TENTH EDITION

MICROECONOMICS
and Behavior

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TENTH EDITION

MICROECONOMICS
and Behavior

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Mc Graw Hill

MICROECONOMICS AND BEHAVIOR, TENTH EDITION

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DEDICATION

FOR ELLEN

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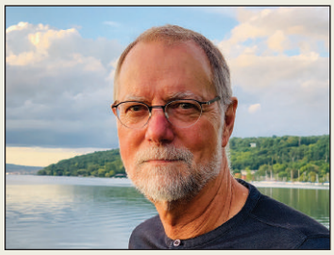

Robert H. Frank

Robert H. Frank is the H. J. Louis Professor of Management and Professor of Economics, emeritus, at Cornell's Johnson School of Management, where he taught from 1972 to 2020. After receiving his B.S. from Georgia Tech in 1966, he taught math and science for two years as a Peace Corps volunteer in rural Nepal. He received his M.A. in statistics in 1971 and his Ph.D. in economics in 1972 from the University of California at Berkeley. He also holds honorary doctorate degrees from the University of St. Gallen and Dalhousie University. During leaves of absence from Cornell, he has served as chief economist for the Civil Aeronautics Board (1978–1980), a Fellow at the Center for Advanced Study in the Behavioral Sciences (1992–1993), Professor of American Civilization at l'École des Hautes Études en Sciences Sociales in Paris (2000–2001), and the Peter and Charlotte Schoenfeld Visiting Faculty Fellow at the NYU Stern School of Business in 2008–2009. His papers have appeared in the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, and other leading professional journals and for more than two decades, his economics columns appeared regularly in *The New York Times*.

Professor Frank is the co-author of two best-selling principles of economics textbook—*Principles of Economics*, Eighth Edition, and *Principles of Economics: A Streamlined Approach*, Fourth Edition (McGraw Hill, 2021). His research has focused on rivalry and cooperation in economic and social behavior. His books on these themes include *Choosing the Right Pond* (Oxford, 1995), *Passions Within Reason* (W. W. Norton, 1988), *What Price the Moral High Ground?* (Princeton, 2004), *Falling Behind* (University of California Press, 2007), *The Economic Naturalist* (Basic Books, 2007), *The Economic Naturalist's Field Guide* (Basic Books, 2009), *The Darwin Economy* (Princeton, 2011), and *Success and Luck* (Princeton, 2016), and *Under the Influence* (Princeton, 2020), which have been translated into 24 languages. *The Winner-Take-All Society* (The Free Press, 1995), co-authored with Philip Cook, received a Critic's Choice Award, was named a Notable Book of the Year by *The New York Times*, and was included in *BusinessWeek's* list of the 10 best books of 1995. *Luxury Fever* (The Free Press, 1999) was named to the Knight-Ridder Best Books list for 1999.

Professor Frank is a co-recipient of the 2004 Leontief Prize for Advancing the Frontiers of Economic Thought. He was awarded the Johnson School's Stephen Russell Distinguished Teaching Award in 2004, 2010, 2012, and 2018, and the School's Apple Distinguished Teaching Award in 2005.

PREFACE

My goal in writing *Microeconomics and Behavior* was to produce an intellectually challenging text that would also be accessible and engaging to students. The more common approach in this market has been to emphasize one of these dimensions or the other. For example, some texts have done well by sacrificing rigor in the name of user-friendliness. But although such books sometimes keep students happy, they often fail to prepare them for upper-division courses in the major. Others texts have succeeded by sacrificing accessibility in the name of rigor, where rigor all too often means little more than mathematical density. These courses overwhelm many undergraduates, and even those few who become adept at solving well-posed mathematical optimization problems are often baffled by questions drawn from everyday contexts. I have always believed that a text could at once be rigorous *and* user-friendly. And to judge by the breadth of *Microeconomics and Behavior*'s adoption list, many of you apparently agree.

I wrote this book in the conviction that the teaching of intuition and the teaching of technical tools are complements, not substitutes. Students who learn only technical tools rarely seem to develop any real affection for our discipline; and even more rarely do they acquire that distinctive mindset we call "thinking like an economist." By contrast, students who develop economic intuition are stimulated to think more deeply about the technical tools they learn, and to find more interesting ways to apply them. Most important, they usually end up *liking* economics.

Microeconomics and Behavior develops the core analytical tools with patience and attention to detail. At the same time, it embeds these tools in a uniquely diverse collection of examples and applications to illuminate the power and versatility of the economic way of thinking.

ECONOMIC NATURALISM

In more than forty years of teaching, I have found no more effective device for developing intuition than to train students to become "Economic Naturalists." Studying biology enables people to observe and marvel at many details of life that would otherwise have escaped notice. In much the same way, studying microeconomics can enable students to see the mundane details of ordinary existence in a sharp new light. Throughout the text, I try to develop intuition by means of examples and applications drawn from everyday experience. *Microeconomics and Behavior* teaches students to see each feature of the manmade landscape as the reflection of an implicit or explicit cost-benefit calculation.

Year in and year out, the most valuable assignments in my course are the two brief papers in which I ask students to report on their efforts to become economic naturalists. Their specific charge is to use microeconomic principles to answer a question prompted by a personal observation. In recent terms, students have grappled with questions like these: Why do the keypads of drive-up ATM machines have Braille dots? Why do top female models earn more than top male models? Why do brides spend so much money on wedding dresses, while grooms often rent cheap tuxedos (even though grooms could potentially wear their tuxedos on many other occasions and brides will never wear their dresses again)? Why are child safety seats required in cars but not for air travel? Why do airlines charge their highest prices to passengers who buy at the last minute, while the practice is exactly the reverse for Broadway theaters?

The beauty of this assignment is not only that most students enjoy writing these papers, but also that few manage to complete them without becoming life-long economic naturalists. For those who would like to learn more about the assignment, my lecture on it is posted in the Authors@google series here: www.youtube.com/watch?v=QalNVxeIKEE.

A host of Economic Naturalist examples are now available as short, engaging video vignettes available within Connect via the eBook or as assignable homework content. Available videos are denoted in the margin throughout the text.

FOCUS ON PROBLEM-SOLVING

Most economists agree that a critical step in learning price theory is to solve problems. More than any other text currently available in the marketplace, *Microeconomics and Behavior* prepares students for its end-of-chapter problems by taking them through a sequence of carefully crafted examples and self-test questions within each chapter. Because most of these examples and self-tests are drawn from familiar contexts, and because students engage more readily with the concrete than with the abstract, this approach has proven effectiveness. In the absence of such groundwork, many students would reach the end-of-chapter problems with little or no idea how to proceed.

OPTIMAL TOPIC COVERAGE

A guiding principle in the evolution of *Microeconomics and Behavior* has been that topics should be emphasized in proportion both to their importance and to the difficulty that students have in mastering them. Because the basic rational choice model is the building block for much of what comes later in the course, I have devoted considerably more attention to its development than competing texts do. I have also allocated extra space for elasticity and its applications in

demand theory, and for the average-marginal distinction in production theory.

As an additional means for discovering which topics are most difficult to master, I have used research in behavioral economics that identifies systematic departures from the prescriptions of the rational choice model. For example, whereas the model says that rational persons will ignore sunk costs, many people are in fact strongly influenced by them. (Someone who receives an expensive, but painfully tight, pair of shoes as a gift is much less likely to wear them than is someone who spent $400 out of his own pocket for those same shoes.) Especially in the chapters on consumer behavior, I call students' attention to situations in which they themselves are likely to make irrational choices. Because student resources are limited, it makes sense to focus on precisely those issues for which knowing price theory is most likely to be helpful.

It may seem natural to wonder whether discussing examples of irrational choices might confuse students who are struggling to master the details of the rational choice model. It's a reasonable question, but my experience has been exactly to the contrary. Such examples actually underscore the normative message of the traditional theory. Students who are exposed to them invariably gain a deeper understanding of the basic theoretical principles at issue. Indeed, they often seem to take an almost conspiratorial pride in being able to see through the errors of judgment that many consumers make. For instructors who want to pursue how cognitive limitations affect consumer behavior in greater detail, there is an entire chapter devoted to this topic. When the first edition of *Microeconomics and Behavior* appeared in 1990, many in the economics profession were skeptical about then emerging field of behavioral economics. But as evidenced by U.C. Berkeley economist Matthew Rabin's receipt of the John Bates Clark Award in 2000 (the honor bestowed every two years by the American Economics Association on the most outstanding American economist under the age of 40) and by the receipt of the Nobel Prize in Economics, first by Daniel Kahneman in 2002 and then by Richard Thaler in 2017, the behavioral approach is now part of the microeconomics mainstream.

A BROADER CONCEPTION OF SELF-INTEREST

Another of my goals has been to incorporate a broader conception of preferences into models of individual choice. Most texts mention at the outset that the rational choice model takes people's tastes as given. They may be altruists, sadists, or masochists; or they may be concerned solely with advancing their narrow material interests. But having said that, most texts then proceed to ignore all motives other than narrow self-interest. It is easy to see why, because economic research has scored its most impressive gains on the strength of this portrayal of human motivation. It tells us, for example, why Ford discontinued production of its 7,500-pound Excursion SUV in the wake of gasoline price increases; and why thermostats are generally set lower in apartments that have separately metered utilities.

And yet, as students are keenly aware, our *Homo economicus* caricature is patently at odds with much of what we know about human behavior. People vote in presidential elections. They give anonymously to public television stations and private charities. They donate bone marrow to strangers with leukemia. They endure great trouble and expense to see justice done, even when it will not undo the original injury. At great risk to themselves, they pull people from burning buildings, and jump into icy rivers to rescue people who are about to drown. Soldiers throw their bodies atop live grenades to save their comrades. Seen through the lens of the self-interest theory emphasized in most textbooks, such behavior is the human equivalent of planets traveling in square orbits. Indeed, many students are strongly alienated by our self-interest model, which they perceive as narrow and mean-spirited.

Microeconomics and Behavior freely concedes the importance of the self-interest motive in many contexts. But it also highlights the role of unselfish motives in social and economic transactions. Employing elementary game theory, Chapter 12 identifies circumstances in which people who hold such motives have a competitive advantage over pure opportunists. It shows, for example, that people known to have cooperative predispositions can often solve prisoner's dilemmas and other commitment problems in ways that purely self-interested persons cannot.

Our theoretical models of human nature are important, not least because they mold our expectations about how others will behave. Economics is the social science most closely identified with the self-interest model of human behavior. Does this model color our expectations of others, and perhaps even our own behavior? When Cornell psychologists Tom Gilovich, Dennis Regan, and I investigated this question, we found numerous indications that economists are much more likely than others to behave opportunistically in social dilemmas.[1] For example, academic economists were more than twice as likely as the members of any other discipline we surveyed to report that they give

[1]See R. H. Frank, T. D. Gilovich, and D. T. Regan, "Does Studying Economics Inhibit Cooperation?" *Journal of Economics Perspectives,* Spring 1993.

no money at all to any private charity. In an experiment, we also found that economics majors were more than twice as likely as nonmajors to defect when playing one-shot prisoner's dilemmas with strangers.

This difference was not merely a reflection of the fact that people who chose to major in economics were more opportunistic to begin with. We found, for example, that the difference in defection rates grew larger the longer a student had studied economics. Questionnaire responses also indicated that freshmen in their first microeconomics course were more likely at the end of the term to expect opportunistic behavior from others than they were at the beginning.

There are thus at least some grounds for concern that, by stressing only the narrow self-interest motive, economists may have undermined our students' propensities for cooperative behavior. The irony is that the internal logic of the economic model never predicted such narrowly self-interested behavior in the first place.

ADDITIONAL PEDAGOGICAL FEATURES

Unlike most intermediate texts, *Microeconomics and Behavior* contains no boxed applications, which tend to distract students from the thread of argument being developed. Instead, applications and examples are integrated fully into the text. Many of these have the added advantage of being drawn from experiences to which students can personally relate.

The chapter introductions and summaries are another innovative feature of *Microeconomics and Behavior.* Most chapters begin with an anecdote that poses a problem or question that the material developed in the chapter will enable the student to answer. These introductions have proved especially helpful for the many students who find that getting started is often the hardest step. The chapter summaries in most current texts consist of brief annotated lists of the topics covered. The chapter summaries in *Microeconomics and Behavior,* by contrast, are written in a narrative form that carefully synthesizes the material covered in the chapters.

Each chapter concludes with a selection of problems that range in difficulty from routine to highly challenging. These problems have all been class-tested to assure their accuracy and effectiveness in helping students master the most important concepts in the chapters.

Answers to all in-text self-test questions appear at the end of the chapter in which they occur. Variations and extensions of these self-tests are echoed in the end-of-chapter problems, which enable students to approach these problem sets with greater confidence. Detailed answers to all end-of-chapter problems are included in the solutions manual.

CHANGES IN THE TENTH EDITION

Beyond the usual updating of time-sensitive numerical examples, I have also tried to achieve a **simpler and more unified design** look throughout the text. The design has been refreshed, the Examples and Concept Checks (now named Self-Tests) from the previous edition are emphasized to provide clarity and to facilitate understanding of concepts. Data has been updated accordingly throughout.

A more robust offering of course content in McGraw Hill Connect is now available for this edition. In addition to the test bank, which was available previously in Connect, the end-of-chapter questions have now been added as assignable, automatically graded, content. **Refinements to the SmartBook offer** have also been made. For more information about the assets available to you, refer to the Connect Economics pages that follow.

Economic Naturalism, as described earlier, has long been a central focus of this book. But it is a feature, not a bug, of specific pithy examples involving manual transmissions or Nepalese stone crushers that they reflect a moment in time. In this edition, we have revisited many of Economic Naturalist examples and have found sometimes that new facts lead to different conclusions. New to this edition, a selection of **Economic Naturalist examples have been developed into short video vignettes**, detailing how economics can help you answer a host of interesting questions from everyday experiences. Applicable videos are denoted in the margin throughout the text, as in the margin here. The videos are available within Connect via the eBook, and as assignable homework content with accompanying questions.

▶ Visit your instructor's Connect© course and access your eBook to view this video.

Why do real estate agents often show clients two nearly identical houses, even though one is both cheaper and in better condition than the other?

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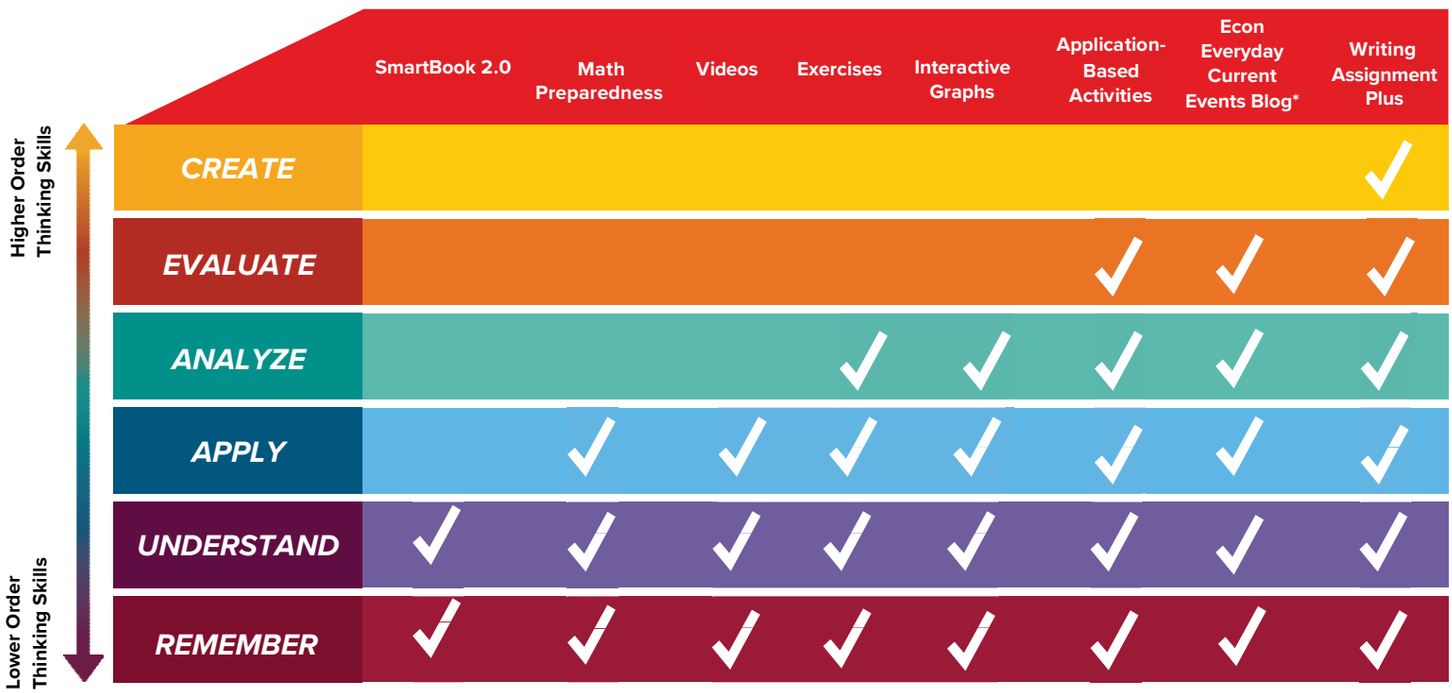
Connect Economics Asset Alignment with Bloom's Taxonomy

We Take Students Higher

As a learning science company, we create content that supports higher order thinking skills. Within Connect®, we tag assessments accordingly so you can filter your search, assign it, and receive reporting on it. These content asset types can be associated with one or more levels of Bloom's Taxonomy.

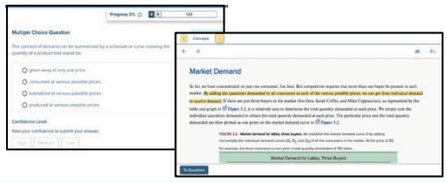
The chart below shows a few of the key assignable economics assets with *McGraw Hill Connect* aligned with Bloom's Taxonomy. Take your students higher by assigning a variety of applications, moving them from simple memorization to concept application.



* Outside of Connect.

SmartBook 2.0

Adaptively aids students to study more efficiently by highlighting where in the chapter to focus, asking review questions and pointing them to passages in the text until they understand. Assignable and assessable.



Math Preparedness

Math preparedness assignments help students refresh important prerequisite topics necessary to be successful in economics. Tutorial videos are included to help illustrate math concepts to students visually.

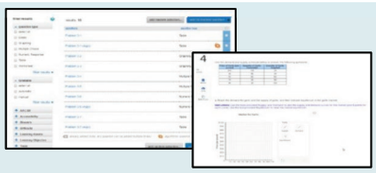
Videos

Select Economic Naturalist examples have been developed into videos that show how to employ basic economic principles to understand and explain what you observe in the world around you. All videos are closed captioned and are assignable with assessment questions for improved retention.

Why are rotisserie chickens less expensive than fresh chickens?

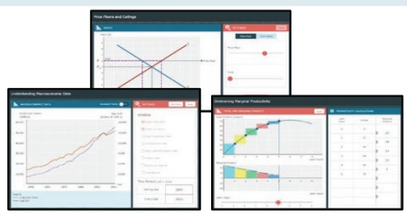
Exercises

Exercises with algorithmic variations provide ample opportunities for students to practice and hone quantitative skills. Graphing Exercises provide opportunities for students to draw, interact with, manipulate, and analyze graphs.



Interactive Graphs

Interactive Graphs provide visual displays of real data and economic concepts for students to manipulate. All graphs are accompanied by assignable Assessment questions and feedback to guide students through the experience of learning to read and interpret graphs and data.

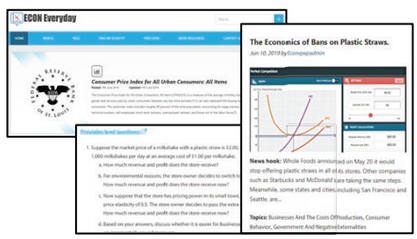


Application-Based Activities

Immersive real-life scenarios engage students and put them in the role of everyday economists. Students practice their economic thinking and problem-solving skills as they apply course concepts and see the implications of their decisions as they go. Each activity is designed as a 15-minute experience, unless students eagerly replay for a better outcome.

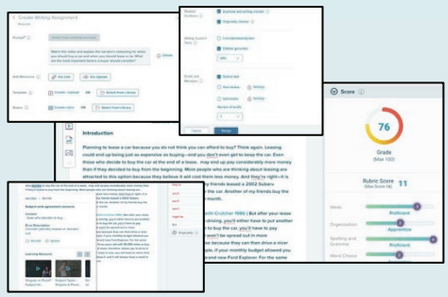
ECON Everyday Current Events Blog

Our Econ Everyday blog saves instructors time bringing current, student-centered content into their course all semester long. Short articles, written for principles-level students, is tagged by topic to bring currency into your course. We also provide discussion questions to help you drive the conversation forward. Visit www.econeverday.com and subscribe for updates.



Writing Assignment Plus

Writing Assignment Plus delivers a learning experience that helps students improve their written communication skills and conceptual understanding. Faculty can assign, monitor, grade, and provide feedback on writing projects efficiently. Built-in grammar and writing review helps students improve writing quality while an originality check helps students correct central plagiarism before submission. End result? Improved workplace skills of writing in critical thinking.



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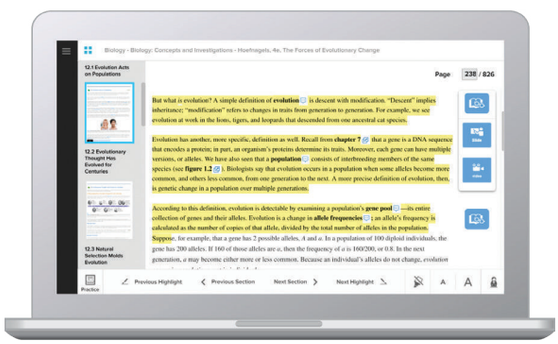

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- Jordan Cunningham, Eastern Washington University

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Changes to this edition emphasize updates to content rather than to organization of the text. Significant new material relating to the economics of climate change have been introduced in Chapters 5, 6, 7, and 17. Chapter 10 begins with a mostly new introduction to the theory of perfect competition. Chapter 18 is streamlined and refocused, with the closing "Income Distribution" section updated to reflect the contemporary discussion around basic income and jobs guarantee proposals.

SUPPLEMENTS FOR THE INSTRUCTOR

The following ancillaries are available for quick download and convenient access via the instructor resource site available through McGraw Hill Connect. Instructor resources are password protected for security. The supplements package, which has been revised and improved, consists of the following:

Instructor's Manual: Each chapter contains a Chapter Summary, a Chapter Outline, Teaching Suggestions, a list of Stumbling Blocks for Students, and Additional Problem Suggestions with accompanying solutions.

Solutions Manual: Answers to end-of-chapter Review Questions and Problems have been extracted from the Instructor's Manual and are available here for quick access.

Test Bank: Hundreds of multiple choice and essay questions test students' knowledge of key terms and concepts. All questions have been accuracy checked and are tagged with the corresponding learning objective, level of difficulty, topic, AACSB learning category, and Bloom's taxonomy for easy filtering.

Test Builder in Connect: Available within Connect, Test Builder is a cloud-based tool that enables instructors to format tests that can be printed or administered within an LMS. Test Builder offers a modern, streamlined interface for easy content configuration that matches course needs, without requiring a download.

Test Builder allows you to:

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- Easily pinpoint the most relevant content through robust filtering options.
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- Determine your preferred treatment of algorithmic questions.
- Choose the layout and spacing.
- Add instructions and configure default settings.

Test Builder provides a secure interface for better protection of content and allows for just-in-time updates to flow directly into assessments.

PowerPoints: The PowerPoints contain a detailed, chapter-by-chapter review of the important concepts and figures presented in the textbook. You can print, or rearrange the slides to fit the needs of your course.

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New remote proctoring and browser-locking capabilities, hosted by Proctorio within Connect, provide control of the assessment environment by enabling security options and verifying the identity of the student.

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As usual, I welcome further comments and suggestions.
Robert H. Frank

BRIEF CONTENTS

CONTENTS

1

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Thinking Like an Economist

Much of microeconomics entails the study of how people choose under conditions of scarcity. Many people react to this description by saying that the subject is of little real relevance in developed countries, where material scarcity is largely a thing of the past.

This reaction, however, takes too narrow a view of the Greek shipping magnate scarcity, for there are *always* important resources in short supply. At his death, Aristotle Onassis was worth several billion dollars. He had more money than he could possibly spend and used it for such things as finely crafted whale ivory footrests for the barstools on his yacht. And yet he confronted the problem of scarcity much more than most of us will ever have to. Onassis was the victim of *myasthenia gravis,* a debilitating and progressive neurological disease. For him, the scarcity that mattered was not money but time, energy, and the physical skill needed to carry out ordinary activities.

Time is a scarce resource for everyone, not just the terminally ill. In deciding which movies to see, for example, it is time, not the price of admission, that constrains most of us. With only a few free nights available each month, seeing one movie means not being able to see another, or not being able to have dinner with friends.

Time and money are not the only important scarce resources. Consider the economic choice you confront when a friend invites you to a buffet brunch. You must decide how to fill your plate. Even if you are not rich, money would be no object, since you can eat as much as you want for free. Nor is time an obstacle, since you have all afternoon and would enjoy spending it in the company of your friend. The important scarce resource here is the capacity of your stomach. A smorgasbord of your favorite foods lies before you, and you must decide which to eat and in what quantities. Eating another waffle necessarily means having less room for more scrambled eggs. The fact that no money changes hands here does not make your choice any less an economic one.

Every choice involves important elements of scarcity. Sometimes the most relevant scarcity will involve money, but not always. Coping with scarcity is the essence of the human condition. Indeed, were it not for the problem of scarcity, life would be stripped of much of its intensity. For someone with an infinite lifetime and limitless material

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- **LO1** Explain and apply the cost-benefit principle.
- **LO2** Explain the uses and limitations of economic models.
- **LO3** Describe the four common decision pitfalls.
- **LO4** Translate quantitative information about costs and benefits into graphical form.
- **LO5** Describe Adam Smith's invisible hand theory.
- **LO6** Give several clear examples of how basic economic principles can be used to explain patterns of behavior observed in everyday life.
- **LO7** Explain the difference between positive and normative theories.
- **LO8** Explain the difference between microeconomics and macroeconomics.

resources, hardly a single decision would ever matter. If you made a bad decision today, you could always start with a clean slate tomorrow.

In this chapter we examine some basic principles of microeconomic theory and see how an economist might apply them to a wide variety of choices involving scarcity. Later chapters more formally develop the theory. For now, our only goal is to get an intuitive feel for that distinctive mindset known as "thinking like an economist." And the best way to do that is to work through a series of problems familiar from actual experience.

THE COST-BENEFIT APPROACH TO DECISIONS

If the benefit of an activity exceeds its cost, do it.

Many of the choices economists study can be posed as the following question:

Should I do activity x?

For the choice confronting a moviegoer, ". . . do activity x?" might be, for example, ". . . see the new *Star Wars* movie tonight?" For the person attending a buffet brunch, it might be ". . . eat another waffle?" Economists answer such questions by comparing the costs and benefits of doing the activity in question. The decision rule we use is disarmingly simple. If $C(x)$ denotes the costs of doing x and $B(x)$ denotes the benefits, it is:

If $B(x) > C(x)$, do x; otherwise don't.

To apply this rule, we must define and measure costs and benefits. Monetary values are a useful common denominator for this purpose, even when the activity has nothing directly to do with money. We define $B(x)$ as the maximum dollar amount you would be willing to pay to do x. Often $B(x)$ will be a hypothetical magnitude, the amount you would be willing to pay if you had to, even though no money will change hands. $C(x)$, in turn, is the value of all the resources you must give up in order to do x. Here too $C(x)$ need not involve an explicit transfer of money.

For most decisions, at least some of the benefits or costs will not be readily available in monetary terms. To see how we proceed in such cases, consider the following simple decision.

EXAMPLE 1.1 Comparing Costs and Benefits

Should I turn down my stereo?

You have settled into your chair and are listening to a vinyl reissue from your favorite punk rock band when you realize that the next two tracks on the record are ones you dislike. If you had a working remote, you could turn down your stereo for the next two songs. But you don't, and so you must decide whether to get up and turn the music down or stay put and wait it out.

The benefit of turning it down is not having the songs you don't like blare away at you. The cost, in turn, is the inconvenience of getting out of your chair. If you are extremely comfortable and the music is only mildly annoying, you will probably stay put. But if you haven't been settled for long or if the music is really bothersome, you are more likely to get up.

Even for simple decisions like this one, it is possible to translate the relevant costs and benefits into a monetary framework. Consider first the cost of getting out of your chair. If someone offered you 1 cent to get up out of a comfortable chair and there were no reason other than the penny to do it, would you take the offer? Most people would not. But if someone offered you $1,000, you would be on your feet in an instant. Somewhere between 1 cent and $1,000 lies your **reservation price,** the minimum amount it would take to get you out of the chair.

reservation price of activity *x* the price at which a person would be indifferent between doing x and not doing x.

To see where the threshold lies, imagine a mental auction with yourself in which you keep boosting the offer by small increments from 1 cent until you reach the

point at which it is barely worthwhile to get up. Where this point occurs will obviously depend on circumstance. If you are rich, it will tend to be higher than if you are poor, because a given amount of money will seem less important; if you feel energetic, it will be lower than if you feel tired; and so on. For the sake of discussion, suppose your reservation price for getting out of the chair turns out to be $1. You can conduct a similar mental auction to determine the maximum sum you would be willing to pay someone to turn the music down. This reservation price measures the benefits of turning the music down; let's suppose it turns out to be 75 cents.

In terms of our formal decision rule, we then have x = "turn my stereo down," with $B(x) = \$0.75 < C(x) = \$1$, which means that you should remain in your chair. Listening to the next two songs will be unpleasant, but less so than getting up would be. A reversal of these cost and benefit figures would imply a decision to get up and turn the music down. If $B(x)$ and $C(x)$ happened to be equal, you would be indifferent between the two alternatives.

Claudia Veja/Moment Select/Getty Images

Is it worth the trouble to turn down your stereo?

THE ROLE OF ECONOMIC THEORY

The idea that anyone might actually calculate the costs and benefits of turning down a stereo may sound absurd. Economists have been criticized for making unrealistic assumptions about how people behave, and outsiders are quick to wonder what purpose is served by the image of a person trying to decide how much he would pay to avoid getting up from his chair.

There are two responses to this criticism. The first is that economists don't assume that people make such calculations explicitly. Rather, many economists argue, we can make useful predictions by assuming people act *as if* they made such calculations. This view was forcefully expressed by Nobel laureate Milton Friedman, who illustrated his point by looking at the techniques expert pool players use.[1] He argued that the shots they choose, and the specific ways they attempt to make them, can be predicted extremely well by assuming that players take careful account of all the relevant laws of Newtonian physics. Of course, few expert pool players have had formal training in physics, and hardly any can recite such laws as "the angle of incidence equals the angle of reflection." Nor

[1]Milton Friedman, "The Methodology of Positive Economics," *Essays in Positive Economics,* Chicago: University of Chicago Press, 1953.

People don't always behave as predicted by economic models, but the models provide useful insights about how to achieve important goals.

are they likely to know the definitions of "elastic collisions" and "angular momentum." Even so, Friedman argued, they would never have become expert players in the first place *unless* they played as dictated by the laws of physics. Our theory of pool player behavior assumes, unrealistically, that players know the laws of physics. Friedman urged us to judge this theory not by how accurate its central assumption is but by how well it predicts behavior. And on this score, it performs very well indeed.

Like pool players, we must also develop skills for coping with our environments. Many economists, Friedman among them, believe that useful insights into our behavior can be gained by assuming that we act as if governed by the rules of rational decision making. By trial and error we eventually absorb these rules, just as pool players absorb the laws of physics.

Taka Wu/Alamy Stock Photo

Professional pool champion Shane Van Boening may not know all the formal laws of Newtonian physics, but the quality of his play suggests that he has a deep understanding of them.

A second response to the charge that economists make unrealistic assumptions is to concede that behavior does often differ from the predictions of economic models. Thus, as economist Richard Thaler puts it, we often behave more like novice than expert pool players—ignoring bank shots and having no idea about putting the proper spin on the cue ball to position it for the next shot. Considerable evidence supports this second view.

But even where economic models fail on descriptive grounds, they often provide useful guidance for decisions. That is, even if they don't always predict how we *do* behave, they may often give useful insights into how to achieve our goals more efficiently. If novice pool players have not yet internalized the relevant physical laws, they may nonetheless consult those laws for guidance about how to improve. Economic models often play an analogous role with respect to ordinary consumer and business decisions. Indeed, this role alone provides a compelling reason for learning economics.

COMMON PITFALLS IN DECISION MAKING

Some economists are embarrassed if an outsider points out that much of what they do boils down to an application of the principle that we should perform an action if and only if its benefits exceed its costs. That just doesn't sound like enough to keep a person with a PhD busy all day! There is more to it, however, than meets the eye. People who study economics quickly discover that measuring costs and benefits is as much an art as a science. Some costs seem almost deliberately hidden from view. Others may seem relevant but, on a closer look, turn out not to be.

Economics teaches us how to identify the costs and benefits that really matter. An important goal of this book is to teach you to become a better decision maker. A good starting point is to examine some common pitfalls in decision making. The relevant economic principles are simple and commonsensical, but many people ignore them.

Pitfall 1. Ignoring Implicit Costs

opportunity cost of activity the value of all that must be sacrificed to do the activity.

One pitfall is to overlook costs that are not explicit. If doing activity x means not being able to do activity y, then the value to you of doing y (had you done it) is an **opportunity cost** of doing x. Many people make bad decisions because they tend to ignore the value of such forgone opportunities. This insight suggests that it will almost always be instructive to translate questions such as "Should I do x?" into ones such as "Should I do x or y?" In the latter question, y is simply the most highly valued alternative to doing x. Example 1.2 helps drive this important point home.

EXAMPLE 1.2 Implicit Cost

Should I go skiing today or work as a research assistant?

There is a ski area near your campus. From experience you know that a day on the slopes is worth $60 to you. The charge for the day is $40 (which includes bus fare, lift ticket, and equipment). However, this is not the only cost of going skiing. You

must also take into account the value of the most attractive alternative you will forgo by heading for the slopes. Suppose the best alternative is your new job as a professor's research assistant. The job pays $45 per day, and you like it just well enough to be willing to do it for free. The question you face is, "Should I go skiing or work as a research assistant?"

Here the cost of skiing is not just the explicit cost of the ski package ($40) but also the opportunity cost of the lost earnings ($45). The total costs are therefore $85, which exceeds the benefits of $60. Since $C(x) > B(x)$, you should stay on campus and work for your professor. Someone who ignored the opportunity cost of the forgone earnings would decide incorrectly to go skiing.

The fact that you liked the research job just well enough to have been willing to do it for free is another way of saying there were no psychic costs associated with doing it. This is important because it means that by not doing the job you would not have been escaping something unpleasant. Of course, not all jobs fall into this category. Suppose instead that your job is to scrape plates in the dining hall for the same pay, $45/day, and that the job is so unpleasant that you would be unwilling to do it for less than $30/day. Assuming your manager at the dining hall permits you to take a day off whenever you want, let's now reconsider your decision about whether to go skiing.

EXAMPLE 1.3 Costs and Benefits Are Reciprocal

Should I go skiing today or scrape plates?

There are two equivalent ways of looking at this decision. One is to say that one benefit of going skiing is not having to scrape plates. Since you would never be willing to scrape plates for less than $30/day, avoiding that task is worth that amount to you. Going skiing thus carries the indirect benefit of not scraping plates. When we add that indirect benefit to the $60 direct benefit of the skiing, we get $B(x) = \$90$. In this view of the problem, $C(x)$ is the same as before, namely, the $40 ski charge plus the $45 opportunity cost of the lost earnings, or $85. So now $B(x) > C(x)$, which means you should go skiing.

Alternatively, we could have viewed the unpleasantness of the plate-scraping job as an offset against its salary. By this approach, we would subtract $30/day from your $45/day earnings and say that the opportunity cost of not working is only $15/day. Then $C(x) = \$40 + \$15 = \$55 < B(x) = \$60$, and again the conclusion is that you should go skiing.

It makes no difference in which of these two ways you handle the valuation of the unpleasantness of scraping plates. It is critically important, however, that you do it either one way or the other. Don't count it twice!

As Example 1.3 makes clear, costs and benefits are reciprocal. Not incurring a cost is the same as getting a benefit. By the same token, not getting a benefit is the same as incurring a cost.

Obvious as this sounds, it is often overlooked. A case in point was a foreign graduate student who got her degree some years ago and was about to return to her home country. The trade regulations of her nation permitted people returning from abroad to bring back a new automobile without having to pay the normal 50 percent tariff. The student's father-in-law asked her to bring him back a new $20,000 Chevrolet and sent her a check for exactly that amount. This put the student in a quandary. She had been planning to bring back a Chevrolet and sell it in her home country. Because, as noted, new cars normally face a 50 percent import tax, such a car would sell at a dealership there for $30,000. The

EXAMPLE 1.4 Opportunity Cost

Why do most students start college right after finishing high school?

Should I work first or go to college first?

College costs are not limited to tuition, fees, supplies, housing, food—or their equivalent in future loan payments. They also include the opportunity cost of earnings forgone while studying. Earnings increase with experience. Thus the more experience you have, the more income you must forgo to attend college. This opportunity cost is therefore lowest when you are right out of high school.

On the benefit side, one big gain of a college education is sharply higher earnings. The sooner you graduate, the longer you will reap this benefit. Another benefit is the pleasantness of going to college as opposed to working. In general, the kinds of jobs people hold tend to be less unpleasant (or more pleasant) the more education they have. By going to college right away, you thus avoid having to work at the least pleasant jobs. For most people, then, it makes sense to go to college first and work afterward. Certainly it makes more sense to attend college at age 20 than at age 50.

A common exception involves people who are too immature right out of high school to reap the benefits of college work, who often do better by working a year or two before college.

student estimated that she could easily sell it privately for $28,000, which would net her an $8,000 gain. Thus the opportunity cost of giving the car to her father-in-law for $20,000 was going to be $8,000! Not getting this big benefit was a big cost. In the end, it was one the student elected to bear because she valued keeping peace in the family even more. As the cost-benefit principle makes clear, the best decision is not always the one that leaves you with the most money in your pocket.

Example 1.4 is a perfect illustration of Friedman's argument about how to evaluate a theory. High school seniors don't decide when to attend college on the basis of sophisticated calculations involving opportunity costs. On the contrary, most start right out of high school simply because that is what most of their peers do. It is the thing to do.

But this begs the question of how it got to *be* the thing to do. Customs do not originate out of thin air. A host of different societies have had centuries to experiment with this decision. If there were a significantly better way of arranging the learning and working periods of life, some society should have long since discovered it. Our current custom has survived because it is efficient. People may not make explicit calculations about the opportunity cost of forgone earnings, but they often behave *as if* they do.[2]

As simple as the opportunity cost concept is, it is one of the most important in microeconomics. The art in applying the concept correctly lies in being able to recognize the most valuable alternative that is sacrificed by the pursuit of a given activity.

Pitfall 2. Failing to Ignore Sunk Costs

An opportunity cost may not seem to be a relevant cost when in reality it is. On the other hand, sometimes an expenditure may seem relevant when in reality it is not. Such is often the case with *sunk costs,* costs that are beyond recovery at the moment a decision is made.

[2]This does not mean that all customs necessarily promote efficiency. For example, circumstances may have changed in such a way that a custom that promoted efficiency in the past no longer does so. In time, such a custom might change. Yet many habits and customs, once firmly entrenched, are very slow to change.

EXAMPLE 1.5 Sunk Cost (Part 1)

Should I drive to Boston or take the bus?

You are planning a 250-mile trip to Boston. Except for the cost, you are completely indifferent between driving and taking the bus. Bus fare is $100. You don't know how much it would cost to drive your car, so you call Budget for an estimate. Budget tells you that for your make of car the costs of a typical 10,000-mile driving year are as follows:

Insurance	$1,000
Interest	2,000
Fuel & Oil	1,000
Maintenance	1,000
Total	$5,000

If a cost has already been incurred and cannot be recovered, it is irrelevant for all decisions about the future.

Suppose you calculate that these costs come to $0.50/mile and use this figure to compute that the 250-mile trip will cost you $125 by car. And since this is more than the $100 bus fare, you decide to take the bus.

If you decide in this fashion, you fall victim to the sunk cost pitfall. Insurance and interest payments do not vary with the number of miles you drive each year. Both are sunk costs and will be the same whether or not you drive to Boston. Of the costs listed, fuel and oil and maintenance are the only ones that vary with miles driven. These come to $2,000 for each 10,000 miles you drive, or $0.20/mile. At $0.20/mile, it costs you only $50 to drive to Boston, and since this is less than the bus fare, you should drive.

Unlike opportunity costs, these costs *should be* ignored. Not ignoring them is a second pitfall in decision making. The principle of ignoring sunk costs emerges clearly in the following example.

In Example 1.5, note the role of the assumption that, costs aside, you are indifferent between the two modes of transport. If you had preferred one mode to the other, we would also have had to weigh that preference. For example, if you were willing to pay $60 to avoid the hassle of driving, the real cost of driving would be $110, not $50, and you should take the bus.

Self-Test questions, such as the one below, are sprinkled throughout the text to help you make sure that you understand important analytical concepts. You will master microeconomics more effectively if you do these exercises as you go along.

SELF-TEST 1.1

How, if at all, would your answer to the question in Example 1.5 be different if the worth of avoiding the hassle of driving is $20 and you average one $28 traffic ticket for every 200 miles you drive?

As a check, the answers to the in-chapter self-test questions are at the end of each chapter. Naturally, the self-tests will be much more useful if you work through them before consulting the answers.

Although our cost-benefit decision rule fails the test of prediction in this experiment, its message for the rational decision maker stands unchallenged. The two groups logically *should* have behaved the same. The only difference between them, after all, is that patrons in the refund group have lifetime incomes that are $5 higher than the others'. Such a

EXAMPLE 1.6 Sunk Cost (Part 2)

The pizza experiment.

A local pizza parlor offers an all-you-can-eat lunch for $5. You pay at the door, then the waiter brings you as many slices of pizza as you like. A former colleague performed this experiment: An assistant served as the waiter for one group of tables.[3] The "waiter" selected half the tables at random and gave everyone at those tables a $5 refund before taking orders. Diners at the remaining tables got no refund. He then kept careful count of the number of slices of pizza each diner ate. What difference, if any, do you predict in the amounts eaten by these two groups?

Eating additional food just to get your money's worth is not a sensible decision strategy.

Diners in each group confront the question "Should I eat another slice of pizza?" Here, the activity x consists of eating one more slice. For both groups, $C(x)$ is exactly zero: Even members of the group that did not get a refund can get as many additional slices as they want at no extra charge. Because the refund group was chosen at random, there is no reason to suppose that its members like pizza any more or less than the others. For everyone, the decision rule says keep eating until there is no longer any extra pleasure in eating another slice. Thus, $B(x)$ should be the same for each group, and people from both groups should keep eating until $B(x)$ falls to zero.

By this reasoning, the two groups should eat the same amount of pizza, on the average. The $5 admission fee is a sunk cost and should have no influence on the amount of pizza one eats. *In fact, however, the group that did not get the refund consumed substantially more pizza.*

trivial difference should have no effect on pizza consumption. Members of the no-refund group seemed to want to make sure they "got their money's worth." In all likelihood, however, this motive merely led them to overeat.[4]

What's wrong with being motivated to "get your money's worth"? Absolutely nothing, as long as the force of this motive operates *before* you enter into transactions. Thus it makes perfectly good sense to be led by this motive to choose one restaurant over an otherwise identical competitor that happens to cost more. Once the price of your lunch has been determined, however, the get-your-money's-worth motive should be abandoned. The satisfaction you get from eating another slice of pizza should then depend only on how hungry you are and on how much you like pizza, not on how much you paid. Yet people often seem not to behave in this fashion. The difficulty may be that we are not creatures of complete flexibility. Perhaps motives that make sense in one context are not easily abandoned in another.

SELF-TEST 1.2

Jim wins a ticket from a radio station to see a jazz band perform at an outdoor concert. Mike has paid $18 for a ticket to the same concert. On the evening of the concert there is a tremendous thunderstorm. If Jim and Mike have the same tastes, which of them will be more likely to attend the concert, assuming that each decides on the basis of a standard cost-benefit comparison?

[3]See Richard Thaler, "Toward a Positive Theory of Consumer Choice," *Journal of Economic Behavior and Organization* 1, 1980.

[4]An alternative to the "get-your-money's-worth" explanation is that $5 is a significant fraction of the amount of cash many diners have available to spend *in the short run.* Thus members of the refund group might have held back in order to save room for the dessert they could now afford to buy. To test this alternative explanation, the experimenter could give members of the no-refund group a $5 cash gift earlier in the day and then see if the amount of pizza consumed by the two groups still differed.

Pitfall 3. Measuring Costs and Benefits as Proportions Rather Than Absolute Dollar Amounts

When a boy asks his mother "Are we almost there yet?" how will she answer if they are 10 miles from their destination? Without some knowledge of the context of their journey, we cannot say. If they are near the end of a 300-mile journey, her answer will almost surely be yes. But if they have just embarked on a 12-mile journey, she will say no.

Contextual clues are important for a variety of ordinary judgments. Thinking about distance as a percentage of the total amount to be traveled is natural and informative. Many also find it natural to think in percentage terms when comparing costs and benefits. But as the following pair of simple examples illustrates, this tendency often causes trouble.

EXAMPLE 1.7 Comparing Costs and Benefits (Part 1)

Should you drive to Walmart to save $10 on a $40 upgrade to your stereo?

You are about to spend $40 for a Bluetooth adapter for your vintage stereo at the nearby campus store when a friend tells you that the very same adapter is on sale at Walmart for only $20. If Walmart is a 15-minute drive away, where would you buy the adapter? (No matter where you bought it, you must send it to the manufacturer for repairs, if it fails under warranty.)

EXAMPLE 1.8 Comparing Costs and Benefits (Part 2)

Should you drive downtown to save $20 on a $1,000 smart TV?

You are about to buy a new TV with the latest wireless interface at the nearby campus store for $1,020 when a friend tells you that the very same set is on sale at Walmart for only $1,000. If Walmart is a 15-minute drive away, where would you buy the television? (Again, repairs under warranty would entail sending the set to the manufacturer in each case.)

There is no uniquely correct answer to either of these questions, both of which ask whether the benefit of driving to Walmart is worth the cost. Most people say the trip would definitely be worth making for the Bluetooth adapter, but definitely not worth making for the TV. When pressed to explain, they say driving yields a 50 percent savings on the adapter but only a 2-percent savings on the TV.

These percentages, however, are irrelevant. In each case the benefit of driving to Walmart is exactly the $20 savings from the lower purchase price. What's the cost of driving to Walmart? Some might be willing to make the drive for as little as $5, while others might not be willing to do it for less than $50. But whatever the number, it should be the same in both cases. So your answers to the questions just posed should be the same. If you would be willing to make the drive for, say, $8, then you should buy both the adapter and TV at Walmart. But if your reservation price for making the drive is, say, $25, then you should buy both appliances at the nearby campus store.

When comparing costs and benefits, always use absolute dollar amounts, not proportions.

When using the cost-benefit test, you should express costs and benefits in absolute dollar terms. Comparing percentages is not a fruitful way to think about decisions like these.

SELF-TEST 1.3

You are holding a discount coupon that will entitle you to a fare reduction on only one of the two trips you are scheduled to take during the coming month. You can get $100 off the normal $200 airfare to New York City, or you can get $120 off the normal $2,400 airfare to New Delhi. On which trip should you use your coupon?

Pitfall 4. Failure to Understand the Average-Marginal Distinction

So far we've looked at decisions about whether to perform a given action. Often, however, the choice is not whether to perform the action but the extent to which it should be performed. In this more complex case, we can apply the cost-benefit principle by reformulating the question. Instead of asking "Should I do activity *x*?," we repeatedly pose the question "Should I increase the level by which I am currently engaging in activity *x*?"

marginal cost the increase in total cost that results from carrying out one additional unit of an activity.

marginal benefit the increase in total benefit that results from carrying out one additional unit of an activity.

To answer this question, we must compare the benefit and cost of an *additional* unit of activity. The cost of an additional unit of activity is called the **marginal cost** of the activity, and the benefit of an additional unit is called its **marginal benefit.**

The cost-benefit rule tells us to keep increasing the level of an activity as long as its marginal benefit exceeds its marginal cost. But as Example 1.9 illustrates, people often fail to apply this rule correctly.

EXAMPLE 1.9 Marginal Cost and Benefit vs. Average Cost and Benefit

Should Tom launch another boat?

Tom manages a small fishing fleet of three boats. His current daily cost of operations, including boat rentals and fishermen's wages, is $300, or an average of $100 per boat launched. His daily total revenue, or benefit, from the sale of fish is currently $600, or an average of $200 per boat launched. Tom decides that since his cost per boat is less than his revenue per boat, he should launch another boat. Is this a sound decision?

average cost the average cost of undertaking *n* units of an activity is the total cost of the activity divided by *n*.

average benefit the average benefit of undertaking *n* units of an activity is the total benefit of the activity divided by *n*.

To answer this question, we must compare the marginal cost of launching a boat with its marginal benefit. The information given, however, tell us only the **average cost** and **average benefit** of launching a boat—which are, respectively, one-third of the total cost of three boats and one-third of the total revenue from three boats. Knowing the average benefit and average cost per boat launched does not enable us to decide whether launching another boat makes economic sense. For although the average benefit of the three boats launched thus far *might* be the same as the marginal benefit of launching another boat, it might also be either higher or lower. The same statement holds true regarding average and marginal costs.

To illustrate, suppose the marginal cost of launching a boat and crew is constant at $100 per boat per day. Then Tom should launch a fourth boat only if doing so will add at least $100 in daily revenue from his total fish catch. The mere fact that the current average revenue is $200 per boat simply doesn't tell us what the marginal benefit of launching the fourth boat will be.

Suppose, for example, that the relationship between the number of boats launched and the daily total revenue is as described in Table 1.1. With three boats per day, the average benefit per boat would then be $200, just as indicated above. If Tom launched a fourth boat, the *average* daily revenue would fall to $160 per boat, which is still more than the assumed marginal cost of $100. Note, however, that in the second column the total revenue from four boats is only $40 per

day more than the total revenue from three boats. That means that the marginal revenue from launching the fourth boat is only $40. And since that is less than its marginal cost ($100), launching the fourth boat makes no sense.

TABLE 1.1
How Total Cost Varies with the Number of Boats Launched

Number of boats	Daily total benefit ($)	Daily average benefit ($/boat)
0	0	0
1	300	300
2	480	240
3	600	200
4	640	160

Example 1.10 illustrates how to apply the cost-benefit principle correctly in this case.

EXAMPLE 1.10 Applying the Cost-Benefit Principle

How many boats should Tom launch?

The marginal cost of launching a boat and crew is again constant at $100 per day. If total daily revenue from the catch again varies with the number of boats launched as shown in Table 1.1, how many boats should Tom launch?

Tom should keep launching boats as long as the marginal benefit of doing so is at least as great as the marginal cost. With marginal cost constant at $100 per launch, Tom should thus keep launching boats as long as the marginal benefit is at least $100.

Applying the definition of marginal benefit to the total benefit entries in the second column of Table 1.1 yields the marginal benefit values in the third column of Table 1.2. (Because marginal benefit is the change in total benefit that results

TABLE 1.2
How Marginal Benefit Varies with the Number of Boats Launched

Number of boats	Daily total benefit ($)	Daily marginal benefit ($/boat)
0	0	
		300
1	300	
		180
2	480	
		120
3	600	
		40
4	640	

when we change the number of boats by one, we place each marginal benefit entry midway between the rows showing the corresponding total benefit entries.) For example, the marginal benefit of increasing the number of boats from one to two is $180, the difference between the $480 total revenue with two boats and the $300 with one.

Comparing the $100 marginal cost per boat with the marginal benefit entries in the third column of Table 1.2, we see that the first three launches satisfy the cost-benefit test, but the fourth does not. Tom should thus launch three boats.

SELF-TEST 1.4

If the marginal cost of launching each boat had not been $100 but $150, how many boats should Tom have launched?

The cost-benefit principle tells us that *marginal* costs and benefits—measures that correspond to the *increment* of an activity under consideration—are the relevant ones for choosing the level at which to pursue the activity. Yet many people compare the *average* cost and benefit of the activity when making such decisions. As Example 1.9 should have made clear, however, increasing the level of an activity may not be justified, even though its average benefit at the current level is significantly greater than its average cost.

USING MARGINAL BENEFIT AND MARGINAL COST GRAPHICALLY

The examples just discussed entail decisions about an activity that could take place only on specific levels—no boats, one boat, two boats, and so on. The levels of many other activities, however, can vary continuously. One can buy gasoline, for example, in any quantity one wishes. For activities that are continuously variable, it is often convenient to display the comparison of marginal benefit and marginal cost graphically.

EXAMPLE 1.11 Comparing Marginal Benefit and Cost Graphically

How much should Susan talk to Hal each month?

Susan has a pay-as-you-go phone plan that has a flat-rate charge of 4 cents per minute for calls to her boyfriend Hal. (Fractional minutes are billed at the same rate, so a 30-second call would cost her 2 cents.) The value to Susan, measured in terms of her willingness to pay, of an additional minute of conversation with Hal is shown on curve *MB* in Figure 1.1. How many minutes should she spend on the phone with Hal each month?

The downward slope of curve *MB* reflects the fact that the value of an additional minute declines with the total amount of conversation that has occurred thus far. (As we will see in Chapter 3, it is a common pattern that the more someone has of a good, the less value he assigns to having additional units of it.) Curve *MC* in the diagram measures the cost of each additional minute, assumed to be constant at $0.04. The optimal quantity of conversation is the quantity for which these two curves cross—namely, 400 minutes per month. If Susan speaks with Hal for less than that amount, the marginal benefit from adding another minute would exceed the marginal cost, so she should talk longer. But if they speak for more than 400 minutes per month, the amount she would save by speaking less would exceed the benefit she would sacrifice, which means they should speak less.

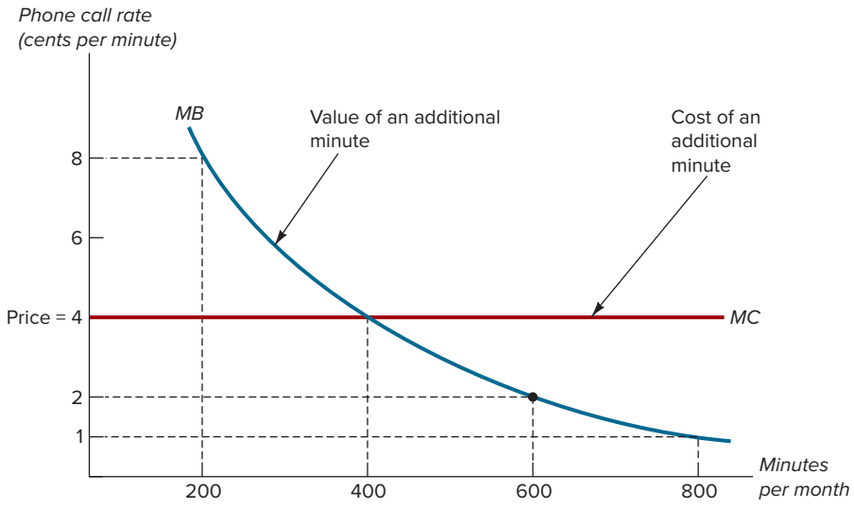


FIGURE 1.1

The Optimal Quantity of Conversation.

The optimal amount of a continuously variable activity is the quantity for which its marginal benefit is just equal to its marginal cost.

SELF-TEST 1.5

If her marginal benefit curve is again as given in Figure 1.1, how many minutes should Susan speak with Hal each month if the flat rate falls to 2 cents per minute?

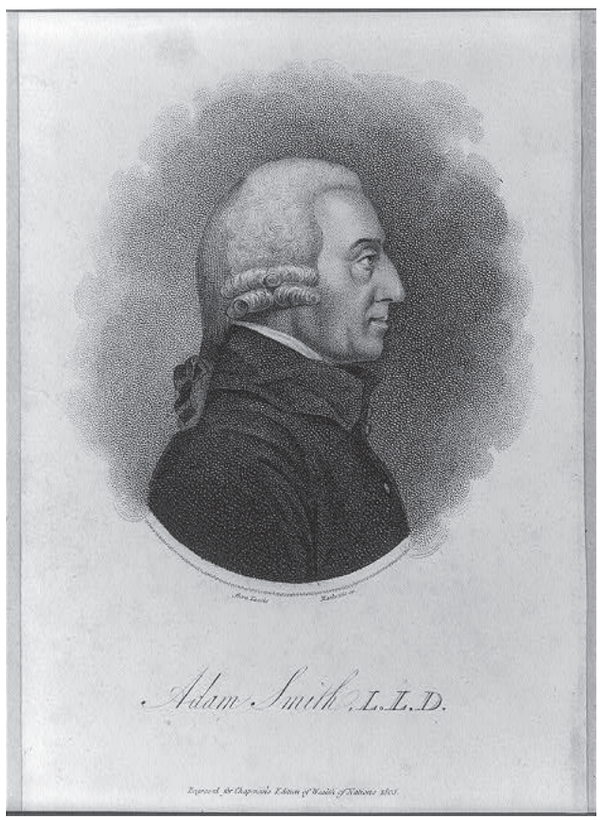
THE INVISIBLE HAND

One of the most important insights of economic analysis is that the individual pursuit of self-interest is often not only *consistent* with broader social objectives, but actually even *required* by them. Wholly unaware of the effects of their actions, self-interested consumers often act as if driven by what Adam Smith called an *invisible hand* to produce the greatest social good. In perhaps the most widely quoted passage from *The Wealth of Nations,* Smith wrote:

> It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard of their own interest. We address ourselves not to their humanity, but to their self-love, and never talk to them of our necessities, but of their advantage.

Smith observed that competition among sellers fostered attempts to develop better products and cheaper ways of producing them. The first to succeed in those attempts enjoyed higher profits than their rivals, but only temporarily. As others copied the new products and methods, their offerings put inevitable downward pressure on prices. Smith's insight, in a nutshell, was that although sellers were seeking only to promote their own advantage, the ultimate beneficiaries were consumers.

Modern economists sometimes lose sight of the fact that Smith did not believe that *only* selfish motives are important.



Library of Congress [LC-USZ62-17407]

Adam Smith: 1723–1790. Smith's modern disciples often oversimplify his message.

In his earlier treatise, *The Theory of Moral Sentiments,* for example, he wrote movingly about the compassion we feel for others:

> How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it. Of this kind is pity or compassion, the emotion which we feel for the misery of others, when we either see it, or are made to conceive it in a very lively manner. That we often derive sorrow from the sorrow of others, is a matter of fact too obvious to require any instances to prove it; for this sentiment, like all the other original passions of human nature, is by no means confined to the virtuous and humane, though they perhaps may feel it with the most exquisite sensibility. The greatest ruffian, the most hardened violator of the laws of society, is not altogether without it.

Smith was well aware, moreover, that the outcome of unbridled pursuit of self-interest is sometimes far from socially benign. As the following example illustrates, the invisible hand mechanism breaks down when important costs or benefits accrue to people other than the decision makers themselves.

EXAMPLE 1.12 Applying Marginal Benefit and Cost Graphically

Should I burn my leaves or haul them into the woods?

external cost of an activity
a cost that falls on people who are not directly involved in the activity.

Suppose the cost of hauling the leaves is $20 and the cost to the homeowner of burning them is only $1. If the homeowner cares only about costs that accrue directly to herself, she will burn her leaves. The difficulty is that burning leaves also entails an important **external cost,** which means a cost borne by people who are not directly involved in the decision. This external cost is the damage done by the smoke from the fire. That cost accrues not to the homeowner who makes the decision about burning the leaves but to the people downwind. Suppose the smoke damage amounts to $25. The good of the community then requires that the leaves be hauled, not burned. From the perspective of the self-interested homeowner, however, it seems best to burn them.[5]

External costs and benefits often motivate laws that limit individual discretion. (External costs and benefits will be our focus in Chapter 16.) Most communities, for example, now have laws prohibiting the burning of leaves within city limits. Such laws may be viewed as a way of making the costs and benefits seen by individuals more nearly resemble those experienced by the community as a whole. With a law against burning leaves in effect, the potential leaf burner weighs the penalty of breaking the law against the cost of hauling the leaves. Most people conclude it is cheaper to haul them.

SELF-INTEREST AND *HOMO ECONOMICUS*

Many economists and other behavioral scientists remain skeptical about the importance of duty and other unselfish motives. They feel that the larger material payoffs associated with selfish behavior so strongly dominate other motives that, as a first approximation, we may safely ignore nonegoistic motives.

[5]Of course, if the homeowner interacts frequently with the people downwind, self-interest may still dictate hauling the leaves, to preserve goodwill for future interactions. But where the people downwind are anonymous strangers, this motive will operate with less force.

With this view in mind, the stereotypical decision maker in the self-interest model is often given the label *Homo economicus*. *Homo economicus* does not experience the sorts of sentiments that motivate people to vote, or to return lost wallets to their owners with the cash intact. On the contrary, personal material costs and benefits are the only things he cares about. He does not contribute voluntarily to private charities or public television stations, keeps promises only when it pays to do so, and if the pollution laws are not carefully enforced, disconnects the catalytic converter on his car to save on fuel. And so on.

Obviously, many people do not fit the me-first caricature of the self-interest model. They donate bone marrow to strangers with leukemia. They endure great trouble and expense to see justice done, even when it will not undo the original injury. At great risk to themselves, they pull people from burning buildings and jump into icy rivers to rescue people who are about to drown. Soldiers throw their bodies atop live grenades to save their comrades.

To be sure, selfish motives are important. When a detective investigates a murder, for example, her first question is, "Who stood to benefit from the victim's death?" When an economist studies a government regulation, he wants to know whose incomes it enhances. When a senator proposes a new spending project, the political scientist tries to discover which of his constituents will be its primary beneficiaries.

Our goal in much of this text is to understand the kinds of behaviors to which selfish motives give rise in specific situations. But throughout this process, it is critical to remember that the self-interest model is not intended as a prescription for how to conduct your own affairs. On the contrary, we will see in later chapters that *Homo economicus* is woefully ill suited to the demands of social existence as we know it. Each of us probably knows people who more or less fit the *Homo economicus* caricature. And our first priority, most of the time, is to steer clear of them.

The irony here is that being a purely self-interested person entails a degree of social isolation that is not only bad for the soul but also harmful to the pocketbook. To succeed in life, even in purely material terms, people must form alliances and relationships of trust. But what sensible person would be willing to trust *Homo economicus*? Later chapters present specific examples of how unselfish motives confer material rewards on those who hold them. For the present, however, bear in mind that the self-interest model is intended only to capture one part of human behavior, albeit an important one.

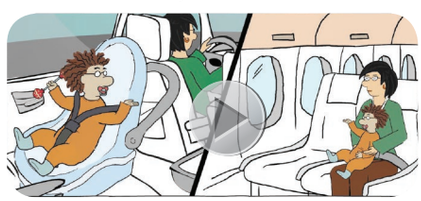
Self-interest is one of the most important human motives. But it is not the only important motive.

THE ECONOMIC NATURALIST

Studying biology enables people to observe and marvel at many details of life that would otherwise escape them. For the naturalist, a walk in a quiet woods becomes an adventure. In much the same way, studying microeconomics enables someone to become an "economic naturalist," a person who sees the mundane details of ordinary existence in a sharp new light. Each feature of the manmade landscape is no longer an amorphous mass but the result of an implicit cost-benefit calculation. Following are some examples of economic naturalism.

Many of us respond warmly to the maxim "Anything worth doing is worth doing well." After all, it encourages a certain pride of workmanship that is often sadly lacking. Economic Naturalist 1.1 makes clear, however, that if the maxim is interpreted literally, it does not make any sense. To do something well requires time, effort, and expense. But these are scarce resources. To devote them to one activity makes them unavailable for another. Increasing the quality of one of the things we do thus necessarily means to reduce the quality of others—yet another application of the concept of opportunity cost. Every intelligent decision must be mindful of this trade-off.

Why does the light come on when you open the refrigerator door but not when you open the freezer?



Why are child safety seats required in automobiles but not in airplanes?

Economic Naturalist 1.1

Why is airline food so bad?

Everyone complains about airline food. Indeed, if any serious restaurant dared to serve such food, it would quickly go bankrupt. Our complaints seem to take for granted that airline meals should be just as good as the ones we eat in restaurants. But why should they? The cost-benefit perspective says that airlines should increase the quality of their meals if and only if the benefit would outweigh the cost. The benefit of better food is probably well measured by what passengers would be willing to pay for it, in the form of higher ticket prices. If a restaurant-quality meal could be had for, say, a mere $10 increase in fares, most people would probably be delighted to pay it. The difficulty, however, is that it would be much more costly than that to prepare significantly better meals at 39,000 feet in a tiny galley with virtually no time. It could be done, of course. An airline could remove 20 seats from the plane, install a modern, well-equipped kitchen, hire extra staff, spend more on ingredients, and so on. But these extra costs would be more like $100 per passenger than $10. For all our complaints about the low quality of airline food, few of us would be willing to bear this extra burden. In fact, most airlines have eliminated meals from all domestic flights and offer meals only for purchase, to lower operating costs.

Economic Naturalist 1.2

How did automatic transmissions become more efficient than manuals?

For many years, manual transmissions offered better fuel economy than automatics. This was not because manual transmissions were inherently more efficient but because they were less complex than the automatics. That made it cheaper to add fuel-saving fifth or sixth "overdrive" gears to a manual gearbox. Automatic transmissions with additional gears would have offered the same fuel economy benefits, but at a higher price. Since automatic transmissions were mainly sold on convenience, "good enough" three- or four-speed solutions prevailed.

But no more. Today's automatics commonly have 9 or 10 speeds (or use continuously variable technology), and few drivers could make a manual perform nearly as well as an automatic on fuel consumption. What led to this change? We could certainly point to technology, ongoing high gasoline costs, and the imposition of federal fuel efficiency standards. But we must not forget the consumer. By some measures, the percentage of vehicles equipped with manual transmissions sold in the United States has fallen from over 25 percent in 1995 to less than 5 percent in 2018.[6] Automatic transmissions are now competing with each other, not with manuals. It "pays" automakers to react to this change in consumer tastes by investing more heavily in improvements to automatic transmissions.

That said, the end may be in sight for now-dominant automatic transmissions. Automakers are investing even more in vehicle electrification than in transmission technologies. Tomorrow's electric cars will not require traditional multi-speed gearboxes.

[6]The sales figures are from www.carmax.com/articles/stick-shift-index. See also National Research Council, *Cost, Effectiveness, and Deployment of Fuel Economy Technologies for Light-Duty Vehicles*, Washington, DC: National Academies Press, 2015, 169, https://doi.org/10.17226/21744.

Everything we see in life is the result of some such compromise. For Roger Federer, playing championship tennis rules out becoming a concert pianist. Yet this obviously does not mean he shouldn't spend any time playing the piano. It just means that he should hold himself to a lower standard there than in the tennis arena.

Leonard Zhukovsky/Shutterstock

The time and effort required to become a championship tennis player rule out the possibility of simultaneously becoming a leading concert pianist.

SHOULD YOU THINK LIKE AN ECONOMIST?

In this chapter, you were given a brief initiation into "thinking like an economist." But should you adopt that perspective? The question goes beyond the strengths and weaknesses of *Homo economicus* that we outlined a few pages back. In recent years, economists and the discipline of economics—often described as monolithic entities[7]—have often come under fierce criticism, and if you believe the critics, many of today's social, political, and environmental ills can be traced to "neoliberal" policies "rooted in conventional economic doctrines."[8]

There is no question that economics has much to say about big problems. We would be unlikely to study economics if it did not. But many of the high-level complaints may be rooted in a failure to distinguish between **normative** and **positive economics,** which is to say between the politics and values of economic stakeholders (economists included) and actual economic theory.

A specific example helps illustrate the difference. In the pacific Northwest, logging companies are currently cutting down some of the few remaining stands of virgin redwoods to supply contractors with timber to build homes. Many of these trees are more than 2,000 years old—a national, indeed international, treasure we can never hope to replace. To the logging companies, however, they are worth more as lumber than as facilities for carbon capture or monuments to nature's magnificence. Whether the remaining stands of virgin redwoods ought to be protected is, in the end, a **normative question,** one that involves our values every bit as much as the question of whether to forgive student loans or increase tax rates on top incomes.

normative question a question about what policies or institutional arrangements lead to the best outcomes.

By itself, economic analysis cannot answer such questions. A society that reveres nature or abhors risks to the environment may well decide the fate of the redwoods differently from one that holds other values, even though members of both societies are in complete agreement about all the relevant economic facts and theories. Economic analysis is on firmer ground when it comes to answering **positive questions**—questions about what the consequences of specific policies or institutional arrangements will be. If we ban the cutting of redwoods, what will happen to the price of lumber? What substitute building materials are likely to be developed and at what cost? Or will virgin lumber cutting simply move overseas? How will employment in the logging and housing industries be affected? These aren't all of the relevant questions. Other sciences must be invoked to provide context—say, of the carbon capture impact and time to remediation. But these positive economic questions and their answers are clearly relevant to our thinking about the underlying normative question.

positive question a question about the consequences of specific policies or institutional arrangements.

MICROECONOMICS AND MACROECONOMICS

Our focus in this chapter is on issues confronting the individual decision maker. As we proceed, we'll also consider economic models of groups of individuals—for example, the group of all buyers or all sellers in a market. The study of individual choices and the study of group behavior in individual markets both come under the rubric of microeconomics.

[7]See, for example, Binyamin Appelbaum, *The Economists' Hour: False Prophets, Free Markets, and the Fracture of Society*, New York: Little, Brown and Company, 2019. On page 16, Appelbaum presents a justification for speaking of economists "as a homogeneous community."

[8]For a compilation and discussion of frequent current accusations against economics, see Suresh Naidu, Dani Rodrik, and Gabriel Zucman, *Economics for Inclusive Prosperity: An Introduction*, https://econfip.org/wp-content/uploads/2019/02/1.Economics-for-Inclusive-Prosperity-An-Introduction.pdf, which has been reprinted, with a symposium, as "Economics After Neoliberalism," *Boston Review*, Summer 2019, http://bostonreview.net/forum/suresh-naidu-dani-rodrik-gabriel-zucman-economics-after-neoliberalism. Naidu, Rodrik, and Zucman take a very different view of standard economic theory than is taken in this text, but we are aligned on the "economics as an evaluation framework" approach to policy questions.

Macroeconomics, by contrast, is the study of broader aggregations of markets. For example, it tries to explain the national unemployment rate, the overall price level, and the total value of national output.

Economists are much better at predicting and explaining what happens in individual markets than in the economy as a whole. Not only is it difficult to identify unintended consequences of policy changes when working at the economy level, but normative biases (in what is, after all, "policy economics") are particularly difficult to avoid. When prominent economists disagree in the press or on television, the issue is more likely to be from macroeconomics than from microeconomics. But even though economists still have trouble with macroeconomic questions, macroeconomic analysis is undeniably important. After all, recessions and inflation disrupt millions of lives.

Economists increasingly believe that the key to progress in macroeconomics lies in more careful analysis of the individual markets that make up broader aggregates. As a result, the distinction between micro and macro has become less clear in recent years. The graduate training of all economists, micro and macro alike, is increasingly focused on microeconomic analysis.

SUMMARY

- Microeconomics entails the study of choice under scarcity. Scarcity is ever present, even when material resources are abundant. There are always important limitations on time, energy, and the other things we need to pursue our goals.
- Much of the economist's task is to try to answer questions of the form "Should I do activity *x*?" The approach to answering them is disarmingly simple. It is to do *x* if and only if its costs are smaller than its benefits. Not incurring a cost is the same as getting a benefit. *(LO1)*
- The cost-benefit model sometimes fails to predict how people behave when confronted with everyday choices. The art of cost-benefit analysis lies in being able to specify and measure the relevant costs and benefits, a skill many decision makers lack. Some costs, such as sunk costs, often seem relevant but turn out not to be. Others, such as implicit costs, are sometimes ignored, even though they are important. Benefits too are often difficult to measure. Experience has taught that becoming aware of the most common pitfalls helps most people become better decision makers. *(LO2, LO3)*
- When the question is not whether to perform an activity but rather at what level to perform it, marginal analysis draws our attention to the importance of marginal benefits and marginal costs. We should increase the level of an activity whenever its marginal benefit exceeds its marginal cost. *(LO1)*
- The principles of rational choice are by no means limited to formal markets for goods and services. Indeed, some form of implicit or explicit cost-benefit calculation lies behind almost every human action, object, and behavior. Knowledge of the underlying principles casts our world in a sharp new light, not always flattering, but ever a source of stimulating insight. *(LO6)*

KEY TERMS

average benefit
average cost
external cost of an activity
marginal benefit
marginal cost
normative question
opportunity cost of activity
positive question
reservation price of activity x

REVIEW QUESTIONS

1. What is your opportunity cost of reading a novel this evening? *(LO3)*
2. Your roommate is thinking of permanently dropping out of school this semester. If his tuition payment for this semester is non-refundable, should he take it into account when making his decision? *(LO3)*
3. Give three examples of activities accompanied by external costs or benefits. *(LO5)*

4. Why is the opportunity cost of attending college higher for a 50 year old than for a 20 year old? *(LO6)*
5. Why should sunk costs be irrelevant for current decisions? *(LO3)*
6. How can the cost-benefit model be useful for studying the behavior of people who do not think explicitly in terms of costs and benefits? *(LO2)*

PROBLEMS

connect

1. Jamal has a flexible summer job. He can work every day but is allowed to take a day off anytime he wants. His friend Don suggests they go to the amusement park on Tuesday. The admission charge for the park is $15 per person, and it will cost them $5 each for gasoline and parking. Jamal loves amusement parks and a day at the park is worth $45 to him. However, Jamal also enjoys his job so much that he would actually be willing to pay $10 per day to do it. *(LO1)*
   a. If Jamal earns $10 if he works, should he go to the amusement park?
   b. If Jamal earns $15 . . . ?
   c. If Jamal earns $20 . . . ?
2. Tom is a mushroom farmer. He invests all his spare cash in additional mushrooms, which grow on otherwise useless land behind his barn. The mushrooms double in size during their first year, after which time they are harvested and sold at a constant price per pound. Tom's friend Dick asks Tom for a loan of $200, which he promises to repay after 1 year. How much interest will Dick have to pay Tom in order for Tom to be no worse off than if he had not made the loan? *(LO3)*
3. The meal plan at University A lets students eat as much as they like for a fixed fee of $500 per semester. The average student there eats 250 lbs. of food per semester. University B charges students $500 for a book of meal tickets that entitles the student to eat 250 lbs. of food per semester. If the student eats more than 250 lbs., he or she pays extra; if the student eats less, he or she gets a refund. If students are rational, at which university will average food consumption be higher? *(LO3)*
4. You are planning a 1,000-mile trip to Florida. Except for cost, you are indifferent between driving and taking the bus. Bus fare is $260. The costs of operating your car during a typical 10,000-mile driving year are as follows: *(LO3)*

Insurance	$1,000
Interest	2,000
Fuel & oil	1,200
Tires	200
License & registration	50
Maintenance	1,100
Total	$5,550

   Should you drive or take the bus?
5. Chris and Jane have rented a banquet hall to celebrate their wedding anniversary. Fifty people have already accepted their invitation. The caterers will charge $5 per person for food and $2 per person for drinks. The band will cost $300 for the evening, and the hall costs $200. Now Chris and Jane are considering inviting 10 more people. By how much will these extra guests increase the cost of their party? *(LO3)*
6. You loan a friend $1,000, and at the end of 1 year she writes you a check for $1,000 to pay off this loan. If the annual interest rate on your savings account is 6 percent, what was your opportunity cost of making this loan? *(LO3)*
7. Monica and Rachel live in Ithaca, New York. At 2 PM, Monica goes to the local Ticketmaster and buys a $30 ticket to a basketball game to be played that night in Syracuse (50 miles north). Rachel plans to attend the same game, but doesn't purchase her ticket in advance because she knows from experience that it is always possible to buy just as good a seat at the arena. At 4 PM, a heavy, unexpected snowstorm begins, making the prospect of the drive to Syracuse much less attractive than before. If both Monica and Rachel have the same tastes and are rational, is one of them more likely to attend the game than the other? If so, say who and explain why. If not, explain why not. *(LO3)*
8. Two types of radar weather-detection devices are available for commercial passenger aircraft: the "state-of-the-art" machine and another that is significantly less costly, but also less effective. The Federal Aviation Administration (FAA) has hired you for advice on whether all passenger planes should be required to use the state-of-the-art machine. After careful study, your recommendation is to require the more expensive machine only in passenger aircraft with more than 200 seats. How would you justify such a recommendation to an FAA member who complains that all passengers have a right to the best weather-detecting radar currently available? *(LO1)*
9. A group has chartered a bus to New York City. The driver costs $100, the bus costs $500, and tolls will cost $75. The driver's fee is nonrefundable, but the bus may be canceled a week in advance at a charge of only $50. At $18 per ticket, how many people must buy tickets so that the trip need not be canceled? *(LO1)*

10. Residents of your city are charged a fixed weekly fee of $6 for garbage collection. They may put out as many cans as they wish. The average household puts out three cans per week.

    Now, suppose your city changes to a "tag" system. Each can of garbage must have a tag affixed to it. The tags cost $2 each.

    What effect will the introduction of the tag system have on the total quantity of trash collected? (*LO1*)

11. Suppose that random access memory (RAM) can be added to your computer at a cost of $8 per gigabyte. Suppose also that the value to you, measured in terms of your willingness to pay, of an additional gigabyte of memory is $32 for the first gigabyte, and then falls by one-half for each additional gigabyte. Draw a graph of marginal cost and marginal benefit. How many gigabytes of memory should you purchase? *(LO4)*

12. Suppose in Problem 11 the cost of RAM falls to $4 per gigabyte. How many gigabytes of memory should you purchase now? Suppose additionally that your benefit for an additional gigabyte of memory rises to $144 for the first gigabyte, also falling by one-half for each additional gigabyte. How many gigabytes of memory should you purchase now, with both the lower price and the larger benefit? *(LO4)*

13*. Dana has purchased a $40 ticket to a rock concert. On the day of the concert she is invited to a welcome-home party for a friend returning from abroad. She cannot attend both the concert and the party. If she had known about the party before buying the ticket, she would have chosen the party over the concert. *True or false:* It follows that if she is rational, she will go to the party anyway. Explain. *(LO3)*

14*. Yesterday you were unexpectedly given a free ticket to a Bruno Mars concert scheduled for April 1. The market price of this ticket is $75, but the most you could sell it for is only $50. Today you discover that Taylor Swift will be giving a concert that same evening. Tickets for the Taylor Swift concert are still available at $75. Had you known before receiving your Bruno Mars ticket yesterday that Taylor Swift would be coming, you definitely would have bought a ticket to see her, not Bruno Mars. *True or false:* From what we are told of your preferences, it follows that if you are a rational utility maximizer, you should attend the Taylor Swift concert. Explain. *(LO3)*

15*. Smith recently faced a choice between being (*a*) an economics professor, which pays $60,000/yr, or (*b*) a safari leader, which pays $50,000/yr. After careful deliberation, Smith took the safari job, but it was a close call. "For a dollar more," he said, "I'd have gone the other way."

    Now Smith's brother-in-law approaches him with a business proposition. The terms are as follows:

    - Smith must resign his safari job to work full-time in his brother-in-law's business.
    - Smith must give his brother-in-law an interest-free loan of $100,000, which will be repaid in full if and when Smith leaves the business. (Smith currently has much more than $100,000 in the bank.)
    - The business will pay Smith a salary of $70,000/yr. He will receive no other payment from the business.

    The interest rate is 10 percent per year. Apart from salary considerations, Smith feels that working in the business would be just as enjoyable as being an economics professor. For simplicity, assume there is no uncertainty regarding either Smith's salary in the proposed business or the security of his monetary investment in it. Should Smith join his brother-in-law and, if so, how small would Smith's salary from the business have to be to make it *not* worthwhile for him to join? If not, how large would Smith's salary from the business have to be to make it worthwhile for him to join? *(LO1, LO3)*

16*. You have just purchased a new Chevrolet Equinox for $25,000, but the most you could get for it if you sold it privately is $20,000. Now you learn that Ford is offering its Explorer, which normally sells for $30,000, at a special sale price of $25,000. If you had known before buying the Equinox that you could buy an Explorer at the same price, you would have definitely chosen the Explorer. *True or false:* From what we are told of your preferences, it follows that if you are a rational utility maximizer, you should definitely not sell the Equinox and buy the Explorer. Explain. *(LO1, LO3)*

*Problems marked with an asterisk (*) are more difficult.

ANSWERS TO SELF-TESTS

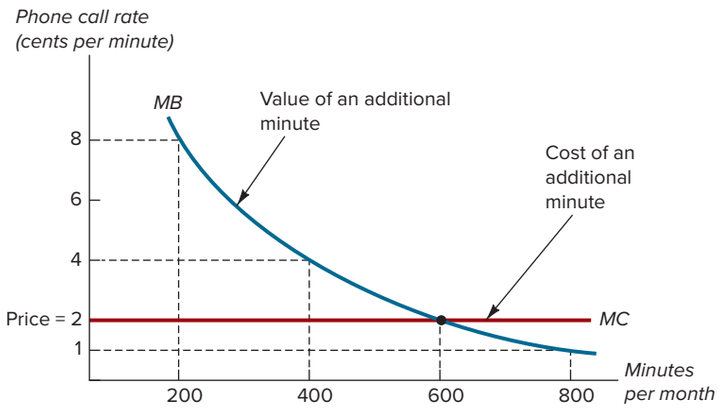
1.1 Someone who gets a $28 traffic ticket every 200 miles driven will pay $35 in fines, on the average, for every 250 miles driven. Adding that figure to the $20 hassle cost of driving, and then adding the $50 fuel, oil, and maintenance cost, we have $105. This is more than the $100 bus fare, which means taking the bus is best. *(LO1)*

1.2 The $18 Mike paid for his ticket is a sunk cost at the moment he must decide whether to attend the concert. For both Jim and Mike, therefore, the costs and benefits should be the same. If the benefit of seeing the concert outweighs the cost of sitting in the rain, they should go. Otherwise they should stay home. *(LO3)*

1.3 You should use your coupon for the New Delhi trip, because it is more valuable to save $120 than to save $100. *(LO1, LO3)*

1.4 Two boats. Referring to Table 1.2, note that if marginal cost is $150, it now pays to launch the second boat (marginal benefit = $180) but not the third. *(LO1, LO3)*

1.5 At 2 cents per minute, Susan should talk for 600 minutes per month. Refer to the graph as shown. *(LO4)*



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Jorge Salcedo/Alamy Stock Photo

Supply and Demand

In April 1979, less than a month after the Carter administration began to ease Nixon-era price controls on domestic crude oil, a major oil supply interruption occurred in the Mideast. Gasoline prices skyrocketed. To head off further increases, the administration implemented a complex system of fuel allocations and gasoline price controls. At the same time, with oil supplies uncertain, it asked U.S. refiners to increase inventories—that is, to send less gasoline to the market. One result was that many urban markets got substantially less gasoline than motorists wanted to buy at the regulated prices. At many service stations, lines of cars stretched many blocks.

Quarrels over position in such queues were common, and many motorists got into fistfights and shouting matches. One was shot and killed for butting into line. Tensions continued until the gasoline lines dwindled with the passing of the summer travel months.

The government's system of price controls and allocations tried to accomplish a task we usually relegate to markets. The gas shortage experience was typical of similar interventions in other times and places. These programs typically produce confusion and conflict. Of course, the unfettered market can itself produce outcomes we don't like. But rarely does it fail to allocate available supplies in a smooth, efficient manner.

You might ask, in light of climate policy options being discussed today, why the Carter administration did not propose a tax on gasoline. It did. It proposed a rebated, "revenue-neutral" gasoline tax as early as 1977, but the proposal failed in Congress.

In Chapter 5, we will look at the objections to the 1977 gas tax proposal and ask whether those objections were supported by economic theory. We begin in this chapter with the basic components of price theory: supply and demand.

CHAPTER PREVIEW

In this chapter we will explore why markets function so smoothly most of the time and why attempts at direct allocation are so often problematic. The "most of the time" in the previous sentence should be noted. There are many kinds of markets, and the theory we develop in this chapter should be used with care when applied to markets where, as in our

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- **LO1** Explain how the demand and supply curves summarize the behavior of buyers and sellers.
- **LO2** Explain why the equilibrium in a market identifies a price-quantity pair for which buyers and sellers are satisfied.
- **LO3** Explain how shifts in supply and demand curves cause equilibrium prices and quantities to change.
- **LO4** Explain why transactions can always be found that make some parties better off without harming others whenever a market is not in equilibrium.
- **LO5** Explain why attempts to peg prices below or above their equilibrium levels produces negative side-effects and describe both the rationing and allocative functions of prices.
- **LO6** List some determinants of supply and demand.
- **LO7** Solve for equilibrium prices and quantities when supply and demand curves are expressed in algebraic form.

Saul Loeb/AFP/Getty Images

Pegging prices below equilibrium levels almost always entails costly side effects.

oil crisis example, a few producers dominate or where an extra-market authority has acted to constrain supply. We will begin to sort out the impacts of these kind of distortions in Chapter 10 and following. That said, the concepts introduced in this chapter provide powerful and intuitive insights into both policy questions and actual market operations. The early part of the chapter will look at basic supply and demand analysis. First, we'll review the usual descriptive features of supply and demand analysis. Next, we'll see that, for given attributes of buyers and sellers, the unregulated competitive market yields the best attainable outcome, in the sense that any other combination of price and quantity would be worse for at least some buyers or sellers.

Despite this attractive feature, market outcomes often do not command society's approval. Concern for the well-being of the poor has motivated the governments of every Western society to intervene in a variety of ways—for instance, by adopting laws that peg prices above or below their equilibrium levels. Such laws, we will see, almost always generate harmful, if unintended, consequences.

A generally more efficient solution to the problems of the poor is to boost their incomes directly. The law of supply and demand cannot be repealed by the legislature. But legislatures can alter the underlying forces that govern the shape and position of supply and demand schedules.

Finally, we will explore supply and demand analysis as a useful device for understanding how taxes affect equilibrium prices and quantities. In particular, it helps dispel the myth that a tax is paid primarily by the party on whom it is directly levied; rather, the burden of a tax falls most heavily on whichever side of the market is least able to avoid it.

SUPPLY AND DEMAND CURVES

Our basic tool for analyzing market outcomes is supply and demand analysis, already familiar to most of you. Let's begin with the following working definition of a market.

Definition: A market consists of the buyers and sellers of a good or service.

Some markets are confined to a single specific time and location. For example, all the participating buyers and sellers (or at least their designated representatives) gather together in the same place for an antiques auction. Other markets span vast geographic territory, and most participants in them never meet or even see one another. The New York Stock Exchange and eBay are examples.

Sometimes the choice of market definition will depend on the bias of the observer. In antitrust cases, for example, current policy prohibits mergers between companies whose combined share of the market would exceed a given threshold. Accordingly, government prosecutors who oppose a merger will often try to define markets as narrowly as possible, thereby making the combined market share as large as possible. The merging companies, by contrast, tend to view their markets in much broader terms, which naturally makes their combined market share smaller. Stouffer's Corporation, when it wanted to merge with Nestlé, told the court that both firms were in the business of selling "frozen dinners." The Justice Department argued to the same court that the two companies were in the business of selling "high-priced ethnic entrees." In general, as in this particular instance, the best market definition will depend on the purpose at hand.

Over the years, economists have increasingly recognized that even subtle product differences matter a great deal to some consumers, and the trend in analysis has been toward ever narrower definitions of goods and markets. Two otherwise identical products are often classified as separate if they differ only with respect to the times or places they are available. An umbrella on a sunny day, for example, is in this sense a very different product from an umbrella during a downpour. And the markets for these two products behave very differently indeed. (My editor tells me that low-quality umbrellas in Manhattan sell for $10 on rainy days, only $5 on sunny days.)

To make our discussion concrete, let's consider the workings of a specific market—say, the one for $1\frac{1}{2}$-pound lobsters in Hyannis, Massachusetts, on July 20, 2019. For this market, our task is to explain both the price of lobsters and the quantity traded. We begin with the basic *demand curve,* a simple mathematical relationship that tells how many lobsters buyers wish to purchase at various possible prices (holding all else constant). The curve *DD* depicted in Figure 2.1, for example, tells us that 4,000 lobsters will be demanded at a price of $8 each, 1,000 at a price of $20, and so on.

If a visitor from Mars were told only that lobsters sell for $8 each, he would have no way of knowing whether they were cheap or expensive. In 1900, an $8 lobster would have been out of reach of all but the wealthiest consumers. In 2019, by contrast, lobsters would have been considered an incredible bargain at that price. Unless otherwise stated, the price on the vertical axis of the demand curve diagram will refer to the **real price** of the good, which means its price relative to the prices of all other goods and services. Thus, the prices on the vertical axis of Figure 2.1 represent lobster prices on July 20, 2019, and the context within which those prices are interpreted by buyers is the set of prices of all other goods on that same date.

real price of a product its price relative to the prices of other goods and services.

The discussion above describes the demand curve as a schedule telling how much of a product consumers wish to purchase at various prices. This is called the *horizontal interpretation* of the demand curve. Under this interpretation, we start with price on the

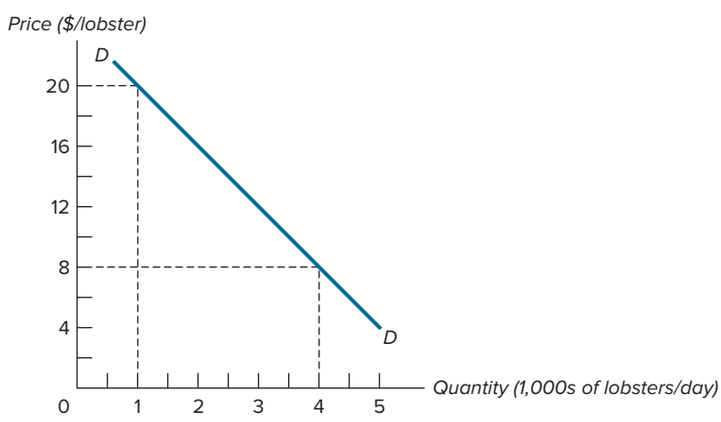


FIGURE 2.1

The Demand Curve for Lobsters in Hyannis Mass., July 20, 2019

The demand curve tells the quantities buyers will wish to purchase at various prices. Its key property is its downward slope; when price falls, the quantity demanded increases. This property is called the law of demand.

vertical axis and read the corresponding quantity demanded on the horizontal axis. For instance, at a price of $20 per lobster, the demand curve in Figure 2.1 tells us that the quantity demanded will be 1,000 lobsters per day.

A second interpretation of the demand curve is to start with quantity on the horizontal axis and then read the marginal buyer's reservation price on the vertical axis. Thus when the quantity of lobsters sold is 4,000 per day, the demand curve in Figure 2.1 tells us that the marginal buyer's reservation price is $8 per lobster. This second way of reading the demand curve is called the *vertical interpretation.*

law of demand the empirical observation that when the price of a product falls, people demand larger quantities of it.

The demand curve shown in Figure 2.1 happens to be linear, but demand curves in general need not be. The key property assumed of them is that they are downward sloping: the quantity demanded rises as the price of the product falls. This property is often called the **law of demand.** Although we will see in Chapter 4 that it is theoretically possible for a demand curve to be upward sloping, such exceptions are virtually never encountered in practice. To be sure, the negative slope of the demand curve accords in every way with our intuitions about how people respond to rising prices.

As we'll see in more detail in Chapter 4, there are normally two independent reasons for the quantity demanded to fall when price rises. One is that many people switch to a close substitute. Thus, when lobster gets more expensive, some consumers may switch to crab, others to meat or poultry. A second reason is that people are not *able* to buy as much as before. Incomes, after all, go only so far. When price goes up, it is not possible to buy as much as before unless we purchase less of something else.

The demand curve for a good is a summary of the various cost-benefit calculations that buyers make with respect to the good, as we'll see in greater detail in the next chapter. The question each person faces is, "Should I buy the product?" (and usually, "If so, how much of it?"). The cost side of the calculation is simply the price of the product (and implicitly, the other goods or services that could be bought with the same money). The benefit side is the satisfaction provided by the product. The negative slope of the demand schedule tells us that the cost-benefit criterion will be met for fewer and fewer potential buyers as the price of the product rises.

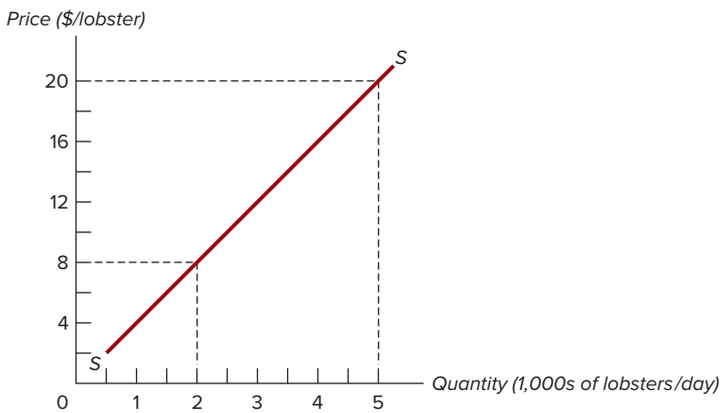
On the seller's side of the market, the corresponding analytical tool is the supply schedule. A hypothetical schedule for our lobster market is shown as line *SS* in Figure 2.2. Again, the linear form of this particular schedule is not a characteristic feature of supply schedules generally. What these schedules do tend to have in common is their upward slope: The quantity supplied rises as the price of a product rises. This property can be called the **law of supply.** For a supplier to be willing to sell a product, its price must cover the marginal cost of producing or acquiring it. As we will see in detail in Chapter 9, the cost of producing additional units often tends to rise as more units are produced, especially in the short run. When this is the case, increased production is profitable only at higher prices.

law of supply the empirical observation that when the price of a product rises, firms offer more of it for sale.

FIGURE 2.2

A Supply Schedule for Lobsters in Hyannis, Mass., July 20, 2019

The upward slope of the supply schedule reflects the fact that costs tend to rise when producers expand production in the short run.



In our lobster market, the reasons for this are clear. Suppliers harvest the lobsters closest to shore first, and then work their way farther offshore as they try to enlarge their catch. The more lobsters they try to harvest, the farther they have to go, and hence the more it costs.

Another factor contributing to the upward slope of the supply curve is substitution on the part of fishermen. As the price of lobsters increases, more producers switch to lobsters, rather than continue to fish for, say, cod or haddock.

Like demand curves, supply curves can be interpreted either horizontally or vertically. Under the horizontal interpretation, we begin with a price, then go over to the supply curve to read the quantity that sellers wish to sell at that price on the horizontal axis. For instance, at a price of $8 per lobster, sellers in Figure 2.2 wish to sell 2,000 lobsters per day.

Under the vertical interpretation, we begin with a quantity, then go up to the supply curve to read the corresponding marginal cost on the vertical axis. For example, if sellers in Figure 2.2 are currently supplying 5,000 lobsters per day, the opportunity cost of the last lobster supplied by the marginal seller would be $20. In other words, the supply curve tells us that the marginal cost of delivering the 5,000th lobster is $20. If someone could deliver a 5,001st lobster for less than $20, she would have had an incentive to do so, in which case the quantity of lobster supplied at a price of $20 would not have been 5,000 per day to begin with. By similar reasoning, when the quantity of lobster supplied is 2,000 per day, the marginal cost of delivering another lobster must be $8.

An alternative way of describing the supply schedule is to call it the set of price-quantity pairs for which suppliers are satisfied. The term "satisfied" has a technical meaning here, which is that any point on the supply schedule represents the quantity that suppliers want to sell, *given the price they face.* They would obviously be happy to get even higher prices for their offerings. But for any given price, suppliers would consider themselves worse off if forced to sell either more or less than the corresponding quantity on the supply schedule. If, for example, the price of lobsters in Figure 2.2 were $8, suppliers would not be satisfied selling either more or fewer than 2,000 lobsters a day.

The demand schedule may be given a parallel description. It is the set of price-quantity pairs for which buyers are satisfied in precisely the same sense. At any given price, they would consider themselves worse off if forced to purchase either more or less than the corresponding quantity on the demand schedule.

Why are rotisserie chickens less expensive than fresh chickens?

EQUILIBRIUM QUANTITY AND PRICE

With both the supply and demand schedules in hand, we can describe the *equilibrium quantity and price* of lobsters. It is the price-quantity pair at which both buyers and sellers are satisfied. Put another way, it is the price-quantity pair at which the supply and demand schedules intersect. Figure 2.3 depicts the equilibrium in our lobster market, at which a total of 3,000 lobsters is traded at a price of $12 each.

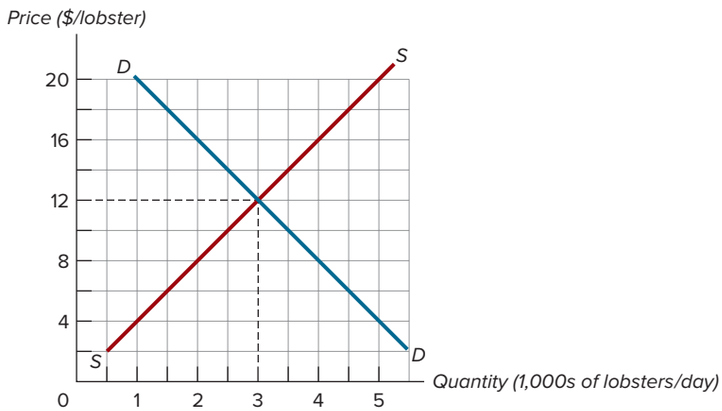


FIGURE 2.3

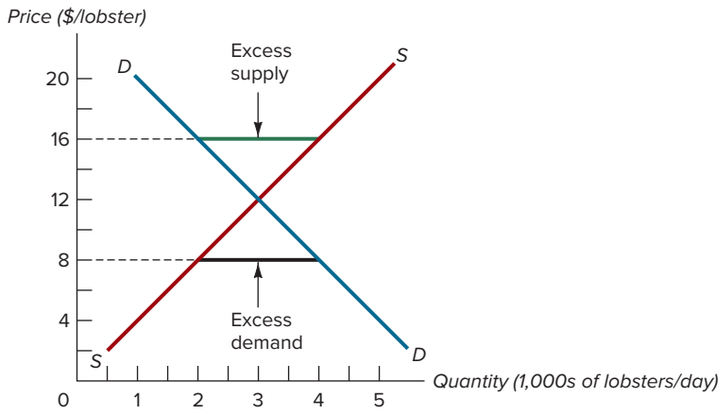
Equilibrium in the Lobster Market

The intersection of the supply and demand curves represents the price-quantity pair at which all participants in the market are "satisfied": Buyers are buying the amount they want to buy at that price, and sellers are selling the amount they want to sell.

FIGURE 2.4

Excess Supply and Excess Demand

When price exceeds the equilibrium level, there is excess supply, or surplus. When price is below the equilibrium level, there is excess demand, or shortage.



If we were at any price-quantity pair other than the one in Figure 2.3, either buyers or sellers, or both, would be dissatisfied in the sense described above. If the price happened for some reason to lie above the $12 equilibrium level, sellers would tend to be the ones who are frustrated. At a price of $16, for example, buyers would purchase only 2,000 lobsters, whereas sellers would offer 4,000. (See Figure 2.4.) Buyers would be satisfied at a price of $16, but sellers would not. A situation in which price exceeds its equilibrium value is called one of **excess supply,** or *surplus.* At $16, there is an excess supply of 2,000 lobsters.

excess supply the amount by which quantity supplied exceeds quantity demanded.

If, by contrast, the price happened to lie below the equilibrium price of $12, then buyers would be the ones dissatisfied. At a price of $8, for example, they would want to purchase 4,000 lobsters, whereas suppliers would be willing to sell only 2,000. A situation in which price lies below its equilibrium value is referred to as one of **excess demand,** or *shortage.* At a price of $8 in this lobster market, there is an excess demand of 2,000 lobsters. At the market equilibrium price of $12, both excess demand and excess supply are exactly zero.

excess demand the amount by which quantity demanded exceeds quantity supplied.

SELF-TEST 2.1

At a price of $4 in this hypothetical lobster market, how much excess demand for lobsters will there be? How much excess supply will there be at a price of $20?

ADJUSTMENT TO EQUILIBRIUM

When price differs from the equilibrium price, trading in the marketplace will be constrained—by the behavior of buyers if the price lies above equilibrium, by the behavior of sellers if below. At any price other than the equilibrium price, one side of the market or the other is dissatisfied. At prices above equilibrium, for example, sellers are not selling as much as they want to. The impulse of a dissatisfied seller is to reduce the price. In the seafood business, after all, the rule of thumb is "sell it or smell it." At a price of $16 each, 2,000 lobsters are being sold, but another 2,000 go unclaimed. Each seller reasons, correctly, that if he were to cut his price slightly, while others remained at $16, he could move all his unsold lobsters. Buyers will abandon sellers who charge $16 in favor of those who charge only $15.95. But then the deserted sellers themselves have a motive for cutting price. And if all sellers cut their price to $15.95, each will again have a large quantity of unsold lobsters. Downward pressure on price will persist as long as there remain any dissatisfied sellers—that is, until price falls to its equilibrium value.

When price is below $12, buyers are dissatisfied. Under these conditions, sellers will realize that they can increase their prices and still sell as much as they wish to. This upward pressure on price will persist until price reaches its equilibrium value. Put another way, consumers will start bidding against each other in the hope of seeing their demands satisfied.

An extraordinary feature of this equilibrating process is that no one consciously plans or directs it. The actual steps that consumers and producers must take to move toward equilibrium are often indescribably complex. Suppliers looking to expand their operations, for example, must choose from a bewilderingly large menu of equipment options. Buyers, for their part, face literally millions of choices about how to spend their money. And yet the adjustment toward equilibrium results more or less automatically from the natural reactions of self-interested individuals facing either surpluses or shortages.

SOME WELFARE PROPERTIES OF EQUILIBRIUM

Given the attributes—tastes, abilities, knowledge, incomes, and so on—of buyers and sellers, the equilibrium outcome has some attractive properties. Specifically, we can say that no reallocation can improve some people's position without harming the position of at least some others. *If price and quantity take anything other than their equilibrium values, however, it will always be possible to reallocate so as to make at least some people better off without harming others.*

Sticking with the lobster example, suppose price is $8, with suppliers therefore offering only 2,000 lobsters. As indicated in Figure 2.5, the vertical interpretation of the demand curve tells us that when only 2,000 lobsters are available, buyers are willing to pay $16. Similarly, the vertical interpretation of the supply curve tells us that when 2,000 lobsters a day are supplied, the marginal cost of delivering another lobster is only $8. When the value to the buyer of the last lobster caught ($16) is higher than the cost of harvesting it ($8), there's room to cut a deal.

Suppose, for example, a dissatisfied buyer were to offer a supplier $10 for a lobster. The supplier would gladly sell an additional lobster at this price (since, at 2,000 lobsters, an additional lobster costs only $8 to harvest). This transaction would improve the buyer's position by $6 (the difference between the $16 value he attaches to the lobster and the $10 he paid for it). It would also improve the seller's position by $2 (the difference between the $10 she got and the $8 cost of harvesting the extra lobster). No one suffers any harm from this transaction (except the extra lobster!), and the participants reap $8 of additional benefit from it ($6 for the buyer, $2 for the seller). A similar argument can be

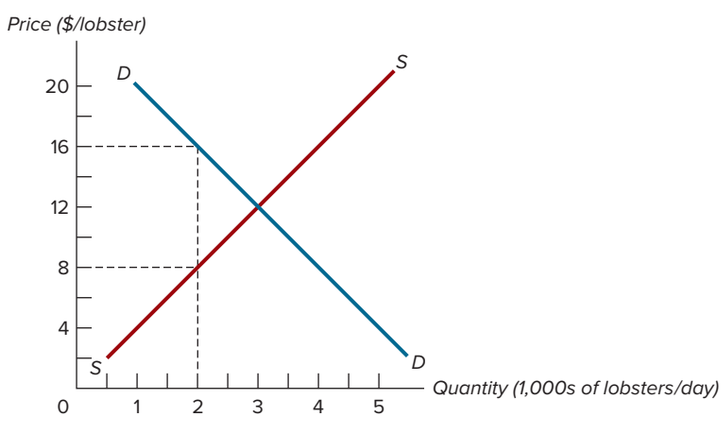


FIGURE 2.5

An Opportunity for Improvement in the Lobster Market

When the quantity traded in the market is below (or above) the equilibrium quantity, it is always possible to reallocate resources in such a way that some people are made better off without harming others. Here, a dissatisfied buyer can pay a seller $10 for an additional lobster, thus making both parties better off.

made concerning any price below the equilibrium value. For any such price, it is always possible to make some people better off without hurting others.

What if the price had been higher than the equilibrium price to begin with? Suppose price is $16 with trading therefore limited by buyers' demands for 2,000 lobsters. (Again, see Figure 2.5.) Now a dissatisfied seller can propose a transaction that will make both the seller and some buyers better off. Suppose, for example, a seller offers an additional lobster for sale for $14. Since buyers value additional lobsters at $16, whoever buys it will be better off by $2. And since lobsters cost only $8 to harvest, the seller will be better off by $6. Again, no one is injured by this transaction, and again the two parties gain a total of $8.

Thus, no matter whether price starts out above or below its equilibrium value, a mutually beneficial transaction will always be possible. We'll examine the welfare properties of the market system in much greater detail in later chapters. But for now, suffice it to say that the equilibrium price and quantity constitute the best outcome attainable, given the initial attributes and endowments of buyers and sellers.

FREE MARKETS AND THE POOR

The fact that market equilibrium is efficient in the sense just described does not mean that it is necessarily desirable in any absolute sense. All markets may be in perfect equilibrium, for example, and yet many people may lack sufficient incomes to purchase even the bare necessities of life. Saying market equilibrium is efficient does not challenge the notion that being poor is difficult, often even painful. Efficiency says merely that, *given the low incomes of the poor,* free exchange enables them to do the best they can. One can hold this view and still believe it desirable to provide public assistance to poor people.

Concern for the well-being of the poor motivates most societies to try to intervene, as in the gasoline price control example mentioned earlier. The difficulty, as in that example, is that these interventions often produce unintended harmful consequences. Indeed, many clearly do more harm than good. As we will see, a more thorough understanding of the workings of the market mechanism would prevent many of the most costly consequences of our current approach.

EXAMPLE 2.1 Alternate Allocation Mechanisms

Denied boarding compensation.

What are the efficiency and distributional implications of handling excess demand for seats on overbooked flights through a first-come, first-served policy as opposed to an auction mechanism?

Commercial airlines frequently issue more reservations than there are seats on a flight. Because many reservation holders fail to show up for their flights, this practice seldom causes difficulty. Occasionally, however, 160 passengers will show up for a flight on which there are only, say, 150 seats. Before the late 1970s, airlines dealt with overbooked flights by boarding passengers on a first-come, first-served basis.

This solution gives insufficient weight to the interests of passengers with pressing needs to arrive at their final destinations on time. With this problem clearly in mind, the Civil Aeronautics Board (CAB), the government agency that used to regulate the commercial aviation industry, proposed a simple regulation. When too many people showed up for a flight, the airline would be required to call for volunteers to abandon their seats in return for either a cash payment or an in-kind payment, such as a free air ticket. The airline would be required to keep increasing its offer until it got enough volunteers.

The advantage of the CAB proposal was that it would allow passengers to decide for themselves how pressing their schedules were. People with important meetings could simply refuse to volunteer. Others could agree to wait a few hours, often in return for several hundred dollars or a free trip to Hawaii. By comparison with the first-come, first-served solution, the CAB proposal promised a better outcome for all passengers.

Or at any rate, so it seemed. A consumer-action group immediately objected to the CAB's proposal on the grounds that it was unfair to low-income passengers. The group's complaint was that the auction method of soliciting volunteers would almost always result in the poorest ticket holders being the ones to wait for the next flight.

Now, a poor person will surely be more likely to find a cash payment a compelling reason to volunteer. But by volunteering, a person says that the cash payment is *worth* the wait. The world would indeed be a better place if poor people had higher incomes and were not tempted by their poverty to give up their seats on airplanes. But the consumer group was not proposing to give the poor higher incomes. Rather, it wanted the industry to stick with a system that bumped passengers from overbooked flights irrespective of the value they attached to remaining on board.

Why is an auction a better way to allocate seats on an over-booked flight than first-come, first-served?

It is hard to see how poor people's interests would be served by preventing them from earning extra cash by volunteering to wait for the next flight. And in the end, the CAB adopted its denied-boarding-compensation proposal, to the benefit of air travelers at all income levels.

Many critics of the market system complain that it is unfair to ration goods and services by asking how much people are willing to pay for them. This criterion, they point out, gives short shrift to the interests of the poor. But as Example 2.1 clearly illustrates, serious contradictions plague alternative schemes of allocation. Consider again our hypothetical lobster market. Suppose we are concerned that the equilibrium price of $12 will exclude many deserving poor persons from experiencing the pleasure of a lobster dinner. And suppose that, with this in mind, we adopt a system that periodically gives free lobsters to the poor. Wouldn't such a system represent a clear improvement in the eyes of any person who feels compassion for the poor?

The answer, as in Example 2.1, is that for the same cost we can do even better. When a poor person, or indeed even a rich person, does not buy lobster because the price is too high, she is saying, in effect, that she would prefer to spend her money on other things. If we gave her a lobster, what would she want to do with it? In an ideal world, she would immediately sell it to someone willing to pay the $12 equilibrium price for it. We know there will be such persons because some of the lobsters that would have been bought for $12 were instead given to the poor. The poor person's sale of the lobster to one of these people will bring about a clear improvement for both parties—for the buyer, or else he would not have bought it, and for the seller because the lobster is worth less than $12 to her.

The practical difficulty, as we'll see in detail in later chapters, is that it would take time and effort for our hypothetical poor person to find a buyer for the lobster. In the end, she would probably eat it herself. True enough, she might enjoy her lobster dinner. But by her own reckoning, she would have enjoyed the $12 even more.

The problem is the same with gasoline price controls. The controls were implemented in the sincere belief they were needed to protect the poor from sharply higher gasoline prices. Their effect, however, was to induce a host of behaviors that helped neither rich nor poor.

Despite statements to the contrary by critics of the market system, people are highly responsive to energy prices when they make decisions about how to spend their incomes. If gasoline costs $5.00/gal, for example, many people will form car pools or purchase fuel-efficient cars, even though they would do neither if the price were only $2.50/gal. Whether a long trip is considered worth taking also clearly depends on the price of gasoline.

Regardless of whether fuel is in short supply, it is in everyone's interest—rich or poor—to use it for the activities people value most. But the costs of a policy that does not do this are particularly high when fuel is scarce. Selling gasoline for less than the equilibrium price is just such a policy. It encourages people to use gasoline in wasteful ways.

Rent Controls

For all their differences, displaced manufacturing workers and recent U.S. college graduates have one issue in common: they face the daunting cost of housing in the great job-cluster cities. The costs of relocating to a city like New York or Seattle—or of maintaining oneself there on a low income—make government-imposed solutions such as rent control attractive to many.

Nonetheless, it has been said that the surest way to destroy a city, short of dropping a nuclear bomb on it, is to pass a rent control law. Such laws, like so many others, are motivated by an honest concern for the well-being of low-income citizens as well as wish to keep living in an affordable community. But their economic consequences are no less damaging for being unintended.

Basic supply and demand analysis is again all we need to see clearly the nature of the difficulties. Figure 2.6 depicts the supply and demand schedules for a hypothetical urban apartment market. The equilibrium rent in this market would be $600/month, and at this level there would be 60,000 apartments rented. The city council, however, has passed a law that holds rents at R_c = $400/month, or $200 below the market-clearing value. R_c in this example constitutes a **price ceiling** for rents, a level beyond which rents are not permitted to rise. At $400/month, buyers would like to rent 80,000 apartments, but suppliers are willing to offer only 40,000. There is an excess demand of 40,000 units. And if the rent control level remains fixed at $400/month, excess demand will grow over time as population grows and inflation reduces the value of money.

price ceiling the level above which the price of a good is not permitted by law to rise.

Why are rent-controlled apartments less well maintained than unregulated units?

In an unregulated market, the immediate response would be for rents to rise sharply. But here the law prevents them from rising above R_c. Yet there are other ways the pressures of excess demand can make themselves felt. One is for owners to spend less on maintaining their rental units. If there are two renters knocking at the door of each vacant apartment, clogged drains, peeling paint, broken thermostats, and the like are not apt to receive prompt attention.

Nor are these the most serious difficulties. With an offering of only 40,000 apartments per month, we see in Figure 2.6 that renters would be willing to pay as much as $800/month for an apartment (again, the vertical interpretation of the demand curve). This pressure almost always finds ways, legal or illegal, of expressing itself. In New York City, for example, it is not uncommon to see "finder's fees" or "key deposits" as high as several thousand dollars. Owners who cannot charge a market-clearing rent for an apartment

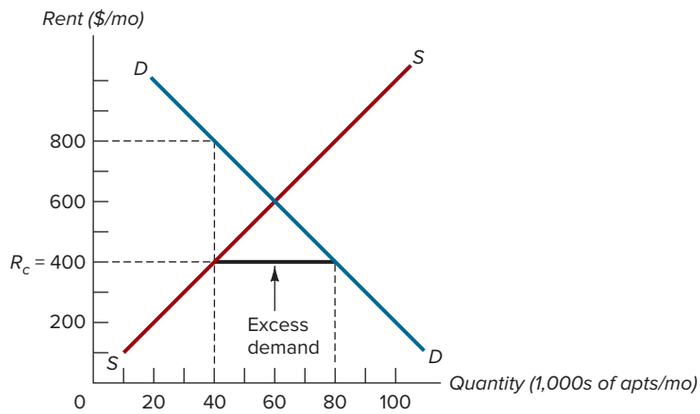


FIGURE 2.6

Rent Controls

With the rent control level set at $400 a month, there is an excess demand of 40,000 apartments a month.

also have the option of converting it to a condominium or co-op, which enables them to sell their asset for a price much closer to its true economic value.

Even when rent-controlled apartment owners do not hike their prices in these various ways, serious misallocations result. A widow steadfastly remains in her seven-room apartment even after her children have left home because it is cheaper than alternative dwellings not covered by rent control. It would be better for all concerned if she relinquished that space to a larger family. But under rent controls, she has no economic incentive to do so.

EXAMPLE 2.2 Excess Demand

Suppose the rent control is lowered (strengthened) to $200/month. What is the excess demand, and how does it compare with the excess demand when rents were limited (more loosely) to $400/month?

At $200/month, buyers would like to rent 100,000 apartments, but suppliers are willing to offer only 20,000. Thus there is an excess demand of 80,000 units. The excess demand is greater than the excess demand of 40,000 units at the $400/month rent control.

SELF-TEST 2.2

In the market for apartments described in Figure 2.6, what would happen if the rent control level were set at $625/mo?

In response to the kinds of problems described above, some rent-control programs have been modified to allow landlords to raise rents when a tenant moves out of an apartment. Such changes reduce, but do not eliminate, misallocations. And they may even create new problems. For example, a landlord who knows that a tenant's departure would permit a rent increase may take any available lawful steps to make the tenant's life unpleasant if he remains.

Of course, the preceding discussion of rent controls does not nearly exhaust the subject of high urban housing costs. For a complete treatment, we would also have to consider, at minimum, how other constraints on supply, such as zoning and density restrictions, serve to drive up home prices and rents. As soon as we did this, we would need to acknowledge that a significant part of household wealth is represented by home

The main problem confronting the poor is that they have too little money. Transferring additional money to the poor does more to help them than attempting to control the prices of things they buy.

Zach Gibson/Getty Images

Legislators can alter many of the forces that determine market outcomes. But they cannot simply repeal the laws of supply and demand.

values. Once you have the goal of protecting home values lined up against the goal of affordable housing, you have a complex normative conflict that goes beyond a basic analysis of supply and demand.

By itself, economics can't strike the balance between the rich or poor. What economic analysis *can* do is point out the existing or likely costs of direct market manipulation or restriction and point to more efficient approaches, such as direct cash transfers or fewer restrictions on housing density. The more "efficient" the approach, the more resources there are to be split between opposing interests. In that sense, efficiency is the normative anchor of positive economics. It will often emerge as the link between the answers provided by economics analysis and the normative questions that motivate our investigations.

If we decide our goal is to help poor people, there are much more effective ways to do it than to give them cheap gasoline, rent-controlled apartments, or free lobsters. One would be to give them additional income and let them decide for themselves how to spend it. Chapter 18 examines some of the practical difficulties involved in transferring additional purchasing power into the hands of the poor. In brief, the most pressing problem is that it is hard to target cash to the genuinely needy without attracting others who could fend for themselves. But as we'll see, economic reasoning also suggests practical ways to overcome this difficulty. There are no simple or easy solutions. But given the enormous losses caused by policies that keep prices below their equilibrium levels, these issues deserve our most serious attention.

Price Supports

price floor a minimum price for a good, established by law, and supported by government's offer to buy the good at that price.

Rent controls are an example of a price ceiling that prevents the price from rising to its equilibrium level. For many agricultural products, the government's policy has been to impose not ceilings but *price supports,* or **price floors,** which keep prices above their equilibrium levels. By contrast to price ceilings, which required merely the announcement of a level beyond which prices could not rise, price supports require the government to become an active buyer in the market.

Figure 2.7, for example, depicts a price support level of P_s in the market for soybeans. Because P_s is above the equilibrium price, there is an excess supply of 200,000 tons/yr. To maintain the price at P_s = \$400/ton, the government must purchase 200,000 tons/yr of soybeans. Otherwise farmers would face powerful incentives to cut their prices.