

PEARSON NEW INTERNATIONAL EDITION

**Economics Today  
The Macro View  
Roger LeRoy Miller  
Seventeenth Edition**



# Pearson New International Edition

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Edinburgh Gate

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**PEARSON®**

ISBN 10: 1-292-04066-1

ISBN 13: 978-1-292-04066-0

**British Library Cataloguing-in-Publication Data**

A catalogue record for this book is available from the British Library

Printed in the United States of America

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Alex HOFFORD/Newscom

# The Nature of Economics

## LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- ▶ Discuss the difference between microeconomics and macroeconomics
- ▶ Evaluate the role that rational self-interest plays in economic analysis
- ▶ Explain why economics is a science
- ▶ Distinguish between positive and normative economics

**MyEconLab** helps you master each objective and study more efficiently. See end of chapter for details.

**H**alf of the babies delivered in 2011 in a typical Hong Kong hospital maternity ward were born to non-Hong Kong residents. This fact means that these babies were born to women classified as tourists visiting from the Chinese mainland. Why have nearly half of the babies born in Hong Kong hospitals had mothers who are not residents of Hong Kong? To formulate an answer, you must learn more about principles of economics. In particular, you must learn the key concepts discussed in this chapter, such as self-interest.





## DID YOU KNOW THAT...

the number of college students majoring in economics rose by more than 40 percent during the past decade? One reason that students opt for extensive study of economics is that they find the subject fascinating. Another reason, however, is self-interest. On average, students who major in economics earn 13 percent more than business management majors, 26 percent more than chemistry majors, and 50 percent more than psychology majors. Thus, students have a strong incentive to consider majoring in economics.

**Incentives**

Rewards or penalties for engaging in a particular activity.

In this chapter, you will learn why contemplating the nature of self-interested responses to **incentives** is the starting point for analyzing choices people make in all walks of life. After all, how much time you devote to studying economics in this introductory course depends in part on the incentives established by your instructor's grading system. As you will see, self-interest and incentives are the underpinnings for all the decisions you and others around you make each day.

## The Power of Economic Analysis

Simply knowing that self-interest and incentives are central to any decision-making process is not sufficient for predicting the choices that people will actually make. You also have to develop a framework that will allow you to analyze solutions to each economic problem—whether you are trying to decide how much to study, which courses to take, whether to finish school, or whether the U.S. government should provide more grants to universities or raise taxes. The framework that you will learn in this text is the *economic way of thinking*.

This framework gives you power—the power to reach informed judgments about what is happening in the world. You can, of course, live your life without the power of economic analysis as part of your analytical framework. Indeed, most people do. But economists believe that economic analysis can help you make better decisions concerning your career, your education, financing your home, and other important matters. In the business world, the power of economic analysis can help you increase your competitive edge as an employee or as the owner of a business. As a voter, for the rest of your life you will be asked to make judgments about policies that are advocated by political parties. Many of these policies will deal with questions related to international economics, such as whether the U.S. government should encourage or discourage immigration, prevent foreign residents and firms from investing in port facilities or domestic banks, or restrict other countries from selling their goods here.

Finally, just as taking an art, music, or literature appreciation class increases the pleasure you receive when you view paintings, listen to concerts, or read novels, taking an economics course will increase your understanding and pleasure when watching the news on TV or reading articles on your iPad.

## Defining Economics

**Economics**

The study of how people allocate their limited resources to satisfy their unlimited wants.

**Economics** is part of the social sciences and, as such, seeks explanations of real events. All social sciences analyze human behavior, as opposed to the physical sciences, which generally analyze the behavior of electrons, atoms, and other nonhuman phenomena.

*Economics is the study of how people allocate their limited resources in an attempt to satisfy their unlimited wants. As such, economics is the study of how people make choices.*

**Resources**

Things used to produce goods and services to satisfy people's wants.

To understand this definition fully, two other words need explaining: *resources* and *wants*. **Resources** are things that have value and, more specifically, are used to produce goods and services that satisfy people's wants. **Wants** are all of the items that people would purchase if they had unlimited income.

**Wants**

What people would buy if their incomes were unlimited.

Whenever an individual, a business, or a nation faces alternatives, a choice must be made, and economics helps us study how those choices are made. For example, you have to choose how to spend your limited income. You also have to choose how to spend your limited time. You may have to choose how many of your company's limited resources to allocate to advertising and how many to allocate to new-product

research. In economics, we examine situations in which individuals choose how to do things, when to do things, and with whom to do them. Ultimately, the purpose of economics is to explain choices.

## Microeconomics versus Macroeconomics

Economics is typically divided into two types of analysis: **microeconomics** and **macroeconomics**.

*Microeconomics is the part of economic analysis that studies decision making undertaken by individuals (or households) and by firms. It is like looking through a microscope to focus on the small parts of our economy.*

*Macroeconomics is the part of economic analysis that studies the behavior of the economy as a whole. It deals with economywide phenomena such as changes in unemployment, in the general price level, and in national income.*

Microeconomic analysis, for example, is concerned with the effects of changes in the price of gasoline relative to that of other energy sources. It examines the effects of new taxes on a specific product or industry. If the government establishes new health care regulations, how individual firms and consumers would react to those regulations would be in the realm of microeconomics. The effects of higher wages brought about by an effective union strike would also be analyzed using the tools of microeconomics.

In contrast, issues such as the rate of inflation, the amount of economywide unemployment, and the yearly growth in the output of goods and services in the nation all fall into the realm of macroeconomic analysis. In other words, macroeconomics deals with **aggregates**, or totals—such as total output in an economy.

Be aware, however, of the blending of microeconomics and macroeconomics in modern economic theory. Modern economists are increasingly using microeconomic analysis—the study of decision making by individuals and by firms—as the basis of macroeconomic analysis. They do this because even though macroeconomic analysis focuses on aggregates, those aggregates are the result of choices made by individuals and firms.

### Microeconomics

The study of decision making undertaken by individuals (or households) and by firms.

### Macroeconomics

The study of the behavior of the economy as a whole, including such economywide phenomena as changes in unemployment, the general price level, and national income.

### Aggregates

Total amounts or quantities. Aggregate demand, for example, is total planned expenditures throughout a nation.

## The Three Basic Economic Questions and Two Opposing Answers

In every nation, three fundamental questions must be addressed irrespective of the form of its government or who heads that government, how rich or how poor the nation may be, or what type of **economic system**—the institutional mechanism through which resources are utilized to satisfy human wants—has been chosen. The three questions concern the problem of how to allocate society's scarce resources:

1. *What and how much will be produced?* Some mechanism must exist for determining which items will be produced while others remain inventors' pipe dreams or individuals' unfulfilled desires.
2. *How will items be produced?* There are many ways to produce a desired item. It is possible to use more labor and less capital, or vice versa. It is possible, for instance, to produce an item with an aim to maximize the number of people employed. Alternatively, an item may be produced with an aim to minimize the total expenses that members of society incur. Somehow, a decision must be made about the mix of resources used in production, the way in which they are organized, and how they are brought together at a particular location.
3. *For whom will items be produced?* Once an item is produced, who should be able to obtain it? People use scarce resources to produce any item, so typically people value access to that item. Thus, determining a mechanism for distributing produced items is a crucial issue for any society.

### Economic system

A society's institutional mechanism for determining the way in which scarce resources are used to satisfy human desires.



Now that you know the questions that an economic system must answer, how do current systems actually answer them?

## Two Opposing Answers

At any point in time, every nation has its own economic system. How a nation goes about answering the three basic economic questions depends on that nation's economic system.

**CENTRALIZED COMMAND AND CONTROL** Throughout history, one common type of economic system has been *command and control* (also called *central planning*) by a centralized authority, such as a king or queen, a dictator, a central government, or some other type of authority that assumes responsibility for addressing fundamental economic issues. Under command and control, this authority decides what items to produce and how many, determines how the scarce resources will be organized in the items' production, and identifies who will be able to obtain the items.

For instance, in a command-and-control economic system, a government might decide that particular types of automobiles ought to be produced in certain numbers. The government might issue specific rules for how to marshal resources to produce these vehicles, or it might even establish ownership over those resources so that it can make all such resource allocation decisions directly. Finally, the government will then decide who will be authorized to purchase or otherwise utilize the vehicles.

How is centralized command and control affecting the net cost of constructing a high-speed rail project in California?

## POLICY EXAMPLE

### The Federal Government Directs New California Train Tracks

The U.S. Department of Transportation recently provided an initial \$3 billion in federal tax funds for a 500-mile high-speed rail project stretching between the California cities of Anaheim and San Francisco. Local planners proposed construction of operating rail line segments in phases, starting at the highly populated ends of the route, at a projected total expense of about \$18 billion. Planners suggested that opening operating segments at the more heavily populated ends of the line would generate revenues that could assist in financing the building of remaining segments of the multiyear rail construction project.

In reaction, Transportation Department officials mandated the rail line to start in California's less-populated Central Valley

region. Of course, train passengers will be far fewer. Why did the U.S. government officials do this? They did so because they consider residents of the Central Valley to be "underserved" by rail transit services. The resulting completion delay will be at least two years and will add more than \$1 billion to the project's ultimate net expense to taxpayers.

### FOR CRITICAL THINKING

*Would Transportation Department officials have made the same decision if they, rather than taxpayers, had to cover the added costs of starting construction in the Central Valley?*

**THE PRICE SYSTEM** The alternative to command and control is the *price system* (also called a *market system*), which is a shorthand term describing an economic system that answers the three basic economic questions via decentralized decision making. Under a pure price system, individuals and families own all of the scarce resources used in production. Consequently, choices about what and how many items to produce are left to private parties to determine on their own initiative, as are decisions about how to go about producing those items. Furthermore, individuals and families choose how to allocate their own incomes to obtain the produced items at prices established via privately organized mechanisms.

In the price system, prices define the terms under which people agree to make exchanges. Prices signal to everyone within a price system which resources are relatively scarce and which resources are relatively abundant. This *signaling* aspect of the price system provides information to individual buyers and sellers about what and how many items should be produced, how production of items should be organized, and who will choose to buy the produced items.

Thus, in a price system, individuals and families own the facilities used to produce automobiles. They decide which types of automobiles to produce, how many of them to produce, and how to bring scarce resources together within their facilities to generate the desired production. Other individuals and families decide how much of their earnings they wish to spend on automobiles.

**MIXED ECONOMIC SYSTEMS** By and large, the economic systems of the world's nations are mixed economic systems that incorporate aspects of both centralized command and control and a decentralized price system. At any given time, some nations lean toward centralized mechanisms of command and control and allow relatively little scope for decentralized decision making. At the same time, other nations limit the extent to which a central authority dictates answers to the three basic economic questions, leaving people mostly free to utilize a decentralized price system to generate their own answers.

A given country may reach different decisions at different times about how much to rely on command and control versus a price system to answer its three basic economic questions. Until 2008, for instance, the people of the United States preferred to rely mainly on a decentralized price system to decide which and how many automobiles to produce, how to marshal scarce resources to produce those vehicles, and how to decide who should obtain them. Today, the U.S. government owns a substantial fraction of the facilities used to manufacture automobiles and hence has considerable command-and-control authority over U.S. vehicle production.

How has Cuba altered the extent to which it relies on command and control compared with the price system?

## INTERNATIONAL POLICY EXAMPLE

### Cuba Experiments with Mixing It Up

For more than half of a century, Cuba has been the Western Hemisphere's only Communist nation. The Cuban government sets the prices of most goods and services. For many years, the government also set the wages of about 85 percent of the country's 5.5 million workers who are government-employed. The government permitted the remaining 15 percent of employed individuals to work in 124 "authorized" private occupations, which include farming, teaching music, selling piñatas, and repairing existing items such as furniture and toys.

Today, the government is in the midst of letting go nearly 600,000 public employees, who will have to seek employment at privately

determined wages. Although the nation will maintain its heavy reliance on command and control, a larger share of its workers will have their wages determined in the price system. Thus, Cuba's economy is becoming more mixed.

### FOR CRITICAL THINKING

*When there are fewer public workers and more private workers, will changes in wages be better or worse signals?*

## The Economic Approach: Systematic Decisions

Economists assume that individuals act *as if* they systematically pursue self-motivated interests and respond predictably to perceived opportunities to attain those interests. This central insight of economics was first clearly articulated by Adam Smith in 1776. Smith wrote in his most famous book, *An Inquiry into the Nature and Causes of the Wealth of Nations*, that "it is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest." Thus, the typical person about whom economists make behavioral predictions is assumed to act *as though* he or she systematically pursues self-motivated interest.

### The Rationality Assumption

The **rationality assumption** of economics, simply stated, is as follows:

*We assume that individuals do not intentionally make decisions that would leave themselves worse off.*

#### Rationality assumption

The assumption that people do not intentionally make decisions that would leave them worse off.

The distinction here is between what people may think—the realm of psychology and psychiatry and perhaps sociology—and what they do. Economics does *not* involve itself in analyzing individual or group thought processes. Economics looks at what people actually do in life with their limited resources. It does little good to criticize the rationality assumption by stating, “Nobody thinks that way” or “I never think that way” or “How unrealistic! That’s as irrational as anyone can get!” In a world in which people can be atypical in countless ways, economists find it useful to concentrate on discovering the baseline. Knowing what happens on average is a good place to start. In this way, we avoid building our thinking on exceptions rather than on reality.

Take the example of driving. When you consider passing another car on a two-lane highway with oncoming traffic, you have to make very quick decisions: You must estimate the speed of the car that you are going to pass, the speed of the oncoming cars, the distance between your car and the oncoming cars, and your car’s potential rate of acceleration. If we were to apply a model to your behavior, we would use the rules of calculus. In actual fact, you and most other drivers in such a situation do not actually think of using the rules of calculus, but to predict your behavior, we could make the prediction *as if* you understood those rules.

How are bankers reducing robbery rates by counting on the rationality of would-be thieves?

## EXAMPLE

### Hello, Bank Robber, I’ll Remember You

Until recently, each year since 1979, on average 11 of every 100 U.S. bank branches experienced a robbery. Bankers have worked to bring down this robbery rate by treating prospective robbers as rational people. A would-be bank robber knows that the likelihood of being caught and sentenced to prison increases significantly when someone in the bank gets a good enough look at the robber’s face to provide a positive identification.

Consequently, many banks now make a point of having a teller, guard, or branch manager greet each entering customer, look the

customer directly in the eye, and say hello. Since banks around the nation have instituted a policy of greeting customers at the doors, the robbery rate has dropped to only 6 of every 100 bank branches.

### FOR CRITICAL THINKING

*What types of costs and benefits must a prospective criminal rationally weigh before deciding whether to attempt a bank robbery?*

## YOU ARE THERE

To contemplate how a higher corporate tax rate in the United States relative to other nations is affecting the incentive for U.S. firms to form corporate structures within U.S. borders, take a look at **Why So Many Firms Are Incorporating Outside the United States**.

## Responding to Incentives

If it can be assumed that individuals never intentionally make decisions that would leave them worse off, then almost by definition they will respond to changes in incentives. Indeed, much of human behavior can be explained in terms of how individuals respond to changing incentives over time.

Schoolchildren are motivated to do better by a variety of incentive systems, ranging from gold stars and certificates of achievement when they are young, to better grades with accompanying promises of a “better life” as they get older. Of course, negative incentives affect our behavior, too. Penalties, punishments, and other forms of negative incentives can raise the cost of engaging in various activities.

## Defining Self-Interest

Self-interest does not always mean increasing one’s wealth measured in dollars and cents. We assume that individuals seek many goals, not just increased wealth measured in monetary terms. Thus, the self-interest part of our economic-person assumption includes goals relating to prestige, friendship, love, power, helping others, creating works of art, and many other matters. We can also think in terms of enlightened self-interest, whereby individuals, in the pursuit of what makes them better off, also achieve the betterment of others around them. In brief, individuals are assumed to want the ability to further their goals by making decisions about how things around them are

used. The head of a charitable organization usually will not turn down an additional contribution, because accepting the funds yields control over how they are used, even though it is for other people's benefit.

Thus, self-interest does not rule out doing charitable acts. Giving gifts to relatives can be considered a form of charity that is nonetheless in the self-interest of the giver. But how efficient is such gift giving?

## EXAMPLE

### The Perceived Value of Gifts

Every holiday season, aunts, uncles, grandparents, mothers, and fathers give gifts to their college-aged loved ones. Joel Waldfogel, an economist at the University of Minnesota, has surveyed several thousand college students after Christmas to find out the value of holiday gifts. He finds that recorded music and outerwear (coats and jackets) have a perceived intrinsic value about equal to their actual cash equivalent. By the time he gets down the list to socks, underwear, and cosmetics, the students'

valuation is only about 82 percent of the cash value of the gift. He finds that aunts, uncles, and grandparents give the "worst" gifts and friends, siblings, and parents give the "best."

### FOR CRITICAL ANALYSIS

*What argument could you use against the idea of substituting cash or gift cards for physical gifts?*

## QUICK QUIZ 1

Answers are given at the end of the chapter. Review concepts from this section in [MyEconLab](#).

**Economics** is a social science that involves the study of how individuals choose among alternatives to satisfy their \_\_\_\_\_, which are what people would buy if their incomes were \_\_\_\_\_.

\_\_\_\_\_, the study of the decision-making processes of individuals (or households) and firms, and \_\_\_\_\_, the study of the performance of the economy as a whole, are the two main branches into which the study of economics is divided.

The three basic economic questions ask what and how much will be produced, how will items be produced, and for whom will items be produced. The two opposing answers are provided by the type of economic system: either \_\_\_\_\_ or the \_\_\_\_\_.

In economics, we assume that people do not intentionally make decisions that will leave them worse off. This is known as the \_\_\_\_\_ assumption.

## Economics as a Science

Economics is a social science that employs the same kinds of methods used in other sciences, such as biology, physics, and chemistry. Like these other sciences, economics uses models, or theories. Economic **models**, or **theories**, are simplified representations of the real world that we use to help us understand, explain, and predict economic phenomena in the real world. There are, of course, differences between sciences. The social sciences—especially economics—make little use of laboratory experiments in which changes in variables are studied under controlled conditions. Rather, social scientists, and especially economists, usually have to test their models, or theories, by examining what has already happened in the real world.

### Models, or theories

Simplified representations of the real world used as the basis for predictions or explanations.

## Models and Realism

At the outset it must be emphasized that no model in *any* science, and therefore no economic model, is complete in the sense that it captures *every* detail or interrelationship that exists. Indeed, a model, by definition, is an abstraction from reality. It is conceptually impossible to construct a perfectly complete realistic model. For example, in physics we cannot account for every molecule and its position and certainly not for every atom and subatomic particle. Not only is such a model unreasonably expensive to build, but working with it would be impossibly complex.

The nature of scientific model building is that the model should capture only the *essential* relationships that are sufficient to analyze the particular problem or answer the particular question with which we are concerned. *An economic model cannot be faulted as unrealistic simply because it does not represent every detail of the real world.* A map of a city that shows only major streets is not faulty if, in fact, all you need to know is how to pass through the city using major streets. As long as a model is able to shed light on the *central* issue at hand or forces at work, it may be useful.

A map is the quintessential model. It is always a simplified representation. It is always unrealistic. But it is also useful in making predictions about the world. If the model—the map—predicts that when you take Campus Avenue to the north, you always run into the campus, that is a prediction. If a simple model can explain observed behavior in repeated settings just as well as a complex model, the simple model has some value and is probably easier to use.

## Assumptions

Every model, or theory, must be based on a set of assumptions. Assumptions define the array of circumstances in which our model is most likely to be applicable. When some people predicted that sailing ships would fall off the edge of the earth, they used the *assumption* that the earth was flat. Columbus did not accept the implications of such a model because he did not accept its assumptions. He assumed that the world was round. The real-world test of his own model refuted the flat-earth model. Indirectly, then, it was a test of the assumption of the flat-earth model.

Is it possible to use our knowledge about assumptions to understand why driving directions sometimes contain very few details?

## EXAMPLE

### Getting Directions

Assumptions are a shorthand for reality. Imagine that you have decided to drive from your home in San Diego to downtown San Francisco. Because you have never driven this route, you decide to use a travel-planner device such as global-positioning-system equipment.

When you ask for directions, the electronic travel planner could give you a set of detailed maps that shows each city through which you will travel—Oceanside, San Clemente, Irvine, Anaheim, Los Angeles, Bakersfield, Modesto, and so on—with the individual maps showing you exactly how the freeway threads through each of these cities. You would get a nearly complete description of reality because the GPS travel planner will not have used many simplifying assumptions. It is more likely, however, that the travel planner will simply

say, “Get on Interstate 5 going north. Stay on it for about 500 miles. Follow the signs for San Francisco. After crossing the toll bridge, take any exit marked ‘Downtown.’” By omitting all of the trivial details, the travel planner has told you all that you really need and want to know. The models you will be using in this text are similar to the simplified directions on how to drive from San Diego to San Francisco—they focus on what is relevant to the problem at hand and omit what is not.

### FOR CRITICAL ANALYSIS

*In what way do small talk and gossip represent the use of simplifying assumptions?*

### ***Ceteris paribus*** [KAY-ter-us PEAR-uh-bus] assumption

The assumption that nothing changes except the factor or factors being studied.

**THE *CETERIS PARIBUS* ASSUMPTION: ALL OTHER THINGS BEING EQUAL** Everything in the world seems to relate in some way to everything else in the world. It would be impossible to isolate the effects of changes in one variable on another variable if we always had to worry about the many other variables that might also enter the analysis. Similar to other sciences, economics uses the ***ceteris paribus* assumption**. *Ceteris paribus* means “other things constant” or “other things equal.”

Consider an example taken from economics. One of the most important determinants of how much of a particular product a family buys is how expensive that product is relative to other products. We know that in addition to relative prices, other factors influence decisions about making purchases. Some of them have to do with income, others with tastes, and yet others with custom and religious beliefs. Whatever these other factors are, we hold them constant when we look at the relationship between changes in prices and changes in how much of a given product people will purchase.



## Deciding on the Usefulness of a Model

We generally do not attempt to determine the usefulness, or “goodness,” of a model merely by evaluating how realistic its assumptions are. Rather, we consider a model “good” if it yields usable predictions that are supported by real-world observations. In other words, can we use the model to predict what will happen in the world around us? Does the model provide useful implications about how things happen in our world?

Once we have determined that the model may be useful in predicting real-world phenomena, the scientific approach to the analysis of the world around us requires that we consider evidence. Evidence is used to test the usefulness of a model. This is why we call economics an **empirical** science. *Empirical* means that evidence (data) is looked at to see whether we are right. Economists are often engaged in empirically testing their models.

### Empirical

Relying on real-world data in evaluating the usefulness of a model.

## Models of Behavior, Not Thought Processes

Take special note of the fact that economists’ models do not relate to the way people *think*. Economic models relate to the way people *act*, to what they do in life with their limited resources. Normally, the economist does not attempt to predict how people will think about a particular topic, such as a higher price of oil products, accelerated inflation, or higher taxes. Rather, the task at hand is to predict how people will behave, which may be quite different from what they *say* they will do (much to the consternation of poll takers and market researchers). Thus, people’s *declared* preferences are generally of little use in testing economic theories, which aim to explain and predict people’s *revealed* preferences. The people involved in examining thought processes are psychologists and psychiatrists, not typically economists.

### WHAT IF...

economists were to base their theories of human behavior on what people *say* they do, rather than on what people *actually* do?

The task of economists is to try to predict decisions that people will make given the incentives that they face. Consider how people respond when asked by pollsters about whether they will cut back on charitable giving if the government eliminates tax breaks for such donations. Most people state that they will continue to give as much as before, because they suspect this answer will please those who have posed the question. In fact, studies of actual responses

to smaller tax breaks for charitable giving reveal that people pursue their own interest. Whether or not their true action might have pleased a pollster, they reduce donations. Thus, if economists were to rely on polls indicating how people claim that they respond to incentives such as diminished tax breaks, economists would persistently make erroneous predictions about the decisions that people actually make.

## Behavioral Economics and Bounded Rationality

In recent years, some economists have proposed paying more attention to psychologists and psychiatrists. They have suggested an alternative approach to economic analysis. Their approach, which is known as **behavioral economics**, examines consumer behavior in the face of psychological limitations and complications that may interfere with rational decision making.

### Behavioral economics

An approach to the study of consumer behavior that emphasizes psychological limitations and complications that potentially interfere with rational decision making.

**BOUNDED RATIONALITY** Proponents of behavioral economics suggest that traditional economic models assume that people exhibit three “unrealistic” characteristics:

1. *Unbounded selfishness.* People are interested only in their own satisfaction.
2. *Unbounded willpower.* Their choices are always consistent with their long-term goals.
3. *Unbounded rationality.* They are able to consider every relevant choice.



**Bounded rationality**

The hypothesis that people are *nearly*, but not fully, rational, so that they cannot examine every possible choice available to them but instead use simple rules of thumb to sort among the alternatives that happen to occur to them.

As an alternative, advocates of behavioral economics have proposed replacing the rationality assumption with the assumption of **bounded rationality**, which assumes that people cannot examine and think through every possible choice they confront. As a consequence, behavioral economists suggest, people cannot always pursue their best long-term personal interests. From time to time, they must also rely on other people and take into account other people's interests as well as their own.

**RULES OF THUMB** A key behavioral implication of the bounded rationality assumption is that people should use so-called *rules of thumb*: Because every possible choice cannot be considered, an individual will tend to fall back on methods of making decisions that are simpler than trying to sort through every possibility.

A problem confronting advocates of behavioral economics is that people who *appear* to use rules of thumb may in fact behave *as if* they are fully rational. For instance, if a person faces persistently predictable ranges of choices for a time, the individual may rationally settle into repetitive behaviors that an outside observer might conclude to be consistent with a rule of thumb. According to the bounded rationality assumption, the person should continue to rely on a rule of thumb even if there is a major change in the environment that the individual faces. Time and time again, however, economists find that people respond to altered circumstances by fundamentally changing their behaviors. Economists also generally observe that people make decisions that are consistent with their own self-interest and long-term objectives.

**BEHAVIORAL ECONOMICS: A WORK IN PROGRESS** It remains to be seen whether the application of the assumption of bounded rationality proposed by behavioral economists will truly alter the manner in which economists construct models intended to better predict human decision making. So far, proponents of behavioral economics have not conclusively demonstrated that paying closer attention to psychological thought processes can improve economic predictions.

As a consequence, the bulk of economic analysis continues to rely on the rationality assumption as the basis for constructing economic models. Advocates of behavioral economics continue to explore ways in which psychological elements might improve analysis of decision making by individual consumers.

## Positive versus Normative Economics

Economics uses *positive analysis*, a value-free approach to inquiry. No subjective or moral judgments enter into the analysis. Positive analysis relates to statements such as "If A, then B." For example, "If the price of gasoline goes up relative to all other prices, then the amount of it that people buy will fall." That is a positive economic statement. It is a statement of *what is*. It is not a statement of anyone's value judgment or subjective feelings.

### Distinguishing between Positive and Normative Economics

For many problems analyzed in the "hard" sciences such as physics and chemistry, the analyses are considered to be virtually value-free. After all, how can someone's values enter into a theory of molecular behavior? But economists face a different problem. They deal with the behavior of individuals, not molecules. That makes it more difficult to stick to what we consider to be value-free or **positive economics** without reference to our feelings.

When our values are interjected into the analysis, we enter the realm of **normative economics**, involving *normative analysis*. A positive economic statement is "If the price of gas rises, people will buy less." If we add to that analysis the statement "so we should not allow the price to go up," we have entered the realm of normative economics—we have expressed a value judgment. In fact, any time you see the word *should*, you will know that values are entering into the discussion. Just remember that positive statements are concerned with *what is*, whereas normative statements are concerned with *what ought to be*.

**Positive economics**

Analysis that is *strictly* limited to making either purely descriptive statements or scientific predictions; for example, "If A, then B." A statement of *what is*.

**Normative economics**

Analysis involving value judgments about economic policies; relates to whether outcomes are good or bad. A statement of *what ought to be*.

Each of us has a desire for different things. That means that we have different values. When we express a value judgment, we are simply saying what we prefer, like, or desire. Because individual values are diverse, we expect—and indeed observe—that people express widely varying value judgments about how the world ought to be.

## A Warning: Recognize Normative Analysis

It is easy to define positive economics. It is quite another matter to catch all unlabeled normative statements in a text, even though an author goes over the manuscript many times before it is printed or electronically created. Therefore, do not get the impression that an author will be able to keep all personal values out of the text. They will slip through. In fact, the very choice of which topics to include involves normative economics. There is no value-free way to decide which topics to use. The author's values ultimately make a difference when choices have to be made. But from your own standpoint, you might want to be able to recognize when you are engaging in normative as opposed to positive economic analysis. Reading this text will help equip you for that task.

### QUICK QUIZ 2

Answers are given at the end of the chapter. Review concepts from this section in [MyEconLab](#).

A \_\_\_\_\_, or \_\_\_\_\_, uses assumptions and is by nature a simplification of the real world. The usefulness of a \_\_\_\_\_ can be evaluated by bringing empirical evidence to bear on its predictions.

Most models use the \_\_\_\_\_ assumption that all other things are held constant, or equal.

\_\_\_\_\_ economics emphasizes psychological constraints and complexities that potentially interfere with rational decision making. This approach utilizes the

\_\_\_\_\_ hypothesis that people are not quite rational, because they cannot study every possible alternative but instead use simple rules of thumb to decide among choices.

\_\_\_\_\_ economics is value-free and relates to statements that can be refuted, such as “If A, then B.”

\_\_\_\_\_ economics involves people's values and typically uses the word *should*.

## YOU ARE THERE

### Why So Many Firms Are Incorporating Outside the United States

Willard Taylor, a tax attorney with Sullivan & Cromwell LLP, is contemplating the latest trend among U.S. firms that have been opting to become corporations. Until recently, it was unusual for U.S. family-owned companies or partnerships to “go public” by incorporating in another nation and selling shares of stock to residents of other nations. A decade ago, only about 1 percent of U.S. companies that became corporations did so outside the United States. During each of the past three years, however, more than 20 percent of U.S. firms choosing corporate structures have decided to incorporate abroad.

As a tax lawyer, Taylor pays close attention to tax rates assessed on corporations based abroad as well as those that apply to U.S. corporations. Most countries' governments, Taylor realizes, have slashed their corporate tax rates in recent years, whereas the U.S. corporate tax rate has remained unchanged at 35 percent. The result, Taylor notes, is that

the U.S. corporate tax rate is now second highest in the world, which provides a strong incentive to incorporate elsewhere. Taylor asks, “What are the pluses and minuses of being incorporated in the U.S. versus somewhere else?” He deduces that given the strong incentive provided by lower corporate tax rates abroad, “Very often, depending on what the business is, you'll conclude that there are no pluses to being in the United States.”

### Critical Thinking Questions

1. How have lower foreign tax rates affected the incentive to incorporate abroad?
2. What do you suppose has happened to federal collections of corporate taxes?

# ISSUES & APPLICATIONS

## Why So Many Tourists Have Been Giving Birth in Hong Kong

Alex Hafford/Newscom



### CONCEPTS APPLIED

- ▶ Rationality Assumption
- ▶ Incentives
- ▶ Self-Interest

There has been a significant upswing in the number of babies born in Hong Kong to mothers from China's mainland who officially are visiting Hong Kong as tourists. The number of births to this category of mothers rose from about 13,000 in 2004 to more than 40,000 in 2011—almost half of all Hong Kong births in the latter year. It turns out that this substantial increase in Hong Kong “tourist births” is consistent with the rationality assumption.

### Incentives for a Mainland Resident to Desire a Hong Kong Birth

Why are so many more women who are officially in Hong Kong as tourists giving birth instead of visiting the city's sites? The answer is that mothers from mainland China are responding to incentives in a manner consistent with self-interested behavior.

Although the \$5,000 price of hospital maternity care is several times higher in Hong Kong than in most hospitals on the mainland, the quality of care is considerably better in Hong Kong. In addition, the benefits for a child born in Hong Kong—and hence for the child's mother—are much greater than those available to a child born on the mainland. These benefits of a Hong Kong birth include twelve years of publicly provided education for the child at no explicit cost and close to zero out-of-pocket health care expenses. Furthermore, tourists who give birth in Hong Kong are exempt from China's “one-child policy,” which limits women to bearing a single child. Such an exemption gives pregnant women desiring to raise a second child a strong incentive to “visit” Hong Kong.

### Why the “Tourist” Fiction Has Been Rational for Hong Kong

Of course, nearly all tourist mothers who travel to Hong Kong to give birth actually plan to remain there. Why does the Hong Kong government permit these women to remain and to obtain publicly provided health care and education for their children? The answer to this second question also relates to the rationality assumption: The Hong Kong government is responding to incentives.

Since the 1990s, the birth rate among Hong Kong residents has declined by more than 33 percent. Early in the 2000s, government officials realized that unless more people immigrated to Hong Kong, its population would begin to shrink—perhaps eventually by about one-third. The city's leaders did not wish to open its borders to all who desired to immigrate, so they decided to permit more expectant mothers to enter under the tourist classification. Thus, it has been rational for the government of Hong Kong to allow numerous “tourist” births, just as it has been consistent with individual self-interest for “tourists” to give birth there.

### For Critical Thinking

1. How have recent improvements in maternity care in mainland China likely affected the incentives to become a “tourist” mother in Hong Kong?
2. How are Hong Kong's incentives to allow “tourist” births affected by the fact that the city pays benefits to older residents from taxes paid by younger residents?

### Web Resources

1. To contemplate the sources of pressures within Hong Kong to restrict tourist births, go to [www.econtoday.com/chap01](http://www.econtoday.com/chap01).
2. Read about the 2011 suspension of Hong Kong's tourist births at [www.econtoday.com/chap01](http://www.econtoday.com/chap01).

### MyEconLab

For more questions on this chapter's Issues & Applications, go to [MyEconLab](http://www.econtoday.com/chap01). In the Study Plan for this chapter, select Section N: News.

## MyEconLab

Here is what you should know after reading this chapter. MyEconLab will help you identify what you know, and where to go when you need to practice.

### WHAT YOU SHOULD KNOW

#### Answering the Three Basic Economic Questions

Economics is the study of how individuals make choices to satisfy wants. Microeconomics is the study of decision making by individual households and firms, and macroeconomics is the study of nationwide phenomena such as inflation and unemployment. The three basic economic questions ask what and how much will be produced, how items will be produced, and for whom items will be produced. The two opposing answers to these questions are provided by the type of economic system: either centralized command and control or the price system.

incentives  
economics  
resources  
wants  
microeconomics  
macroeconomics  
aggregates  
economic system

### WHERE TO GO TO PRACTICE

- [MyEconLab](#) Study Plans 1.1, 1.2, 1.3

**Self-Interest in Economic Analysis** Rational self-interest is the assumption that people never intentionally make decisions that would leave them worse off. Instead, they are motivated mainly by their self-interest, which can relate to monetary and nonmonetary goals, such as love, prestige, and helping others.

rationality  
assumption

- [MyEconLab](#) Study Plan 1.3

**Economics as a Science** Economic models, or theories, are simplified representations of the real world. Economic models are never completely realistic because by definition they are simplifications using assumptions that are not directly testable. Nevertheless, economists can subject the predictions of economic theories to empirical tests in which real-world data are used to decide whether or not to reject the predictions.

models, or theories  
*ceteris paribus*  
assumption  
empirical  
behavioral  
economics  
bounded rationality

- [MyEconLab](#) Study Plan 1.5

**Positive and Normative Economics** Positive economics deals with *what is*, whereas normative economics deals with *what ought to be*. Positive economic statements are of the “if . . . then” variety. They are descriptive and predictive. In contrast, statements embodying values are within the realm of normative economics, or how people think things ought to be.

positive economics  
normative  
economics

- [MyEconLab](#) Study Plan 1.6

Log in to [MyEconLab](#), take a chapter test, and get a personalized Study Plan that tells you which concepts you understand and which ones you need to review. From there, [MyEconLab](#) will give you further practice, tutorials, animations, videos, and guided solutions. For more information, visit [www.myeconlab.com](http://www.myeconlab.com)

# PROBLEMS

*All problems are assignable in MyEconLab. Answers to odd-numbered problems appear at the end of the chapter.*

- Define economics. Explain briefly how the economic way of thinking—in terms of rational, self-interested people responding to incentives—relates to each of the following situations.
  - A student deciding whether to purchase a textbook for a particular class
  - Government officials seeking more funding for mass transit through higher taxes
  - A municipality taxing hotel guests to obtain funding for a new sports stadium
- Some people claim that the “economic way of thinking” does not apply to issues such as health care. Explain how economics does apply to this issue by developing a “model” of an individual’s choices.
- Does the phrase “unlimited wants and limited resources” apply to both a low-income household and a middle-income household? Can the same phrase be applied to a very high-income household?
- In a single sentence, contrast microeconomics and macroeconomics. Next, categorize each of the following issues as a microeconomic issue, a macroeconomic issue, or not an economic issue.
  - The national unemployment rate
  - The decision of a worker to work overtime or not
  - A family’s choice to have a baby
  - The rate of growth of the money supply
  - The national government’s budget deficit
  - A student’s allocation of study time across two subjects
- One of your classmates, Sally, is a hardworking student, serious about her classes, and conscientious about her grades. Sally is also involved, however, in volunteer activities and an extracurricular sport. Is Sally displaying rational behavior? Based on what you read in this chapter, construct an argument supporting the conclusion that she is.
- Recently, a bank was trying to decide what fee to charge for “expedited payments”—payments that the bank would transmit extra-speedily to enable customers to avoid late fees on cable TV bills, electric bills, and the like. To try to determine what fee customers were willing to pay for expedited payments, the bank conducted a survey. It was able to determine that many of the people surveyed already paid fees for expedited payment services that *exceeded* the maximum fees that they said they were willing to pay. How does the bank’s finding relate to economists’ traditional focus on what people do, rather than what they *say* they will do?
- Explain, in your own words, the rationality assumption, and contrast it with the assumption of bounded rationality proposed by adherents of behavioral economics.
- Why does the assumption of bounded rationality suggest that people might use rules of thumb to guide their decision making instead of considering every possible choice available to them?
- Under what circumstances might people appear to use rules of thumb, as suggested by the assumption of bounded rationality, even though they really are behaving in a manner suggested by the rationality assumption?
- For each of the following approaches that an economist might follow in examining a decision-making process, identify whether the approach relies on the rationality assumption or on the assumption of bounded rationality.
  - To make predictions about how many apps a person will download onto her tablet device, an economist presumes that the individual faces limitations that make it impossible for her to examine every possible choice among relevant apps.
  - In evaluating the price that an individual will be willing to pay for a given quantity of a particular type of health care service, a researcher assumes that the person considers all relevant health care options in pursuit of his own long-term satisfaction with resulting health outcomes.
  - To determine the amount of time that a person will decide to devote to watching online videos each week, an economist makes the assumption that the individual will feel overwhelmed by the sheer volume of videos available online and will respond by using a rule of thumb.
- For each of the following approaches that an economist might follow in examining a decision-making process, identify whether the approach relies on the rationality assumption or on the assumption of bounded rationality.
  - An economic study of the number of online searches that individuals conduct before selecting a particular item to purchase online presumes that people are interested only in their own



- satisfaction, pursue their ultimate objectives, and consider every relevant option.
- b. An economist seeking to predict the effect that an increase in a state's sales tax rate will have on consumers' purchases of goods and services presumes that people are limited in their ability to process information about how the tax-rate increase will influence the after-tax prices those consumers will pay.
  - c. To evaluate the impact of an increase in the range of choices that an individual confronts when deciding among devices for accessing the Internet, an economic researcher makes the assumption that the individual is unable to take into account every new Internet-access option available to her.
12. Which of the following predictions appear(s) to follow from a model based on the assumption that rational, self-interested individuals respond to incentives?
    - a. For every 10 exam points Myrna must earn in order to pass her economics course and meet her graduation requirements, she will study one additional hour for her economics test next week.
    - b. A coin toss will best predict Leonardo's decision about whether to purchase an expensive business suit or an inexpensive casual outfit to wear next week when he interviews for a high-paying job he is seeking.
    - c. Celeste, who uses earnings from her regularly scheduled hours of part-time work to pay for her room and board at college, will decide to purchase and download a newly released video this week only if she is able to work two additional hours.
  13. Consider two models for estimating, in advance of an election, the shares of votes that will go to rival candidates. According to one model, pollsters' surveys of a randomly chosen set of registered voters before an election can be used to forecast the percentage of votes that each candidate will receive. This first model relies on the assumption that unpaid survey respondents will give truthful responses about how they will vote and that they will actually cast a ballot in the election. The other model uses prices of financial assets (legally binding IOUs) issued by the Iowa Electronic Markets, operated by the University of Iowa, to predict electoral outcomes. The final payments received by owners of these assets, which can be bought or sold during the weeks and days preceding an election, depend on the shares of votes the candidates actually end up receiving. This second model assumes that owners of these assets wish to earn the highest possible returns, and it predicts that the market prices of these assets provide an indication of the percentage of votes that each candidate will actually receive on the day of the election.
    - a. Which of these two models for forecasting electoral results is more firmly based on the rationality assumption of economics?
    - b. How would an economist evaluate which is the better model for forecasting electoral outcomes?
  14. Write a sentence contrasting positive and normative economic analysis.
  15. Based on your answer to Problem 14, categorize each of the following conclusions as being the result of positive analysis or normative analysis.
    - a. A higher minimum wage will reduce employment opportunities for minimum wage workers.
    - b. Increasing the earnings of minimum wage employees is desirable, and raising the minimum wage is the best way to accomplish this.
    - c. Everyone should enjoy open access to health care at no explicit charge.
    - d. Health care subsidies will increase the consumption of health care.
  16. Consider the following statements, based on a positive economic analysis that assumes that all other things remain constant. For each, list one other thing that might change and thus offset the outcome stated.
    - a. Increased demand for laptop computers will drive up their price.
    - b. Falling gasoline prices will result in additional vacation travel.
    - c. A reduction of income tax rates will result in more people working.



## ECONOMICS ON THE NET

**The Usefulness of Studying Economics** This application helps you see how accomplished people benefited from their study of economics. It also explores ways in which these people feel others of all walks of life can gain from learning more about the economics field.

**Title:** How Taking an Economics Course Can Lead to Becoming an Economist

**Navigation:** Go to [www.econtoday.com/chap01](http://www.econtoday.com/chap01) to visit the Federal Reserve Bank of Minneapolis publication, *The Region*. Select the last article of the issue, “Economists in *The Region* on Their Student Experiences and the Need for Economic Literacy.”

**Application** Read the interviews of the six economists, and answer the following questions.

1. Based on your reading, which economists do you think other economists regard as influential? What educational institutions do you think are the most influential in economics?
2. Which economists do you think were attracted to microeconomics and which to macroeconomics?

**For Group Study and Analysis** Divide the class into three groups, and assign the groups the Blinder, Yellen, and Rivlin interviews. Have each group use the content of its assigned interview to develop a statement explaining why the study of economics is important, regardless of a student’s chosen major.

# APPENDIX

## Reading and Working with Graphs

A graph is a visual representation of the relationship between variables. In this appendix, we'll deal with just two variables: an **independent variable**, which can change in value freely, and a **dependent variable**, which changes as a result of changes in the value of the independent variable. For example, even if nothing else is changing in your life, your weight depends on your intake of calories. The independent variable is caloric intake, and the dependent variable is weight.

A table is a list of numerical values showing the relationship between two (or more) variables. Any table can be converted into a graph, which is a visual representation of that list. Once you understand how a table can be converted to a graph, you will understand what graphs are and how to construct and use them.

Consider a practical example. A conservationist may try to convince you that driving at lower highway speeds will help you conserve gas. Table A-1 shows the relationship between speed—the independent variable—and the distance you can go on a gallon of gas at that speed—the dependent variable. This table does show a pattern. As the data in the first column get larger in value, the data in the second column get smaller.

Now let's take a look at the different ways in which variables can be related.

### Direct and Inverse Relationships

Two variables can be related in different ways, some simple, others more complex. For example, a person's weight and height are often related. If we measured the height and weight of thousands of people, we would surely find that taller people tend to weigh more than shorter people. That is, we would discover that there is a **direct relationship** between height and weight. By this we simply mean that an *increase* in one variable is usually associated with an *increase* in the related variable. This can easily be seen in panel (a) of Figure A-1 below.

Let's look at another simple way in which two variables can be related. Much evidence indicates that as the price of a specific commodity rises, the amount purchased decreases—there is an **inverse relationship** between the variable's price per unit and quantity purchased. Such a relationship indicates that for higher and higher prices, smaller and smaller quantities will be purchased. We see this relationship in panel (b) of Figure A-1.

#### Independent variable

A variable whose value is determined independently of, or outside, the equation under study.

#### Dependent variable

A variable whose value changes according to changes in the value of one or more independent variables.

TABLE A-1

Gas Mileage as a Function of Driving Speed

Miles per Hour	Miles per Gallon
45	25
50	24
55	23
60	21
65	19
70	16
75	13

#### Direct relationship

A relationship between two variables that is positive, meaning that an increase in one variable is associated with an increase in the other and a decrease in one variable is associated with a decrease in the other.

#### Inverse relationship

A relationship between two variables that is negative, meaning that an increase in one variable is associated with a decrease in the other and a decrease in one variable is associated with an increase in the other.

FIGURE A-1

Direct and Inverse Relationships

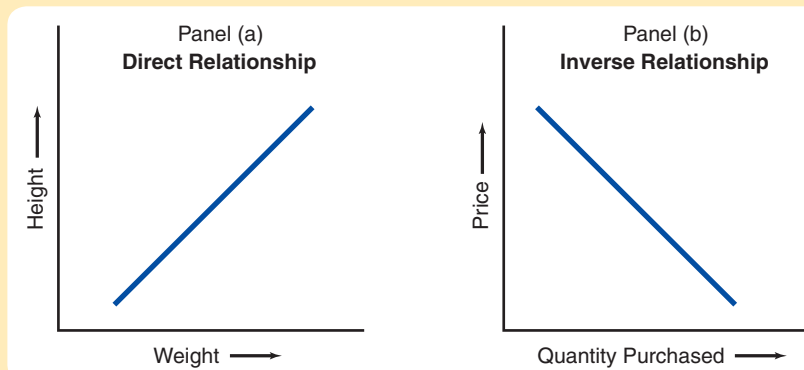
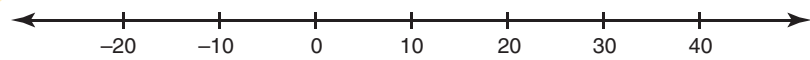


FIGURE A-2

## Horizontal Number Line

**Number line**

A line that can be divided into segments of equal length, each associated with a number.

## Constructing a Graph

Let us now examine how to construct a graph to illustrate a relationship between two variables.

### A Number Line

The first step is to become familiar with what is called a **number line**. One is shown in Figure A-2 above. You should know two things about it:

1. The points on the line divide the line into equal segments.
2. The numbers associated with the points on the line increase in value from left to right. Saying it the other way around, the numbers decrease in value from right to left. However you say it, what you're describing is formally called an *ordered set of points*.

On the number line, we have shown the line segments—that is, the distance from 0 to 10 or the distance between 30 and 40. They all appear to be equal and, indeed, are each equal to  $\frac{1}{2}$  inch. When we use a distance to represent a quantity, such as barrels of oil, graphically, we are *scaling* the number line. In the example shown, the distance between 0 and 10 might represent 10 barrels of oil, or the distance from 0 to 40 might represent 40 barrels. Of course, the scale may differ on different number lines. For example, a distance of 1 inch could represent 10 units on one number line but 5,000 units on another. Notice that on our number line, points to the left of 0 correspond to negative numbers and points to the right of 0 correspond to positive numbers.

Of course, we can also construct a vertical number line. Consider the one in Figure A-3 alongside. As we move up this vertical number line, the numbers increase in value; conversely, as we descend, they decrease in value. Below 0 the numbers are negative, and above 0 the numbers are positive. And as on the horizontal number line, all the line segments are equal. This line is divided into segments such that the distance between -2 and -1 is the same as the distance between 0 and 1.

### Combining Vertical and Horizontal Number Lines

By drawing the horizontal and vertical lines on the same sheet of paper, we are able to express the relationships between variables graphically. We do this in Figure A-4 on the following page. We draw them (1) so that they intersect at each other's 0 point and (2) so that they are perpendicular to each other. The result is a set of coordinate axes, where each line is called an *axis*. When we have two axes, they span a *plane*.

For one number line, you need only one number to specify any point on the line. Equivalently, when you see a point on the line, you know that it represents one number or one value. With a coordinate value system, you need two numbers to specify a single point in the plane; when you see a single point on a graph, you know that it represents two numbers or two values.

FIGURE A-3

## Vertical Number Line

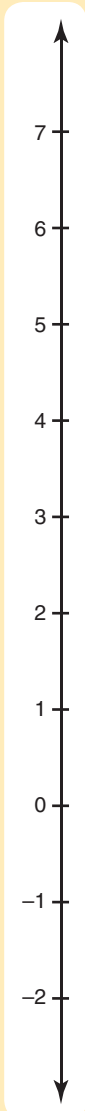
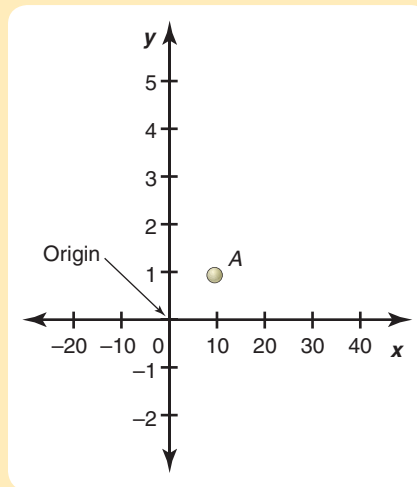


FIGURE A-4

## A Set of Coordinate Axes



The basic things that you should know about a coordinate number system are that the vertical number line is referred to as the **y axis**, the horizontal number line is referred to as the **x axis**, and the point of intersection of the two lines is referred to as the **origin**.

Any point such as *A* in Figure A-4 above represents two numbers—a value of  $x$  and a value of  $y$ . But we know more than that: We also know that point *A* represents a positive value of  $y$  because it is above the  $x$  axis, and we know that it represents a positive value of  $x$  because it is to the right of the  $y$  axis.

Point *A* represents a “paired observation” of the variables  $x$  and  $y$ ; in particular, in Figure A-4, *A* represents an observation of the pair of values  $x = 10$  and  $y = 1$ . Every point in the coordinate system corresponds to a paired observation of  $x$  and  $y$ , which can be simply written  $(x, y)$ —the  $x$  value is always specified first and then the  $y$  value. When we give the values associated with the position of point *A* in the coordinate number system, we are in effect giving the coordinates of that point. *A*’s coordinates are  $x = 10$ ,  $y = 1$ , or  $(10, 1)$ .

**y axis**

The vertical axis in a graph.

**x axis**

The horizontal axis in a graph.

**Origin**

The intersection of the  $y$  axis and the  $x$  axis in a graph.

## Graphing Numbers in a Table

Consider Table A-2 alongside. Column 1 shows different prices for T-shirts, and column 2 gives the number of T-shirts purchased per week at these prices. Notice the pattern of these numbers. As the price of T-shirts falls, the number of T-shirts purchased per week increases. Therefore, an inverse relationship exists between these two variables, and as soon as we represent it on a graph, you will be able to see the relationship. We can graph this relationship using a coordinate number system—a vertical and horizontal number line for each of these two variables. Such a graph is shown in panel (b) of Figure A-5 on the following page.

In economics, it is conventional to put dollar values on the  $y$  axis and quantities on the horizontal axis. We therefore construct a vertical number line for price and a horizontal number line, the  $x$  axis, for quantity of T-shirts purchased per week. The resulting coordinate system allows the plotting of each of the paired observation points. In panel (a), we repeat Table A-2, with a column added expressing these points in paired-data  $(x, y)$  form. For example, point *J* is the paired observation  $(30, 9)$ . It indicates that when the price of a T-shirt is \$9, 30 will be purchased per week.

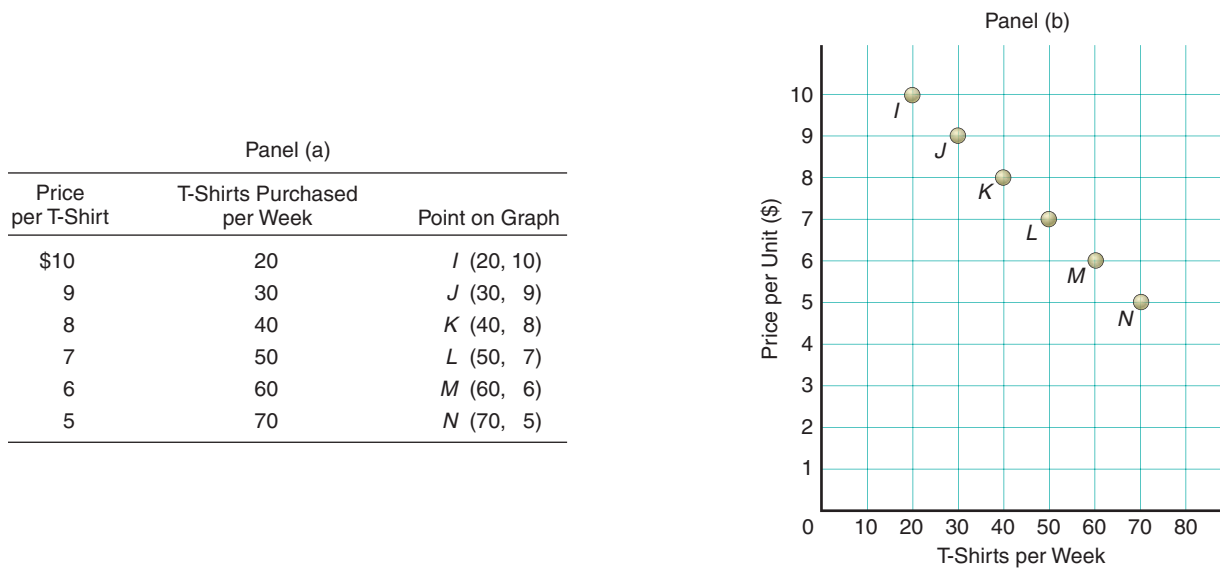
TABLE A-2

## T-Shirts Purchased

(1) Price of T-Shirts	(2) Number of T-Shirts Purchased per Week
\$10	20
9	30
8	40
7	50
6	60
5	70

FIGURE A-5

## Graphing the Relationship between T-Shirts Purchased and Price



If it were possible to sell parts of a T-shirt ( $\frac{1}{2}$  or  $\frac{1}{20}$  of a shirt), we would have observations at every possible price. That is, we would be able to connect our paired observations, represented as lettered points. Let's assume that we can make T-shirts perfectly divisible so that the linear relationship shown in Figure A-5 also holds for fractions of dollars and T-shirts. We would then have a line that connects these points, as shown in the graph in Figure A-6 below.

In short, we have now represented the data from the table in the form of a graph. Note that an inverse relationship between two variables shows up on a graph as a line or curve that slopes *downward* from left to right. (You might as well get used to the idea that economists call a straight line a "curve" even though it may not curve at all. Economists' data frequently turn out to be curves, so they refer to everything represented graphically, even straight lines, as curves.)

FIGURE A-6

## Connecting the Observation Points

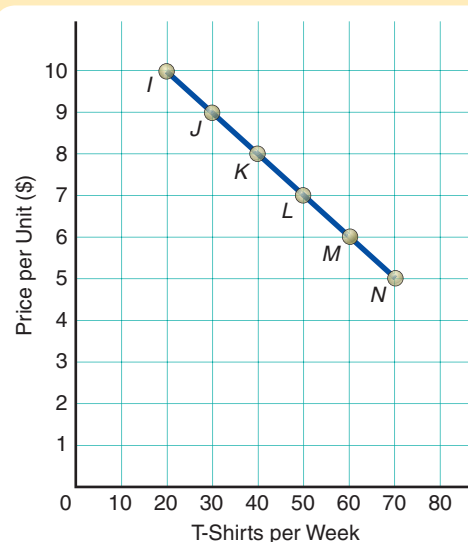
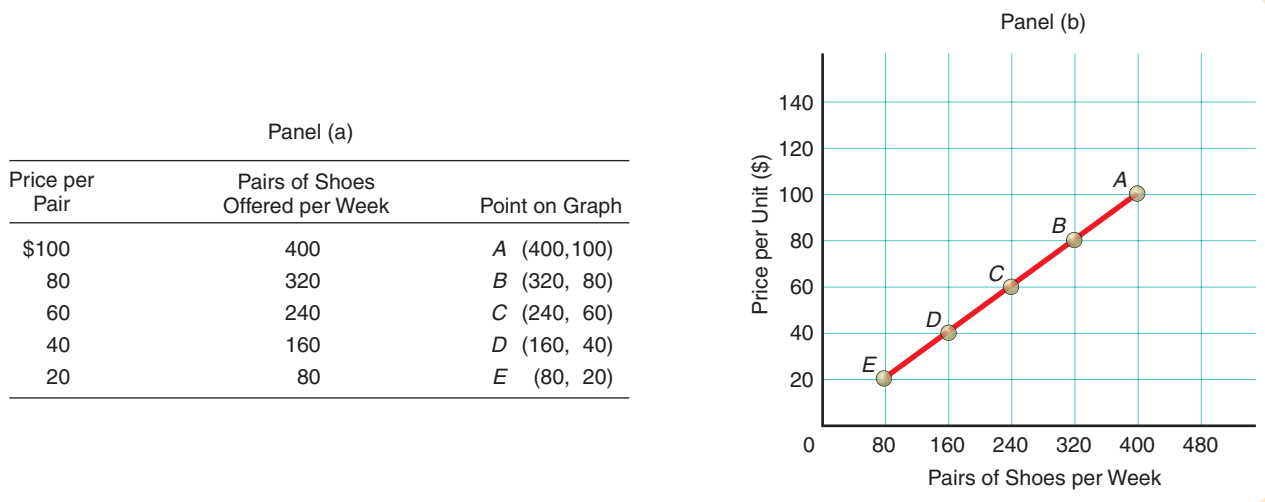


FIGURE A-7

## A Positively Sloped Curve



## The Slope of a Line (A Linear Curve)

An important property of a curve represented on a graph is its *slope*. Consider Figure A-7 above, which represents the quantities of shoes per week that a seller is willing to offer at different prices. Note that in panel (a) of Figure A-7, as in Figure A-5, we have expressed the coordinates of the points in parentheses in paired-data form.

The **slope** of a line is defined as the change in the  $y$  values divided by the corresponding change in the  $x$  values as we move along the line. Let's move from point  $E$  to point  $D$  in panel (b) of Figure A-7. As we move, we note that the change in the  $y$  values, which is the change in price, is  $+20$ , because we have moved from a price of \$20 to a price of \$40 per pair. As we move from  $E$  to  $D$ , the change in the  $x$  values is  $+80$ ; the number of pairs of shoes willingly offered per week rises from 80 to 160 pairs. The slope, calculated as a change in the  $y$  values divided by the change in the  $x$  values, is therefore

$$\frac{20}{80} = \frac{1}{4}$$

It may be helpful for you to think of slope as a “rise” (movement in the vertical direction) over a “run” (movement in the horizontal direction). We show this abstractly in Figure A-8 on the following page. The slope is the amount of rise divided by the amount of run. In the example in Figure A-8, and of course in Figure A-7 above, the amount of rise is positive and so is the amount of run. That's because it's a direct relationship. We show an inverse relationship in Figure A-9 on the next page. The slope is still equal to the rise divided by the run, but in this case the rise and the run have opposite signs because the curve slopes downward. That means that the slope is negative and that we are dealing with an inverse relationship.

Now let's calculate the slope for a different part of the curve in panel (b) of Figure A-7. We will find the slope as we move from point  $B$  to point  $A$ . Again, we note that the slope, or rise over run, from  $B$  to  $A$  equals

$$\frac{20}{80} = \frac{1}{4}$$

A specific property of a straight line is that its slope is the same between any two points. In other words, the slope is constant at all points on a straight line in a graph.

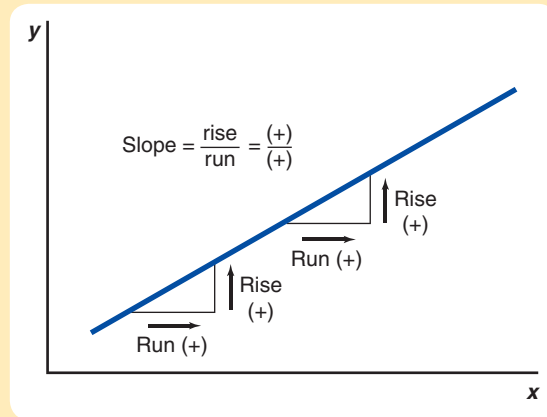
### Slope

The change in the  $y$  value divided by the corresponding change in the  $x$  value of a curve; the “incline” of the curve.



FIGURE A-8

## Figuring Positive Slope



We conclude that for our example in Figure A-7 on the previous page, the relationship between the price of a pair of shoes and the number of pairs of shoes willingly offered per week is *linear*, which simply means “in a straight line,” and our calculations indicate a constant slope. Moreover, we calculate a direct relationship between these two variables, which turns out to be an upward-sloping (from left to right) curve. Upward-sloping curves have positive slopes—in this case, the slope is  $+\frac{1}{4}$ .

We know that an inverse relationship between two variables is a downward-sloping curve—rise over run will be negative because the rise and run have opposite signs, as shown in Figure A-9 below. When we see a negative slope, we know that increases in one variable are associated with decreases in the other. Therefore, we say that downward-sloping curves have negative slopes. Can you verify that the slope of the graph representing the relationship between T-shirt prices and the quantity of T-shirts purchased per week in Figure A-6 is  $-\frac{1}{10}$ ?

## Slopes of Nonlinear Curves

The graph presented in Figure A-10 on the following page indicates a *nonlinear* relationship between two variables, total profits and output per unit of time. Inspection of this graph indicates that, at first, increases in output lead to increases in total profits; that is, total profits rise as output increases. But beyond some output level, further increases in output cause decreases in total profits.

FIGURE A-9

## Figuring Negative Slope

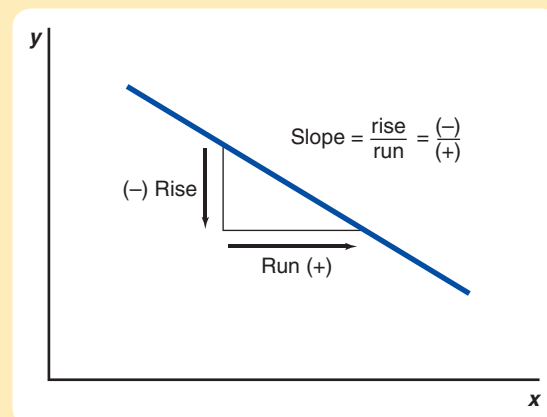
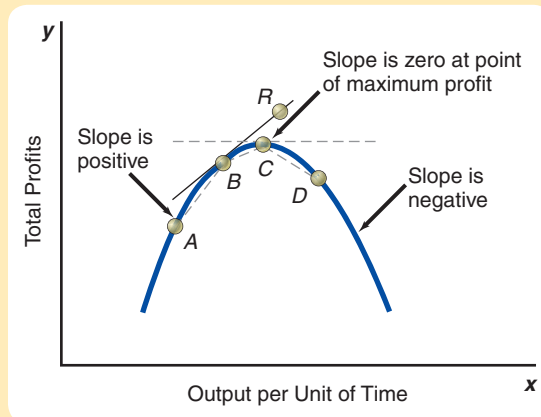


FIGURE A-10

## The Slope of a Nonlinear Curve



Can you see how this curve rises at first, reaches a peak at point  $C$ , and then falls? This curve relating total profits to output levels appears mountain-shaped.

Considering that this curve is nonlinear (it is obviously not a straight line), should we expect a constant slope when we compute changes in  $y$  divided by corresponding changes in  $x$  in moving from one point to another? A quick inspection, even without specific numbers, should lead us to conclude that the slopes of lines joining different points in this curve, such as between  $A$  and  $B$ ,  $B$  and  $C$ , or  $C$  and  $D$ , will *not* be the same. The curve slopes upward (in a positive direction) for some values and downward (in a negative direction) for other values. In fact, the slope of the line between any two points on this curve will be different from the slope of the line between any two other points. Each slope will be different as we move along the curve.

Instead of using a line between two points to discuss slope, mathematicians and economists prefer to discuss the slope *at a particular point*. The slope at a point on the curve, such as point  $B$  in the graph in Figure A-10 above, is the slope of a line tangent to that point. A tangent line is a straight line that touches a curve at only one point. For example, it might be helpful to think of the tangent at  $B$  as the straight line that just “kisses” the curve at point  $B$ .

To calculate the slope of a tangent line, you need to have some additional information besides the two values of the point of tangency. For example, in Figure A-10, if we knew that the point  $R$  also lay on the tangent line and we knew the two values of that point, we could calculate the slope of the tangent line. We could calculate rise over run between points  $B$  and  $R$ , and the result would be the slope of the line tangent to the one point  $B$  on the curve.

## MyEconLab

Here is what you should know after reading this appendix. MyEconLab will help you identify what you know, and where to go when you need to practice.

### WHAT YOU SHOULD KNOW

**Direct and Inverse Relationships** In a direct relationship, a dependent variable changes in the same direction as the change in the independent variable. In an inverse relationship, the dependent variable changes in the opposite direction of the change in the independent variable.

independent variable  
dependent variable  
direct relationship  
inverse relationship

- [MyEconLab](#) Study Plan 1.7

**Constructing a Graph** When we draw a graph showing the relationship between two economic variables, we are holding all other things constant (the Latin term for which is *ceteris paribus*).

number line  
y axis  
x axis  
origin

- [MyEconLab](#) Study Plan 1.8

**Graphing Numbers** We obtain a set of coordinates by putting vertical and horizontal number lines together. The vertical line is called the  $y$  axis; the horizontal line, the  $x$  axis.

- [MyEconLab](#) Study Plan 1.9

**The Slope of a Linear Curve** The slope of any linear (straight-line) curve is the change in the  $y$  values divided by the corresponding change in the  $x$  values as we move along the line. Otherwise stated, the slope is calculated as the amount of rise over the amount of run, where rise is movement in the vertical direction and run is movement in the horizontal direction.

slope  
**Key Figures**  
Figure A-8  
Figure A-9

- [MyEconLab](#) Study Plan 1.10
- Animated Figures A-8, A-9

**The Slope of a Nonlinear Curve** The slope of a nonlinear curve changes; it is positive when the curve is rising and negative when the curve is falling. At a maximum or minimum point, the slope of the nonlinear curve is zero.

**Key Figure**  
Figure A-10

- [MyEconLab](#) Study Plan 1.10
- Animated Figure A-10

Log in to [MyEconLab](#), take an appendix test, and get a personalized Study Plan that tells you which concepts you understand and which ones you need to review. From there, [MyEconLab](#) will give you further practice, tutorials, animations, videos, and guided solutions. For more information, visit [www.myeconlab.com](http://www.myeconlab.com)

# PROBLEMS

All problems are assignable in MyEconLab. Answers to odd-numbered problems appear at the end of the chapter.

- A-1.** Explain which is the independent variable and which is the dependent variable for each of the following examples.
- Once you determine the price of a notebook at the college bookstore, you will decide how many notebooks to buy.
  - You will decide how many credit hours to register for this semester once the university tells you how many work-study hours you will be assigned.
  - You anticipate earning a higher grade on your next economics exam because you studied more hours in the weeks preceding the exam.
- A-2.** For each of the following items, state whether a direct or an inverse relationship is likely to exist.
- The number of hours you study for an exam and your exam score
  - The price of pizza and the quantity purchased
  - The number of games the university basketball team won last year and the number of season tickets sold this year
- A-3.** Review Figure A-4, and then state whether each of the following paired observations is on, above, or below the  $x$  axis and on, to the left of, or to the right of the  $y$  axis.
- $(-10, 4)$
  - $(20, -2)$

c.  $(10, 0)$

- A-4.** State whether each of the following functions specifies a direct or an inverse relationship.

- $y = 5x$
- $y = 10 - 2x$
- $y = 3 + x$
- $y = -3x$

- A-5.** Given the function  $y = 5x$ , complete the following schedule and plot the curve.

$y$	$x$
	-4
	-2
	0
	2
	4

- A-6.** Given the function  $y = 8 - 2x$ , complete the following schedule and plot the curve.

$y$	$x$
	-4
	-2
	0
	2
	4

- A-7.** Calculate the slope of the function you graphed in Problem A-5.
- A-8.** Calculate the slope of the function you graphed in Problem A-6.

# Answers to Odd-Numbered Problems

1. Economics is the study of how individuals allocate limited resources to satisfy unlimited wants.
  - a. Among the factors that a rational, self-interested student will take into account are her income, the price of the textbook, her anticipation of how much she is likely to study the textbook, and how much studying the book is likely to affect her grade.
  - b. A rational, self-interested government official will, for example, recognize that higher taxes will raise more funds for mass transit while making more voters, who have limited resources, willing to elect other officials.
  - c. A municipality's rational, self-interested government will, for instance, take into account that higher hotel taxes will produce more funds if as many visitors continue staying at hotels, but that the higher taxes will also discourage some visitors from spending nights at hotels.
3. Because wants are unlimited, the phrase applies to very high-income households as well as low- and middle-income households. Consider, for instance, a household with a low income and unlimited wants at the beginning of the year. The household's wants will still remain unlimited if it becomes a high-income household later in the year.
5. Sally is displaying rational behavior if all of these activities are in her self-interest. For example, Sally likely derives intrinsic benefit from volunteer and extracurricular activities and may believe that these activities, along with good grades, improve her prospects of finding a job after she completes her studies. Hence, these activities are in her self-interest even though they reduce some available study time.
7. The rationality assumption states that people do not intentionally make choices that leave them worse off. The bounded rationality hypothesis suggests that people are *almost*, but not completely, rational.
9. Suppose that a person faces a change in the environment, and the person adjusts to this change as predicted by the rationality assumption. If the new

environment becomes predictable, then the individual who actually behaves as predicted by the traditional rationality assumption may settle into behavior that *appears* to involve repetitive applications of a rule of thumb.

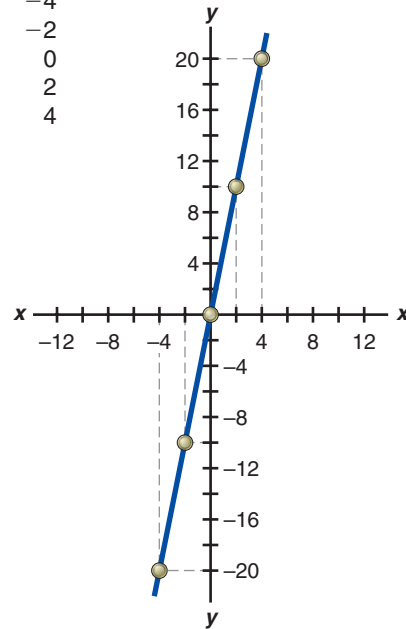
11.
  - a. Rationality assumption
  - b. Bounded rationality
  - c. Bounded rationality
13.
  - a. The model using prices from the Iowa Electronic Market is more firmly based on the rationality assumption, because people who trade assets on this exchange that are based on poor forecasts actually experience losses. This gives them a strong incentive to make the best possible forecasts. Unpaid respondents to opinion polls have less incentive to give truthful answers about whether and how they will vote.
  - b. An economist would develop a means of evaluating whether prices in the Iowa Electronic Market or results of opinion polls did a better job of matching actual electoral outcomes.
15.
  - a. Positive
  - b. Normative
  - c. Normative
  - d. Positive

## APPENDIX

- A-1.
  - a. Independent: price of a notebook; Dependent: quantity of notebooks
  - b. Independent: work-study hours; Dependent: credit hours
  - c. Independent: hours of study; Dependent: economics grade
- A-3.
  - a. Above  $x$  axis; to left of  $y$  axis
  - b. Below  $x$  axis, to right of  $y$  axis
  - c. On  $x$  axis; to right of  $y$  axis

A-5.

$y$	$x$
-20	-4
-10	-2
0	0
10	2
20	4



A-7. Each one-unit increase in  $x$  yields a 5-unit increase in  $y$ , so the slope given by the change in  $y$  corresponding to the change in  $x$  is equal to 5.

## ANSWERS TO QUICK QUIZZES

**Quick Quiz 1:** (i) wants . . . unlimited;  
(ii) Microeconomics . . . macroeconomics;  
(iii) centralized command and control . . . price system;  
(iv) rationality

**Quick Quiz 2:** (i) model . . . theory . . . model;  
(ii) *ceteris paribus*; (iii) Behavioral . . . bounded rationality;  
(iv) Positive . . . Normative





# Scarcity and the World of Trade-Offs



## Scarcity and the World of Trade-Offs

**T**he airliner in which you have been flying will land about an hour earlier than indicated by your formal travel itinerary. As the plane taxis to the gate, you contemplate how to use that extra hour. You might eat a more leisurely dinner at a nicer restaurant, grab an extra hour of sleep, or engage in additional income-generating work. Now you find out the bad news: No empty gates are available for your plane, and you will have to wait at least one hour to exit the plane. Nonetheless, the airline can now report your flight as “on time” because it touched down on the ground earlier than officially scheduled. The result is that you must remain on the plane for the hour you thought would be available for another, most-valued use off the plane. Thus, you will have to give up the alternative use of that hour after all. As you will learn in this chapter, you have incurred an *opportunity cost*.

### LEARNING OBJECTIVES

**After reading this chapter, you should be able to:**

- ▶ Evaluate whether even affluent people face the problem of scarcity
- ▶ Understand why economics considers individuals’ “wants” but not their “needs”
- ▶ Explain why the scarcity problem induces individuals to consider opportunity costs
- ▶ Discuss why obtaining increasing increments of any particular good typically entails giving up more and more units of other goods
- ▶ Explain why the economy faces a trade-off between consumption goods and capital goods
- ▶ Distinguish between absolute and comparative advantage

**MyEconLab** helps you master each objective and study more efficiently. See end of chapter for details.



### DID YOU KNOW THAT...

the U.S. Department of Commerce recently published a report concluding that each year, U.S. consumers spend about \$1.2 trillion, or more than 11 percent of total consumer expenditures, on “non-essential items”? Included among these items were candy, gambling, jewelry, liquor, and pleasure boats. During the weeks that followed, media commentators filled newspaper pages, TV airtime, and the blogosphere with laments about U.S. residents making “poor economic decisions” by paying prices that are “too high” to buy goods and services that “they don’t really need.”

You will discover in this chapter that economists do not rely on the particularly subjective concept of “needs” to explain people’s decisions. What influences individuals’ economic choices are their *wants*, which are all of the items that people would purchase if they had unlimited income. In reality, of course, people’s incomes *are* limited. Irrespective of normative judgments by U.S. government officials to classify some items as “non-essential,” *all* of the items among which consumers allocate their limited incomes are *scarce* goods available only at prices greater than zero.

## Scarcity

Whenever individuals or communities cannot obtain everything they desire simultaneously, they must make choices. Choices occur because of *scarcity*. **Scarcity** is the most basic concept in all of economics. Scarcity means that we do not ever have enough of everything, including time, to satisfy our *every* desire. Scarcity exists because human wants always exceed what can be produced with the limited resources and time that nature makes available.

### What Scarcity Is Not

Scarcity is not a shortage. After a hurricane hits and cuts off supplies to a community, TV newscasts often show people standing in line to get minimum amounts of cooking fuel and food. A news commentator might say that the line is caused by the “scarcity” of these products. But cooking fuel and food are always scarce—we cannot obtain all that we want at a zero price. Therefore, do not confuse the concept of scarcity, which is general and all-encompassing, with the concept of shortages as evidenced by people waiting in line to obtain a particular product.

Scarcity is not the same thing as poverty. Scarcity occurs among the poor and among the rich. Even the richest person on earth faces scarcity. For instance, even the world’s richest person has only limited time available. Low income levels do not create more scarcity. High income levels do not create less scarcity.

Scarcity is a fact of life, like gravity. And just as physicists did not invent gravity, economists did not invent scarcity—it existed well before the first economist ever lived. It has existed at all times in the past and will exist at all times in the future.

### Scarcity and Resources

Scarcity exists because resources are insufficient to satisfy our every desire. Resources are the inputs used in the production of the things that we want. **Production** can be defined as virtually any activity that results in the conversion of resources into products that can be used in consumption. Production includes delivering items from one part of the country to another. It includes taking ice from an ice tray to put it in your soft-drink glass. The resources used in production are called *factors of production*, and some economists use the terms *resources* and *factors of production* interchangeably. The total quantity of all resources that an economy has at any one time determines what that economy can produce.

Factors of production can be classified in many ways. Here is one such classification:

1. **Land.** **Land** encompasses all the nonhuman gifts of nature, including timber, water, fish, minerals, and the original fertility of land. It is often called the *natural resource*.
2. **Labor.** **Labor** is the *human resource*, which includes productive contributions made by individuals who work, such as Web page designers, iPad applications creators, and professional football players.

#### Scarcity

A situation in which the ingredients for producing the things that people desire are insufficient to satisfy all wants at a zero price.

#### Production

Any activity that results in the conversion of resources into products that can be used in consumption.

#### Land

The natural resources that are available from nature. Land as a resource includes location, original fertility and mineral deposits, topography, climate, water, and vegetation.

#### Labor

Productive contributions of humans who work.

How has Japan's energy policy reduced the productive contributions of many individuals who provide labor?

## INTERNATIONAL POLICY EXAMPLE

### A Lower Productive Contribution of Sweltering Japanese Labor

During the past few years, the Japanese government has established rules aimed at reducing the nation's emissions of carbon dioxide (CO<sub>2</sub>) by nearly 3 million tons each summer. To attain this goal, Japan's government has effectively declared war on air conditioning. The government has mandated that thermostats in all government offices be set no lower than 82 degrees during the months spanning June to September. Private Japanese businesses have followed suit with a "Cool Biz" program establishing 82 degrees as the "new office norm" for indoor temperatures.

Of course, 82 degrees is above the temperature at which people in enclosed spaces are most effective at producing goods and services. Consequently, the productive contribution of Japanese labor now declines every summer.

### FOR CRITICAL THINKING

*What do you suppose happened to the productive contribution of labor when Japan's government temporarily raised the summer target office temperature to 86 degrees?*

#### Physical capital

All manufactured resources, including buildings, equipment, machines, and improvements to land that are used for production.

#### Human capital

The accumulated training and education of workers.

#### Entrepreneurship

The component of human resources that performs the functions of raising capital; organizing, managing, and assembling other factors of production; making basic business policy decisions; and taking risks.

3. *Physical capital.* **Physical capital** consists of the factories and equipment used in production. It also includes improvements to natural resources, such as irrigation ditches.

4. *Human capital.* **Human capital** is the economic characterization of the education and training of workers. How much the nation produces depends not only on how many hours people work but also on how productive they are, and that in turn depends in part on education and training. To become more educated, individuals have to devote time and resources, just as a business has to devote resources if it wants to increase its physical capital. Whenever a worker's skills increase, human capital has been improved.

5. *Entrepreneurship.* **Entrepreneurship** (actually a subdivision of labor) is the component of human resources that performs the functions of organizing, managing, and assembling the other factors of production to create and operate business ventures. Entrepreneurship also encompasses taking risks that involve the possibility of losing large sums of wealth. It includes new methods of engaging in common activities and generally experimenting with any type of new thinking that could lead to making more income. Without entrepreneurship, hardly any business organizations could continue to operate.

## Goods versus Economic Goods

#### Goods

All things from which individuals derive satisfaction or happiness.

#### Economic goods

Goods that are scarce, for which the quantity demanded exceeds the quantity supplied at a zero price.

#### Services

Mental or physical labor or assistance purchased by consumers. Examples are the assistance of physicians, lawyers, dentists, repair personnel, housecleaners, educators, retailers, and wholesalers; items purchased or used by consumers that do not have physical characteristics.

**Goods** are defined as all things from which individuals derive satisfaction or happiness. Goods therefore include air to breathe and the beauty of a sunset as well as food, cars, and iPhones.

**Economic goods** are a subset of all goods—they are scarce goods, about which we must constantly make decisions regarding their best use. By definition, the desired quantity of an economic good exceeds the amount that is available at a zero price. Almost every example we use in economics concerns economic goods—cars, Blu-ray disc players, computers, socks, baseball bats, and corn. Weeds are a good example of *bads*—goods for which the desired quantity is much *less* than what nature provides at a zero price.

Sometimes you will see references to "goods and services." **Services** are tasks that are performed by individuals, often for someone else, such as laundry, Internet access, hospital care, restaurant meal preparation, car polishing, psychological counseling, and teaching. One way of looking at services is to think of them as *intangible goods*.

## Wants and Needs

Wants are not the same as needs. Indeed, from the economist's point of view, the term *needs* is objectively undefinable. When someone says, "I need some new clothes," there is no way to know whether that person is stating a vague wish, a want, or a lifesaving requirement. If the individual making the statement were dying of exposure in a northern country during the winter, we might conclude that indeed the person does need clothes—perhaps not new ones, but at least some articles of warm clothing. Typically, however, the term *need* is used very casually in conversation. What people mean, usually, is that they desire something that they do not currently have.

Humans have unlimited wants. Just imagine that every single material want that you might have was satisfied. You could have all of the clothes, cars, houses, downloadable movies, yachts, and other items that you want. Does that mean that nothing else could add to your total level of happiness? Undoubtedly, you might continue to think of new goods and services that you could obtain, particularly as they came to market. You would also still be lacking in fulfilling all of your wants for compassion, friendship, love, affection, prestige, musical abilities, sports abilities, and the like.

In reality, every individual has competing wants but cannot satisfy all of them, given limited resources. This is the reality of scarcity. Each person must therefore make choices. Whenever a choice is made to produce or buy something, something else that is also desired is not produced or not purchased. In other words, in a world of scarcity, every want that ends up being satisfied causes one or more other wants to remain unsatisfied or to be forfeited.

### QUICK QUIZ 1

Answers are given at the end of the chapter. Review concepts from this section in [MyEconLab](#).

\_\_\_\_\_ is the situation in which human wants always exceed what can be produced with the limited resources and time that nature makes available.

We use scarce resources, such as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ capital, and \_\_\_\_\_, to produce economic goods—goods that are desired but are not directly obtainable from nature to the extent demanded or desired at a zero price.

\_\_\_\_\_ are unlimited. They include all material desires and all nonmaterial desires, such as love, affection, power, and prestige.

The concept of \_\_\_\_\_ is difficult to define objectively for every person. Consequently, we simply consider every person's wants to be unlimited. In a world of **scarcity**, satisfaction of one want necessarily means nonsatisfaction of one or more other wants.

## Scarcity, Choice, and Opportunity Cost

The natural fact of scarcity implies that we must make choices. One of the most important results of this fact is that every choice made means that some opportunity must be sacrificed. Every choice involves giving up an opportunity to produce or consume something else.

### Valuing Forgone Alternatives

Consider a practical example. Every choice you make to study economics for one more hour requires that you give up the opportunity to choose to engage in any one of the following activities: study more of another subject, listen to music, sleep, browse at a local store, read a novel, or work out at the gym. The most highly valued of these opportunities is forgone if you choose to study economics an additional hour.

Because there were so many alternatives from which to choose, how could you determine the value of what you gave up to engage in that extra hour of studying economics? First of all, no one else can tell you the answer because only *you* can put a value on the alternatives forgone. Only you know the value of another hour of sleep or of an hour looking



for the latest digital music downloads—whatever one activity *you* would have chosen if you had not opted to study economics for that hour. That means that only you can determine the highest-valued, next-best alternative that you had to sacrifice in order to study economics one more hour. Only you can determine the value of the next-best alternative.

## Opportunity Cost

The value of the next-best alternative is called **opportunity cost**. The opportunity cost of any action is the value of what is given up—the next-highest-ranked alternative—because a choice was made. What is important is the choice that you would have made if you hadn't studied one more hour. Your opportunity cost is the *next-highest-ranked* alternative, not *all* alternatives.

### Opportunity cost

The highest-valued, next-best alternative that must be sacrificed to obtain something or to satisfy a want.

## YOU ARE THERE

To consider why perceived opportunity costs induce residents of South Korea to work more hours each year than workers in many other countries and, hence, take fewer vacation days, read **The Opportunity Cost of Vacation Time in South Korea**.

*In economics, cost is always a forgone opportunity.*

One way to think about opportunity cost is to understand that when you choose to do something, you lose something else. What you lose is being able to engage in your next-highest-valued alternative. The cost of your chosen alternative is what you lose, which is by definition your next-highest-valued alternative. This is your opportunity cost.

What has a decrease in the daily amount of time spent working by a typical U.S. resident revealed about the opportunity cost of approximately a quarter hour of time?

## EXAMPLE

### The Opportunity Cost of 17 Minutes of Labor in the United States

In the aftermath of the significant economic downturn between 2007 and 2009, the average U.S. resident aged 15 years or older found herself working about 17 fewer minutes per day. The U.S. Labor Department has determined that there were no changes in the amounts of time that the typical resident devoted to engaging in pursuits such as education, volunteering, exercise, or religious activities. Instead, the amount of time per day that the average U.S. resident spent watching TV rose by nearly 12 minutes, and the amount of time she spent sleeping increased by more than

5 minutes. Hence, the implied opportunity cost of the 17 minutes per day that previously had been spent working is the value of passive leisure time that otherwise would have been devoted to TV viewing and sleeping.

### FOR CRITICAL THINKING

*For someone who could otherwise be working but decides to devote an extra hour per day to obtaining education, what is the opportunity cost of that hour of learning?*

## The World of Trade-Offs

Whenever you engage in any activity using any resource, even time, you are *trading off* the use of that resource for one or more alternative uses. The extent of the trade-off is represented by the opportunity cost. The opportunity cost of studying economics has already been mentioned—it is the value of the next-best alternative. When you think of *any* alternative, you are thinking of trade-offs.

Let's consider a hypothetical example of a trade-off between the results of spending time studying economics and mathematics. For the sake of this argument, we will assume that additional time studying either economics or mathematics will lead to a higher grade in the subject to which additional study time is allocated. One of the best ways to examine this trade-off is with a graph.

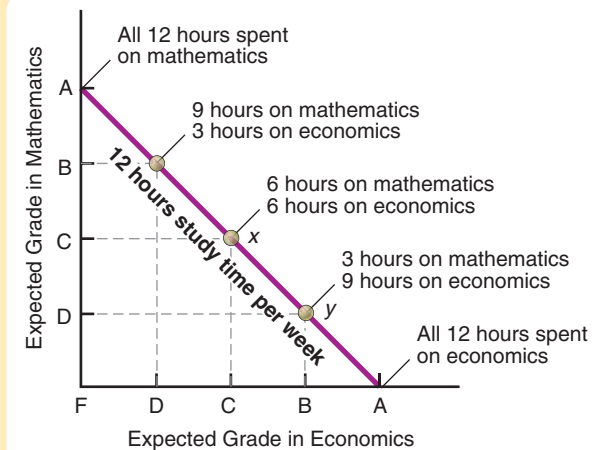
## Graphical Analysis

In Figure 1 on the following page, the expected grade in mathematics is measured on the vertical axis of the graph, and the expected grade in economics is measured on the horizontal axis. We simplify the world and assume that you have a maximum of

FIGURE 1

**Production Possibilities Curve for Grades in Mathematics and Economics (Trade-Offs)**

We assume that only 12 hours can be spent per week on studying. If the student is at point *x*, equal time (6 hours a week) is spent on both courses, and equal grades of C will be received. If a higher grade in economics is desired, the student may go to point *y*, thereby receiving a B in economics but a D in mathematics. At point *y*, 3 hours are spent on mathematics and 9 hours on economics.



12 hours per week to spend studying these two subjects and that if you spend all 12 hours on economics, you will get an A in the course. You will, however, fail mathematics. Conversely, if you spend all of your 12 hours studying mathematics, you will get an A in that subject, but you will flunk economics. Here the trade-off is a special case: one to one. A one-to-one trade-off means that the opportunity cost of receiving one grade higher in economics (for example, improving from a C to a B) is one grade lower in mathematics (falling from a C to a D).

### The Production Possibilities Curve (PPC)

The graph in Figure 1 above illustrates the relationship between the possible results that can be produced in each of two activities, depending on how much time you choose to devote to each activity. This graph shows a representation of a **production possibilities curve (PPC)**.

Consider that you are producing a grade in economics when you study economics and a grade in mathematics when you study mathematics. Then the line that goes from A on one axis to A on the other axis therefore becomes a production possibilities curve. It is defined as the maximum quantity of one good or service that can be produced, given that a specific quantity of another is produced. It is a curve that shows the possibilities available for increasing the output of one good or service by reducing the amount of another. In the example in Figure 1, your time for studying was limited to 12 hours per week. The two possible outputs were your grade in mathematics and your grade in economics. The particular production possibilities curve presented in Figure 1 is a graphical representation of the opportunity cost of studying one more hour in one subject. It is a *straight-line production possibilities curve*, which is a special case. (The more general case will be discussed next.)

If you decide to be at point *x* in Figure 1, you will devote 6 hours of study time to mathematics and 6 hours to economics. The expected grade in each course will be a C. If you are more interested in getting a B in economics, you will go to point *y* on the production possibilities curve, spending only 3 hours on mathematics but 9 hours on economics. Your expected grade in mathematics will then drop from a C to a D.

Note that these trade-offs between expected grades in mathematics and economics are the result of *holding constant* total study time as well as all other factors that might influence your ability to learn, such as computerized study aids. Quite clearly, if you were able to spend more total time studying, it would be possible to have higher grades in both economics and mathematics. In that case, however, we would no longer be on the specific production possibilities curve illustrated in Figure 1. We would have to draw a new curve, farther to the right, to show the greater total study time and a different set of possible trade-offs.

#### Production possibilities curve (PPC)

A curve representing all possible combinations of maximum outputs that could be produced, assuming a fixed amount of productive resources of a given quality.

**QUICK QUIZ 2**

Answers are given at the end of the chapter. Review concepts from this section in MyEconLab.

**Scarcity** requires us to choose. Whenever we choose, we lose the \_\_\_\_\_-\_\_\_\_\_valued alternative.

Cost is always a forgone \_\_\_\_\_.

Another way to look at **opportunity cost** is the trade-off that occurs when one activity is undertaken rather than the \_\_\_\_\_-\_\_\_\_\_ alternative activity.

A \_\_\_\_\_ curve graphically shows the trade-off that occurs when more of one output is obtained at the sacrifice of another. This curve is a graphical representation of, among other things, opportunity cost.

## The Choices a Nation's Economy Faces

The straight-line production possibilities curve presented in Figure 1 on the previous page can be generalized to demonstrate the related concepts of scarcity, choice, and trade-offs that our entire nation faces. As you will see, the production possibilities curve is a simple but powerful economic model because it can demonstrate these related concepts.

### A Two-Good Example

The example we will use is the choice between the production of smartphones and tablet devices. We assume for the moment that these are the only two goods that can be produced in the nation.

Panel (a) of Figure 2 below gives the various combinations of smartphones and tablet devices, or tablets, that are possible. If all resources are devoted to smartphone production, 50 million per year can be produced. If all resources are devoted to production of tablets, 60 million per year can be produced. In between are various possible combinations.

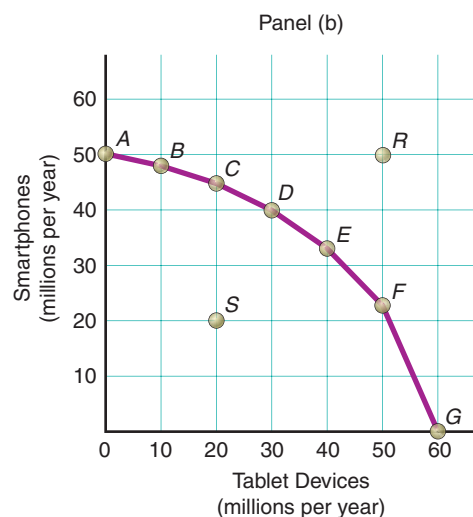
**FIGURE 2**

#### The Trade-Off between Smartphones and Tablet Devices

The production of smartphones and tablet devices is measured in millions of units per year. The various combinations are given in panel (a) and plotted in panel (b). Connecting the points A–G with a relatively smooth line gives society's production possibilities curve for smartphones and

tablets. Point *R* lies outside the production possibilities curve and is therefore unattainable at the point in time for which the graph is drawn. Point *S* lies inside the production possibilities curve and therefore entails unemployed or underemployed resources.

Panel (a)		
Combination	Smartphones (millions per year)	Tablets (millions per year)
A	50.0	0
B	48.0	10
C	45.0	20
D	40.0	30
E	33.0	40
F	22.5	50
G	0.0	60



## Production Trade-Offs

The nation's production combinations are plotted as points *A*, *B*, *C*, *D*, *E*, *F*, and *G* in panel (b) of Figure 2 on the previous page. If these points are connected with a smooth curve, the nation's production possibilities curve (PPC) is shown, demonstrating the trade-off between the production of smartphones and tablets. These trade-offs occur *on* the PPC.

Notice the major difference in the shape of the production possibilities curves in Figure 1 and Figure 2. In Figure 1, there is a constant trade-off between grades in economics and in mathematics. In Figure 2, the trade-off between production of smartphones and tablet production is not constant, and therefore the PPC is a *bowed* curve. To understand why the production possibilities curve is typically bowed outward, you must understand the assumptions underlying the PPC.

How has a trade-off between roads and factories contributed to traffic problems in China?

Go to [www.econtoday.com/chap02](http://www.econtoday.com/chap02) for one perspective, offered by the National Center for Policy Analysis, on whether society's production decisions should be publicly or privately coordinated.

## INTERNATIONAL EXAMPLE

### In China, More Factories Mean Fewer Roads—and More Traffic

Recently, a 62-mile section of highway between the Chinese cities of Beijing and Zhangjiakou became ensnarled in a massive traffic jam that took public safety officers nearly two weeks to break up. Traffic experts agree that this stretch of highway, which covers less than 0.7 square mile of area stretched thinly along the 62 miles, is often overburdened with much more traffic than it was designed to handle.

Most observers agree that this state of affairs has arisen because the people of China have allocated resources away from road construction in favor of building new manufacturing facilities. These facilities,

though, churn out more products to be shipped by trucks that clog roads. Thus, in China the choice to build more factories to produce goods has entailed an opportunity cost: fewer roads for transporting those goods.

### FOR CRITICAL THINKING

*What is an example of an opportunity cost that a trucker may have incurred by spending a full day traversing the traffic jam between Beijing and Zhangjiakou?*

## Assumptions Underlying the Production Possibilities Curve

When we draw the curve that is shown in Figure 2, we make the following assumptions:

1. Resources are fully employed.
2. Production takes place over a specific time period—for example, one year.
3. The resource inputs, in both quantity and quality, used to produce smartphones or tablets are fixed over this time period.
4. Technology does not change over this time period.

**Technology** is defined as the total pool of applied knowledge concerning how goods and services can be produced by managers, workers, engineers, scientists, and artisans, using land, physical and human capital, and entrepreneurship. You can think of technology as the formula or recipe used to combine factors of production. (When better formulas are developed, more production can be obtained from the same amount of resources.) The level of technology sets the limit on the amount and types of goods and services that we can derive from any given amount of resources. The production possibilities curve is drawn under the assumption that we use the best technology that we currently have available and that this technology doesn't change over the time period under study.

### Technology

The total pool of applied knowledge concerning how goods and services can be produced.

**WHAT IF...**

**the U.S. government tries to increase total production of all goods by diverting resources to the manufacture of “green” products?**

Some government officials suggest that shifting existing resources away from producing other goods and services to the manufacture of “green” products believed to be safer for the environment will lead to greater overall production of all items. In fact, with a fixed set of available resources and an unchanged technology, shifting

resources to making more green products necessarily shifts those resources away from producing other items. As a consequence, production of other goods and services must decrease when the government diverts resources to the manufacture of “green” products.

### Being off the Production Possibilities Curve

Look again at panel (b) of Figure 2. Point *R* lies *outside* the production possibilities curve and is *impossible* to achieve during the time period assumed. By definition, the PPC indicates the *maximum* quantity of one good, given the quantity produced of the other good.

It is possible, however, to be at point *S* in Figure 2. That point lies beneath the PPC. If the nation is at point *S*, it means that its resources are not being fully utilized. This occurs, for example, during periods of relatively high unemployment. Point *S* and all such points inside the PPC are always attainable but imply unemployed or underemployed resources.

### Efficiency

The production possibilities curve can be used to define the notion of efficiency. Whenever the economy is operating on the PPC, at points such as *A*, *B*, *C*, or *D*, we say that its production is efficient. Points such as *S* in Figure 2, which lie beneath the PPC, are said to represent production situations that are not efficient.

**Efficiency** can mean many things to many people. Even in economics, there are different types of efficiency. Here we are discussing *productive efficiency*. An economy is productively efficient whenever it is producing the maximum output with given technology and resources.

A simple commonsense definition of efficiency is getting the most out of what we have. Clearly, we are not getting the most out of what we have if we are at point *S* in panel (b) of Figure 2. We can move from point *S* to, say, point *C*, thereby increasing the total quantity of smartphones produced without any decrease in the total quantity of tablets produced. Alternatively, we can move from point *S* to point *E*, for example, and have both more smartphones and more tablets. Point *S* is called an **inefficient point**, which is defined as any point below the production possibilities curve.

### The Law of Increasing Additional Cost

In the example in Figure 1, the trade-off between a grade in mathematics and a grade in economics was one to one. The trade-off ratio was constant. That is, the production possibilities curve was a straight line. The curve in Figure 2 is a more general case. We have re-created the curve in Figure 2 as Figure 3 on the following page. Each combination, *A* through *G*, of smartphones and tablets is represented on the PPC. Starting with the production of zero tablets, the nation can produce 50 million smartphones with its available resources and technology.

**INCREASING ADDITIONAL COSTS** When we increase production of tablet devices from zero to 10 million per year, the nation has to give up in smartphones an amount shown by that first vertical arrow, *Aa*. From panel (a) of Figure 2, you can see that this is 2 million per year (50 million minus 48 million). Again, if we increase production of tablets by another 10 million units per year, we go from *B* to *C*. In order to do so, the nation has to give up the vertical distance *Bb*, or 3 million smartphones per year. By the time we go from 50 million to 60 million tablets, to obtain that 10 million increase, we have to forgo the vertical distance *Ff*, or 22.5 million smartphones. In other words, we see

#### Efficiency

The case in which a given level of inputs is used to produce the maximum output possible. Alternatively, the situation in which a given output is produced at minimum cost.

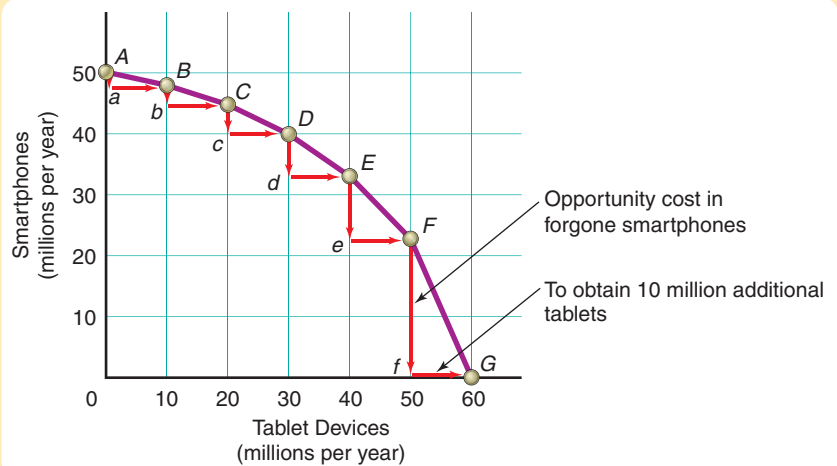
#### Inefficient point

Any point below the production possibilities curve, at which the use of resources is not generating the maximum possible output.

FIGURE 3

## The Law of Increasing Additional Cost

Consider equal increments of production of tablets, as measured on the horizontal axis. All of the horizontal arrows— $aB$ ,  $bC$ , and so on—are of equal length (10 million). In contrast, the length of each vertical arrow— $Aa$ ,  $Bb$ , and so on—increases as we move down the production possibilities curve. Hence, the opportunity cost of going from 50 million tablets per year to 60 million ( $Ff$ ) is much greater than going from zero units to 10 million ( $Aa$ ). The opportunity cost of each additional equal increase in production of tablets rises.



that the opportunity cost of the last 10 million tablets has increased to 22.5 million smartphones, compared to 2 million smartphones for the same increase in tablets when we started with none at all being produced.

What we are observing is called the **law of increasing additional cost**. When people take more resources and applies them to the production of any specific good, the opportunity cost increases for each additional unit produced.

**EXPLAINING THE LAW OF INCREASING ADDITIONAL COST** The reason that as a nation we face the law of increasing additional cost (shown as a production possibilities curve that is bowed outward) is that certain resources are better suited for producing some goods than they are for other goods. Generally, resources are not *perfectly* adaptable for alternative uses. When increasing the output of a particular good, producers must use less suitable resources than those already used in order to produce the additional output. Hence, the cost of producing the additional units increases.

With respect to our hypothetical example here, at first the computing specialists at smartphone firms would shift over to producing tablet devices. After a while, though, the workers who normally design and produce smartphones would be asked to help design and manufacture tablet components. Typically, they would be less effective at making tablets than the people who previously specialized in this task.

In general, *the more specialized the resources, the more bowed the production possibilities curve*. At the other extreme, if all resources are equally suitable for smartphone production or production of tablets, the curves in Figures 2 and 3 above would approach the straight line shown in our first example in Figure 1.

**Law of increasing additional cost**

The fact that the opportunity cost of additional units of a good generally increases as people attempt to produce more of that good. This accounts for the bowed-out shape of the production possibilities curve.

**QUICK QUIZ 3**

Answers are given at the end of the chapter. Review concepts from this section in [MyEconLab](#).

Trade-offs are represented graphically by a \_\_\_\_\_ curve showing the maximum quantity of one good or service that can be produced, given a specific quantity of another, from a given set of resources over a specified period of time—for example, one year.

A **production possibilities curve** is drawn holding the quantity and quality of all resources \_\_\_\_\_ over the time period under study.

Points \_\_\_\_\_ the **production possibilities curve** are unattainable. Points \_\_\_\_\_ are attainable but represent an inefficient use or underuse of available resources.

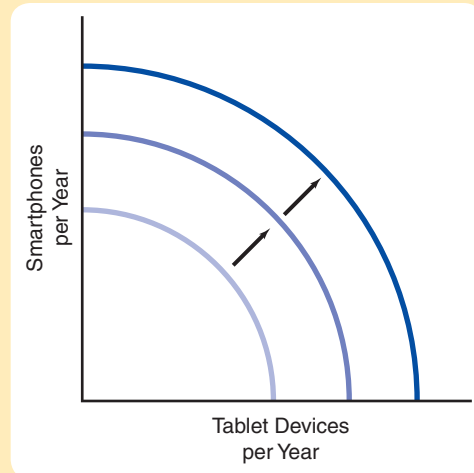
Because many resources are better suited for certain productive tasks than for others, the production possibilities curve is bowed \_\_\_\_\_, reflecting the **law of increasing additional cost**.



FIGURE 4

**Economic Growth Allows for More of Everything**

If the nation experiences economic growth, the production possibilities curve between smartphones and tablets will move out as shown. This output increase takes time, however, and it does not occur automatically. This means, therefore, that we can have more of both smartphones and tablets only after a period of time during which we have experienced economic growth.



## Economic Growth and the Production Possibilities Curve

At any particular point in time, a society cannot be outside the production possibilities curve. *Over time*, however, it is possible to have more of everything. This occurs through economic growth. (An important reason for economic growth, capital accumulation, is discussed next.) Figure 4 above shows the production possibilities curve for smartphones and tablet devices shifting outward. The two additional curves shown represent new choices open to an economy that has experienced economic growth. Such economic growth occurs for many reasons, including increases in the number of workers and productive investment in equipment.

Scarcity still exists, however, no matter how much economic growth there is. At any point in time, we will always be on some production possibilities curve. Thus, we will always face trade-offs. The more we have of one thing, the less we can have of others.

If economic growth occurs in the nation, the production possibilities curve between smartphones and tablets moves outward, as shown in Figure 4. This takes time and does not occur automatically. One reason it will occur involves the choice about how much to consume today.

## The Trade-Off between the Present and the Future

The production possibilities curve and economic growth can be combined to examine the trade-off between present **consumption** and future consumption. When we consume today, we are using up what we call consumption or consumer goods—food and clothes, for example.

### Consumption

The use of goods and services for personal satisfaction.

## Why We Make Capital Goods

Why would we be willing to use productive resources to make things—capital goods—that we cannot consume directly? The reason is that capital goods enable us to produce larger quantities of consumer goods or to produce them less expensively than we otherwise could. Before fish are “produced” for the market, equipment such as fishing boats, nets, and poles is produced first. Imagine how expensive it would be to obtain fish for market without using these capital goods. Catching fish with one’s hands is not an easy task. The cost per fish would be very high if capital goods weren’t used.

## Forgoing Current Consumption

Whenever we use productive resources to make capital goods, we are implicitly forgoing current consumption. We are waiting for some time in the future to consume the rewards that will be reaped from the use of capital goods. In effect, when we forgo current consumption to invest in capital goods, we are engaging in an economic activity that is forward-looking—we do not get instant utility or satisfaction from our activity.

## The Trade-Off between Consumption Goods and Capital Goods

To have more consumer goods in the future, we must accept fewer consumer goods today, because resources must be used in producing capital goods instead of consumer goods. In other words, an opportunity cost is involved. Every time we make a choice of more goods today, we incur an opportunity cost of fewer goods tomorrow, and every time we make a choice of more goods in the future, we incur an opportunity cost of fewer goods today. With the resources that we don't use to produce consumer goods for today, we invest in capital goods that will produce more consumer goods for us later. The trade-off is shown in Figure 5 below. On the left in panel (a), you can see this trade-off depicted as a production possibilities curve between capital goods and consumption goods.

Assume that we are willing to give up \$1 trillion worth of consumption today. We will be at point *A* in the left-hand diagram of panel (a). This will allow the economy to grow. We will have more future consumption because we invested in more capital goods today. In the right-hand diagram of panel (a), we see two consumer goods represented, food and entertainment. The production possibilities

**FIGURE 5**

### Capital Goods and Growth

In panel (a), people choose not to consume \$1 trillion, so they invest that amount in capital goods. As a result, more of all goods may be produced in the future, as shown in the right-hand diagram in panel (a). In panel (b), people choose even more capital goods (point *C*). The result is that the production possibilities curve (PPC) moves even more to the right on the right-hand diagram in panel (b).

