# *Economics Today 20th edition Miller Solutions Manual*

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# Chapter 1
## The Nature of Economics

### ■ Overview

This chapter introduces economics as a science. Economics is defined, and its subareas, macroeconomics and microeconomics, are introduced. The chapter also discusses the three fundamental questions faced by every nation of what to produce, how to produce, and for whom to produce. The chapter then presents the two types of economic systems, command and control and the price system, that are used to answer the three fundamental questions. Economic rationality and self-interest are discussed along with their implications for decision making and economic model building. The concept of behavioral economics is introduced. Economics as a science is closely associated with the development of models. To aid understanding, a significant section on the methodology of economics discusses model construction, the role of assumptions, and determining the usefulness of a model. Finally, the difference between positive and normative economics is presented. There is a discussion of why it is important to separate these two areas of analysis clearly.

### ■ Learning Objectives

After studying this chapter, students should be able to:

1.1 Define economics and discuss the difference between microeconomics and macroeconomics

1.2 Identify the three basic economic questions and the two opposing sets of answers

1.3 Evaluate the role that rational self-interest plays in economic analysis

1.4 Explain why economics is a science

1.5 Distinguish between positive and normative economics

### ■ Outline

**I. The Power of Economic Analysis:** The analytical framework of the course is *the economic way of thinking*. The economic way of thinking permits the student to reach informed conclusions about what is happening in the world.

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A. **Defining Economics:** The study of how people allocate their limited resources to satisfy their unlimited wants. The ultimate purpose of economics is to explain how people make choices.

B. **Microeconomics versus Macroeconomics:** Economics is divided into two types of analysis: microeconomics and macroeconomics.

1. **Microeconomics:** The part of economic analysis that studies decision making undertaken by individuals (or households) and by firms.
2. **Macroeconomics:** 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, the general price level, and national income.

II. **The Three Basic Economic Questions and Two Opposing Sets of Answers:** Every nation must address three fundamental questions that concern the problem of how an economic system allocates a society's scarce resources.

A. **The Three Basic Questions:** (1) *What and how much will be produced?* (2) *How will items be produced?* (3) *For whom will items be produced?*

B. **Two Opposing Sets of Answers**

1. **Centralized Command and Control:** A centralized command and control system, also called central planning, has a centralized authority that decides what items to produce and how many of each, determines how the scarce resources will be organized in the items' production, and identifies who will be able to obtain the items.
2. **The Price System:** A price system, also called a market system, answers the three basic questions using decentralized decision making. In a pure price system, individuals own all the scarce resources used in production. This means those choices about what and how many of each item to produce are made by private parties on their own initiative, as are the decisions about how to produce those items. Individuals and families choose how to allocate their incomes to obtain those items at prices established by privately organized mechanisms. Those prices signal the relative scarcity of different resources, which provides information about what and how many items to produce, how to each item should be produced, and who will choose to buy the items.
3. **Mixed Economic Systems:** Most economic systems of the world incorporate aspects of both centralized command and control and the decentralized price systems.

III. **The Economic Approach: Systematic Decisions:** Economists assume that individuals act as if they pursue self-motivated interests and respond predictably to perceived opportunities to obtain those interests.

A. **The Rationality Assumption:** The assumption that individuals will not intentionally make decisions that would leave them worse off.

B. **Responding to Incentives:** An incentive is the reward for engaging in a given activity. Much of human behavior can be explained in terms of how individuals respond to changing incentives over time. In general, before making decisions,

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individuals compare costs and benefits of their actions and choose those actions which result in higher benefits than costs.

C. **Defining Self-Interest:** The pursuit of goals that make the individual better off. In economic analysis, these goals are often those which can be measured in monetary terms, although the pursuit of other goals such as prestige, love, power, or others can be analyzed using this concept.

**IV. Economics as a Science:** Economics is a social science that utilizes the same types of methods used in biology, physics, and chemistry. Economic models, or theories, are simplified representations of the real world that are developed and used as aids in understanding, explaining, and predicting economic phenomena in the real world.

A. **Models and Realism:** A model should capture the essential relationships that are sufficient to analyze the specific problem or answer the specific question being asked. No economic model is complete in the sense of capturing every detail and relationship that exists in the real world.
A model is, by definition, an abstraction from reality. This does not mean that models are deficient simply because they are not perfectly realistic and use simplified assumptions. Every model in every science requires simplification compared to the real world but can still be useful if it explains the issue at hand.

B. **Assumptions:** Assumptions define the set of circumstances in which a model is most likely to be applicable. Every model, therefore, must be based on a set of assumptions.

1. **The *Ceteris Paribus* Assumption: All Other Things Being Equal:** The assumption that nothing changes except the factors being studied. It is used to isolate the effect of a change in one variable on another one by assuming that all other variables do not change.

C. **Deciding on the Usefulness of a Model:** A model is useful if it yields usable predictions supported by real-world observations. If a model makes a prediction and factual evidence supports the prediction, then the model is useful. Economics is an empirical science; that is, it relies on real-world data in evaluating the usefulness of a model.

D. **Models of Behavior, *Not* Thought Processes:** Economic models predict how people act and what they will do in life with their limited resources, not to the way they think. Economic models normally generalize people's behavior. Economists are interested in what people actually do (revealed preferences) rather than what they think they will do (declared preferences).

E. **Behavioral Economics and Bounded Rationality:** An approach to consumer behavior that emphasizes psychological limitations and complications that potentially interfere with rational decision making.

1. **Bounded Rationality:** The idea that people are nearly, but not fully, rational so that they cannot examine every choice available to them. Instead, they use simple rules of thumb to sort among the available alternatives.
2. **Rules of Thumb:** A behavioral implication of bounded rationality is that people will use *rules of thumb;* that is, simplified methods for making

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decisions. An important issue is that people who appear to use rules of thumb may behave *as if* they are fully rational.

3. **Behavioral Economics Goes Mainstream:** A number of economists are exploring ways in which psychological elements might improve analysis of decision making by individual consumers, firm owners and managers, and government officials.

**V. Positive versus Normative Economics:** Positive economics deals with what is. Positive economic statements are "if-then" statements and no subjective or moral judgements enter into the analysis. Normative economics deals with what ought to be. Normative economic statements involve value judgments and normally have the words "ought" or "should" in them. Because positive economics predicts consequences of actions, it can be used to predict the effects of various policies to determine if those policies aid in achieving some desired goal. Positive economics cannot provide criteria for choosing which outcomes or goals are preferable.

**A. Distinguishing between Positive and Normative Economics:** Positive economics is analysis that is strictly limited to making either purely descriptive statements or scientific predictions. Normative economics is analysis involving value judgments about economic policies, as it relates to whether outcomes are good or bad.

**B. A Warning: Recognize Normative Analysis:** Although it is easy to define positive economics, it is often difficult to identify unlabeled normative statements, even in a textbook.

## ■ Points to Emphasize

### THE DISCIPLINE OF ECONOMICS

Economics is the study of how people make choices to satisfy their wants. Wants have a special meaning in economics. Wants represent those things that people would buy if they had unlimited income. In economics, we note that income is in fact limited, and thus, people must make choices. These choices are made based on rational self-interest. This means that people make choices that, in their view, make them better off. People do not voluntarily make choices that they believe will make them worse off. This assumption of rational behavior underlies all economic decision making.

### ECONOMIC SYSTEMS AND THE ALLOCATION OF SCARCE RESOURCES

Because resources are scarce, every nation must answer the three fundamental questions of what and how much of each item to produce, how each item will be produced, and for whom items will be produced. Emphasize that there are not enough resources to produce as much of everything that the citizens of any nation would want. Because resources are scarce, decisions about which resources and how much of each resource will be used need to be made. Again, compared to wants, resources are limited. Scarcity also means in practice that everyone cannot have as much of everything that they would like to have. Thus, some mechanism must exist to determine which items get produced, how much of those items get produced, and which members of each nation will receive those items.

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## ECONOMIC MODELS

Economic models are simplified representations of the real world. Economic models frequently present problems for students because they are so abstract. The goal is for students to realize that only essential relationships are needed to deal with the problem at hand. A classic example of using an abstract theory is the decision of whether to take an umbrella when going outside. If a person misses the weather report, the person can look outside at the sky. If the sky is overcast or if dark clouds can be seen in the distance, then a prudent person will carry an umbrella. A person reasons that clouds are often associated with rain. If there are clouds of a certain type, then rain is likely but not certain. To actually know if rain will fall in a given place requires a complete knowledge of atmospheric conditions in a rather large area. Even the weather service does not have this kind of information. The simplest theory that can be used to accurately predict an outcome is the one that should be used.

## PREDICTION—THE TEST OF A THEORY

A model is useful only if it accurately predicts how things happen in the real world. It is not correct to fault a model because its assumptions are not realistic or because it is too abstract. Because economists cannot do controlled experiments the way chemists can, they must look at evidence to see if the model can accurately predict actions in the real world. Normally models are tested using statistical evidence and techniques, however a great deal of economic research consists of empirical testing of theories.

## THE INDIVIDUAL IN ECONOMIC ANALYSIS

The unit of analysis is the individual. It is often difficult for students to distinguish between the individual as an abstraction and a given individual in the real world. The difference between the two can be explained in the following way. The individual as an abstraction is a hypothetical typical individual, or as psychologists would say, a normal individual. This is a "person" whose behavior is that which is expected most of the time from most persons. Obviously, it is possible to find actual persons who are "abnormal" or who do not behave in the typical way. When we say that the individual is motivated by rational self-interest, this does not exclude the possibility that some persons may choose to not act in their own self-interest (e.g., someone sacrificing his or her life to save a child). It only says that in most of our affairs, we choose to do those things that we believe will benefit us in some way and we choose not to do those things that we believe will make us worse off. Economists have found that economic models work best when the individual is the unit of analysis because individuals making choices are at the basis of every decision.

## POSITIVE VERSUS NORMATIVE ECONOMICS

The text points out that normative economics can be identified by statements that use the word "should." Other words that provide an indicator of a normative statement instead of a positive statement are good, bad, best, desirable, undesirable, better, and worse. Examples of these are as follows:

1. An increase in extended unemployment benefits is good because the benefits reduce the hardship faced by the unemployed.
2. Increases in interest rates by the Federal Reserve are bad because higher interest rates hurt low-income borrowers.

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3. The best policy to get the economy out of a recession is to cut taxes.
4. High gasoline prices are undesirable.
5. It would be desirable to lower the prices of drugs to combat AIDS in poor countries.
6. The increase in prescription drug prices is undesirable because many senior citizens must choose between their drugs and food.
7. It is better to increase the progressive income tax than to increase a regressive sales tax.
8. Of the two methods of financing the war in Afghanistan, it is better to raise taxes on the American people rather than to borrow the money.

## ■ For Those Who Wish to Stress Theory

**UNREALISTIC ASSUMPTIONS OF ECONOMIC MODELS?**

One of the more frustrating aspects of economic analysis is what appears to be the unrealistic assumptions of many economic models. For example, in the realm of macroeconomics, the rational expectations hypothesis in its pure form talks about workers not being fooled by expected changes in the money supply by the Federal Reserve. It is true that most workers cannot tell you what the latest money supply growth rate figures are. They do not subscribe to the *Federal Reserve Bulletin* or read the Federal Open Market Committee report. However, workers do respond to what they perceive to be the expected state of the economy as it affects them. If the Fed is increasing the money supply at a faster rate and the inflation rate rises, workers will react **as if** they had a model of expected inflation. It is their behavior that we measure and predict, not what they are thinking. If the assumption of economic rationality is correct, then they will not be systematically fooled. One approach to explaining the same approach outside economics is to point out that it is highly unlikely that a champion pool player knows the laws of physics with regard to the exact force needed to hit the cue ball and the mathematical formulas needed to compute the exact angle to hit the pool table bank, but his behavior is the same **as if** he did.

## ■ Further Questions for Class Discussion

1. Political disturbances such as wars and threats of wars in the Middle East often lead to increases in the price of oil. You will often hear people say that the U.S. government should not let the price rise. Ask your students the difference between these statements. Obviously, the first is a positive statement. Generally, a political disturbance leads to reduced supplies or to fears of reduced supplies, or both. Price then rises. Whether or not oil prices should rise is a normative statement. Nothing scientific can be said about it because it is based on a value judgment.
2. It is worth examining the idea that changes in incentives cause people to change their behavior.
   For example, any decrease in costs tends to encourage an activity, *ceteris paribus*. In recent years, streaming services have entered the entertainment market at a lower price point than cable or satellite subscriptions. What has happened with cable subscriptions with the introduction of Netflix, Hulu, and Amazon Prime? Many

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households have "cut the cord" and use streaming services for all their entertainment needs.

3. An important issue raised after the financial meltdown in 2008 and the resulting recession was how to deal with the recession. The economic stimulus policies of cutting taxes and increasing government spending contributed to a very large increase in the federal government's deficit. As a result, the recession moderated, the economy began to grow and gross domestic product (GDP) began to rise. During this period, a debate began in the United States that the size of government had gotten too large, therefore spending should be cut. Discuss the positive and normative economic issues presented.
   **Positive:** Increases in government spending have contributed to a large increase in the federal deficit, which resulted in economic growth. These are positive statements because they are testable statements about the economic effect of increases in federal spending and reduced taxes on the size of the federal deficit, as well as the effect of increased spending and tax cuts on the level of economic activity.
   **Normative:** The statements that "the size of government had gotten too large" and that "spending should be cut" are not testable—they are based on value judgments about what "ought to be."
4. Some widely reported and watched polls are viewed as economic indicators of future levels of economic activity and as various measures of "consumer confidence." The Conference Board, the University of Michigan, and *ABC News/Money Magazine* all use polls of consumers to measure their confidence in the economy. These polls ask people about their thoughts on the economy and about their spending plans. Why are these polls not likely to provide a reliable model for predictions? These polls measure people's plans, rather than what they actually do; their plans may be different from their actions.
5. Scarcity forces society to come up with a mechanism to determine how output is to be distributed. Typically, prices of items are used to determine this distribution. If price is not used as an allocative mechanism, what other mechanisms can be used to allocate output? Universities can allocate seats in classes using price (where students bid for classes), instead of using a first-come, first-served system based on some sort of administrative procedure. An objection to this allocation method is almost certainly that the wealthier students would get the most desirable courses with the best professors, and poorer students would get the less desirable courses with less talented professors. Suppose that the university responds by providing more sections of the high-demand courses by paying the best professors more to teach an overload? The availability of seats will increase, and more students can take the course. Under administrative methods, there is little or no incentive to make more sections available (e.g., by paying qualified professors more to teach an overload in the short run and in the long run by hiring more faculty in those areas).

## ■ Answers to Questions for Critical Analysis

### AI: Decision Making Through Data (p. 4)

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*Why do you suppose that economists sometimes disagree about whether to classify as a microeconomic or macroeconomic endeavor the application of big data analytics to massive volumes of information encompassing virtually all of a nation's industries and interactions among those industries?*

Because big data analytics uses such massive volumes of information, which can encompass virtually all a nation's industries and interactions among those industries, it seems as if the endeavor is a macroeconomic application (large scale). However, in many cases, this big data just represents a small part of the economy, which could be perceived as a microeconomic application (individual scale or sub-scale).

**THE ALTERED INCENTIVES CONFRONTING PROSPECTIVE COLLEGE STUDENTS (P. 7)**
*Sometimes adults tell young people to "get all the education you can get." Does this mean that you should necessarily obtain an advanced degree?*

Under special circumstances, your answer to this *Real Application* question would be, yes. Those special circumstances would involve being able to obtain an advanced degree at zero cost to you and simultaneously not having any job opportunities as an alternative. Otherwise, you should look at how much more you would expect to earn per year if you complete an advanced degree program compared with what you could have earned working rather than spending more time in a university. Plus, you would have to consider the out-of-pocket costs of pursuing an advanced degree.

**ASSESSING WHETHER CHARITABLE DONATIONS REFLECT CARING FOR OTHERS OR FOR ONESELF (P. 7)**
*How might the fact that the U.S. government allows larger tax deductions for some charitable donations than for others affect U.S. taxpayers' incentives about how much to donate and to whom they direct their donations?*

U.S. taxpayers are likely to donate to charities that will both help others and those in which will make them better off (either through a tax deduction or a charitable gift). If the government allows larger tax deductions for some charitable donations over others, taxpayers are likely to donate more to the charities where they receive a larger benefit (tax deduction).

**GETTING DIRECTIONS (PP. 8-9)**
*In what way do small talk and gossip represent the use of simplifying assumptions?*

Gossip and small talk usually deal with other persons or situations of interest to the persons engaged in the conversation. Often the people who are talking choose to leave out details which they consider unimportant or information that do not support their position. The interpretation of the situation or the behavior of the person being talked about will be affected by which details are omitted.

## ■ Economics in Your Life

**GOVERNMENT INVOLVEMENT ENABLES A PRIVATE U.S. HOUSING FINANCE COMPANY TO PROVIDE "CHEAP" LOANS (P. 12)**

***For Critical Thinking***

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*Overall, does it appear that the affordable-housing loans offered by Freddie Mac arise from the application of centralized command and control, the price system, or a mix of the two? Explain your reasoning.*

It appears that the affordable-housing loans offered by Freddie Mac arise from the application of a centralized command and control system. The organization, a government-sponsored financial company, sets interest rates at an artificially low price to induce more real-estate owners to take out loans. They determine what and how much to produce (loans), how items will be produced (by Freddie Mac), and for whom items will be produced (those that agree to the terms).

***Real Application***

*Assume that you and two friends decide to buy an apartment building next to a college. Renters are primarily full-time students. Should you take advantage of the low-interest rate loan? What calculations do you have to make?*

Because you and your friends have to agree to not raise rents for ten years in order to qualify for the low-interest loan, you obviously have to be careful about applying for and accepting this low-interest-rate loan. We are presuming, of course, that the interest rate offered is substantially lower than market interest rates from a normal real estate lending institution. So, you have the task of estimating how much you are going to save on interest payments over ten years and at the same time estimating how your rental income might be reduced by the requirement that you can't raise rents for a decade. The uncertainty here is, at a minimum, what will happen to rents in general in the area around the college over ten years. If you anticipate that they might rise substantially, then the "good deal" on the low-interest-rate loan for purchasing the apartment building might not be such a good deal after all.

## ■ Issues & Applications

### WHY FEWER MEN IN MANUFACTURING JOBS HELPS TO EXPLAIN WHY FEWER WOMEN ARE MARRIED (PP. 12-13)

***For Critical Thinking***

*Why do you think that the prevalence of marriages by women to higher-income-earning men has remained relatively steady in recent years? (Hint: Higher-income-earning men have completed more years of education and have more stable employment prospects than men who work at manufacturing firms.)*

The argument states that women choose to marry out of self-interest and will marry a man that will be able to provide financially for the household. If women's interests and actions do not change, then the prevalence of marriages to higher-income-earning men should remain relatively steady.

***Real Application***

*Currently, a larger percentage of women are obtaining advanced degrees than are men. What are some of the real-world implications of this trend with respect to marriage?*

Women with advanced degrees typically do not seek out spouses who have little or no education past high school. Consequently, the reduction in high-paid manufacturing jobs over time will have trivial consequences on marriage rates among women with

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advanced degrees. One might predict, though, that there will be a higher percentage of marriages among men and women who have advanced degrees.

## Answers to End-of-Chapter Questions

**1-1.** 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. A student deciding whether to purchase a textbook for a particular class
b. Government officials seeking more funding for mass transit through higher taxes
c. A municipality taxing hotel guests to obtain funding for a new sports stadium

*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 consider 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, consider 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.*

**1-2.** 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.

*This issue involves choice and, therefore, can be approached using the economic way of thinking. In the case of health care, an individual typically has an unlimited desire for good health. The individual has a limited budget and limited time, however. She must allocate her budget across other desirable goods, such as housing and food, and must allocate her time across waiting in a physician's office, work, leisure, and sleep. Hence, choices must be made in light of limited resources.*

**1-3.** 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?

*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.*

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**1-4.** 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.

a. The national unemployment rate
b. The decision of a worker to work overtime or not
c. A family's choice to have a baby
d. The rate of growth of the money supply
e. The national government's budget deficit
f. A student's allocation of study time across two subjects

*Microeconomics is the study of individual decision making, whereas macroeconomics examines the aggregate behavior of the entire economy.*

*a. macroeconomics*
*b. microeconomics*
*c. microeconomics*
*d. macroeconomics*
*e. macroeconomics*
*f. microeconomics*

**1-5.** 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. Could Sally be displaying rational behavior? Based on what you read in this chapter, construct an argument supporting the conclusion that she is.

*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.*

**1-6.** Recently, a bank was trying to decide what fee to charge for "expedited payments"—payments the bank would transmit with extra speed so that customers could 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 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?

*This example illustrates that what people say they will do does not actually correspond to what matters in the economy, which is what they actually do.*

**1-7.** Explain, in your own words, the rationality assumption, and contrast it with the assumption of bounded rationality proposed by adherents of behavioral economics.

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*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.*

**1-8.** 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?

*The bounded rationality hypothesis indicates that because people cannot study every possible alternative available to them, they consider only the most obvious apparent choices. They find easy ways of deciding which of these obvious choices to select, and according to the hypothesis, these methods are simple rules of thumb.*

**1-9.** 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?

*Suppose that there is a change in the environment that a person faces, 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.*

**1-10.** 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.

a. 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.
b. 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.
c. 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.

*a. Bounded rationality*
*b. Rationality assumption*
*c. Bounded rationality*

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**1-11.** 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.

a. 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 sales-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.

*a. Rationality assumption*
*b. Bounded rationality*
*c. Bounded rationality*

**1-12.** 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 ten 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.

*a. Yes, because Myrna is acting in her own self-interest by establishing this allocation of her time to studying economics.*
*b. No, because Leonardo is leaving an important decision affecting his self-interest to random chance, potentially leaving him worse off if he fails to obtain employment.*
*c. Yes, because Celeste is basing her choice on a self-interest assessment of expenditures in light of available resources.*

**1-13.** Write a sentence contrasting positive and normative economic analysis.

*Positive economic analysis deals with economics models with predictions that are statements of fact, which can be objectively proved or disproved. Normative analysis considers subjective personal or social values concerning the way things ought to be.*

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**1-14.** Based on your answer to Problem 1–13, categorize each of the following conclusions as resulting from 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.

*a. Positive*
*b. Normative*
*c. Normative*
*d. Positive*

**1-15.** Consider the following statements, based on a positive economic analysis that assumes all other things remain constant. For each, list one other thing that could independently change in a way that offsets the outcome stated.
a. Increased demand for digital devices 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.

*a. An increase in the supply of digital devices, perhaps because of the entry of new device manufacturers into the market, pushes their price back down.*
*b. Another factor, such as higher hotel taxes at popular vacation destinations, makes vacation travel more expensive.*
*c. Some other factor, such as a fall in market wages that workers can earn, discourages people from working additional hours.*

**1-16.** Suppose that the U.S. federal government has borrowed $500 billion to expand its total spending on goods and services across the entire economy in an effort to boost by $500 billion the aggregate production by the nation's firms. Would we apply microeconomic or macroeconomic analysis to analyze this policy action?

*This policy action involves billions of dollars in economywide total spending and aggregate production. Because the action involves the economy has a whole, macroeconomic analysis would be applied.*

**1-17.** Suppose that the government has raised by $10 a per-carat tax rate it imposes on diamonds in an effort to influence production of this particular good by each of the firms that produce it and purchases by individual consumers. Would we apply microeconomic or macroeconomic analysis to analyze this policy action?

*This policy action involves a tax per unit applied to sales of one specific item produced by a particular set of firms and bought by a particular group of consumers. Because the action involves a small part of the economy, microeconomic analysis would be applied.*

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**1-18.** Centralized command and control prevails throughout a certain nation's economy. What three key economic questions have been addressed in this nation, and what has been the common element of the nation's answers to those questions?

*The three questions are as follows: What and how much will be produced? How will items be produced? For whom will items be produced? In this command-and-control economy, the common element of the nation's answers to these questions is that the government makes all decisions.*

**1-19.** During her years of college, Dominique discovered that her three favorite subjects were astronomy, chemistry, and political science. She chose to major in astronomy because she had seen data indicating that science majors earn higher-than-average wages and because she liked astronomy better than both chemistry and political science. Upon graduation, however, she learned that average wages in chemistry fields were 20 percent higher than average wages earned by astronomers. Did Dominique's behavior violate the rationality assumption?

*The rationality assumption states that individuals do not intentionally make decisions that would leave themselves worse off. When Dominique decided on astronomy over chemistry, she sought an enjoyable field of study within the generally higher-pay area of science. Thus, she did not intentionally make herself worse off. Indeed, with her training in astronomy she may still receive earnings higher than average pay in other non-science fields, including political science. She has ended up "less well off" only in the sense that she could have earned even higher wages if she had majored in chemistry and only after the fact—not because she intentionally made a decision that would leave her "worse off."*

**1-20.** Sebastian is a financial analyst who is convinced that his clients do not always make choices that are consistent with their long-term objectives. He has also determined that his clients do not consider every relevant choice and often fail to act in their own self-interest. Does Sebastian perceive that his clients' behavior necessarily accords with the rationality assumption or the assumption of bounded rationality?

*Sebastian perceives that the bounded rationality assumption applies, because he views their behavior as inconsistent with their long-term goals, their capabilities to evaluate every relevant choice, and their own self-interest.*

**1-21.** Maneesha has completed an analysis of the market for a prescription medication. She concludes that the policymaker should act to prevent an increase in the price of this drug on the grounds that the mainly older consumers of the medication have already spent their lives paying too much for pharmaceuticals. They ought not to have to pay higher prices, Maneesha has concluded, so the government should act to halt any further price increases in this market. Has Maneesha applied positive or normative economic analysis?

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*Maneesha has predicated her analysis on the basis of what the outcome "should" be, what price is "too much" to pay, and what people "ought not" be obliged to do. Consequently, her analysis is based on value judgments instead of purely descriptive considerations, and as such it is an example of normative economic analysis.*

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## ■ Appendix A: Reading and Working with Graphs

A graph is a visual representation of the relationship between variables. An independent variable has values determined independently of the equation under study. A dependent variable has values that change according to changes in the value of one or more independent variables. **(See Table A-1.)**

**I. Direct and Inverse Relationships**

A direct relationship occurs when an increase in one variable is associated with an increase in the other variable, and vice versa. An inverse relationship occurs when an increase in one variable is associated with a decrease in the other variable, and vice versa. **(See Figure A-1.)**

**II. Constructing a Graph**

**A. A Number Line:**

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A number line can be divided into segments of equal length, each associated with a number. A number line can be horizontal or vertical. **(See Figures A-2 and A-3.)**

**B. Combining Vertical and Horizontal Number Lines:**

A graph or plane has a vertical, or *y*, axis, and a horizontal, or *x*, axis. The origin is intersection of the *y* axis and *x* axis. **(See Figure A-4.)**

**III. Graphing Numbers in a Table**

In economics, it is conventional to put dollar values on the y (vertical) axis and quantities on the x (horizontal) axis. **(See Table A-2 and Figures A-5 and A-6.)**

**IV. The Slope of a Line (A Linear Curve)**

**A. Slopes of Linear (Straight-Line) Curves:**

The slope of a line is the change in the *y* value divided by the corresponding change in the *x* value of a curve, or "rise" over "run." **(See Figures A-7, A-8, and A-9)**

**B. Slopes of Nonlinear Curves:**

**Slope Varies Along a Nonlinear Curve:**

The slope of a nonlinear curve varies as we move along the curve. **(See Figure A-10)**

**Measuring Slope at a Point Along a Nonlinear Curve:**

For nonlinear curves, mathematicians and economists prefer to discuss the slope at a point. The slope at a point on the curve is the slope of a line tangent to that point, or the straight line that just "kisses" the curve at the point. **(See Figure A-10)**

## ■ Appendix A: Answers to End-of-Appendix Questions

**A-1.** Explain which is the independent variable and which is the dependent variable for each of the following examples.

a. Once you determine the price of a flash drive at the college bookstore, you will decide how many flash drives to buy.
b. 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.
c. You anticipate earning a higher grade on your next economics exam because you studied more hours in the weeks preceding the exam.

*a. Independent: price of a flash drive; Dependent: quantity of flash drives*
*b. Independent: work-study hours; Dependent: credit hours*
*c. Independent: hours of study; Dependent: economics grade*

**A-2.** For each of the following items, state whether a direct or an inverse relationship is likely to exist.

a. The number of hours you study for an exam and your exam score
b. The price of pizza and the quantity purchased
c. The number of games the university basketball team won last year and the number of season tickets sold this year

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*a. direct*
*b. inverse*
*c. direct*

**A-3.** Review Figure A-4 on page 19, plot the points on the coordinate axes, 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.
a. (–10, 4)
b. (20, −2)
c. (10, 0)

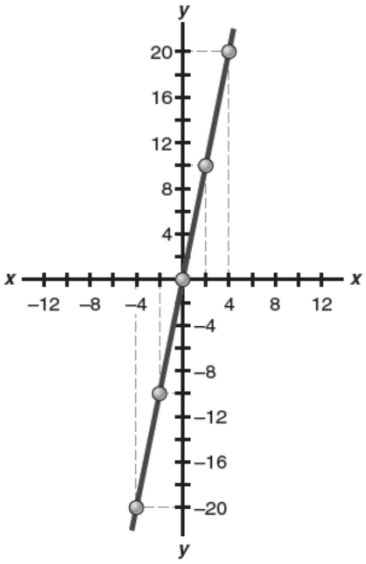
*a. above x axis; left of y axis*
*b. below x axis; right of y axis*
*c. on x axis; to right of y axis*

**A-4.** State whether each of the following functions specifies a direct or an inverse relationship.
a. $y = 5x$
b. $y = 10 - 2x$
c. $y = 3 + x$
d. $y = -3x$

*a. direct (or positive); each 1-unit rise in x induces a 5-unit increase in y.*
*b. inverse (or negative); each 1-unit rise in x induces a 2-unit decrease in y.*
*c. direct (or positive); each 1-unit rise in x induces a 1-unit increase in y.*
*d. inverse (or negative); each 1-unit rise in x induces a 3-unit decline in y.*

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

| Y | x |
|---|---|
| -20 | -4 |
| -10 | -2 |
| 0 | 0 |
| 10 | 2 |
| 20 | 4 |

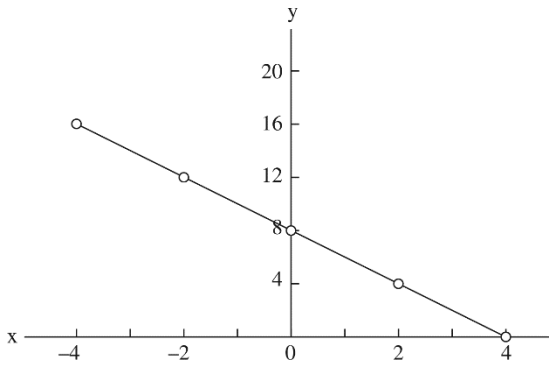



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A-6. Given the function $y = 8 - 2x$, complete the following schedule and plot the curve.

| y | x |
|---|---|
| 16 | -4 |
| 12 | -2 |
| 8 | 0 |
| 4 | 2 |
| 0 | 4 |




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

*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.*

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

*Each one-unit increase in x yields a 2-unit decrease in y, so the slope given by the change in y corresponding to the change in x is equal to −2.*

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# Chapter 2
## Scarcity and the World of Trade-Offs

### ■ Overview

This chapter introduces scarcity, the central concept of economics. It is the existence of scarcity that requires people to make choices, both individually and collectively. Along with the concept of scarcity, the chapter introduces the tools that economists use to analyze choice. These are the concepts of opportunity costs, trade-offs, and the production possibilities curve. The production possibilities curve is used not only to analyze trade-offs, but also to illustrate economic growth and the implications of an inefficient use of resources. Specialization is introduced along with a discussion of the basis for trade, comparative advantage.

### ■ Learning Objectives

After studying this chapter, students should be able to:

2.1 Evaluate why everyone, whether poor or affluent, faces the problem of scarcity

2.2 Explain why the scarcity problem causes people to consider opportunity costs and trade-offs among choices

2.3 Discuss why obtaining increasing increments of any particular good typically entails giving up more and more units of other goods

2.4 Explain why the economy faces a trade-off between consumption goods and capital goods

2.5 Distinguish between absolute and comparative advantage

### ■ Outline

**I. Scarcity:** Scarcity is a situation in which the ingredients for producing the things that people desire are insufficient to satisfy all wants at a zero price. It exists in all societies and at all income levels because human wants exceed what can be produced with the limited resources and time that nature makes available.

**A. What Scarcity Is Not:** Scarcity is not a shortage. It is also not poverty. High incomes do not create less scarcity. Scarcity is a fact of life; it has existed in all times in the past and will exist at all times in the future.

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**B. Scarcity and Resources:** Resources, or factors of production, are inputs used in the production of things that people want. Production is any activity that results in the conversion of resources into products that can be used in consumption.

1. **Land:** The natural resources that are available from nature, including location, original fertility and mineral deposits, topography, climate, water, and vegetation.
2. **Labor:** The human resource that includes all productive contributions made by individuals who work and involves both mental and physical activities.
3. **Physical Capital:** All manufactured resources that are used for production, including buildings, equipment, machines, and improvements to natural resources, such as irrigation ditches.
4. **Human Capital:** The accumulated training and education workers receive that increases their productivity.
5. **Entrepreneurship:** The component of human resources that perform the functions of raising capital (organizing, managing, and assembling the other factors of production) to create and operate business ventures. This also includes taking risks associated with introducing new methods and other types of new thinking that could lead to more monetary income.

**C. Goods versus Economic Goods:**

1. **Goods:** All things from which individuals derive satisfaction or happiness, such as air to breathe, the beauty of the sunset, food, and other physical items.
2. **Economic Goods:** Goods that are scarce. The quantity of such goods desired exceeds the quantity that is available at a zero price.
4. **Economic Bads:** Goods for which the desired quantity is much *less* than what nature provides at a zero price, like weeds.
3. **Services:** Mental or physical labor or help purchased by consumers or intangible goods.

**D. Wants and Needs:** Needs are not objectively definable. Perhaps the best way to view a need is as an absolute necessity to stay alive. Wants are unlimited and refer to goods that are desired. In reality, every individual has competing wants and cannot satisfy all of them, given limited resources (scarcity).

**II. Opportunity Cost, Trade-Offs, and Choices:** Scarcity requires choices be made. When one choice is made, then another is given up.

**A. Valuing Forgone Alternatives:** Only the individual can determine the highest-valued, next-best alternative for each choice that is available.

**B. Opportunity Cost:** The highest-valued, next-best alternative that must be sacrificed to obtain something or to satisfy a want. *In economics, cost is always a forgone opportunity.*

**C. The World of Trade-Offs and Your Future Expected Income:** Whenever you engage in any activity using any resource, you are trading off the use of that resource for one or more alternative uses. For example, the more time that is

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devoted to studying economics, the less time that can be devoted to studying mathematics. Thus, a higher grade in economics has a "cost" of a lower mathematics grade. **(See Figure 2-1.)**

**D. Graphical Analysis:** Figure 2-1 assumes that only 6 hours can be spent per week on studying. In this example, the trade-off is a special case: one to one, meaning the opportunity cost of receiving one grade higher in economics is one grade lower in mathematics.

**E. The 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.

1. **Production Possibilities for Course Grades:** A straight-line production possibilities curve can show the opportunity cost of studying one more hour in one subject in terms of a change in the grade of another subject. **(See Figure 2-1.)**
2. **Measuring Trade-Offs Along a Production Possibilities Curve:** A movement from one point to another on the PPC shows that some of one good must be given up to have more of another, holding constant all other factors. **(See Figure 2-1.)**

**III. The Economic Choices a Nation's People Face:** In practice, the production possibilities curve does not have constant trade-offs of one good for another and is typically a curve that is bowed outward. **(See Figure 2-2.)**

**A. A Two-Good Example:** Figure 2-2 examines the choice between the production of smartphones and tablet devices.

**B. Production Trade-Offs:** The tradeoffs between smartphones and tablet devices occur *on* the PPC. **(See Figure 2-2.)**

**C. Assumptions Underlying the Production Possibilities Curve:**

1. Resources are fully employed.
2. Production takes place over a specific time period—for example, one year.
3. Resources are fixed in both quantity and quality over this time period.
4. Technology does not change over this time period.
   a. Technology is defined as the total pool of applied knowledge concerning how goods and services can be produced.

**D. Being off the Production Possibilities Curve:** Any point *outside* the PPC is unattainable the given time period. Any point *inside* the PPC is attainable, but resources are not being fully utilized due to unemployment or underemployment. **(See Figure 2-2.)**

**E. 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. An economy is efficient when it produces on the PPC. An inefficient point is any point below the production possibilities curve.

**F. The Law of Increasing Additional Cost:** The fact that the opportunity cost of additional units of a good generally increases as society attempts to produce

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more of that good. This accounts for the bowed-out shape of the production possibilities curve. **(See Figure 2-3.)**

1. **Increasing Additional Costs:** As society takes more and more resources and applies them to the production of any one item, the opportunity cost increases for each additional unit produced. This law is illustrated by the PPC being bowed outward.
2. **Explaining the Law of Increasing Additional Cost:** Some resources are better suited for producing some goods than other goods and are not perfectly adaptable for alternative uses. The more specialized the resources, the more bowed outward the PPC will be.

**IV. Economic Growth, Production Possibilities, and the Trade-Off between Present and Future**

**A. Economic Growth and the Production Possibilities Curve:** Economic growth is illustrated by an outward shift of the production possibilities curve. **(See Figure 2-4.)**

**B. The Trade-Off between the Present and the Future**

1. **Why We Make Capital Goods:** Producing more capital goods allows a society to produce more of all types of goods in the future.
2. **Forgoing Current Consumption:** When existing resources are used to produce capital goods, we are forgoing current consumption. When we forgo consumption to invest in capital goods, we are waiting to consume what will be produced from the use of those capital goods in the future.
3. **The Trade-Off between Consumption Goods and Capital Goods:** To have more consumer goods in the future, we must produce capital goods today. The more capital goods that are produced today, the less consumer goods that are produced today. In the future there will be more consumption goods as the economy grows. **(See Figure 2-5.)**

**V. Comparative Advantage and Maximizing Your Future Income:** Specialization means working at a relatively well-defined, limited activity. It means the organization of economic activity so that what each person (or region) consumes is not identical to what each person (or region) produces.

**A. Comparative Advantage:** The ability to produce a good or service at a lower opportunity cost compared to other producers. Comparative advantage is always a *relative* concept. This is the basis for specialization.

**B. Absolute Advantage:** The ability to produce more units of a good or service using a given quantity of labor or resource inputs. Equivalently, the ability to produce the same quantity of a good or service using fewer units of labor or resource inputs. This is not the basis for specialization.

1. **Absolute Advantage versus Comparative Advantage:** Only comparative advantage, not absolute advantage, matters in determining how people will allocate their time.

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2. **Comparative Advantage in Sports:** Babe Ruth had an absolute advantage in both hitting and pitching baseball, but his comparative advantage was in hitting home runs rather than pitching.

C. **Scarcity, Self-Interest, and Specialization:** Persons who are making decisions that further their self-interest will make choices that maximize benefits net of opportunity cost. The result is that they choose their comparative advantage and end up specializing.

D. **The Division of Labor:** The segregation of a resource into different specific tasks to increase the amount of output possible from the fixed resources available.

E. **Comparative Advantage and Trade among Nations:** The analysis of absolute advantage, comparative advantage, and specialization applies equally to nations.

1. **Trade among Regions:** Specialization along lines of comparative advantage in agricultural products in the Plains states and industrial products in the eastern states and resulting trade between them allows each region to have higher incomes and living standards. The result would be the same if the Plains states and the eastern states were separate countries.

2. **International Aspects of Trade:** A producer in one part of the United States must adapt to improvements in production along the lines of comparative advantage by those in another part. Producers in the United States will try to raise political barriers to trade with foreign producers by arguing about "unfair" competition and loss of U.S. jobs, which is not necessarily true. When nations specialize in an area of comparative advantage and trade with the rest of the world, the average standard of living in the world rises.

## ■ Points to Emphasize

GRAPHING

Graphs are usually difficult for students to grasp. It is worthwhile spending some time going over basic graphing techniques and terminology from the Appendix to Chapter 1 before getting into this chapter. These pictures of relationships between variables may simply create confusion rather than clarify the issue being presented. This confusion results when students are trying to figure out where the graph comes from and what it means to refer to an inverse or positive relationship, while at the same time trying to make sense of the actual economic analysis.

SCARCITY

This is the central concept in economics. All economic analysis derives from this condition. Stress that scarcity arises because at any given time people want more than their resources will allow them to consume. The classic way to define scarcity is that wants are unlimited while resources are limited. Resources or inputs are anything that can be used to produce things people want. It is important to stress that scarcity is a relative concept. Even though not everyone has "unlimited" wants, they usually want more than they can have at the moment. As income rises, so do wants. Studies by Simon Kuznets and Milton Friedman provide evidence of this fact. Kuznets found that between

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1869 and 1929, real national income rose by a factor of 4, but the average propensity to consume (APC) remained constant. Friedman reported in *The Theory of the Consumption Function* that the APC remains constant even cross-sectionally as income goes from lower levels to higher levels out of permanent income. Also, poverty in the United States is defined at levels that would be considered affluent by people in most countries.

RESOURCES

Resources, or inputs, are things that produce goods and services. At any given time, resources are fixed. Generally, students will agree that this is so. Thus, at any given time, the amount of goods and services that can be produced is limited. Over time, resources have increased. Indeed, 150 years ago petroleum was not even a resource. Today, it is one of the most important resources. Advances in technology allow society to use things that were previously not considered resources. Over time, an increase in resources does not allow society to eliminate scarcity because, at any given time, resources are fixed while wants are not.

CHOICE

After the scarcity problem is analyzed, the problem of choice should be presented. Because of scarcity, wants are greater than the means to satisfy these wants (resources), people are forced to choose a means of satisfying these wants. The concepts of opportunity cost, trade-offs, and the production possibilities curve are introduced. These concepts are often difficult for students to grasp. The production possibilities curve can be especially troublesome if actual numbers are not presented along with the graph. A successful method of presenting this model is to use a table of combinations of two goods and fully develop the model before introducing the graph.

SPECIALIZATION AND COMPARATIVE ADVANTAGE

After the tools for analyzing choice are developed, the chapter discusses specialization based on comparative advantage. The relationship between these two is essential to develop because it is the basis for exchange. A convincing case can be made on an intuitive level that if each person, region, and country specialize in producing those things that they can relatively produce most efficiently, then it is possible to increase output without increasing the total amount of resources. Then a more formal demonstration can be given. A result of specialization is that trade occurs because each economic unit ends up producing more of something than they want. In some cases, they produce something that they do not consume at all. Higher incomes and living standards result from specialization and trade based on comparative advantage.

## ■ For Those Who Wish to Stress Theory

PRODUCTION POSSIBILITIES CURVE

An in-depth analysis of the production possibilities curve (PPC) can be especially valuable. In particular, consider the following:

1. Rigorously define the PPC: The PPC shows the maximum possible combinations of output of two goods that can be produced by given resources and technology in a given time period.

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2. Consider the PPC when inputs are equally suited to producing both of the goods. The *x* and *y* intercepts define the maximum quantities of each good that can be had. By connecting these two points, a linear PPC is derived.
3. Note that when some resources are better suited to either output, there are two important differences in the PPC.
   a. It is no longer linear. Instead, it is now concave to the origin due to increasing resource cost.
      As we move from producing all *x* to all *y*, we initially produce units of *y* by releasing greater percentages of resources more suited to production of *y* and smaller percentages of resources more suited to the production of *x*. Since only 100 percent of resources exist, we must eventually release greater percentages of *y*-suited resources and smaller percentages of *x*-suited resources to produce additional units of *x*.
   b. The new PPC lies above the linear PPC except at the *x* and *y* intercepts because the new curve accounts for the fact that inputs are more suitable to producing *x* or *y*.

## ■ Further Questions for Class Discussion

1. In recent years, online news sites such as the ones at MSNBC and Yahoo! have designed a business model in which they collect stories from the online pages of newspapers and wire services, such as the Associated Press (AP), and allow free access to the articles for visitors to their Web sites. The effect has been to decrease newspaper and wire service revenues and profits. As a result, newspapers and organizations such as the AP have begun to charge or discuss plans to charge visitors to access to their Web sites or to download their stories. Most users of both the newspapers and sites such as Yahoo! and MSN argue that they should not be charged for access to these companies' Web sites. Why do you think that access to news should be free? Is any given news story a free good or an economic good in the sense that economists use those terms?
   Obviously, news stories are economic goods because scarce resources are used to produce them. Because those resources have alternative uses, there is an opportunity cost for using them to research and produce news stories.
2. Does the federal government face a scarcity constraint? In discussions of the federal government, each interest group wants more spent on its programs and speaks as if the government has virtually unlimited funds for its program that has some supposed beneficial social impact. The problem is that the government has fewer funds to allocate than are desired by all the interest groups. Thus, wants exceed the ability of the federal government to finance all of these wants—a clear case of scarcity. The government does indeed face a scarcity constraint in the form of a limited budget with which to accomplish its goals. The way this constraint is manifested is in wrangling about budget priorities. The opportunity cost of more for one program means less for others.
3. Students will usually agree that specialization along lines of comparative advantage and then trade is beneficial. Point out Adam Smith's statement in *The Wealth of Nations* that no "prudent master [will] make at home what it will cost him more to

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make than to buy." Consider outsourcing, where American firms have foreign firms produce certain goods or services for them instead of producing them in the United States. Why is this a problem if the foreign firms in fact have comparative advantage? If trade along the lines of comparative advantage allows U.S. companies to buy these goods and services more cheaply than they can produce them, then why should we want to restrict trade in them? There will be a reallocation of jobs in the United States, as those displaced by outsourcing find jobs in activities in which the United States has a comparative advantage. This will usually generate controversy.

4. A major political issue revolves around tax policy and its effect on investment and economic growth. How might increases in taxes on business profits affect economic growth? (*Hint:* Investment is inversely related to expected after-tax profits on new investment.) Use the production possibilities curve to explain your answer. Other things being equal, an increase in taxes on profits will reduce investment spending by decreasing expected after-tax profits. Investment represents new capital formation, and thus less capital will be produced. The rate of economic growth will be reduced by higher business taxes, other things being equal.

## ■ Adam Smith (1723–1790): Scottish Economist

"I have never known much good done by those who affected to trade for the public good," Adam Smith once remarked. If he put little stock in good intentions, Smith did invest heavily in demonstrating that selfish intentions could lead to public good. In *The Theory of Moral Sentiments* (1759), his first book, Smith tried to show how altruism could come out of self-interest. In his second, more famous book, he attempted to reveal how the self-interest of private individuals could be transformed by the sleight of an invisible hand (the unfettered market) into social harmony and public benefit, producing the wealth of the nation in the best of all possible ways. The result of this effort was *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), perhaps the most influential economics treatise ever written, one that has set the tone for capitalist ideology for more than two centuries.

As the title indicates, Smith attempted to examine the sources of the wealth of nations. He proposed that first on the list of sources was the division of labor. Smith's pin factory example of dramatic increases in productivity possible through the division of labor has made its mark on virtually every textbook written on the subject since. He went on to point out that the division of labor does not occur because individuals possess an overall perception of its ultimate benefit to society. Rather, the division of labor occurs simply because it is in each individual's self-interest to specialize and to exchange: "The natural effort of every individual to better his own condition, when suffered to exert itself with freedom and security, is so powerful a principle, that it is alone, and without any assistance . . . capable of carrying on the society to wealth and prosperity."

In addition to Smith's famous "invisible hand", the theme of individual economic freedom was quite strong in *The Wealth of Nations*. He believed that any governmental attempt to guide or to regulate actions of individuals in the economic marketplace would end up doing more harm than good. Smith was especially harsh on legally protected

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monopolies. Smith's critics contend that his model may have fit England at the time he wrote his treatise, but it does not fit industrialized Western countries today—where the state plays a large role and large corporations have replaced shopkeepers. Nonetheless, for many, *The Wealth of Nations* remains a laissez-faire bible, and Smith remains a central figure in the development of economic thought.

## ■ Answers to Questions for Critical Analysis

**WHY PEOPLE WITH THE HIGHEST HOURLY OPPORTUNITY COST ALLOCATE AS MUCH TIME TO LEISURE AS EVERYONE ELSE (PP. 29-30)**
*Why might a high-income individual perceive a substantial opportunity cost of devoting an available labor hour to a low-income task?*

A high-income individual would need to give up a substantial amount (the cost of the time they could have spent working) to devote one hour to a low-income task (like watching TV). Whereas a low-income individual would need to give up less (the cost of the time they could have spent working) to devote one hour to a low-income task).

**THE ECONOMIC EXPLANATION FOR SHRINKING AIRLINE RESTROOMS (P. 31)**
*Why do you suppose that some airlines have simply removed a restroom or two from each of their passenger planes?*

These airlines have found these additional restrooms have incurred a high opportunity cost. By reducing the number of restrooms, they can add additional rows of seats to the airplane, which can generate additional revenue for the airline (whereas the restrooms generate no revenue).

**AI: CITY MANAGEMENT (P. 33)**
*Who ultimately funds the information-gathering and decision-making activities of city governments that big data techniques are helping to guide?*

Governments are mainly funded by taxpayer dollars. By using big data techniques for information-gathering and decision-making, city governments are using their scarce resources more efficiently.

**CITY BICYCLE LANES ENCOUNTER THE LAW OF INCREASING ADDITIONAL COST (P. 35)**
*Why might we anticipate a bowed shape for the production possibilities curve relating space taken up by a bicycle lane along a street to parking spaces along the street?*

Cities will first convert parking spaces that are more suitable for bicycle lanes (those with fewer potholes) at a relatively low cost. As more and more spaces are being converted from parking spaces to bicycle lanes, eventually they will require resources that are not as suitable for bicycle lanes, thus increasing the costs associated with the change.

## ■ Economics in Your Life

**EXTREME SPECIALIZATION LEADS ONE PERSON TO PURSUE SMALL-ROCKET LAUNCHES (P. 41)**

***For Critical Thinking***

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*As more aerospace firms set up in New Zealand to launch satellites and other payloads beyond the earth's atmosphere, what is likely to happen to the opportunity cost of larger portions of the airspace above that nation? Explain briefly.*

As more aerospace firms set up to launch satellites in New Zealand, the opportunity cost of the portions of airspace would likely rise. The companies will first seek out the areas with the lowest opportunity costs (for example, inhabitable land that is not utilized). As more and more land is being used to launch satellites, however, areas with greater opportunity costs (for example, farmland) will need to be used.

***Real Application***

*Assume you are hired as part of the management team for a new aerospace company in New Zealand. It, too, wishes to launch satellites along paths very close to those of Rocket Labs. What would you tell the president of that new company about future opportunity costs?*

You would have to point out that the opportunity cost of the airspace that your new company desires to use will definitely rise, and in particular it will rise more quickly, the more satellites Rocket Lab launches.

## ■ Issues & Applications

### THERE IS NO SUCH THING AS FREE PARKING (PP. 41-42)

***For Critical Thinking***

*Why do you suppose that trying to assess the aggregate opportunity cost of all lands devoted to parking would require determining the opportunity costs of parking spaces by all of the owners of those lands? (Hint: Recall that the opportunity cost is the value of the single next-best alternative as evaluated by each individual who makes a choice).*

The opportunity cost of parking land is the owner's assessment of the value of the single next-best alternative, which can be different for each individual. Therefore, to assess the total opportunity cost of all parking land, the owner's opportunity cost must be determined.

***Real Application***

*Assume that you are a homeowner with a parking space. You discover that you can lease the land for $1,000 per year to someone who covets that space. Alternatively, you can build a small basketball court for your personal use. Of the two options, how do you determine which makes you better off?*

You already know that you can lease the land for $1,000 per year. You have to ascertain the derived satisfaction that you would receive if instead you used the land for a small basketball court. If, for example, you believed that your derived satisfaction would be worth about $700 per year, then the opportunity cost of the parking space is $700 per year. Your net gain of leasing the land would be $1,000 minus $700, or $300 per year, and you should lease the land. If your derived satisfaction from building the small basketball court would be worth more than $1,000, however, you should build the basketball court.

## ■ Answers to End-of-Chapter Questions

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**2-1.** Define opportunity cost. What is your opportunity cost of attending a class at 11:00 A.M.? How does it differ from your opportunity cost of attending a class at 8:00 A.M.?

*The opportunity cost of attending a class at 11:00 A.M. is the next-highest-valued use of that hour of the day. Likewise, the opportunity cost of attending an 8:00 A.M. class is the next-highest-valued use of that particular hour of the day. If you are an early riser, it is arguable that the opportunity cost of the 8:00 A.M. hour is lower because you will already be up at that time, but have fewer choices compared with the 11:00 A.M. hour when shops, recreation centers, and the like are open. If you are a late riser, it may be that the opportunity cost of the 8:00 A.M. hour is higher, because you place a relatively high value on an additional hour of sleep in the morning.*

**2-2.** If you receive a ticket to a concert at no charge, what, if anything, is your opportunity cost of attending the concert? How does your opportunity cost change if miserable weather on the night of the concert requires you to leave much earlier for the concert hall and greatly extends the time it takes to get home afterward?

*The opportunity cost of attending the concert is the next-highest-value use of the time spent at the concert. If bad weather extends the amount of time spent on an evening at the concert, then there is an additional opportunity cost in the form of the next-best uses of that additional time.*

**2-3.** You and a friend decide to spend $100 each on concert tickets. Each of you alternatively could have spent the $100 to purchase a textbook, a meal at a highly rated local restaurant, or several Internet movie downloads. As you are on the way to the concert, your friend tells you that if she had not bought the concert ticket, she would have opted for a restaurant meal, and you reply that you otherwise would have downloaded several movies. Identify the relevant opportunity costs for you and your friend of the concert tickets that you purchased. Explain briefly.

*The opportunity cost is the cost of the single, next-highest-valued foregone alternative to the $100 spent on the concert ticket, which for your friend was a restaurant meal she otherwise could have purchased and which for you was movie downloads that you otherwise could have bought.*

**2-4.** After the concert discussed in Problem 2-3 is over and you and your friend are traveling home, you discuss how each of you might otherwise have used the four hours devoted to attending the concert. The four hours could have been used to study, to watch a streaming video of a sporting event, or to get some extra sleep. Your friend decides that if she had not spent four hours attending the concert, she would have chosen to study, and you reply that you otherwise would have watched the streaming video. Identify the relevant opportunity costs for you and your friend for allocating your four hours to attending the concert. Explain briefly.

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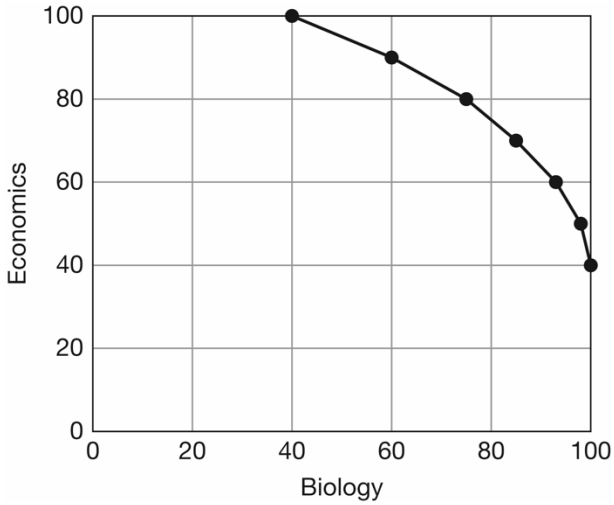
*The opportunity cost is the cost of the single, next-highest-value forgone alternative to the four hours spent attending the concert, which for your friend was time that she otherwise could have devoted to study and for you was time that you otherwise could have spent watching the streaming video of the sporting event.*

**2-5.** Recently, a woman named Mary Krawiec attended an auction in Troy, New York. At the auction, a bank was seeking to sell a foreclosed property: a large Victorian house suffering from years of neglect in a neighborhood in which many properties had been on the market for years yet remained unsold. Her $10 offer was the highest bid in the auction, and she handed over a $10 bill for a title to ownership. Once she acquired the house, however, she became responsible for all taxes on the property and for an overdue water bill of $2,000. In addition, to make the house habitable, she and her husband devoted months of time and unpaid labor to renovating the property. In the process, they incurred explicit expenses totaling $65,000. Why do you suppose that the bank was willing to sell the house to Ms. Krawiec for only $10? (*Hint*: Contemplate the bank's expected gain, net of all explicit and opportunity costs, if it had attempted to make the house habitable.)

*The bank apparently determined that the net gain that it anticipated receiving from trying to sell the house to someone else, considering the opportunity cost of resources that the bank would have had to devote to renovating the house, was less than $10.*

**2-6.** The following table illustrates the points a student can earn on examinations in economics and biology if the student uses all available hours for study. Plot this student's production possibilities curve. Does the PPC illustrate the law of increasing additional cost?

| Economics | Biology |
|---|---|
| 100 | 40 |
| 90 | 60 |
| 80 | 75 |
| 70 | 85 |
| 60 | 93 |
| 50 | 98 |
| 40 | 100 |




*Each additional 10 points earned in economics costs a greater number of biology points. For example, the opportunity cost to the student of increasing points earned in economics from 60 to 70 is 8 points forgone in biology, but the opportunity cost of increasing*

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*economics points from 90 to 100 rises to 20 points forgone in biology. Thus, the new PPC curve illustrates the law of increasing relative cost.*

**2-7.** Based on the information provided in Problem 2-6, what is the opportunity cost to this student of allocating enough additional study time on economics to move her grade up from a 90 to a 100?

*If the student allocates additional study time to economics in order to increase her score from 90 to 100, her biology score declines from 60 to 40, so the opportunity cost of earning 10 additional points in economics is 20 fewer points in biology.*

**2-8.** Consider a change in the table in Problem 2-6. The student's set of opportunities is now as follows: Does the PPC illustrate the law of increasing additional cost? What is the opportunity cost to this student for the additional amount of study time on economics required to move her grade from 60 to 70? From 90 to 100?

| Economics | Biology |
|---|---|
| 100 | 40 |
| 90 | 50 |
| 80 | 60 |
| 70 | 70 |
| 60 | 80 |
| 50 | 90 |
| 40 | 100 |

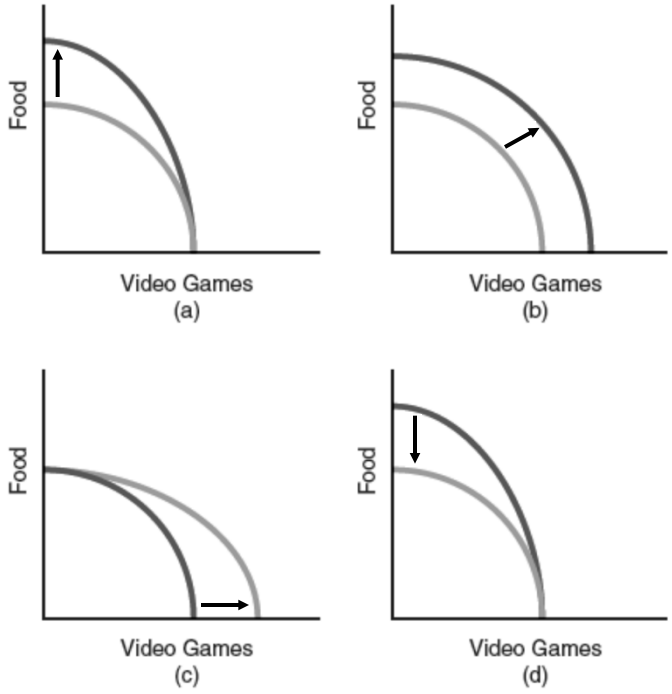
*Each additional 10 points earned in economics costs 10 additional points in biology, so this PPC illustrates constant additional opportunity costs. It does not satisfy the law of increasing additional costs. For instance, the opportunity cost to the student of increasing points earned in economics from 60 to 70 is 10 points forgone in biology, and the opportunity cost of increasing economics points from 90 to 100 remains at 10 points forgone in biology.*

**2-9.** Construct a production possibilities curve for a nation facing increasing opportunity costs for producing food and video games. Show how the PPC changes given the following events.

a. A new and better fertilizer is invented.
b. Immigration occurs, and immigrants' labor can be employed in both the agricultural sector and the video game sector.
c. People invent a new programming language that is much less costly to code and is more memory-efficient.
d. A heat wave and drought result in a 10 percent decrease in usable farmland.

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Consider the following diagram when answering Problems 2-10, 2-11, and 2-12.




**2-10.** During a debate on the floor of the U.S. Senate, Senator Creighton states, "Our nation should not devote so many of its fully employed resources to producing capital goods because we already are not producing enough consumption goods for our citizens." Compared with the other labeled points on the diagram, which one could be consistent with the current production combination choice that Senator Creighton believes the nation has made?

*Point C*

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**2-11.** In response to Senator Creighton's statement reported in Problem 2-10, Senator Long replies, "We must remain at our current production combination if we want to be able to produce more consumption goods in the future." Of the labeled points on the diagram, which one could depict the future production combination Senator Long has in mind?

*Point D*

**2-12.** Senator Borman interjects the following comment after the statements by Senators Creighton and Long reported in Problems 2-10 and 2-11: "In fact, both of my esteemed colleagues are wrong, because an unacceptably large portion of our nation's resources is currently unemployed." Of the labeled points on the diagram, which one is consistent with Senator Borman's position?

*Point A*

**2-13.** A nation's residents can allocate their scarce resources either to producing consumption goods or to producing human capital—that is, providing themselves with training and education. The table below displays the production possibilities for this nation:

| Production Combination | Units of Consumption Goods | Units of Human Capital |
|---|---|---|
| A | 0 | 100 |
| B | 10 | 97 |
| C | 20 | 90 |
| D | 30 | 75 |
| E | 40 | 55 |
| F | 50 | 30 |
| G | 60 | 0 |

a. Suppose that the nation's residents currently produce combination A. What is the opportunity cost of increasing production of consumption goods by 10 units? By 60 units?
b. Does the law of increasing additional cost hold true for this nation? Why or why not?

*a. If the nation's residents increase production of consumption goods from 0 units to 10 units, the opportunity cost is 3 units of human capital forgone. If the nation's residents increase production of consumption goods from 0 units to 60 units, the opportunity cost is 100 units of human capital.*
*b. Yes, because successive 10-unit increases in production of consumption goods generate larger sacrifices of human capital, equal to 3, 7, 15, 20, 25, and 30.*

**2-14.** Like physical capital, human capital produced in the present can be applied to the production of future goods and services. Consider the table in Problem 2-13, and

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suppose that the nation's residents are trying to choose between combination C and combination F. Other things being equal, will the future production possibilities curve for this nation be located farther outward if the nation chooses combination F instead of combination C? Explain.

*No, because combination F entails production of less human capital than combination C, so choosing combination F today would result in a smaller output shift in the production possibilities curve than would be experienced if combination C were chosen instead.*

**2-15.** You can wash, fold, and iron a basket of laundry in two hours and prepare a meal in one hour. Your roommate can wash, fold, and iron a basket of laundry in three hours and prepare a meal in one hour. Who has the absolute advantage in laundry, and who has an absolute advantage in meal preparation? Who has the comparative advantage in laundry, and who has a comparative advantage in meal preparation?

*Because it takes you less time to do laundry, you have an absolute advantage in laundry. Neither you nor your roommate has an absolute advantage in meal preparation. You require 2 hours to fold a basket of laundry, so your opportunity cost of folding a basket of laundry is 2 meals. Your roommate's opportunity cost of folding a basket of laundry is 3 meals. Hence, you have a comparative advantage in laundry, and your roommate has a comparative advantage in meal preparation.*

**2-16.** Based on the information in Problem 2-15, should you and your roommate specialize in a particular task? Why? If so, who should specialize in which task? Show how much labor time you save if you choose to "trade" an appropriate task with your roommate as opposed to doing it yourself.

*Yes, you and your roommate should specialize in the task in which each of you has a comparative advantage. You should specialize in folding laundry and your roommate in preparing meals. If you fold a basket of laundry, you must forgo the time that it would take to prepare two meals. For your roommate to fold a basket of laundry, the time that it takes to prepare three meals must be given up. Suppose that you "trade" folding a basket of laundry for preparing 2.5 meals. You gain 0.5 meals, which is equivalent to one-half hour of meal preparation time. Hence, you save one-half hour for every basket of laundry you fold for your roommate in exchange for an hour of meal preparation time.*

**2-17.** Using only the concept of comparative advantage, evaluate this statement: "A professor with a Ph.D. in physics should never mow his or her own lawn, because this would fail to take into account the professor's comparative advantage."

*It may be that the professor is very proficient at doing yard work relative to teaching and research activities, so in fact the professor may have a comparative advantage in doing yard work.*

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**2-18.** Country A and country B produce the same consumption goods and capital goods and currently have identical production possibilities curves. They also have the same resources at present, and they have access to the same technology.
a. At present, does either country have a comparative advantage in producing capital goods? Consumption goods?
b. Suppose that country A now chooses to produce more consumption goods, compared with country B. Other things being equal, which country will experience the larger outward shift of its PPC during the next year?

*a. If the two nations have the same production possibilities, then they face the same opportunity costs of producing consumption goods and capital goods. Thus, at present neither has a comparative advantage in producing either good.*
*b. Because country B produces more capital goods today, it will be able to produce more of both goods in the future. Consequently, country B's PPC will shift outward by a greater amount next year.*

**2-19.** Suppose that in Figure 2-1, a student currently is allocating her study time in such a way that she is earning a C in mathematics and a C in economics. What is the opportunity cost, measured in terms of the resulting grade change, if this student wishes to reallocate her study time in order to raise her mathematics grade by one letter, from a C to a B?

*According to the figure, if the student makes the required reallocation of study time to earn a B in mathematics, then she will earn a D in economics. Thus, the student's opportunity cost of raising her grade by one letter grade, from a C to a B, is a one-letter grade drop in her economics grade, from a C to a D.*

**2-20.** Suppose that in Figure 2-1, a student currently is allocating her study time in such a way that she is earning a C in mathematics and a C in economics. If the student desires to boost her economics grade to an A, how must she alter the number of hours per week that she studies economics? How must she alter the number of hours per week that she studies mathematics?

*The student currently is allocating 3 hours per week of study time to mathematics and 3 hours per week of study time to economics. To boost her grade in economics from a C to an A, she must devote all 6 hours of available study time to economics, so she must increase the amount of time she spends studying economics by 3 hours per week. To attain a grade of A in economics, she can devote none of her weekly study hours to mathematics, so she must decrease the amount of time she devotes to studying mathematics by 3 hours per week.*

**2-21.** Suppose that in Figure 2-2, the nation currently is producing combination D in the table and on the graph of the production possibilities curve. What is the opportunity cost of producing 5 million more smartphones and moving to production combination C?

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*To move from combination D to combination C and produce 5 million more smartphones, instead of producing 30 million tablet devices at point D, at point C the nation is capable of producing only 20 million tablets. Thus, in order to move to point C, the nation must give up production of 10 million tablets (30 million tablets – 20 million tablets = 10 million tablets). The opportunity cost of the additional 5 million smartphones, therefore, is 10 million tablets.*

**2-22.** Suppose that in Figure 2-2, the nation currently is producing combination D in the table and on the graph of the production possibilities curve. What is the opportunity cost of producing 20 million more tablet devices and moving to production combination F?

*To move from combination D to combination F and produce 20 million more tablet devices at point F, instead of producing 45 million smartphones at point C, at point F the nation is capable of producing only 22.5 million smartphones. Thus, in order to move to point F, the nation must give up production of 17.5 million smartphones (45 million smartphones – 22.5 million smartphones = 17.5 million smartphones). The opportunity cost of the additional 20 million tablets, therefore, is 17.5 million smartphones.*

**2-23.** Suppose that in Figure 2-4, the nation currently has sufficient resources to produce combinations located along only the innermost production possibilities curve. In addition, suppose that the nation's residents have determined that smartphones function mainly as consumption goods while tablet devices function primarily as capital goods. If the nation produces no additional tablets this year, will the intermediate-shifted PPC resulting from minimal economic growth or the farthest-shifted PPC caused by more significant economic growth be more likely to apply next year?

*The nation is said to have determined that tablet devices are capital goods that can be used to produce more items in the future, whereas smartphones are consumption goods that cannot. Consequently, by producing no additional tablets this year, the nation has chosen to produce no new capital goods. Its economic growth will be minimal, so the intermediate-shifted PPC will result.*

**2-24.** Suppose that in Figure 2-4, the nation with otherwise the same background conditions as in Problem 2-23 currently has sufficient resources to produce combinations located along only the innermost production possibilities curve. If the nation produces no additional smartphones this year, will the intermediate-shifted PPC resulting from minimal economic growth or the farthest-shifted PPC caused by more significant economic growth be more likely to apply next year?

*The nation is said to have determined that tablet devices are capital goods that can be used to produce more items in the future, whereas smartphones are consumption goods that cannot. Consequently, by producing no additional smartphones this year, the nation has chosen to produce as many tablets—that is, capital goods—as feasibly can produce. Its economic growth will be substantial, so the farthest-shifted PPC will result.*

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