

CHAPTER ONE

LIMITS, ALTERNATIVES, AND CHOICES

CHAPTER OVERVIEW

This chapter begins with a discussion of the meaning and importance of economics. In this first chapter, however, we will not plunge into problems and issues; instead we consider some important preliminaries. We first look at the economic perspective—how economists think about problems. Second, we examine economists' use of the scientific method to investigate economic behavior and the economy, and distinguish between microeconomics and macroeconomics. Finally, we explore the fundamental economic problem facing both individuals and societies, and develop the budget line, production possibilities model, and marginal benefit/cost analysis to examine resource allocation decisions.

The appendix at the end of the chapter provides an introduction to graphical analysis. While this will be review material for most students, for some this may be new. Instructors are strongly urged to confirm that their students understand this section before proceeding. The software supplement can provide effective remedial help for those students who are not familiar with graphical analysis, or just a refresher.

WHAT'S NEW

- At the beginning of each chapter, the learning objectives have been modified to reflect tasks students should be able to complete.
- The definition of investment has been clarified by specifying that it is spending on production or accumulation of capital goods.
- When explaining the reason that money is not capital, it is now specified that money is not only used to buy capital goods, but also to buy goods and services.
- An opportunity cost example has been updated.
- An example of capital has been added—ovens that are used to bake loaves of bread.
- A more detailed explanation of entrepreneurs and their role in economic growth has been included.
- There are now questions and problems at the end of each chapter where the questions are analytical and open-ended while the problems are focused on computations.
- There are no longer questions that are designated as Key Questions.
- Web-based questions have been removed from each chapter and students are directed to the book's online learning center for questions that require information from the web.
- References in graphs, tables, questions, and problems have been updated to reflect the most current data available.
- The Chapter One Appendix: Graphs and Their Meaning has been converted from Web-Only content into the main product.

LEARNING OBJECTIVES

After reading this chapter, students should be able to:

1. Define economics and the features of the economic perspective. (LO 1-1)
2. Describe the role of economic theory in economics. (LO 1-2)
3. Distinguish microeconomics from macroeconomics. (LO 1-3)
4. List the categories of scarce resources and nature of the economizing problem. (1-4)
5. Apply production possibilities analysis, increasing opportunity costs, and economic growth. (1-5)
6. (Chapter appendix) Understand graphs, curves, and slopes as they relate to economics. (1-6)

COMMENTS AND TEACHING SUGGESTIONS

1. This chapter and related classroom activities will set the tone for the rest of the course. The methods used in the initial class meetings set the expectations and attitudes of the students. Making dramatic changes later can be confusing and the outcome less successful than desired. Please refer to the “Getting Started” section in the introduction for detailed suggestions. If you plan to make current events an integral part of the class, consider offering educational subscriptions to *The Wall Street Journal* or one of the weekly news or business publications such as *The Economist*.
2. Current news articles can help students understand and apply basic economic principles. Have students bring in a recent newspaper clipping or a printout of an online news article that relates to an economic principle or concept you are covering. Allow a few minutes of discussion per article, depending on how many. You may even want to require students to keep a journal of economic news events each week. At the end of the term, have students summarize what they have learned by incorporating the news articles they have collected.
3. On the level of personal decision making, students might be asked to list some of the economic choices they had to make that day or that week. This impresses upon them that, as Marshall said in the 1890s, “economics is the study of man in the ordinary business of life.” To illustrate the purposeful basis of their decisions, students could analyze one or two of these choices in terms of the alternatives they gave up. What other choices did they have? What criteria were used to judge the alternatives? A discussion of how rational our decisions are might also follow, providing an opportunity to introduce problems such as imperfect information and short- versus long-term objectives.
4. To personalize the concept of opportunity cost, ask what else they could be doing during a specific economics class; what are their forgone alternatives? Why might it be more expensive for older students to attend the class than younger ones? Encourage students to find examples of opportunity cost in newspaper articles and magazines. Choice is a necessary part of life; every action has its costs and benefits. Identifying and quantifying these trade-offs is at the heart of economic analysis. You may also want to use the following illustration to facilitate student understanding of opportunity cost.

Concept Illustration—Opportunity Cost

The concept of opportunity cost can be illustrated through the eyes of a small child. Suppose that a young girl named Amber receives a \$30 gift certificate from her grandparents to be used at Toys4Me. The grandparents take the girl to the store, where she spots several toys she would like—all priced above \$30. After gaining a sense of what is affordable, Amber narrows her focus to small stuffed animals (\$10 each) and picture books (\$5 each).

The grandparents tell Amber that she can buy three stuffed animals, six books, or some limited combinations of the two items. She initially settles on one stuffed animal at \$10 and four picture books at \$5 each. The grandparents assure her that this selection works; it will exactly use up the \$30 certificate. Amber takes the goods to the checkout counter.

But while waiting to pay, she changes her mind. She decides she wants another stuffed animal because they are so cute. What should she do? The grandparents tell her to go pick out a second stuffed animal and then return two of her four books to the shelf. She makes the exchange, ending up with two stuffed animals at \$10 each and two picture books at \$5 each.

From an adult's perspective, the second stuffed animal cost \$10. But in the eyes of the child, *it cost two picture books*. To get the second stuffed animal, Amber had to give up two books. That sacrifice was the *opportunity cost* of her last-minute decision. Amber's way of looking at cost is one of the fundamental ideas in economics.

5. Read the following poem to the students (or have them read it on their own) and discuss how it relates to the concepts of choice and forgone opportunities. Robert Frost describes coming to a crossroads in the woods and choosing the road less traveled that "made all the difference." You can open up discussion by asking students if the traveler made the right choice. What was the trade-off or best alternative forgone? Is the choice rational? What do you need to know before making a choice? Use this exercise to help students understand that some choices are not easy to make, especially when there is not enough information given, and that once a choice is made, we must accept the consequence or outcome.

Concept Illustration—Opportunity Cost

*Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;*

*Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that, the passing there
Had worn them really about the same,*

*And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet how way leads on to way,
I doubted if I should ever come back.*

*I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by,
And that has made all the difference.*

Robert Frost

The Road Not Taken, 1915

6. There are many dimensions to the topic of "utility" that introductory students will benefit from contemplating. With these many dimensions comes the danger in taking students too deep too quickly. It is useful for students to understand that utility may be obtained both through material and nonmaterial means. Accordingly, it may be difficult to express how much one is willing to pay (or otherwise sacrifice) to obtain utility through a given activity.

When discussing purposeful (rational) behavior, and seemingly irrational decisions, it may be useful to point out that for some people their utility is interdependent. You can have a bit of fun

telling students that economists define love as “strongly interdependent utility functions.” The main point, of course, is that there are many situations where people obtain utility through seeing others having material and nonmaterial wants satisfied. Likewise, some gain utility from watching others suffer, even if it means that they are themselves worse off in material terms. One could mention Gary Becker’s theory of employer taste for discrimination, where a utility-maximizing discriminatory employer sacrifices profits in order to maximize utility.

If a question arises about the measurement of utility, the distinction between cardinal and ordinal utility can be made, but there is little to be gained from an elaborate discussion. Students may find it interesting that Jeremy Bentham envisioned some sort of “util-o-meter,” a contraption that one might strap to the head to record brain waves in an attempt to measure utility from an activity. Even suggesting that one might use “utils” as a measure of satisfaction often amuses students and helps them better recall the concept.

7. Introductory students are often eager to find exceptions to commonly accepted economic theories. Depending on time constraints and interest, you may want to address how models simplify or abstract from reality. While this does make them more susceptible to error, it also makes them useful. Several noneconomic examples exist to illustrate the importance of models or simplification—for example, explaining that a road map is an abstraction or simplification of the real world. The amount of detail on any road map would be determined by the needs of the traveler, i.e., “I need to travel between Chicago and Denver as quickly as possible,” versus, “I would like to visit some historical museums as I am traveling through Nebraska.” Neither road map would have the details of the real world. Devoting some time and effort to this point can help students see the importance of using economic models to represent the real world (as opposed to attempting to describe every economic relationship or activity in exacting detail). You may wish to share the piece below with your students to illustrate the point.

Concept Illustration—Abstractions and Models

“What do you consider the largest map that would be really useful?”

“About six inches to the mile.”

“About six inches!” exclaimed Mein Herr. “We very soon got six yards to the mile. And then came the grandest idea of all! We actually made a map of the country on a scale of a mile to a mile!”

“Have you used it much?” I enquired.

“It has never been spread out yet,” said Mein Herr. “The farmers objected. They said it would cover the whole country and shut out the sunlight!”

Lewis Carroll

Silvie and Bruno, 1889

In many ways, good economic models are like good maps. Both are abstractions that purposely leave out irrelevant facts and circumstances. Both are useful and practical *because* they simplify complex realities.

Maps not only help us understand geographical relationships but also serve as useful tools. A road map of the United States, for instance, helps us understand where Connecticut is located relative to California. It also is highly practical in helping us drive between Indiana and Idaho.

In much the same way, economic models are helpful and useful. For example, a model indicating how consumers respond to a change in a product’s price helps us understand a significant facet of

human behavior. That model also is highly practical. Among other things, it identifies the primary way a business can reduce an overstock of unsold goods.

The appropriate map or appropriate economic model is the simplest one that accomplishes a specific goal. Although we may need a highly detailed street map of Cleveland to find a specific residence there, we need only a general road map to drive between Cleveland and Columbus. Similarly, we need a highly complex, detailed economic model to predict the economic effects of a general reduction of U.S. tariffs (taxes on imported goods) on the relative outputs of various U.S. industries. In contrast, a much simpler model will suffice to show how a reduced U.S. tariff on imported beef will affect the total consumption of beef in the United States.

You will discover many economic models in your study of economics. The trick is to use the right model for the right purpose. Think of these models as highly useful, highly practical “maps,” which help us better understand elements of the highly complex economy.

8. The section on theory, principles, and models can be used to explain what economists do when employed in both the private and public sectors. An economist may be asked by his/her railroad employer to determine how the company should best allocate its box cars, or a legislative aide may be asked to research the effects of a state’s current welfare-to-work program.
9. The marginal benefit equals marginal cost rule is one that economics majors and minors will see repeatedly over their course of study. The centrality of the concept should be emphasized and reinforced with additional examples. You may want to use examples that lead them to the corollary rule of marginal revenue equal to marginal cost (that they will see later in the text).
10. The problems of underdeveloped countries could also be used to illustrate the seriousness of choosing between capital goods and consumer goods. Focusing a project on the problems of a single developing country can be interesting. It would allow students to make many comparisons including the impact of differing economic systems, degree of government regulation, environmental quality standards, differences in resource availability, climate, educational levels, and the choice between consumer and capital goods.

STUDENT STUMBLING BLOCKS

1. Instructors cannot take for granted students’ background knowledge of economics. Students generally have no idea about the magnitude of common economic measurements and, therefore, their reading of the news may be colored by this lack of knowledge. One teaching tip that has worked for others is to give students a pretest during the first week of class, in which simple questions are asked about the U.S. economy. For example, questions can be asked about the size of population and labor force, unemployment and inflation rates, GDP, federal budget, deficits and debt. You will find wildly different answers to these questions with most far away from “ball park” figures. This exercise accomplishes two things. First, it lets students know that they have a lot to learn about “everyday” news items. Second, the correct answers can give them some early perspective on news events as they relate to the course. As the course progresses, don’t forget to reinforce these facts by reminding students of them.
2. The specialized definitions in economics sometimes frustrate students, especially when they are familiar with a term in a different context. You may wish to use the following piece to help students appreciate that specialized definitions are common in our everyday lives.

Concept Illustration— Specialized Definitions

*"Then you should say what you mean," the March Hare went on.
 "I do," Alice hastily replied; "at least I mean what I say—that's the same thing you know."
 "Not the same thing a bit!" said the Hatter.
 "Why, you might just as well say that 'I see what I eat' is the same thing as 'I eat what I see!'"*

Lewis Carroll,
Alice in Wonderland, 1865

In an indirect way, the specialized terms used in games such as soccer, baseball, bowling, and so forth provide insights on the study of economics. Consider the game of pool, for example. The following terms are used in pool but have slightly or totally different meanings in everyday language: "pool," "cue," "kiss," "bank," "bridge," "combination," "break," "lag," "run," "rack," "scratch," "chalk," and "rail." Economics, too, uses terms that have different meanings than in everyday usage. In economics "labor" usually means all productive effort, not simply blue-collar workers; "capital" means human-made productive resources, not money used to buy resources. Also, "investment" means purchase of capital goods, not purchases of stocks and bonds; "public good" means goods that have special characteristics, not the good of society; and so forth.

Learning to communicate in the game of pool (or any other game) requires learning the meaning of specialized terms. It's the same with economics! It is not enough to "mean what you say," in economics. To communicate effectively (and to do well on exams!) you must "say what you mean," using the precise terms of the discipline.

3. Principles of economics students are often frustrated by the apparent lack of precision and definitive answers in the discipline. Such students are not alone in their frustration. President Harry S. Truman is quoted as saying "Give me a one-handed economist!" Truman was frustrated with his economic advisers providing multiple perspectives rather than definitive answers. Economists establish a framework of purposeful (or rational) decision making based on maximizing utility, only to have that utility be immeasurable, or decision outcomes to be less than optimal because of imperfect information or seemingly irrational behavior. It is important to help students understand that, among other things, they are gaining more of an analytical toolkit than a set of hard-and-fast rules or immutable natural laws. To help students appreciate this, it is useful to appeal back to the road map illustration. Using a road map, one can find the shortest (and presumably fastest) route from one point to another. Even if someone has driven a route many times, there are factors such as traffic, weather, and road construction that may cause the otherwise quickest route to be less than ideal for that day's travel. Maps, like economic models, are often effective at telling people what they need to know. They are, however, limited in their effectiveness by factors beyond view.
4. Students sometimes question how "labor" and "entrepreneurship" differ. Some students may also be familiar with the term "human capital" although this term is not explicitly discussed in the text. Provide numerous examples to help students understand the differences. Bill Gates, CoCo Chanel, Sam Walton, Michael Dell, and Walt Disney are great examples of entrepreneurs. While labor represents the effort of individuals to produce goods and services, human capital is the accumulated knowledge, skill, and experience of the labor force.
5. In the discussion of marginal analysis, students often bring up examples that include "sunk" costs. For example, if you ask students why they came to class, many will answer that they paid tuition and imply that they would somehow lose that money if they didn't attend. If probed further,

however, students will acknowledge that the college is unlikely to refund their money for any missed classes. That doesn't mean there wouldn't be future expenditures (paying tuition later to retake a failed class). It also doesn't mean that there aren't some psychological benefits to "getting what you paid for," but many students will erroneously identify that tuition payment as a marginal cost of attending a given day of class. While your intention may be to discuss sunk costs in a later chapter, student questions and discussion may require you to be prepared to introduce the concept earlier. Many students, even those in more advanced courses, frequently make the mistake of assuming that marginal benefits and/or marginal costs are always constant. One could utilize the low-hanging fruit principle in an example to illustrate the general principle of increasing marginal cost.

6. The "Applying the Analysis" on the September 11, 2001, terrorist attacks and subsequent wars in Afghanistan and Iraq may elicit emotional and/or politically charged responses from students. While one must be sensitive, especially regarding those directly and negatively impacted by those events, it presents an opportunity to demonstrate how economists attempt to detach their emotional and political biases to achieve a more objective economic analysis. It is also an opportunity to point out that the usual role of the economist is to tell us what choices are available, and the opportunity cost of those choices, not what choices should be made.
7. The production possibilities curve simplifies many concepts for students who don't have "graph anxiety." However, for those who are uncomfortable with graphs, this model may confuse rather than simplify. Computerized tutorials will be especially helpful for these students.
8. The appendix on graphical analysis is a useful supplement for those students who have weak backgrounds in reading or constructing simple graphs. There is often a wide disparity among student abilities here. You may wish to have a remedial session and special assignments for students deficient in graphing skills. Comparing graphs to maps seems to help students who have "graph anxiety."

LECTURE NOTES

I. Definition of Economics

- A. The social science that studies how individuals, institutions, and society make optimal choices under conditions of scarcity.
- B. Human wants far exceed the ability (limited resources) to satisfy them.

II. The Economic Perspective

- A. Scarcity and Choice
 1. Resources can only be used for one purpose at a time.
 2. Scarcity requires that choices be made.
 3. The cost of any good, service, or activity is the value of what must be given up to obtain it. This is known as the opportunity cost.
- B. Illustrating the Idea: Did Zuckerberg, Swift, and Lawrence Make Bad Choices?
 1. On average, college graduates earn around twice as much as those with just high school diplomas.
 2. Zuckerberg, Swift, and Lawrence all gave up college to pursue their careers, each believing he or she could earn more by forgoing or delaying college.
 3. Differences in opportunity costs help explain why people make different choices.
- C. Purposeful Behavior
 1. Rational self-interest entails making decisions to achieve maximum utility.
 2. Individuals weigh costs and benefits in an effort to reach decisions that will maximize their satisfaction.

3. Purposeful (or rational) behavior does not preclude bad decisions from faulty logic or bad information.
 4. Rational self-interest is not the same as selfishness.
- D. **Marginalism: Comparing Benefits and Costs**
1. Most decisions concern a change in current conditions; therefore, the economic perspective is largely focused on marginal analysis.
 2. Each option considered weighs the marginal benefit against the marginal cost, where “marginal” means “extra,” “additional,” or “a change in.”
 3. Whether the decision is personal or one made by business or government, the principle is the same.
 4. The marginal cost of an action should not exceed its marginal benefits.
 5. Marginal costs are also always opportunity costs.
- E. **Applying the Analysis: Fast Food Lines**
1. People choose the shortest line to reduce time cost.
 2. Lines tend to have equal lengths as people shift from longer to shorter lines in an effort to save time.
 3. Lines are chosen based on length without much other information—cost of obtaining more information is not worth the benefit.
 - a. Imperfect information may lead to an unexpected wait.
 - b. Imperfect information may cause some people to leave when they see a long line.
 4. When a customer reaches the counter, other economic decisions are made about what to order. These choices are all purposeful, made after the consumer compares the costs and benefits of possible choices.

III. Theories, Principles, and Models

- A. Economists use the scientific method to establish theories, laws, and principles.
1. The scientific method consists of:
 - a. The observation of facts (real data).
 - b. The formulations of explanations of cause-and-effect relationships (hypotheses) based upon the facts.
 - c. The testing of the hypotheses.
 - d. The acceptance, rejection, or modification of the hypotheses.
 - e. Continued testing of a hypothesis, leading to determination of a theory, law, principle, or model.
 2. Principles are purposeful simplifications used to explain and/or predict the behavior of individuals and institutions.
 3. Terminology—Principles, laws, theories, and models are all terms that refer to generalizations about economic behavior. They are used synonymously in the text, with custom or convenience governing the choice in each particular case.
 4. Generalization—Economic principles are expressed as the tendencies of the typical or average consumer, worker, or business firm.
 5. “Other things equal” or *ceteris paribus* assumption—In order to judge the effect one variable has upon another, it is necessary to hold other contributing factors constant. Natural scientists can test with much greater precision than can economists. They have the advantage of controlled laboratory experiments. Economists must test their theories using the real world as their laboratory.
 6. Graphical expression—many economic relationships are quantitative, and are demonstrated efficiently with graphs.

IV. Microeconomics and Macroeconomics

- A. Microeconomics looks at specific economic units.

1. It is concerned with decision making by individual consumers, households, and business firms. The detail of their behavior is observed and analyzed.
 2. It is an examination of the sand, rocks, and shells, not the beach.
 - B. Macroeconomics examines the economy as a whole.
 1. It includes measures of total output, total employment, total income, aggregate expenditures, and the general price level—aggregates.
 2. It is a general overview examining the beach, not the sand, rocks, and shells.
- V. Individual's Economic Problem**
- A. All individuals and societies face the economic problem.
 1. The means to satisfy wants (time, money, resources) are limited (scarce).
 2. An individual's income is finite and comes in the form of wages, rent, interest, and profit.
 3. Economic wants are unlimited and include both necessities (food, shelter, clothing) and luxuries (diamonds, caviar, yachts).
 - B. Budget Line (Figure 1.1)
 1. An individual's income limits can be represented graphically with a budget line (or budget constraint).
 2. It shows the various combinations of two goods a consumer can purchase with a specific money income, given the products' prices.
 3. Combinations on or inside the budget line are attainable.
 4. Combinations beyond the budget line are unattainable.
 5. The negative slope of the budget line represents the opportunity cost (trade-off) of one good in terms of the other.
 6. The constant slope indicates constant opportunity cost—the trade-off is unchanged whether buying the first or last possible unit of a good.
 7. The budget constraint forces people to choose, weighing marginal benefits and marginal costs in order to maximize satisfaction.
 8. Increases in income shift the budget line to the right, allowing the consumer to buy more.
- VI. Society's Economic Problem**
- A. Scarce resources—Economic resources are limited relative to wants.
 - B. Resource categories
 1. Economic resources refer to all natural, human, and manufactured resources used in the production of goods and services.
 2. Economic resources are sometimes called factors of production and include four categories:
 - a. Land or natural resources ("gifts of nature").
 - b. Labor or human resources, which include physical and mental activities that people contribute to the production of goods and services.
 - c. Capital or investment goods that are all manufactured aids to production like tools, equipment, factories, transportation, etc.
 - d. Entrepreneurial ability—a special kind of human resource that provides four important functions:
 - i. Takes initiative to combine resources needed for production.
 - ii. Makes strategic business policy decisions.
 - iii. Innovates to commercialize new products, production techniques, and organizational forms.
 - iv. Bears the risk of time, effort, and funds.
- VII. Production Possibilities Model**
- A. Assumptions:
 1. Economy is employing all available resources (full employment).
 2. Available supply of resources is fixed in quantity and quality at this point in time.

3. Technology is constant during analysis.
4. Economy produces only two types of products:
 - a. Consumer goods satisfy wants directly, and
 - b. Capital goods indirectly satisfy wants by aiding production of consumer goods.
- B. Production Possibilities Table (Figure 1.2)
 1. Lists the combinations of consumer and capital goods that can be produced given a set of resources and technology, and assuming full employment.
 2. Choices now impact future production possibilities—by forgoing more now, society can have much more later.
- C. Production Possibilities Curve (Figure 1.2)
 1. The production possibilities curve is a graphical representation of the constraints, analogous to the individual's budget line.
 2. Points on the curve represent maximum possible combinations of manufacturing equipment and food products given resources and technology.
 3. Points inside the curve represent underemployment or unemployment.
 4. Points outside the curve are unattainable at present.
- D. Law of increasing opportunity costs:
 1. The amount of other products that must be sacrificed to obtain more of any given product is called the opportunity cost.
 2. Opportunity costs are measured in terms of real goods rather than money (market prices are not part of the production possibilities model).
 3. The more of a product produced, the greater is its (marginal) opportunity cost.
 4. The slope of the production possibilities curve becomes steeper, demonstrating increasing opportunity cost. This makes the curve appear bowed out, concave from the origin.
 5. Economic Rationale:
 - a. Economic resources are not completely adaptable to alternative uses.
 - b. To get increasing amounts of food products, resources not particularly well suited for that purpose must be used. Workers that are accustomed to producing manufacturing equipment on an assembly line may not do as well processing food.
- E. Optimal allocation (or best product mix):
 1. It will be some point on the curve.
 2. Society will receive maximum satisfaction at the combination where marginal benefit equals marginal cost ($MB = MC$). If $MB > MC$, the activity should increase to the point where $MB = MC$. If $MB < MC$, the activity should decrease to the point where $MB = MC$.
 3. Graphically, the optimal allocation occurs where the marginal benefit curve and marginal cost curve intersect (at 200,000 units of food in Figure 1.3, alternative C on Figure 1.2).
- F. **Applying the Analysis: The Economics of War**
 1. The costs of the war on terrorism at the end of 2017 were estimated to exceed 1.7 trillion.
 2. Any society must decide how to allocate resources between “defense goods” and “civilian goods,” where the optimal allocation is found where $MB = MC$.
 3. The terrorist attacks of September 11, 2001, caused many U.S. leaders to conclude that the marginal benefits of defense goods are now greater than before, shifting the MB curve to the right (outward).
 4. The outward shift of the MB curve would result in an increase in the optimal quantity of defense goods relative to civilian goods.

VIII. Unemployment, Growth, and the Future

- A. Unemployment results in an economy producing inside its production possibilities curve (point *U* in Figure 1.4). This requires dropping the assumption of full employment.

- B. An outward shift of the production possibilities curve allows an economy to grow (Figure 1.5).
 - 1. Increasing resource supplies (labor force, stock of capital) shifts the curve out, increasing the potential output of all goods.
 - 2. Improved quality of resources (better-educated labor force) increases production possibilities.
 - 3. Advances in technology allow an economy to produce more with a given supply of resources, and are represented by an outward shift of the curve.
- C. **Applying the Analysis: Information Technology and Biotechnology**
 - 1. Advances in computer technology have reduced their cost and increased their speed.
 - 2. Software improvements have expanded the capabilities (production possibilities) of computers.
 - 3. Cellular phones and the Internet have improved communication, reducing costs and expanding production capabilities.
 - 4. Biotechnology advances have improved production in agriculture and medicine.
- D. Present Choices and Future Possibilities
 - 1. Present choices about consumer and capital goods affect future production possibilities.
 - 2. Presentville's decision to produce more goods for the present (consumer goods) and less goods for the future (capital) will result in a smaller outward shift than Futureville's decision to produce more capital (Figure 1.6).

IX. Appendix: Graphs and Their Meaning

- A. Graphs help to visualize and understand economic relationships. Most of our economic models are represented with two-dimensional graphs.
- B. Construction of a graph
 - 1. The independent variable or determining factor is represented on the horizontal axis while the dependent variable is represented on the vertical axis.
 - 2. The axes are marked using convenient increments and fit the data given (Figure 1A.1).
 - 3. Each point within the graph represents two pieces of information, the quantity of the variable on the horizontal, or x-axis and the corresponding quantity of the variable on the vertical, or y-axis (Figure 1A.1).
- C. Direct and inverse relationships
 - 1. If two variables change in the same direction (an increase in one is associated with an increase in the other), it is a direct or positive relationship (Figure 1A.1).
 - 2. If the two sets of data move in opposite directions, they are inversely or negatively related (Figure 1A.2).
- D. Dependent and independent variables
 - 1. Economists are often interested in determining which variable is the "cause" and which the "effect."
 - 2. Mathematicians always place the independent variable (cause) on the horizontal axis and the dependent variable (effect) on the vertical axis.
 - 3. Economists' graphing of independent and dependent variables is more arbitrary; historically they put price or cost data on the vertical axis.
- E. Other things equal
 - 1. Economists employ the *ceteris paribus* rule when constructing graphs because of the limitations of only easily being able to graph in two dimensions.
 - 2. All other factors that may influence the relationship between the two variables considered are presumed constant. If any of these other factors change, a new plot of the relationship must be made because the functional relationship between the dependent variable and graphed independent variable has changed.
- F. Slope of a line

1. The slope of a straight line is the ratio of the vertical change to horizontal change between any two points on the line, or “rise over run.”
2. Positive slope: both variables change in the same direction (a positive or direct relationship).
3. Negative slope: both variables change in the opposite direction (an inverse or negative relationship).
4. Economic analysis is often concerned with marginal changes, the relative change in one variable with respect to another; it is this *rate of change* that is measured by the slope.
5. Lines that are parallel with either the horizontal or vertical axis indicate that the two variables are unrelated, that is, a change in one variable has no effect on the value of the other.
 - a. A vertical line has an infinite slope (Figure 1A.3a).
 - b. A horizontal line has a zero slope (Figure 1A.3b).
6. The slope of a nonlinear curve changes from one point to another (Figure 1A.4).
 - a. A straight line that is tangent to a curve at a specific point can be used to measure the slope at that point.
 - b. The curve has a different slope (a different tangent line) at each specific point.
 - c. The flatter the part of the curve, the less negative is the slope.

QUIZ

1. Economics is a social science concerned with:
 - A. How individuals, institutions, and society make choices under conditions of scarcity.
 - B. Increasing the level of productive resources so there is a minimum level of income.
 - C. Increasing the level of productive resources so there is maximum output in society.
 - D. The best use of scarce resources paid for at the minimum level of cost to consumers and businesses.

Answer: A

2. A person should consume more of something when its marginal:
 - A. Benefit exceeds its marginal cost.
 - B. Cost exceeds its marginal benefit.
 - C. Cost equals its marginal benefit.
 - D. Benefit is still positive.

Answer: A

3. The process of developing hypotheses, testing them against facts, and using the results to construct theories is called:
 - A. Opportunity cost calculation.
 - B. Microeconomics.
 - C. Marginal analysis.
 - D. The scientific method.

Answer: D

4. Which is an illustration of a microeconomic question?
 - A. What is the current national rate of unemployment?
 - B. Is the economy experiencing a decline in the rate of inflation?
 - C. Will a new type of television set increase the number of buyers?
 - D. Is the production of goods and services in the economy greater this year than last year?

Answer: C

5. A schedule or curve that shows the various combinations of two products a consumer can purchase with a specific amount of money income is:
- A. A trade-off.
 - B. A budget line.
 - C. A tangent point.
 - D. A production possibilities line.

Answer: B

6. Which of the following is real capital?
- A. A pair of stockings
 - B. A construction crane
 - C. A savings account
 - D. A share of IBM stock

Answer: B

7. A point inside a production possibilities curve best illustrates:
- A. Unemployment.
 - B. The efficient use of resources.
 - C. The use of best-available technology.
 - D. Unlimited wants.

Answer: A

8. A normative statement is one that:
- A. Is based on the law of averages.
 - B. Applies only to microeconomics.
 - C. Applies only to macroeconomics.
 - D. Is based on value judgments.

Answer: D

9. The problems of aggregate inflation and unemployment are:
- A. Major topics of macroeconomics.
 - B. Not relevant to the U.S. economy.
 - C. Major topics of microeconomics.
 - D. Peculiar to command economies.

Answer: A

10. On a production possibilities curve, the single optimal or best combination of output for any society:
- A. Is at a point near the top of the curve.
 - B. Is at the precise midpoint of the curve.
 - C. Is at a point near the bottom of the curve.
 - D. Depends upon the preferences of society.

Answer: D