Economics 9th edition Hubbard Solutions Manual

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CHAPTER 1 | Economics: Foundations and Models

Brief Chapter Summary and Learning Objectives

1.1 Three Key Economic Ideas, page 4

Explain these three key economic ideas: People are rational, people respond to economic incentives, and optimal decisions are made at the margin.

- Because resources are scarce, people must make choices to attain their goals.

1.2 The Economic Problem That Every Society Must Solve, page 9

Discuss how an economy answers these questions: What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

- Because of scarcity, producing more of one good or service means that less of some other good or service will be produced.

1.3 Economic Models, page 10

Explain how economists use models to analyze economic events and government policies.

- Economists use models—simplified versions of reality—to analyze real-world issues.

1.4 Microeconomics and Macroeconomics, page 12

Distinguish between microeconomics and macroeconomics.

- Microeconomics is the study of how households and firms make choices, while macroeconomics is the study of the economy as a whole

1.5 Economic Skills and Economics as a Career, page 13

Describe economics as a career and the key skills you can gain from studying economics.

- Individuals, managers, and government policymakers can all benefit from applying economic concepts when they make decisions.

1.6 A Preview of Important economic Terms, page 13

Define important economic terms.

Appendix: Using Graphs and Formulas, page 14

Use graphs and formulas to analyze economic situations.

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Key Terms

Allocative efficiency, p. 8 A state of the economy in which production is in accordance with consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.

Centrally planned economy, p. 8 An economy in which the government decides how economic resources will be allocated.

Economic model, p. 10 A simplified version of reality used to analyze real-world economic situations.

Economic variable, p. 11 Something measurable that can have different values, such as the number of people employed in manufacturing.

Economics, p. 4 The study of the choices people make to attain their goals, given their scarce resources.

Equity, p. 8 The fair distribution of economic benefits.

Macroeconomics, p. 12 The study of the economy as a whole, including topics such as inflation, unemployment, and economic growth.

Marginal analysis, p. 4 Analysis that involves comparing marginal benefits and marginal costs.

Market, p. 4 A group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

Market economy, p. 8 An economy in which the decisions of households and firms as they interact in markets determine the allocation of economic resources.

Microeconomics, p. 12 The study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices.

Mixed economy, p. 8 An economy in which most economic decisions result from the interaction of buyers and sellers in markets but in which the government plays a significant role in the allocation of resources.

Normative analysis, p. 11 Analysis concerned with what ought to be.

Opportunity cost, p. 7 The highest-valued alternative that must be given up to engage in an activity.

Positive analysis, p. 11 Analysis concerned with what is.

Productive efficiency, p. 8 A state of the economy in which every good or service is produced at the lowest possible cost.

Scarcity, p. 4 A situation in which unlimited wants exceed the limited resources available to fulfill those wants.

Trade-off, p. 7 The idea that, because of scarcity, producing more of one good or service means producing less of another good or service.

Voluntary exchange, p. 8 A situation that occurs in markets when both the buyer and the seller of a product are made better off by the transaction.

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Chapter Outline

Should Apple Manufacture the iPhone in the United States?

Although Apple designs the iPhone at its headquarters in Cupertino, California, most iPhones are assembled in China. Many products that were once manufactured in the United States are now manufactured overseas. Tariffs lead to higher prices for imported goods, making it more likely that U.S. and foreign companies will manufacture goods in the United States. In the summer of 2022 Congress passed the Chips and Science Act of 2022, which included $53 billion in federal government assistance to private firms that construct new semiconductor factories in the United States or to expand existing factories. In a market system, firms respond to economic incentives. In the case of Apple, lower wages earned by Chinese workers reduce the costs of assembling iPhones. Technological progress often creates incentives for firms to change how they produce goods and services. Firms also respond to changes in consumer tastes. When more people began using smartphones rather than computers, they reduced their demand for computers. Firms like Apple responded by shifting resources from producing computers in order to produce smartphones.

Teaching Tips

Here are special features in the textbook:

1. The introduction, or chapter opener, uses a real-world business example to preview the economic issues discussed in the chapter. Examples within the chapter often link back to that chapter-opening example. A video of each chapter opener appears within MyLab Economics and the eText.
2. At the end of each of the first four textbook chapters is a feature titled An Inside Look that consists of a recent news article plus analysis, graph, and questions. The article links back to a topic discussed in the chapter opener. Visit MyLab Economics for additional current news articles.
3. A boxed feature titled Economics in Your Life & Career complements the business example that opens the chapter. This feature poses questions that help students make a personal connection with the chapter theme. At the end of the chapter, the authors use the concepts described in the chapter to answer these questions. *Extra* Economics in Your Life & Career features are included in select chapters of this Instructor's Manual.
4. A boxed feature titled Don't Let This Happen to You alerts students to common pitfalls covered in that chapter.
5. There are between two and four *Apply the Concept* features in each chapter that provide real-world reinforcement of key concepts by citing news stories that focus on business and policy issues. A video of each *Apply the Concept* appears within MyLab Economics and the eText. *Extra Apply the Concept* features appear in this Instructor's Manual.
6. *Solved Problems* use a step-by-step process for solving economic problems. *Extra Solved Problems* are included in this Instructor's Manual.
7. *Real-Time Data* (*RTDA*) *Exercises* are included with problems at the end of macroeconomics chapters. These exercises refer to data and graphs that students will find at the web site of the Federal Reserve Bank of St. Louis (FRED). Many exercises require more elaborate calculations than other problems and the use of Excel spreadsheets.

You can use these features as the basis for classroom discussion, homework assignments, and examination questions.

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Teaching Tips

Hubbard/O'Brien Blog

Visit **http://hubbardobrieneconomics.com** for the following updates for instructors and students:

- Frequently posted podcast recordings with authors Glenn Hubbard and Tony O'Brien, and occasional guests, discussing key economic topics in the news
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People must make choices as they try to attain their goals. The choices people make represent the trade-offs made necessary by scarcity. **Scarcity** is a situation in which unlimited wants exceed the limited resources available to fulfill those wants. **Economics** is the study of the choices people make to attain their goals, given their scarce resources.

Teaching Tips

Students will better understand what scarcity means if given examples of things that are *not* scarce. Suggest examples of "free" resources—sand on a beach and fresh air—and ask your students to contribute their own examples. They will soon realize that the list of free resources is much shorter than the list of scarce resources.

1.1 Three Key Economic Ideas

Learning Objective: Explain these three key economic ideas: People are rational, people respond to economic incentives, and optimal decisions are made at the margin.

A **market** is a group of buyers and sellers of a good or service and the institution or arrangement by which they come together to trade.

A. People Are Rational

Rational consumers and firms use all available information as they act to achieve their goals. Although not everyone behaves rationally all the time, the assumption of rational behavior is useful in explaining most of the choices people make.

B. People Respond to Economic Incentives

Economists emphasize that individuals and firms consistently respond to economic incentives.

C. Optimal Decisions Are Made at the Margin

Economists use the word marginal to mean an extra or additional benefit or cost from making a decision. The optimal decision is to continue any activity to the point where the marginal benefit equals the marginal cost. **Marginal analysis** is analysis that involves comparing marginal benefits and marginal costs.

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Extra Solved Problem 1.1A

A Doctor Makes a Decision at the Margin

A doctor receives complaints from patients that her office isn't open enough hours. In response, the doctor asks her office manager to analyze the effect of keeping her office open 9 hours per day rather than 8 hours. The doctor's office manager tells her: "Keeping the office open an extra hour is a good idea because the revenue from your practice will increase by $300,000 per year when the office is open 9 hours per day." Do you agree with the office manager's reasoning? What, if any, additional information would you need to decide whether the doctor should keep her office open an additional hour per day?

Solving the Problem

Step 1: **Review the chapter material.** This problem is about making decisions, so you may want to review the section "Optimal Decisions Are Made at the Margin" in the textbook.

Step 2: **Explain whether you agree with the office manager's reasoning.** We have seen that any activity should be continued to the point where the marginal benefit is equal to the marginal cost, $MB = MC$. In this case, the doctor should keep her office open up to the point where the additional revenue she receives from seeing more patients is equal to the marginal cost of keeping her office open an additional hour. The office manager has provided information on marginal revenue but not on marginal cost. The office manager has not provided enough information to make a decision, so you should not agree with the office manager's reasoning.

Step 3: **Explain what additional information you need.** To make a correct decision, you would need information on the marginal cost of remaining open an extra hour per day. The marginal cost would include the additional salary to be paid to the office staff, any additional medical supplies that would be used, as well as any additional electricity or other utilities. The doctor would also need to take into account the nonmonetary cost of spending another hour working rather than spending time with her family and friends or in other leisure activities. The marginal revenue would depend on how many more patients the doctor can see in the extra hour. The doctor should keep her office open an additional hour if the marginal revenue of doing so is greater than the marginal cost. If the marginal cost is greater than the marginal revenue, then the doctor should continue to keep her office open for 8 hours.

Extra Analyze the Concept

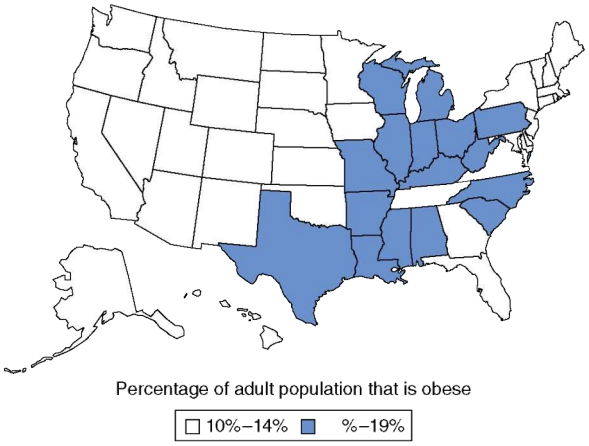
Does Health Insurance Give People an Incentive to Become Obese?

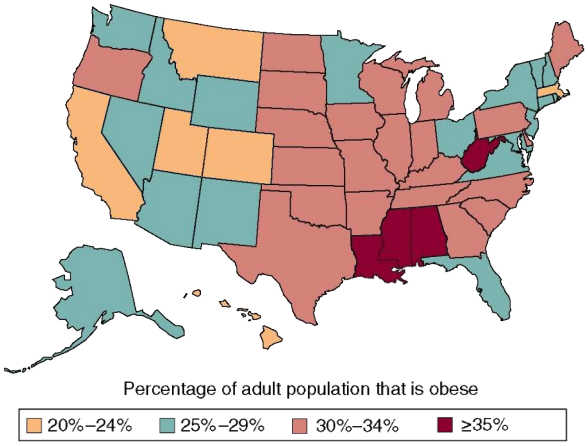
Obesity is a factor in a variety of diseases, including heart disease, stroke, diabetes, and hypertension, making it a significant health problem in the United States. Body mass index (BMI) is a measurement of a person's weight relative to the person's height. According to the U.S. Centers for Disease Control and Prevention (CDC), an adult with a BMI of 30 or greater is considered *obese*. For example, a 5'6" adult with a BMI of 30 is 40 pounds overweight.

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The following two maps show the dramatic increase in obesity between 1994 and 2015. In 1994, in a majority of states only between 10 percent and 14 percent of the adult population was obese, and in no state was more than 20 percent of the adult population obese.





By 2015, in every state, at least 20 percent of the adult population was obese, and in 44 states, at least 25 percent of the adult population was obese. Many people who suffer from obesity have underlying medical conditions. For these people, obesity is a medical problem that they cannot control. The fact that obesity has increased, though, indicates that for some people, obesity is the result of diet and lifestyle choices. Potential explanations for the increase in obesity include greater intake of high-calorie fast foods, insufficient exercise, and a decline in the physical activity associated with many jobs. The CDC recommends that teenagers get a minimum of 60 minutes of aerobic exercise per day, a standard that only 15 percent of high school students meet. In 1960, 50 percent of jobs in the United States required at least moderate physical activity. Today, only 20 percent of jobs do. As a result, a typical worker today who may work at a computer is burning off about 130 *fewer* calories per workday than a worker in the 1960s who was more likely to have worked in a manufacturing plant.

In addition to eating too much and not exercising enough, could having health insurance be a cause of obesity? Obese people tend to suffer more medical problems and so incur higher medical costs. Obese people with health insurance that will reimburse them for only part of their medical bills, or who have no health insurance, must pay some or all of these higher medical bills themselves. People with health insurance that covers most of their medical bills will not suffer as large a monetary cost from being obese. In other words, by reducing some of the costs of obesity, health insurance may give people an economic incentive to gain weight.

At first glance, this argument may seem implausible. Some people suffer from medical conditions that can make physical activity difficult or that can cause weight gain even with moderate eating, so these people may become obese, regardless of which type of health insurance they have. The people who are obese because of poor eating habits or lack of exercise probably don't consider health insurance when deciding whether to have a slice of chocolate cake or to watch Netflix instead of going to the gym. But if economists are correct about the importance of economic incentives, then we would expect that if we hold all other personal characteristics—such as age, gender, and income—constant, people with health insurance will be more likely to be overweight than people without health insurance.

Jay Bhattacharya and Kate Bundorf of Stanford University, Noemi Pace of the University of Venice, and Neeraj Sood of the University of Southern California, have analyzed the effects of health insurance on weight. Using a sample that followed nearly 80,000 people from 1989 to 2004, they found that after

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controlling for factors including age, gender, income, education, and race, people with health insurance were significantly more likely to be overweight than people without health insurance. Having private health insurance increased BMI by 1.3 points. Having public health insurance, such as Medicaid, which is a program under which the government provides health care to low-income people, increased BMI by 2.3 points. These findings do not mean that health insurance is the sole cause, or even the most important cause, of obesity. The findings do suggest that people respond to economic incentives even when making decisions about what they eat and how much they exercise. In Section 1.3, we will see that economists modify conclusions as they collect additional data.

Note: The exact formula for the body mass index is BMI = (Weight in pounds/Height in inches^2) x 703.

Sources: Centers for Disease Control and Prevention, "Prevalence of Self-Reported Obesity among U.S. Adults," www.cdc. gov; Katherine M. Flegal, Margaret D. Carroll, Cynthia L. Ogden, and Lester R. Curtin, "Prevalence and Trends in Obesity among U.S. Adults, 1999–2008," *Journal of the American Medical Association*, Vol. 303, No. 3, January 20, 2010, pp. 235–241; Jay Bhattacharya, Kate Bundorf, Noemi Pace, and Neeraj Sood, "Does Health Insurance Make You Fat?" in Michael Grossman and Naci H. Mocan, eds., *Economic Aspects of Obesity*, Chicago: University of Chicago Press, 2011; and Tara Parker-Pope, "Less Active at Work, Americans Have Packed on Pounds," *New York Times*, May 25, 2011.

Teaching Tips

Instructors do not need to spend a lot of class time explaining the material in Section 1.1; subsequent chapters will reinforce students' understanding of markets and the three key economic ideas.

1.2 The Economic Problem That Every Society Must Solve

Learning Objective: Discuss how an economy answers these questions: What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

Every society faces the economic problem that it has only a limited amount of economic resources, so it can produce only a limited amount of goods and services. Every society faces trade-offs. A **trade-off** is the idea that, because of scarcity, producing more of one good or service means producing less of another good or service. Every activity has an **opportunity cost**: The highest-valued alternative that must be given up to engage in an activity. Trade-offs force society to answer three fundamental questions:

1. *What* goods and services will be produced?
2. *How* will the goods and services be produced?
3. *Who* will receive the goods and services produced?

A. What Goods and Services Will Be Produced?

The answer to this question is determined by the choices consumers, managers of firms, and government policymakers make. Each choice made has an opportunity cost.

B. How Will the Goods and Services Be Produced?

Firms choose how to produce the goods and services they sell. For example, firms often face trade-offs between using more workers or more machines.

C. Who Will Receive the Goods and Services Produced?

In the United States, who receives the goods and services produced depends largely on how income is distributed. An important policy question is whether the government should intervene to make the distribution of income more equal.

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D. Centrally Planned Economies versus Market Economies

Societies organize their economies in two main ways. A **centrally planned economy** is an economy in which the government decides how economic resources will be allocated. A **market economy** is an economy in which the decisions of households and firms interacting in markets determine the allocation of economic resources. Today, only North Korea has a completely centrally planned economy. In a market economy, the income of an individual is determined by the payments he or she receives for what he or she sells. Generally, the more extensive the training your receive and the longer the hours you work, the higher your income will be.

E. The Modern "Mixed" Economy

The high rates of unemployment and business bankruptcies during the Great Depression of the 1930s caused a dramatic increase in government intervention in the economy of the United States and other market economies. Some government intervention is designed to raise the incomes of the elderly, the sick, and people with limited skills. In recent years, government intervention has expanded to meet goals such as protection of the environment, promotion of civil rights, and increased access to medical care.

Some economists argue that the extent of government intervention makes it more accurate to refer to the economies of the United States, Canada, Japan and Western Europe as mixed economies rather than pure market economies. A **mixed economy** is an economy in which most economic decisions result from the interaction of buyers and sellers in markets but in which the government plays a significant role in the allocation of resources.

F. Efficiency and Equity

Market economies tend to be more efficient than centrally planned economies. There are two types of efficiency. **Productive efficiency** is a state of the economy in which every good or service is produced at the lowest possible cost. **Allocative efficiency** is a state of the economy in which production is in accordance with consumer preferences; in particular, every good or service is produced up to the point where the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it. **Voluntary exchange** is a situation that occurs in markets when both the buyer and the seller of a product are made better off by the transaction.

Inefficiency arises from various sources. Sometimes governments reduce efficiency by interfering with voluntary exchange in markets. The production of some goods damages the environment when firms ignore the costs of environmental damage. In this case, government intervention can increase efficiency.

Society may not find an efficient economic outcome to be desirable. Many people prefer economic outcomes they consider fair or equitable———even if these outcomes are less efficient. **Equity** is the fair distribution of economic benefits. There is often a trade-off between efficiency and equity.

Teaching Tips

Ask students for examples of government regulation of private markets in the United States. Responses may include: (1) restrictions on the number of diners allowed in a restaurant during a pandemic; (2) making the sale of addictive drugs such as cocaine and heroin illegal; (3) minimum age requirements for the purchase of alcoholic beverages and cigarettes; and (4) the prohibition of the sale of new drugs before their effectiveness is demonstrated through government supervised tests. Ask students whether one of these examples of government regulation promotes equity or fairness. The difficulty in defining equity will be apparent.

To show how students may value equity less than they claim, an economics teacher at a college in Western New York once told her students at the beginning of her course that their grades would be

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auctioned to the highest bidders. Because grades are usually normally distributed, she offered to sell a few A grades, a few more B grades, and so on. Although the announcement produced shock and grumbling, the auction proceeded, with frenzied bidding for A grades. As prices for A grades rose, bidding switched to B grades. Because few students bothered to bid for C grades, one enterprising student bid on several such grades in the belief that those who lost out on getting an A or B would have to buy their C grades from him—for a higher price than he paid! After about a week, the instructor informed the class the auction was intended only as an economics lesson; they would have to earn their grades the old-fashioned way.

Extra Solved Problem 1.2

Advising New Government Leaders

Suppose a country experiences a change in government leadership. Prior to this change, this country had a centrally planned economy. The new leaders are willing to try a different system if they can be convinced that it will yield better results. They hire an economist from a country with a market economy to advise them and will order their citizens to follow the economist's recommendations for change. The economist suggests that a market economy replace central planning to answer the nation's economic questions (*what*, *how*, and *who*?).

What will the economist suggest the leaders order their citizens to do in order to change from a centrally planned economy to a market economy?

Are there reasons why the leaders of this country might not accept the economist's suggestions? Briefly explain.

Solving the Problem

Step 1: **Review the chapter material.**
The problem is about different types of economic systems, so you may want to review the section "Centrally Planned Economies versus Market Economies" in the textbook.

Step 2: **What will the economist suggest the leaders order their citizens to do?**
Market economies allow members of households to select occupations and purchase goods and services based on self-interest and allow privately owned firms to produce goods and services based on their self-interests. Therefore, the economist would advise the leaders of the country to not issue any orders. Government officials should have no influence over individual decisions made in markets.

Step 3: **Are there reasons the leaders of this country might not accept the economist's suggestions?**
Even democratically elected leaders may find it difficult to accept the economist's suggestions. They may wonder how self-interested individuals will produce and distribute goods and services so as to promote the welfare of the entire country. This new system requires a significant reduction in government influence in people's lives, but history has shown that most government officials are reluctant to give up this influence. Acceptance is most likely when the leaders have some knowledge and experience with the successful operation of a market economy in other countries. Ordinary citizens are more likely to accept the economist's suggestions because they would have more freedom to pursue their own economic goals.

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Extra Analyze the Concept

It's Saturday Afternoon: Why Aren't You at the Game?

For many students, attending college football games is an enjoyable way to spend Saturday afternoons in the fall. However, some colleges have experienced a decline in the number of students attending their games.

What explains this decline in attendance? Rising ticket prices are one reason for the decline. One student at the University of Michigan was quoted as saying: "People are looking to trim costs, and for a lot of folks, football is an easy thing to cut. It's not essential to going to college."

Remember that the opportunity cost of engaging in an activity is the value of the best alternative that must be given up to engage in that activity. The opportunity cost of attending a college football game is not just the price of a ticket. If the price of a ticket to a game is $50, your opportunity cost is the ticket price plus the value you place on what else you could do if you don't attend the game. At one time, relatively few college football games were televised, but today multiple cable networks broadcast games. If you attend your college's games, you miss the opportunity to watch other games being broadcast at the same time—in high-definition with replays shown from multiple camera angles and expert commentary to clarify what is happening. When watching games in your room or at a sports restaurant, you can also post to Facebook, Instagram, or X, read e-mail, surf the Web, and take or receive phone calls. Wi-Fi and cellular reception are often poor in college stadiums, making these activities difficult.

So the opportunity cost of attending college football games has increased in recent years, not just because ticket prices have risen but because the number of alternative activities that students value highly has also increased. We expect that when the opportunity cost of engaging in an activity increases, people will engage in that activity less, which is what we've seen with college football games.

Colleges have responded to declining student attendance by reducing ticket prices, improving Wi-Fi and cellular service, and installing high-definition video boards that show replays in stadiums as they appear on television. Whether these attempts to lower the opportunity cost of attending college football games enough to increase attendance at games remains to be seen.

Sources: Jon Solomon, "College Attendance in 2016: Crowds Decline for the Sixth Straight Year," *CBSSports.com*, December 16, 2016; Adam Rittenberg, "Attendance Challenges Big Deal for B1G," espn.com, February 14, 2014; and Ben Cohen, "At College Football Games, Student Sections Likely to Have Empty Seats," *Wall Street Journal*, August 27, 2014.

1.3 Economic Models

Learning Objective: Explain how economists use models to analyze economic events and government policies.

An **economic model** is a simplified version of reality used to analyze real-world situations. To develop a model, economists generally follow five steps.

1. Decide on the assumptions to use.
2. Formulate a testable hypothesis.
3. Use economic data to test the hypothesis.
4. Revise the model if it fails to explain the economic data well.
5. Retain the revised model to help answer similar economic questions in the future.

A. The Role of Assumptions in Economic Models

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Models are based on making assumptions because models must be simplified to be useful. When using models, economists make behavioral assumptions about the motives of consumers and firms. Economists assume consumers will buy goods and services that will maximize their satisfaction and firms will act to maximize their profits.

B. Forming and Testing Hypotheses in Economic Models

An **economic variable** is something measurable that can have different values, such as the number of people employed in manufacturing. A hypothesis in an economic model is a statement that may be correct or incorrect about an economic variable. To test a hypothesis, we analyze statistics on the relevant economic variables. Economists accept and use an economic model if it leads to hypotheses that are confirmed by statistical analysis.

C. Positive and Normative Analysis

Positive analysis is analysis concerned with what is. **Normative analysis** is analysis concerned with what ought to be. Economics is about positive analysis, which measures the costs and benefits of different courses of action.

D. Economics as a Social Science

Because economics studies the actions of individuals, it is a social science. Economics considers human behavior in every context, not just in the context of business. Economists have played an important role in formulating government policies in areas such as the environment, health care, and poverty.

Extra Solved Problem 1.3

Snowfalls and Skiing

Marsha Shawn is a college student and downhill skier who lives near The Ski Chalet, a ski resort located in Vermont. For a course project she and four other students are required to develop an economic model. Marsha suggests that their model test the effect of snowfalls on the sale of ski equipment (skis, boots, poles) and snowboards at the six ski shops located within a ten-mile radius of The Ski Chalet. The group agrees that a snowfall would have to result in at least four inches of new snow to have an effect on equipment sales. How would you recommend the group develop their model? Suggest an alternative model in the event that the first model fails to explain the data the group is using to test it.

Solving the Problem

Step 1: **Review the chapter material.**
The problem is about how to use models to analyze economic issues, so you may want to review the section "Economic Models" in the textbook.

Step 2: **To develop and test a model of the relationship between snowfall and sales of ski equipment the students in Marsha's group should follow these steps:**

1. *Decide on the assumptions to use in developing the model*. For example: sales of ski equipment and snowboards are greater after snowfalls (four or more inches) than are sales at other times during the period that The Ski Chalet is open.
2. *Formulate a testable hypothesis*. Sales of ski equipment and snowboards at the six ski shops located near the Ski Chalet are higher (for example, by 5 percent or more) within one

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week following snowfalls of four or more inches than other weeks that The Ski Chalet is open.

3. *Use economic data to test the hypothesis*. Marsha's group must obtain sales data from the six Vermont ski shops and agree on the number of observations (including the number of times a snowfall of at least four inches is observed) required to test the hypothesis.
4. *Revise the model if it fails to explain the economic data well*. *Suggest an alternative model.* The model could fail if large numbers of skiers and snowboard owners buy their equipment prior to the months that The Ski Chalet is open, or if large numbers rent, rather than purchase, their equipment. One alternative model would compare the sales of lift tickets or rental equipment in weeks following snowfalls of four or more inches and other weeks during the time The Ski Chalet is open.
5. *Retain the revised model to help answer similar economic questions in the future*. If the data support the model, one can assume that there is a relationship between snowfalls and equipment sales. Tests of the model with data from different time periods or in different locations could either support or refute these results. Acceptance of a model is always tentative pending the acquisition of new data or additional statistical analysis.

1.4 Microeconomics and Macroeconomics

Learning Objective: Distinguish between microeconomics and macroeconomics.

Microeconomics is the study of how households and firms make choices, how they interact in markets, and how the government attempts to influence their choices.

Macroeconomics is the study of the economy as a whole, including topics such as inflation, unemployment, and economic growth.

Extra Solved Problem 1.4

Microeconomic and Macroeconomic Views

Sports fans are used to watching events on television from different camera angles. For popular events such as the Olympics, the baseball World Series, and the Super Bowl, network coverage captures action from ground level as well as higher levels with the use of blimps with cameras flown above stadiums and ballparks. The aerial view of such a camera is visually appealing but is never broadcast for very long because the athletes are barely visible. Coverage of games includes a view from a mobile or "sideline" camera that can zoom in on individual players or fans sitting in the stands, a degree of detail much greater than that provided by the aerial view.

How do the different camera angles help to explain the difference between microeconomics and macroeconomics?

Solving the Problem

Step 1: **Review the chapter material.**
The problem concerns the differences between microeconomics and macroeconomics, so you may want to review the section "Microeconomics and Macroeconomics" in the textbook.

Step 2: **Compare the focus of microeconomics with television coverage of a sports event.**

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Microeconomics focuses on how individual households and firms make choices, how they interact in markets, and how the government attempts to influence their choices. This focus is similar to that of a sideline camera at a football game.

Step 3: **Compare the focus of macroeconomics with the television coverage of a sports event.** Macroeconomics is the study of the economy as a whole, including topics such as inflation, unemployment, and economic growth. Macroeconomics does not study the decisions made by individuals but the consequences of actions taken by all decision makers in an economy. This is similar to the blimp's aerial view of the venue where a sports event occurs. A sports fan can see the entire venue, but the blimp's point of view is too far away to see any individual player or fan.

1.5 Economic Skills and Economics as a Career

Learning Objective: Describe economics as a career and the key skills you can gain from studying economics.

Economists describe how individuals, businesses, and governments make choices and analyze the results of these choices. Many businesses, government agencies, and non-profit organizations hire economists. Students who consider whether to pursue a career in economics may seek an internship with a firm or agency that employs economists.

A. Does Majoring in Economics Increase Your Income?

Regardless of your major, studying economics will provide you with tools to make personal decisions, understand how business decisions are made, and evaluate government policies. Research has shown that early in their careers economics majors earn an annual wage that is about 33 percent higher than the annual wage earned by all majors.

1.6 A Preview of Important Economic Terms

Learning Objective: Define important economic terms.

This section provides a brief definition and preview of terms students will see throughout the book: firm (company, or business), entrepreneur, innovation, technology, goods, services, revenue, profit, household, factors of production (economic resources or inputs), capital, and human capital.

Extra Economics in Your Life & Career:

Is Cheating a Rational Decision?

In their best-selling book *Freakonomics*, Steven D. Levitt and Stephen J. Dubner stated: "Who cheats? Well, just about anyone, if the stakes are right…Cheating…is a prominent feature in just about every human endeavor." Evidence that *some* people cheat surfaced in the summer of 2011 when the superintendent of the board of the Atlanta school district resigned after a report documented widespread cheating on standardized tests that implicated officials from about 80 percent of Atlanta's elementary and middle schools. In 2015, an Atlanta jury convicted 11 teachers as a result of the cheating scandal.

Steven Levitt and other economists assume that decision-makers—students and non-students alike—are rational. They compare the benefits and costs of their options and make choices for which the expected

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benefits exceed the expected costs. The benefits of (successful) cheating may be monetary; for example, K-12 teachers in some states are eligible for bonus payments of up to $25,000 if their students perform well on standardized tests. New technology has made it easier for high school and college students to cheat. The widespread use of cell phones and Internet access makes it easier (less costly) to share exam answers and buy term papers.

Sources: Steven D. Levitt and Stephen J. Dubner, *Freakonomics* New York: HarperCollins 2005, pages 24–25; Patrik Jonsson, "America's biggest teacher and principal cheating scandal unfolds in Atlanta," *Christian Science Monitor*, July 5, 2011; Mary Beth McCauley, "Atlanta school cheating: When teachers cheat, what do you tell the kids?" *Christian Science Monitor*, September 5, 2013; and Valerie Strauss, "How and Why Convicted Teachers Cheated on Standardized Tests," *Washington Post*, April 1, 2015.

Question: For the sake of argument, let's assume that you would never cheat. Under what circumstances are students in general more or less likely to cheat on an economics examination?

Answer: Your economics instructor will be pleased if you would never cheat under any circumstances. But cheating is more likely when: (a) the positive consequences of receiving a high grade are significant (for example, a high grade is necessary to maintain a scholarship, gain admittance to medical school, or get a good job offer) and (b) the probability of getting caught is low (the instructor gives the same multiple-choice exam to all students in a large classroom with no supervision). Reducing the benefit and increasing the cost of getting caught will reduce the incidence of cheating. If appeals to personal integrity are not enough to convince students not to cheat, a more effective deterrent may be for potential employers to let students know that they fire dishonest employees.

Appendix

Using Graphs and Formulas

Learning Objective: Use graphs and formulas to analyze economic situations.

Graphs simplify economic ideas and make the ideas more concrete so they can be applied to real-world problems.

Graphs of One Variable

Figure 1A.1 in the textbook displays examples of two common types of graphs: bar graphs and pie charts. The height of the bars in the bar graph represents the market shares of firms in the world laptop market. The pie chart shows the same information with the market shares of each group of firms represented by the size of its slice of the pie. Information on economic variables can also be displayed in time-series graphs. These graphs are displayed on a coordinate grid. The vertical axis (y-axis) of a coordinate grid measures the value of one variable. The point where the vertical axis intersects the horizontal axis is the origin. The horizontal axis of a coordinate grid measures the value of another variable. The points in a coordinate grid represent the values of the two variables. Figure 1A.2 illustrates examples of time-series graphs.

Graphs of Two Variables

We often use graphs to show the relationship between two variables. Figure 1A.3 illustrates the graph of a linear or straight-line demand curve where price is measured along the vertical axis and quantity is measured along the horizontal axis.

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A. Slopes of Lines

The slope of a straight line indicates how much the variable measured along the *y*-axis changes as the variable measured along the *x*-axis changes. Slope can be measured between any two points on the line because the slope of a straight line has a constant value. The slope can be expressed as the change in the value measured on the vertical axis divided by the change in the value measured on the horizontal axis; slope can also be expressed using the Greek letter delta (Δ) to stand for the change in a variable (slope = $\Delta y/\Delta x$). The slope is also called the *rise* divided by the *run*.

$$\text{Slope} = \frac{\text{Change in value on the vertical axis}}{\text{Change in the value on the horizontal axis}} = \frac{\Delta y}{\Delta x} = \frac{\text{Rise}}{\text{Run}}$$

Taking into Account More Than Two Variables on a Graph

The demand curve in Figure 1A.4 shows the relationship between the price of pizza and the quantity of pizza sold, but the quantity of any good sold depends on more than just the price of the good. Allowing other variables to change will cause the position of the demand curve in the graph to change. The table in Figure 1A.5 shows the effect of a change in the price of hamburgers on the quantity of pizza demanded. By shifting the demand curve, we take into account the effect of changes in a third variable.

A. Positive and Negative Relationships

Sometimes the relationship between two variables is negative, as in the case with the price of pizza and the quantity of pizza demanded. The relationship between two variables can be positive, as in Figure 1A.6 which shows values for disposable personal income and consumption spending in the United States for 2018–2021.

B. Determining Cause and Effect

Inferring cause and effect relationships by observing graphs can lead to incorrect conclusions. One reason for this outcome is that there may be an omitted variable that is not accounted for in the graph. A related problem in determining cause and effect is reverse causality; this occurs when we conclude that changes in variable *X* cause changes in variable *Y,* when changes in variable *Y* cause changes in variable *X.*

C. Are Graphs of Economic Relationships Always Straight Lines?

The relationship between two variables is linear when it can be represented by a straight line. Few economic relationships are actually linear. However, it is often useful to approximate a nonlinear relationship with a linear relationship.

D. Slopes of Nonlinear Curves

To measure the slope of a nonlinear curve at a particular point, we must measure the slope of a tangent to the curve at that point. A tangent line touches the curve at only one point. The slope of a tangent is measured in the same way as the slope of any straight line.

Formulas

A. Formula for a Percentage Change

The formula for a percentage change between two variables for any two periods is:

$$\text{Percentage change} = \frac{\text{Value in the second period} - \text{Value in the first period}}{\text{Value in the first period}} \times 100.$$

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B. Formulas for the Areas of a Rectangle and a Triangle

The formula for the area of a rectangle is Base × Height. The formula for the area of a triangle is:

$$\frac{1}{2} \times \text{Base} \times \text{Height}.$$

C. Summary of Using Formulas

Follow these steps when using a formula:

1. Make sure you understand the economic concept the formula represents.
2. Make sure you are using the correct formula for the problem you are solving.
3. Make sure the number you calculate using the formula is economically reasonable.

Teaching Tips

You can assign the appendix as "on your own" reading. But don't assume students will understand the formulas for computing a slope or a percentage change. Reviewing these formulas in class will be time well spent, either at this point in the course or when these formulas are first applied. In particular, students will need to use graphs of two variables and percentage changes often throughout the remainder of the text.

Solutions to End-of-Chapter Exercises

Answers to *Thinking Critically* Questions to accompany the *Inside Look* newspaper feature

1. The $2 billion in initial funding for biotechnology and biomanufacturing in the United States provides pharmaceutical manufacturers with funds they can use to increase domestic research and development (R&D) and expand domestic manufacturing facilities. These funds would help cover some of the costs domestic manufacturers incur if they choose to conduct R&D and manufacture products in the United States. The funding would therefore become an economic incentive for these companies to return pharmaceutical manufacturing jobs from China to the United States—if the funds are enough to offset the lower labor and manufacturing costs that the companies are currently incurring by manufacturing products in China.

2. Positive analysis is concerned with "what is," while normative analysis is concerned with "what ought to be." Positive economic analysis could be used to determine whether environmental regulations were primarily responsible for API production leaving the United States and moving to China and India or if other factors were also responsible for some of this offshoring. Positive analysis could also be used to determine if eliminating these regulations would likely increase API manufacturing in the United States. The answer to the question about the environmental regulations being ill-advised involves normative analysis. Positive analysis can show the consequences of a particular policy, such as the implementation of environmental regulations, but it cannot tell us whether such a policy is a good or bad idea, so the statement is inaccurate.

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1.1 Three Key Economic Ideas

Learning Objective: Explain these three key economic ideas: People are rational, people respond to economic incentives, and optimal decisions are made at the margin.

Review Questions

1.1 "People are rational" is the assumption that decision makers explicitly or implicitly weigh the benefits and costs of each action and then choose an action only if the benefits are expected to outweigh the costs. "People respond to economic incentives" by changing their behavior in response to an economic incentive. For example, if the federal government begins to tax firms an amount equal to the government benefits their low-wage employees receive, firms are likely to hire fewer low-wage workers. "Optimal decisions are made at the margin" means that most decisions are not "all or nothing," but involve doing a little more or a little less of an activity. Therefore, the optimal decision is to continue any activity up to the point where the marginal benefit equals the marginal cost.

1.2 Scarcity is the situation in which unlimited wants exceed the limited resources available to fulfill those wants. Economics is the study of the choices consumers, business managers, and government officials make to attain their goals. Scarcity is central to economics because scarcity requires people to make choices about how to use their resources to best fulfill their wants. In making choices, we must give up other opportunities that we value. What we give up (our second-best choice) is called the opportunity cost of our choice.

Problems and Applications

1.3 Economists assume that people are rational in the sense that they use all available information as they act to achieve their goals. Rational individuals weigh the benefits and costs of each action, and they choose an action only if the benefits outweigh the costs. Economists do not assume everyone is a genius or always makes the "right" decision in every circumstance; rather, economists assume that the actions of consumers and businesses reflect their attempts to achieve their goals.

1.4 We need information on the losses the typical bank suffers from a robbery and the cost of installing a bandit barrier or taking other actions, such as hiring a guard, to deter a robbery. The cost of installing a bandit barrier would include the cost of potentially losing customers who find bandit barriers off-putting. The fact that not many banks install bandit barriers indicates that these banks have found that the marginal cost of adding the additional security is greater than the expected marginal benefit from reducing the expected number of robberies.

1.5 **a**. Students face a scarcity of time, like everyone else, and respond to the incentives of the teacher's grading system. Students have more incentive to put their efforts into the parts of the course that have the most weight in the grading system.

b. If teachers put too little weight in the grading scale on outside readings, or similar assignments, students will have little incentive to read and master the material. Students will put less effort into the parts of the course that have little effect on their grades.

c. Quizzes on assigned readings would give students an incentive to come to class having read the upcoming material. Some teachers give preparation assignments where students have to read and answer questions about the upcoming material, and over the course of the semester

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students have to successfully complete a certain percentage of the preparation assignments to qualify for an A, B, or other grade in the course.

1.6 **a.** The private sector refers to businesses that are privately owned and business owners who are profit-motivated and respond to "price signals." Whereas scientists "often lack the resources to find, collect and preserve every fossil with scientific value before it is destroyed…" privately-owned firms can provide those resources. Since firms own and can sell dinosaur fossils that they discover, they have the incentive to "plug the gap" that government can't.

b. You should expect more fossils to be discovered in the U.S., or another country that allows individuals to own the fossils they find.

c. People who buy and sell fossils may not realize the non-monetary, scientific, value of the fossils have.

1.7 Your friend would be correct if the value of receiving a *B* grade to you in both chemistry and economics was the same. Devoting more time to chemistry than economics would be rational if the value of receiving a high grade in chemistry (for example, if you are a chemistry major) is greater than in economics. Also, your friend may assume that the number of hours required to earn a *B* grade is the same for both economics and chemistry. To increase your grade in economics from a *C* to a *B*, it may be necessary, for example, to devote enough fewer hours from chemistry that your grade in this subject would be a *C* rather than a *B*.

1.8 Putin believed that the benefit of the invasion would be greater than the cost of a war that would end quickly in the defeat of the Ukrainian military. For him (but not for Ukrainians) the decision to invade would have been rational. When it became clear that the cost of the invasion was much higher and the prospects for military success less than he had anticipated, it would have made sense for him to accept a political compromise. But this would have forced Putin to admit that he miscalculated the benefit and cost of his actions, something that, as of late 2023, he was not willing to do.

1.9 **a.** As a result of changes in the federal student loan programs, the total amount students borrow should increase. The changes increase the incentive students have to borrow money under the programs because they limit the amount of the loans that must be repaid.

b. If in 2016 President Obama was recommending further changes to the student loan program, then it's likely that the 2011 changes to the program had unexpected results. The most likely unexpected result is that because the 2011 changes required students to pay back less, students were borrowing more money than the president and his advisers had anticipated. So, in 2016, it's likely that President Obama recommended changes that would increase the loan repayments borrowers would have to make.

c. President Obama and his advisers may have failed to take into account that the 2011 changes to the program changed the incentives students faced. Because the incentive to increase the amount borrowed increased, President Obama and his advisers underestimated the increase in the amount the federal government would have to pay in loan subsidies.

1.10 **a.** Employees who have health problems incur higher medical costs than healthier employees. The higher medical costs increase the health insurance premiums that firms must pay for employer-provided health insurance, which raises the firms' costs. These higher costs provide an incentive for universities and corporations to encourage employees to improve and maintain their health.

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b. Health insurance decreases the incentive of employees to improve or maintain their health, because employees with health insurance do not pay the full cost of their medical bills.

c. A wellness program, if successful, would decrease the premiums that an insurance company would charge. Healthier employees would have fewer health problems that would be covered by a university's or a corporation's insurance plan.

1.11 By "incremental revenue" and "incremental cost," the business writer means marginal revenue and marginal cost. "Incremental" means the same thing as "marginal." The USPS's total cost includes such things as the cost of purchasing delivery trucks and the cost of maintaining post office buildings and warehouses that are not affected by the number of packages that the USPS delivers. In determining whether delivering packages for Amazon will increase its overall profit or reduce its overall loss, the USPS should look only at the marginal (or incremental or additional) revenue and marginal cost of delivering packages for Amazon. If the marginal revenue exceeds the marginal cost, the USPS's profit will increase (or its loss will decrease). If the marginal cost exceeds the marginal revenue, the USPS's profit will decrease (or its loss will increase).

1.12 Your friend is failing to think at the margin. It doesn't matter how much time your friend has already spent studying psychology. What matters is the marginal benefit to be received from studying psychology relative to the marginal cost, where cost is the opportunity cost of lower grades in other subjects. If the course is required, that may raise the marginal benefit.

1.13 A complete explanation for the connection between majoring in economics and success in business would involve many factors. But we can say that economics teaches us how to look at the trade-offs involved in every decision we make. Those who do not make decisions by weighing the costs of an action against its benefits are unlikely to make good decisions. Climbing the corporate or governmental ladder requires making a wider and wider array of decisions.

1.2 The Economic Problem That Every Society Must Solve

Learning Objective: Discuss how an economy answers these questions: What goods and services will be produced? How will the goods and services be produced? Who will receive the goods and services produced?

Review Questions

2.1 Scarcity implies that every society and every individual faces trade-offs because wants are unlimited but the ability to satisfy those wants is limited. Societies and individuals cannot have everything they want, so they have to make choices of what to have and what not to have.

2.2 The three economic questions that every society must answer are (1) What goods and services will be produced? (2) How will the goods and services be produced? (3) Who will receive the goods and services produced? In a centrally planned economy, the government makes most of these decisions. In a pure market economy, almost all of these decisions are made by the decentralized interaction of households and firms in markets. In a mixed economy, most economic decisions result from the interaction of buyers and sellers in markets, but government may play a significant role in the allocation of resources.

2.3 Productive efficiency occurs when a good or service is produced at the lowest possible cost. Allocative efficiency means that what is produced reflects consumer preferences—every good or service is produced up to the point at which the last unit provides a marginal benefit to consumers equal to the marginal cost of producing it.

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2.4 Efficiency is concerned with producing the goods and services that people want at the lowest cost. Equity is "fairness," a concept that can differ from person to person. Government policymakers often want to make economic outcomes "fairer," but doing so usually involves redistributing income from one group to another. Redistributing income often (but not always) hampers efficiency because it reduces incentives to produce and drives up production costs.

Problems and Applications

2.5 Yes, even Elon Must faces scarcity because his wants exceed his resources. There are an unlimited number of worthy causes Elon Musk could fund, so even with his vast wealth he faces scarcity. Further, even Musk has only 24 hours in a day, so he must make choices about how to spend his scarce time. Everyone faces scarcity because human desires are virtually unlimited. Your resources are limited, so the only way not to face scarcity would be to reduce your wants to be no greater than your resources—not something most people are willing to do!

2.6

a. Remdesivir was a scarce resource in 2020 because there was not enough of drug to treat all of the patients who were stricken with the Covid–19 virus. This required doctors and other hospital personnel to decide who would receive the drug.

b. Fairness or equity is a subjective concept. It is not possible to conclude that either a lottery or first come, first served was a fairer way to allocate remdesivir.

c. Treating one patient with remdesivir in West Virginia in 2020 meant that another patient was not treated with the drug. It is not possible to determine who the patient was.

d. Manufacturing remdesivir, or any drug, requires the use of scarce resources. But after the drugs are produced, there are costs that have been incurred and cannot be recovered (these are referred to as sunk costs). If hospitals had enough remdesivir in 2020 to treat all patients who had the Covid-19 virus, the drug would not have been scarce at that time.

2.7 Spending resources in a way that helps only one poor person is likely to be an ineffective way of helping poor people. How many poor people could be helped by using another method? The opportunity cost of using one method is the number of poor people that could be helped by using the best available alternative method.

2.8 Although many factors that affect the opportunity cost of attending college football games have changed over time, some of the most significant changes during the past decade involve technology. For example, more games are televised, games can be viewed online with enhanced features, and alternative sources of entertainment, such as streaming television shows and movies or interacting with friends on social media, have also become available. These changes increase the opportunity cost of watching football games in person and help to explain the decline in attendance over time.

2.9 Allocative efficiency occurs when production is in accordance with consumer preferences. Productive efficiency occurs when a good or service is produced at the lowest possible cost. Profit is the incentive for a firm in a market economy to be allocatively efficient and productively efficient. If a firm is not allocatively efficient and productively efficient, then it will eventually suffer losses and go out of business.

2.10 Productive efficiency refers to a situation in which a good or service is produced at the lowest possible cost. Allocative efficiency is a state in which production is in accordance with consumer preferences: Every good or service is produced up to the point where the last unit provides a marginal benefit to society equal to the marginal cost of producing it. The test that Alberto Chong and his colleagues carried out was not designed to measure how much it would cost to send and return letters in various countries, but how often–and how quickly–the letters sent were returned.

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Each envelope mailed contained one page to limit the possibility that curious postal employees would be tempted to open the envelope to steal the contents. Written on each envelope was a request to "please return to sender if undeliverable." Therefore, it was likely that the letter would either be returned or discarded. Because the experiment was testing which postal services were best at properly handling consumers' letters, it is better viewed as an evaluation of allocative efficiency rather than productive efficiency.

2.11 Although the federal government's Food and Drug Administration (FDA) must approve a drug or medical device before it is offered for sale, privately owned firms produce and sell these products. It would be more accurate to view markets for drugs and medical devices as characteristic of a mixed economy: an economy in which most economic decisions result from the interaction of buyers and sellers in markets but one in which the government plays a significant role in the allocation of resources.

2.12 If all of an economic system's resources were devoted to providing health care, there would be other important goods and services, such as food, housing, clothing, and education that the economy could not provide. An economic system that provided its citizens with state-of-the-art health care but so little food that most were on the verge of starvation, no housing so that many were sleeping in streets and fields, and no schooling so most people were illiterate, would generally be regarded as inefficient and treating the population unfairly by depriving them of such important goods and services. A market economy restricts access to health care, just as it restricts access to all goods and services, by charging a price at which less than an unlimited quantity of health care is demanded.

2.13 As discussed in the chapter, equity, or the fair distribution of benefits, can be difficult to define. For some people, equity means a more *equal* distribution of income than would result from an emphasis on efficiency alone. Raising taxes on people with higher incomes to provide the funds for programs that aid the poor might increase equity, but may reduce the economic incentive to work hard, start new businesses, and save. Reducing these activities will reduce economic efficiency, which illustrates the trade-off between equality and efficiency. An economist can write an entire book on the subject because equality can be difficult to define and because it can be difficult to measure the extent to which efforts to promote equality can reduce efficiency. The trade-off involves complicated normative and positive issues.

2.14 **a.** Lowenstein means that if a scarce resource (for example, tax revenue) is used for one worthy purpose, it cannot be used for another purpose that may be equally worthy. Therefore, to "give" resources for one project implies they must be "taken" from another.

b. You should agree. Economists often use the phrase "there is no such thing as a free lunch" when discussing the cost of using resources to address policy options.

2.15 **a.** The groups of students most likely to get the tickets will be those for whom the expected marginal benefit of going to the athletic department office on Monday morning is greater than the expected marginal cost. These would include students who have a relatively low opportunity cost of their time, such as those who have no Monday morning classes. Other students who are likely to stand in line are those who would have a large benefit from having the tickets: Those who love football and those who hope to sell their tickets ("scalpers").

b. The major opportunity cost of distributing the tickets this way is the cost to those students who attempt to get the tickets, such as: The activities the students can't do while standing in line, and the costs to students who stand in line but find that all the tickets are sold before their turn comes. There's also the cost of the lost revenue to the college from giving away the tickets instead of selling them.

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c. This isn't an efficient way to distribute the tickets because of the high cost in wasted time. It would be more efficient to sell the tickets to those willing to pay the highest prices

d. Equity is hard to define. Some people will see this way of distributing tickets as equitable because students with low incomes can still get tickets, provided they are willing to pay the opportunity cost of waiting in line. Some people will see this way of distributing the tickets as equitable because only those with the greatest desire to watch the game in person will put up with the hassle of getting the tickets. Some people might argue that this system is equitable because students are more deserving than nonstudent recipients of the tickets. Others may disagree, saying that students with a strong desire to obtain the tickets, but who are unable to be at the athletic department office at the designated time, would have no chance to get the tickets. Still others could argue that the system was not equitable because this way of distributing tickets generates no revenue for the athletic department, which could use the revenue to cover some of the costs of administering the college's athletic programs.

1.3 Economic Models

Learning Objective: Explain how economists use models to analyze economic events and government policies.

Review Questions

3.1 Economists use models for the same reason that other scientists do—to make a complicated world simple enough that problems can be understood and analyzed and questions can be accurately answered. Useful models will generate testable predictions. If these predictions are consistent with economic data, the model isn't rejected and can be used to understand the economy. Testing models with data can be very difficult, however, because the economy is always changing, and it is difficult to conduct controlled economic experiments.

3.2 Economists can create a useful model by following these five steps: (1) decide the assumptions to be used; (2) formulate a testable hypothesis; (3) use economic data to test the hypothesis; (4) revise the model if it fails to explain the economic data well; and (5) retain the revised model to help answer similar economic questions in the future.

3.3 Positive economic analysis is concerned with what *is*; that is, it deals with how the economy actually behaves. Normative economic analysis is concerned with what *ought to be*. Economics is mainly concerned with positive analysis—conceptualizing and measuring the costs and benefits of different courses of action. Decision makers, including voters and government officials, can use the trade-offs and costs and benefits identified by positive economic analysis to normatively decide what course of action they should take.

Problems and Applications

3.4 The economist should revise the model in light of its failure to explain or predict real-world events.

3.5 The problem with Dr. Strangelove's theory is that it cannot be tested unless we can devise a way to measure the emission of these subatomic particles, which is impossible because such testing methods don't exist. Because we cannot test the model's predictions, we have no way of knowing if the theory might be true; therefore, the theory is not very useful.

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3.6 **a.** This statement represents positive analysis, analysis concerned with "what is." Positive analysis would use an economic model to measure the effect a tax on cigarettes has on teenagers' purchases of cigarettes.

b. This statement represents normative analysis, analysis concerned with "what ought to be." Whether the federal government should or should not spend more on research to reduce opioid addiction cannot be determined based on positive analysis alone, but requires a normative judgment, or opinion.

c. This statement represents positive analysis. This statement can be tested to determine whether it is correct.

d. This statement represents normative analysis because it is an opinion or belief that the price of Starbucks coffee is too high.

3.7 Lowery is making a normative judgment regarding the policy: She believes that the federal government should guarantee everyone financial security. Normative analysis concerns what one person believes ought to be. You can agree or disagree with her opinion depending on your own views of this issue. There is no way to demonstrate that Lowery's opinion is objectively correct. If the federal government were to adopt Lowery's proposal, it would have to weigh the benefits of a universal basic income with the costs, which would include the resources that could not be devoted to some other policy.

3.8 President Biden's changes to the federal student loan program may or may not be considered a "bad idea." This is a normative issue upon which people will disagree. But considering potential unintended consequences of the program should be discussed and evaluated when deciding whether the total benefits of the program exceeds its total costs.

3.9 To evaluate the positive elements of this debate, it would be useful to have statistics on the effect similar import tariffs on other goods have had on sales of those imported goods and on employment in import-competing firms. It would also be useful to have forecasts of the likely effect a tariff imposed on imports from China would have on the prices of those goods in the United States and on employment in the U.S. industries that produce goods that compete with Chinese imports. Even if this information were available, it is unlikely that the normative issues involved in the debate would be resolved. People differ on how they evaluate the benefits of saving jobs in a domestic industry that would be protected by tariffs relative to the cost of the higher prices domestic consumers will have to pay because of the tariffs.

3.10 **a.** This is a positive economic statement; when a good is scarce, there is less of the good than people want. Therefore, rationing is required either by charging a price to buy the good, restricting the quantity that each person can receive, or by some other means.

b. Although it may seem "simple and fair" to ration vaccines based on a patient's age fairness is a normative concept. Therefore, this is a normative statement.

3.11 **a.** A tariff on imported goods will raise the prices of the imported goods. This will reduce sales and profits of foreign producers.

b.

i. The tariff will hurt U.S. automobile firms because steel is an input in the production of automobiles.

ii. The tariff will hurt U.S. consumers because they will have to pay higher prices for goods, such as automobiles and washing machines, that use steel as an input.

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iii. The tariff will likely help workers at U.S. steel firms because sales of domestic steel will likely increase, increasing employment at domestic steel firms. In addition, steel firms may become more profitable and steel workers may be able to negotiate for higher wages.

iv. If the tariff increases the profits of U.S. steel firms, the value of these firms may increase, which will help people who invested in these firms.

c. People who benefitted from tariffs are likely to support them. We can't say those people will necessarily support tariffs, though, because their support for free trade unrestricted by tariffs may supersede their monetary gains from a particular tariff. The people who are hurt by the tariffs are likely to oppose them, but we can't say they will necessarily oppose them for two reasons: (1) Some of the people who lose from tariffs may not understand that tariffs inflicted losses on them. For example, a consumer who pays more for a washing machine may not understand that the price of the washing machine has increased because of the steel tariffs; (2) Some people who are hurt by the tariffs may still support them because, for example, they believe it is a good idea, on normative grounds, to protect jobs in the steel industry.

3.12 An economic model used to forecast the number of employees in manufacturing industries in 2031 should take account of the expected growth of manufactured goods during this time period. The model should also account for the effect of technology on manufacturing because new technology, including the use of robotics, will affect the number of workers firms will hire. The model should account for possible changes in economic policy enacted by the government, but estimates of the effects will be imprecise because Congress and the president must agree on some policy proposals before they become law and the outcome of that political process is uncertain.

3.13 **a.** The system helps protect consumers by providing high-quality training for physicians.

b. This system allows physicians in a specialty to limit the number of physicians in that specialty. Increasing the number of physicians in a specialty is likely to reduce the incomes physicians earn.

c. Occupational licensing, such as licensing doctors, is an important topic in economics. While the licensing requirements—in this case the control of the size of residency programs—help ensure high-quality training for physicians, they also are in the self-interest of physicians because the requirements help maintain physicians' salaries. Given this trade-off, whether it is a good system is a normative question.

1.4 Microeconomics and Macroeconomics

Learning Objective: Distinguish between microeconomics and macroeconomics.

Review Question

4.1 Microeconomics is the study of how households and firms make choices, how they interact in specific markets, and how the government influences their choices. "Micro" means small, and microeconomics deals with individual decision makers. Macroeconomics is the study of the economy as a whole. "Macro" means large, and macroeconomics deals with economy-wide outcomes, such as the inflation rate, the unemployment rate, and the economic growth rate.

4.2 No, because many economic situations have both a microeconomic and a macroeconomic component. For example, the level of total consumption spending by households helps to determine how fast the economy grows—which is a macroeconomic issue. But to understand the amount of

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consumption spending by households, we have to analyze the incentives and constraints individual households face—this is a microeconomic issue.

Problems and Applications

4.3 **a.** and d. are microeconomic questions because they relate to specific industries.

b. and c. are macroeconomic questions because they relate to economy-wide issues.

4.4 You should disagree with the assertion. Microeconomics deals with individual decision makers. Because the unemployment rate in any one city would be an issue for the economy of the entire city and not an individual, it is a macroeconomic issue rather than a microeconomic issue. The effect on teen smoking of an increase in the tax on cigarettes is better thought of as a microeconomic issue because it depends on the reactions of individuals to the increase in the tax.

Suggestions for the *Thinking Critically Exercises*

CT1.1 Answers to this question will vary substantially and will depend on the background of the student. The main point is not correctness, but to help students connect the chapter to their prior knowledge. Whether students' responses accomplish this goal is difficult for an instructor to evaluate. Finally, by connecting to their prior knowledge, students should have an incentive to learn economic concepts and ideas more deeply.

CT1.2 The key here is what incentive you need to select to encourage you to train. Also, keep in mind that this question suggests that you are already training now so the question is also about *additional* training, or marginal analysis.

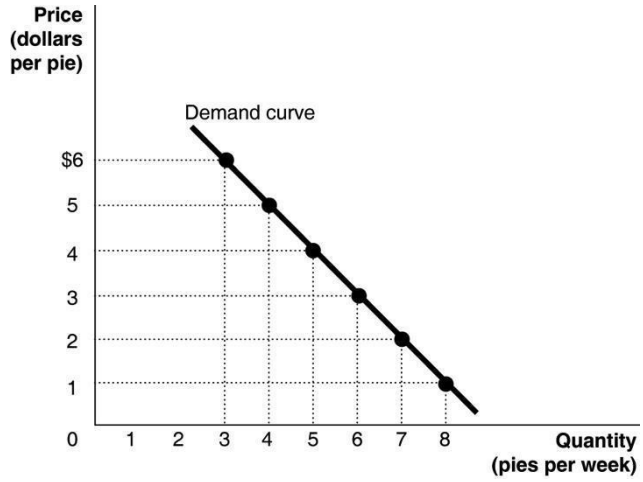
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Solutions to Chapter 1 Appendix

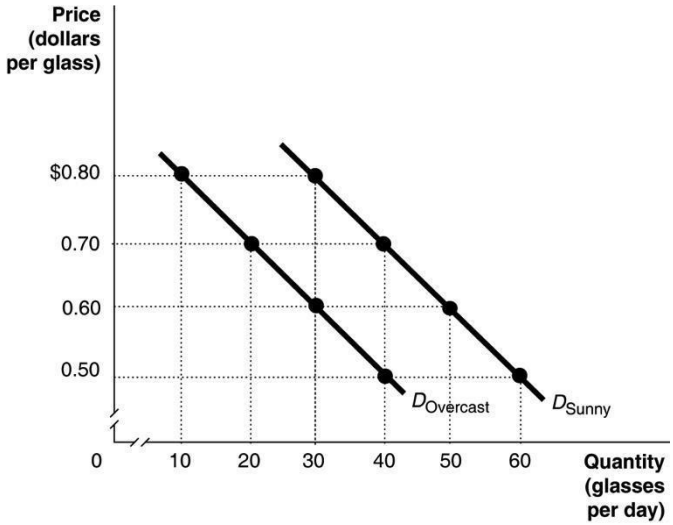
1A.1 **a.** The relationship is negative because as price decreases, the quantity of pies purchased increases.

b.



c. The slope = $\Delta y/\Delta x$ = rise/run = –1/1 = –1.

1A.2



1A.3

Year	Percentage Change
2015	_____
2016	[(22.8 – 25.5)/25.5] × 100 = –10.6%
2017	[(25.9 – 22.8)/22.8] × 100 = 13.6%
2018	[(25.8 – 25.9)/25.9] × 100 = –0.4%
2019	[(25.7 – 25.8)/25.8] × 100 = –0.4

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2020 [(28.6 – 25.7)/25.7] × 100 = 11.3%

2021 [(35.2 – 28.6)/28.6] × 100 = 23.1%

2022 [(40.2 – 35.2)/35.2] × 100 = 14.2%

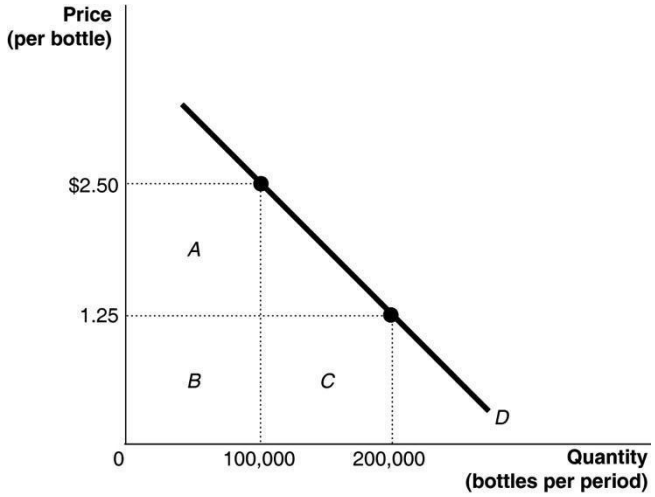
a. Sales fell at the highest rate in 2016.

b. Sales increased at the highest rate in 2021.

1A.4 [($19,610 billion – $18,509 billion)/ $18,509 billion] × 100 = 5.9%

The percentage change in real GDP from one year to the next is the economy's growth rate.

1A.5 **a.**



b. At $2.50, the total revenue equals rectangles $A + B$ = $250,000 (because $2.50 × 100,000 = $250,000). At $1.25, the total revenue equals rectangles $B + C$ = $250,000 (because $1.25 × 200,000 = $250,000).

1A.6 The triangle's area = (0.5) × (175,000 – 115,000) × ($2.25 − $1.50) = 0.5 × 60,000 × $0.75 = $22,500.

1A.7 The slope is calculated using the formula:

$$\text{Slope} = \frac{\text{Change in value on the vertical axis}}{\text{Change in value on the horizontal axis}} = \frac{\Delta y}{\Delta x} = \frac{\text{Rise}}{\text{Run}}.$$

At point A: rise = 300 − 175 = 125, run = 7 − 5 = 2. Therefore, the slope = 125/2 = 62.5.

At point B: rise = 900 − 700 = 200, run = 14 – 12 = 2. Therefore, the slope = 200/2 = 100.

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