous public aid for the poor.

Certainly, the market cannot deal with every economic problem. Indeed, we have just noted that the market is the *source* of a number of significant problems. Even so, the evidence accumulated over centuries leads economists to believe that most economic problems are best handled by market techniques. The analysis in this book is intended to help you identify both the objectives that the market mechanism can reliably achieve and those that it will fail to promote, or at least not promote very effectively. We urge you to forget the slogans you have heard—whether from the left or from the right—and make up your own mind after learning the material in this book.

SUMMARY

- Supplies of all **resources** are limited. Because resources are **scarce**, an **optimal decision** is one that chooses the best alternative among the options that are possible with the available resources.
- With limited resources, a decision to obtain more of one item is also a decision to give up some of another. What we give up is called the **opportunity cost** of what we get. The opportunity cost is the true cost of any decision. This is one of the *Ideas for Beyond the Final Exam*.
- When markets function effectively, firms are led to use resources efficiently and to produce the things that consumers want most. In such cases, opportunity costs and money costs (prices) correspond closely. When the market performs poorly, or when important, socially costly items are provided without charging an appropriate price, or are given away free, opportunity costs and money costs can diverge.
- A firm’s **production possibilities frontier** shows the combinations of goods it can produce, given the current technology and the resources at its disposal. The frontier is usually bowed outward because resources tend to be specialized.
- The **principle of increasing costs** states that as the production of one good expands, the opportunity cost of producing another unit of that good generally increases.
- Like a firm, the economy as a whole has a production possibilities frontier whose position is determined by its technology and by the available resources of land, labor, capital, and raw materials.
- A firm or an economy that ends up at a point below its production possibilities frontier is using its resources inefficiently or wastefully. This is what happens, for example, when there is unemployment.
- Economists define **efficiency** as the absence of waste. It is achieved primarily by the gains in productivity brought about through **specialization** that exploits **division of labor** and **comparative advantage** and by a system of exchange.
- Two countries (or two people) can gain by specializing in the activity in which each has a *comparative advantage* and then trading with one another. These gains from trade remain available even if one country is inferior at producing everything. This so-called principle of comparative advantage is one of our *Ideas for Beyond the Final Exam*.
- If an exchange is voluntary, both parties must benefit, even if no additional goods are produced. This is another of the *Ideas for Beyond the Final Exam*.
- Every economic system must find a way to answer three basic questions: How can goods be produced most effi-

ciently? How much of each good should be produced? How should goods be distributed among users?

12. The **market system** works very well in solving some of society's basic problems, but it fails to remedy others and

may, indeed, create some of its own. Where and how it succeeds and fails constitute the central theme of this book and characterize the work of economists in general.

KEY TERMS

Resources 36

Opportunity cost 37

Optimal decision 37

Outputs 38

Inputs 38

Production possibilities frontier 39

Principle of increasing costs 40

Efficiency 43

Allocation of resources 44

Division of labor 44

Comparative advantage 45

Market system 46

TEST YOURSELF

- A person rents a house for which she pays the landlord \$12,000 per year. The house can be purchased for \$100,000, and the tenant has this much money in a bank account that pays 4 percent interest per year. Is buying the house a good deal for the tenant? Where does opportunity cost enter the picture?
- Graphically show the production possibilities frontier for the nation of Stromboli, using the data given in the following table. Does the principle of increasing cost hold in Stromboli?
- Consider two alternatives for Stromboli in 2002. In case (a), its inhabitants eat 60 million pizzas and build 6,000 pizza ovens. In case (b), the population eats 15 million pizzas but builds 18,000 ovens. Which case will lead to a more generous production possibilities frontier for Stromboli in 2003?
- Jasmine's Snack Shop sells two brands of potato chips. Brand X costs Jasmine 60 cents per bag, and Brand Y costs her \$1. Draw Jasmine's production possibilities frontier if she has \$60 budgeted to spend on potato chips. Why is it not "bowed out"?

Stromboli's 2002 Production Possibilities	
Pizzas per Year	Pizza Ovens per Year
75,000,000	0
60,000,000	6,000
45,000,000	11,000
30,000,000	15,000
15,000,000	18,000
0	20,000

DISCUSSION QUESTIONS

- Discuss the resource limitations that affect:
 - the poorest person on earth
 - Bill Gates, the richest person on earth
 - a farmer in Kansas
 - the government of Indonesia
- If you were president of your college, what would you change if your budget were cut by 10 percent? By 25 percent? By 50 percent?
- If you were to leave college, what things would change in your life? What, then, is the opportunity cost of your education?
- Raising chickens requires several types of feed, such as corn and soy meal. Consider a farm in the former Soviet Union. Try to describe how decisions on the number of chickens to be raised, and the amount of each feed to use in raising them, were made under the old communist regime. If the farm is now privately owned, how does the market guide the decisions that used to be made by the central planning agency?
- The United States is one of the world's wealthiest countries. Think of a recent case in which the decisions of the U.S. government were severely constrained by scarcity. Describe the trade-offs that were involved. What were the opportunity costs of the decisions that were actually made?

