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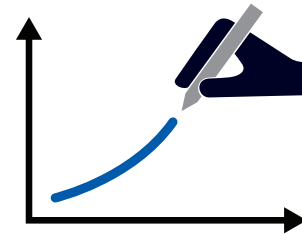
MICROECONOMICS

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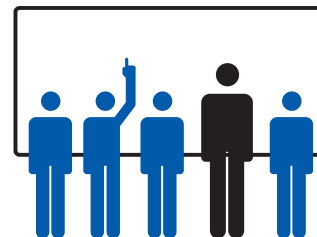
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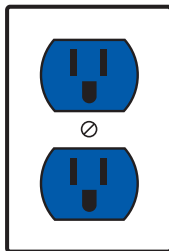
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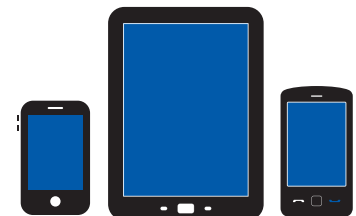
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Second Edition

MICROECONOMICS

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Dedication

***With love for Annika, Aras, Arda, Eli,
Greta, Mason, Max, and Noah,
who inspire us every day.***

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CHAPTERS ON THE WEB

Web chapters are available on MyEconLab.

WEB Chapter 1 Financial Decision Making

WEB Chapter 2 Economics of Life, Health, and the Environment

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Preface

We love economics. We marvel at the way economic systems work. When we buy a smartphone, we think about the complex supply chain and the hundreds of thousands of people who played a role in producing an awe-inspiring piece of technology that was assembled from components manufactured across the globe.

The market's ability to do the world's work without anyone being in charge strikes us as a phenomenon no less profound than the existence of consciousness or life itself. We believe that the creation of the market system is one of the greatest achievements of humankind.

We wrote this book to highlight the simplicity of economic ideas and their extraordinary power to explain, predict, and improve what happens in the world. We want students to master the *essential* principles of economic analysis. With that goal in mind, we identify the three key ideas that lie at the heart of the economic approach to understanding human behavior: optimization, equilibrium, and empiricism. These abstract words represent three ideas that are actually highly intuitive.

The breakneck speed of modern technological change has, more than ever, injected economics into the lives—and hands—of our students. The technologies that they use daily illustrate powerful economic forces in action: Uber users observe real-time congestion in the transportation market when they confront surge pricing, and Airbnb travelers explore the relationships among location, convenience, and price by comparing listings near different subway stops in the same city.

As educators, it's our job to transform economic concepts into language, visual representations, and empirical examples that our students understand. Today, markets are much more interactive than they were only a decade ago, and they exemplify that it is not just competitive markets with perfect information that are relevant to our economic lives. Our students routinely take part in auctions, purchase goods and services via organized platforms such as Uber, have to struggle with pervasive informational asymmetries as they participate in online exchanges, and have to guard themselves against a bewildering array of mistakes and traps that are inherent to these new transactions.

In this ever-changing world, students must understand not just well-known economic concepts such as opportunity cost, supply, and demand, but also modern ones such as game theory, auctions, and behavioral mistakes. It is these modern concepts, which are bit parts in most Principles textbooks, that occupy center stage in ours. Today economic analysis has expanded its conceptual and empirical boundaries and, in doing so, has become even more relevant and useful.

This new world provides incredible opportunities for the teaching of economics as well, provided that we adjust our Principles canon to include modern and empirically-based notions of economics. This has been our aim from day one and continues to be our in this second edition.

New to the Second Edition

In our new edition of *Microeconomics*, evidence-based economics becomes an even more important mainstay of our approach. We have imbued it with new relevance by applying it to many more topics with which our students have first-hand experience. So in addition to updating the existing data and empirical features, we have now added many new empirical examples.

- In Chapter 2 we've added a feature that forces students to wrestle with the question of causality. We discuss a recent research paper that reports a positive correlation between expensive weddings and high rates of divorce. We ask our students to use this finding as a springboard from which to wrestle with the difference between correlation and causality, and to understand the role of omitted variables.
- We've rewritten Chapter 4 to tell the story of the fracking revolution and its remarkable impact on oil and gasoline prices. Supply and demand come alive when students

can see how the recent rightward shift in the oil supply curve, due to the development of fracking technologies, has played a role in halving the equilibrium price of oil.

- The new edition focuses more on the sharing economy—a phenomenon that both permeates our students’ lives and provides researchers novel data with which to solve age-old questions. In Chapter 7, we include a new Evidence-Based Economics section on Uber and the invisible hand; drawing from recent papers, we discuss the role of surge pricing in equilibrating driver supply and rider demand. The resulting insights enable our students to more deeply understand the markets that they personally use.
- The revised text also emphasizes the role of microeconomics in examining prominent social issues, from natural disaster management to global inequality. For example, we have added an Evidence-Based Economics box in Chapter 9 titled “What can the government do to lower earthquakes in Oklahoma?”, which investigates how to reduce fracking-generated earthquakes by applying the concept of externalities. Elsewhere, we examine inequality through a feature on Scandinavia, a feature on broadband access, and more.
- The revised text also uses the recent election to teach topics like probability. For example, in Chapter 15 we have a new Letting the Data Speak feature that discusses forecasts on the eve of the U. S. Presidential election: a 72% chance of a Clinton victory and a 28% chance of a Trump victory. We give students the analytic tools they need to understand how to interpret such forecasts.

Introductory economics classes draw students with diverse interests and future career paths: with this textbook, we show them how to apply economic thinking creatively to improve their work, their choices, and their daily lives.

One of our main objectives in writing this textbook was to show that the fundamentals of economics are not just exciting, but also alive with myriad personal applications. In the first edition, the themes of optimization, equilibrium, and empiricism were our primary tools for communicating both the surprising power and broad applicability of economics. We believe that the intervening years have confirmed these conceptual priorities; these concepts have become even more relevant for our students.

At a time when competing empirical claims abound and news sources across the political spectrum are denounced as “fake,” our students need the skills to systematically question and evaluate what they read. That is why, in our Evidence-Based Economics segments, we examine both the implications *and the limitations* of academic studies. We hope that our textbook will help form a new generation of careful thinkers, smart decision-makers, engaged citizens, and even a few future economists!

Our Vision: Three Unifying Themes

The first key principle is that people try to choose the best available option: *optimization*. We don’t assume that people always successfully optimize, but we do believe that people try to optimize and often do a relatively good job of it. Because most decision makers try to choose the alternative that offers the greatest net benefit, optimization is a useful tool for predicting human behavior. Optimization is also a useful prescriptive tool. By teaching people how to optimize, we improve their decisions and the quality of their lives. By the end of this course, every student should be a skilled optimizer—without using complicated mathematics, simply by using economic intuition.

The second key principle extends the first: economic systems operate in *equilibrium*, a state in which everybody is simultaneously trying to optimize. We want students to see that they’re not the only ones maximizing their well-being. An economic system is in equilibrium when each person feels that he or she cannot do any better by picking another course of action. The principle of equilibrium highlights the connections among economic actors. For example, Apple stores stock millions of iPhones because millions of consumers are going to turn up to buy them. In turn, millions of consumers go to Apple stores because those stores are ready to sell those iPhones. In equilibrium, consumers and producers are simultaneously optimizing, and their behaviors are intertwined.

Our first two principles—optimization and equilibrium—are conceptual. The third is methodological: *empiricism*. Economists use *data* to test economic theories, learn about the world, and speak to policymakers. Accordingly, data play a starring role in our book,

though we keep the empirical analysis extremely simple. It is this emphasis on matching theories with real data that we think most distinguishes our book from others. We show students how economists use data to answer specific questions, which makes our chapters concrete, interesting, and fun. Modern students demand the evidence behind the theory, and our book supplies it.

For example, we begin every chapter with an empirical question and then answer that question using data. One chapter begins by asking:

Would a smoker quit the habit for \$100 per month?

Later in that chapter, we describe how smoking rates fell when researchers paid smokers to quit.

In our experience, students taking their first economics class often have the impression that economics is a series of theoretical assertions with little empirical basis. By using data, we explain how economists evaluate and improve our scientific insights. Data also make concepts more memorable. Using evidence helps students build intuition, because data move the conversation from abstract principles to concrete facts. Every chapter sheds light on how economists use data to answer questions that directly interest students. Every chapter demonstrates the key role that evidence plays in advancing the science of economics.

Features

All of our features showcase intuitive empirical questions.

- In **Evidence-Based Economics (EBE)**, we show how economists use data to answer the question we pose in the opening paragraph of the chapter. The EBE uses actual data from field experiments, lab experiments, or naturally occurring data, while highlighting some of the major concepts discussed within the chapter. This tie-in with the data gives students a substantive look at economics as it plays out in the world around them.

The questions explored aren't just dry intellectual ideas; they spring to life the minute the student sets foot outside the classroom—*Is Facebook free? Is college worth it? Will free trade cause you to lose your job? Is there value in putting yourself into someone else's shoes? What is the optimal size of government?*

EVIDENCE-BASED

ECONOMICS

Would a smoker quit the habit for \$100 per month?



At the beginning of this chapter, we posed a question concerning whether a smoker would quit the habit for \$100 a month. The tools of this chapter can help us begin to think about whether such an incentive can work, and why it might work.

In thinking about such a reward, we have learned that the impact of an increase in income leads to changes in the consumer budget constraint and subsequently the demand for goods and services. To see these tools in action, we return to the shopping-spree example. Exhibit 5.5 shows the mechanics behind the effects of an increase in what we have available to spend.

With that foundation laid, we can return to the question of quitting smoking for a month. Given our economic framework, the very same principle that was at work in the shopping-spree problem applies when considering the smoker's problem. By providing \$100 for not smoking, we create a trade-off between the current benefits of smoking and the benefits obtained by \$100 of increased income. There is also another saving: by not smoking, you save the money otherwise spent on cigarettes or cigars. For simplicity, let's assume that is another \$100 per month. Thus the comparison that we need to make is whether, at the margin, \$200 of additional monthly income

- **Letting the Data Speak** is another feature that analyzes an economic question by using real data as the foundation of the discussion. Among the many issues we explore are such questions as *Should McDonald's be interested in elasticities? Do wages really go down if labor supply increases? Why do some firms advertise while others don't?*

LETTING THE DATA SPEAK

Fair Trade Products

What's Behind the Boom?

In response to the feeling that the growth of free trade has led to the exploitation of developing countries, a new market has opened up for the consumer concerned with a broad variety of production-related issues, including the environment, fair labor practices, and child labor in the developing world. Goods imported from the developing world that meet certain criteria are certified by third-party organizations as “fair trade” products.

To receive a fair trade label, the production of a good has to meet certain standards. For example, if the producer doesn't allow unionization, uses child or slave labor, or doesn't adhere to the U.N. Charter on Human Rights, then the product can't be classified as fair trade.

Consumers can't seem to get enough fair trade products. Sales growth for fair trade goods has reached double-digit proportions over the past decade. Surprisingly, sales continued to expand even after the 2008 recession, growing 15 percent in 2009.¹

In spite of the recent surge in demand for fair trade products, not everyone is a fan. Overseeing billions of dollars of production isn't easy, and the capacity for certifying organiza-



tions to enforce labor standards sometimes can't keep up with the increasing demand for fair trade products.²

- In keeping with the optimization theme, in a feature entitled **Choice & Consequence** we ask students to make a real economic decision or evaluate the consequences of past real decisions. We then explain how an economist might analyze the same decision. Among the questions investigated are *Do people really optimize? Should LeBron James paint his own house? Does revenge have an evolutionary logic?*

CHOICE & CONSEQUENCE

Positive Externalities in Spots You Never Imagined

Externalities are the result of agents trying to do the best they can and ignoring how their actions affect others. In this sense, it would be wrong to think of externalities as “mistakes.” Externalities may result from just *not knowing* the harm we cause others. In this case, we might make choices that we later regret.

Consider the case of flu vaccinations. When you make the decision of whether or not to be vaccinated against the flu, you likely consider only the private benefits and costs from the vaccination—namely, the benefits or costs to yourself. But you are not the only person to incur benefits or costs.

If you decide to take the flu shot, others gain: once you are vaccinated, they are now protected against catching the flu from you. But people can also lose if you choose not to get the shot, because you could catch the flu and spread it. Many of us would not take such externalities—whether positive or negative—into account when making a decision about whether to get a flu shot. But they nevertheless exist.

Researchers who have studied the externalities of vaccinations report quite large effects.² For instance, in certain situations, the external effect of you getting a flu shot can be as high as 1.5 infections. Given that approximately



10 percent to 20 percent of the U.S. population contracts the flu each year, this estimate reveals the potential value in flu vaccination programs.

If you find it important to take account of your own externalities, the next time you are weighing your private benefits and costs of getting a flu vaccination, remember that not getting a shot could result in as many as 1.5 more infections for everyone else. In this sense, by avoiding the needle you have imposed a great externality on the rest of the population.

Organization

Part I: Introduction to Economics lays the groundwork for understanding the economic way of thinking about the world. In *Chapter 1*, we show that the principle of *optimization* explains most of our choices. In other words, we make choices based on a consideration of benefits and costs, and to do this we need to consider trade-offs, budget constraints, and opportunity cost. We then explain that *equilibrium* is the situation in which everyone is simultaneously trying to individually optimize. In equilibrium, there isn't any perceived

benefit to changing one's own behavior. We introduce the free-rider problem to show that individual optimization and social optimization do not necessarily coincide.

Because data play such a central role in economics, we devote an entire chapter—**Chapter 2**—to economic models, the scientific method, empirical testing, and the critical distinction between correlation and causation. We show how economists use models and data to answer interesting questions about human behavior. For the students who want to explore further, there is an appendix on constructing and interpreting graphs, which is presented in the context of an actual experiment on incentive schemes designed by one of us.

Chapter 3 digs much more deeply into the concept of optimization, including an intuitive discussion of marginal analysis. We use a single running example of choosing an apartment, which confronts students with a trade-off between the cost of rent and the time spent commuting. We demonstrate two alternative approaches—optimization using total value and optimization using marginal analysis—and show why economists often use the latter technique.

Chapter 4 introduces the demand and supply framework via a running example of the market for gasoline. We show how the price of gasoline affects the decisions of buyers, like commuters, and sellers, like ExxonMobil. As we develop the model, we explore how individual buyers are added together to produce a market demand curve and how individual sellers are added together to generate a market supply curve. We then show how buyers and sellers jointly determine the equilibrium market price and the equilibrium quantity of goods transacted in a perfectly competitive market. Finally, we show how markets break down when prices aren't allowed to adjust to equate the quantity demanded and the quantity supplied.

Part II: Foundations of Microeconomics anchors *Microeconomics* with a deeper exploration of the sources of demand and supply. One important thing that we have learned as teachers is that even after a year of economics, most students really have no idea about the underpinnings of the demand and supply curves—specifically, where the curves actually come from. Most textbooks do not illuminate these issues.

When crafting Chapters 5 and 6, our goal was to provide two stand-alone chapters that would show students that consumption and production are really two sides of the same coin, “glued” together by the idea of incentives. We gather consumer and producer concepts under their own respective umbrellas, and merge material that is spread out over several chapters in other texts. The goal is to show the commonalities and linkages between consumers' and producers' optimization decisions. With this setup, the student is able to view the whole picture in one place and understand how concepts tie together without flipping back and forth between several chapters.

In **Chapter 5**, we look “under the hood” to show where the demand curve actually comes from. We frame the question of how consumers decide what to buy as “the buyer's problem” and discuss the three key ingredients of demand: tastes and preferences, prices, and the budget set. The discussion is intuitive: once these three pieces are in place, the demand curve naturally falls out. This approach leads fluidly to a discussion of consumer surplus, demand elasticities, and how consumers predictably respond to incentives. In this way, the student can readily see holistically why policymakers and business people should concern themselves with the demand side of economics. For the students who want to delve deeper, there is an appendix on income and substitution effects, which is presented as an extension of the text.

In **Chapter 6**, we use the same holistic approach, but here we follow a single company (The Wisconsin Cheeseman, which a coauthor worked at for two high school summers) to showcase “the seller's problem.” The seller's problem also has three parts: production, costs, and revenues. In thinking through the seller's problem, it is natural to treat these three components together rather than strew them over separate chapters as in other books. They need to be simultaneously considered by the firm when making optimal choices, so why not present them jointly? The running theme of The Wisconsin Cheeseman makes the chapter quite cohesive, and what was once a difficult puzzle to sort through becomes clear when presented under a single continuous example. For the more inquisitive students there is an appendix showing that for firms with different cost structures, economic profits can exist in long-run equilibrium.

Chapter 7 takes an aerial view by considering what happens when we put together the buyers of Chapter 5 and the sellers of Chapter 6 in a perfectly competitive market. The chapter begins by asking: can markets composed of only self-interested people maximize the overall well-being of society? The beauty of economics is on full display in this chapter, as it shows that in a perfectly competitive market, the invisible hand creates harmony between the interests of the individual and those of society. Prices guide the invisible

hand and incentivize buyers and sellers, who in turn maximize social surplus by allocating resources efficiently within and across sectors of the economy. The chapter uses Vernon Smith's seminal laboratory experiments to provide the evidence that prices and quantities converge to the intersection of supply and demand.

In *Chapter 8* we first walk through a discussion of the production possibilities curve, comparative advantage, and the gains from trade. We move the discussion from individuals trading with each other to trade between states (an innovation in a Principles text) and finally to trade between countries. Students can thus see that the principles motivating them to trade are the same as those motivating states and nations to trade. They develop an understanding that there are sometimes winners and losers in trade, but that overall, the gains from trade are larger than the losses. The key policy issue becomes: can we shift surplus to make trade a win-win for everyone?

If students stopped reading the book at this point, they would be rabid free-market proponents. This is because the beauty of the free market is unparalleled. *Chapter 9* begins a discussion of important cases that frustrate the workings of the invisible hand. When some firms produce, they pollute the air and water. There are some goods that everyone can consume once they are provided, such as national defense. Chapter 9 probes three cases of market failure—externalities, public goods, and common pool resources—and highlights an important link: in all three cases, there is a difference between social and private benefits or social and private costs. The student learns that the invisible hand of Chapter 7 can become “broken” and that government can enact policies in regard to externalities to improve social well-being, provide public goods, and protect common pool resources.

But government intervention can be a two-edged sword, and in *Chapter 10* we ask the question, “How much government intervention is necessary and how much is desirable?” We provide an aerial view of taxation and spending, and study how regulation—the main tool that governments use to deal with the externalities and other market failures of Chapter 10—has its costs and limitations. We see that the trade-off between equity and efficiency represents the nub of the conflict between those who support big government and those who argue for smaller government. The Evidence-Based Economics feature at the end of the chapter tackles the thorny question of the optimal size of government by exploring the deadweight loss of income taxation.

Chapter 11 motivates the importance of factor markets—the inputs that firms use to make their goods and services—by asking if there is discrimination in the labor market. This question is couched within a general discussion about why people earn different wages in the labor market. This approach allows the student to seamlessly transition from being a demander (as in Chapter 5 as a buyer) to being a supplier (of labor). The economics behind the other major factors of production—physical capital and land—naturally follow from the labor discussion. The chapter concludes by showing several interesting data sets that measure whether discrimination exists in labor markets.

Part III: Market Structure introduces the alternatives to the perfectly competitive market: monopolies, oligopolies, and monopolistic competition. This section also provides the tools necessary to understand these market structures.

Chapter 12 on monopoly connects the student's thinking to Chapter 6, where the seller's problem was introduced, and shows that all of the production and cost concepts learned earlier apply here: production should be expanded until marginal cost equals marginal revenue. To illustrate the “monopolist's problem,” we use a running example of the allergy drug Claritin and its 20-year patent to show how a monopoly optimizes. Once again, we use the metaphor of the broken invisible hand to illustrate how a monopoly reallocates resources toward itself and thereby sacrifices social surplus. At this point, the student might wonder why legal market power is ever granted by the government. The opening question, *Can a monopoly ever be good for society?*, discusses the other side of the coin by presenting evidence that a monopoly *can* sometimes be good for society.

At this point in the book, we have covered many of the topics that are treated in existing texts. *Chapter 13* is a point of major departure, as we devote an entire chapter to game theory, which is a source of some of the most powerful economic insights. We emphasize that it helps us better understand the world when we place ourselves in the shoes of someone else. In so doing, the student develops a deeper understanding of how to choose a strategy that is a best response to the strategies of others. We apply game theory to many situations, including pollution, soccer, and advertising, to name a few.

In *Chapter 14*, we present the two market structures that fall between the extremes of perfect competition and monopoly: oligopoly and monopolistic competition. We develop the chapter around the motivating question of how many firms are necessary to make a market competitive. Throughout, we emphasize how oligopolist firms and monopolistically competitive firms set their prices and quantities by considering the choices of their competitors. We connect with previous chapters by framing the discussion in terms of the optimization problem of these firms: the “oligopolist’s problem” and the “monopolistic competitor’s problem.” We show how in the short run it is identical to the monopolist’s problem and in the long run to the perfectly competitive model.

Part IV: Extending the Microeconomic Toolbox provides a selection of special-topic, optional chapters, depending on the individual instructor’s course emphasis. We have included these chapters because we feel that too often the student doesn’t get to see the myriad of interesting applications that follow from all those months of learning basic economic principles!

Chapter 15 studies trade-offs involving time and risk. The chapter begins by asking how the timing of a reward affects its economic value. We show how compound interest causes an investment’s value to grow over time. We also show how to discount future financial flows and how to make financial decisions using the net present value framework. The second half of the chapter discusses probability and risk and explains how to calculate expected value. We apply these ideas to the study of gambling, extended warranties, and insurance.

Why does a new car lose considerable value the minute it is driven off the lot? *Chapter 16* examines markets we are all familiar with—ones in which one side of the market has more information than the other. The chapter examines the informational disparities between buyers and sellers in terms of hidden characteristics (for example, a sick person is more likely to apply for health insurance) and hidden actions (for example, an insured person is more likely to drive recklessly). Along the way, we look at many timely topics such as lemons in the used-car market, adverse selection in the health insurance market, and moral hazard in risk and insurance markets.

In *Chapter 17* we explore situations that students sometimes face: auctions and bargaining. Our optimization theme continues as we discuss best strategies and bargaining principles in a variety of settings. We explore the four common types of auctions and provide insights into how economics can help the student bid in auctions—from eBay to estate auctions to charity auctions. We then shift gears and examine bargaining situations that affect our lives daily. To show the power of the bargaining model, we present empirical evidence of who in the household determines how money is spent.

Perhaps the most unusual chapter for a Principles textbook is *Chapter 18*, which is on social economics. Here we introduce new variants of *homo economicus*. We explore two different areas of human behavior: the economics of charity and fairness and the economics of revenge. We then revisit the concept and origin of preferences—do we take satisfaction from contributing to a charity or from exacting revenge on a perceived enemy? This last chapter drives home the fact that economic principles can be extended to every corner of our world. And it teaches us that we can considerably extend our understanding of the world around us by adding insights from our sister sciences—psychology, history, anthropology, sociology, and political science, to name a few.

MyEconLab[®]

MyEconLab’s powerful assessment and tutorial system works hand-in-hand with the Second Edition of *Microeconomics*. It includes comprehensive homework, quiz, test, interactive, engagement and tutorial options which allow students to test their knowledge and instructors to manage all of their assessment and engagement needs in one program. Students and instructors can register, create and access all of their MyLab courses at www.pearsonmylab.com.

Key Features in the MyEconLab for *Microeconomics*, Second Edition include the following resources for instructors and students:

Personalized Learning

Not every student learns the same way or at the same rate. With the growing need for acceleration through many courses, it’s more important than ever to meet students where they learn. Personalized learning in the MyEconLab gives you the flexibility to incorporate the approach that best suits your course and your students.

Interactive Graphs

The Interactive Graphs in MyEconLab enhance the student learning experience. Students can manipulate the coordinates and parameters of these graphs and watch the graphs change in real time, thereby deepening their conceptual understanding of the material.

Study Plan

The Study Plan acts as a tutor, providing personalized recommendations for each of your students based on his or her ability to master the learning objectives in your course. This allows students to focus their study time by pinpointing the precise areas they need to review, and allowing them to use customized practice and learning aids—such as videos, eText, tutorials, and more—to get them back on track. Using the report available in the gradebook, you can then tailor course lectures to prioritize the content for which students need the most support—offering you better insight into classroom and individual performance.

With comprehensive homework, quiz, test, activity, practice, and tutorial options, instructors can manage all their assessment and online activity needs in one program. MyEconLab saves time by automatically grading questions and activities and tracking results in an online gradebook.

Each chapter contains two preloaded homework exercise sets that can be used to build an individualized study plan for each student. These study plan exercises contain tutorial resources, including instant feedback, links to the appropriate chapter section in the eText, pop-up definitions from the text, and step-by-step guided solutions, where appropriate. Within its rich assignment library, instructors will find a vast array of assessments that ask the students to draw graph lines and shifts, plot equilibrium points, and highlight important graph areas, all with the benefit of instant, personalized feedback. This feedback culminates, when needed, with the correct graph output alongside the student's personal answer, creating a powerful learning moment.

After the initial setup of the MyEconLab course for Acemoglu/Laibson/List, there are two primary ways to begin using this rich online environment. The first path requires no further action by the instructor. Students, on their own, can use MyEconLab's Study Plan problems and tutorial resources to enhance their understanding of concepts. The online gradebook records each student's performance and time spent on the assessments, activities, and the study plan and generates reports by student or chapter.

Alternatively, instructors can fully customize MyEconLab to match their course exactly: reading assignments, homework assignments, video assignments, current news assignments, digital activities, experiments, quizzes, and tests. Assignable resources include:

- Preloaded exercise assignment sets for each chapter that include the student tutorial resources mentioned earlier
- Preloaded quizzes for each chapter
- Assignable and gradable exercises that are similar to the end-of-chapter questions and problems and numbered exactly as in the book to make assigning homework easier
- *Real-Time Data Analysis Exercises* allow students and instructors to use the very latest data from the Federal Reserve Bank of St. Louis's FRED site. By completing the exercises, students become familiar with a key data source, learn how to locate data, and develop skills in interpreting data.
- In MyEconLab, select exhibits labeled MyEconLab Real-Time Data display updated graphs with real-time data from FRED.
- *Current News Exercises* provide a turnkey way to assign gradable news-based exercises in MyEconLab. Each week, Pearson scours the news, finds current economics articles, creates exercises around the news articles, and then automatically adds them to MyEconLab. Assigning and grading current news-based exercises that deal with the latest economics events and policy issues have never been more convenient.
- *Econ Exercise Builder* allows you to build customized exercises. Exercises include multiple-choice, graph drawing, and free-response items, many of which are generated algorithmically so that each time a student works them, a different variation is presented.
- Test Item File questions that allow you to assign quizzes or homework that will look just like your exams

MyEconLab grades every problem type (except essays), even problems with graphs. When working homework exercises, students receive immediate feedback, with links to additional learning tools.

- *Experiments in MyEconLab* are a fun and engaging way to promote active learning and mastery of important economic concepts. Pearson's Experiments program is flexible and easy for instructors and students to use.
- Single-player experiments allow your students to play against virtual players from anywhere at any time so long as they have an Internet connection.
- Multiplayer experiments allow you to assign and manage a real-time experiment with your class.

Pre- and post-questions for each experiment are available for assignment in MyEconLab.

Dynamic Study Modules

Dynamic Study Modules help students study effectively on their own by continuously assessing their activity and performance in real time. Here's how it works: students complete a set of questions with a unique answer format that also asks them to indicate their confidence level. Questions repeat until the student can answer them all correctly and confidently. Once completed, Dynamic Study Modules explain the concept using materials from the text. These are available as graded assignments prior to class, and accessible on smartphones, tablets, and computers. NEW! Instructors can now remove questions from Dynamic Study Modules to better fit their course.

Enhanced eText

The Enhanced eText keeps students engaged in learning on their own time, while helping them achieve greater conceptual understanding of course material. The concept checks, animations, and interactive graphs bring learning to life, and allow students to apply the very concepts they are reading about. Combining resources that illuminate content with accessible self-assessment, MyEconLab with Enhanced eText provides students with a complete digital learning experience—all in one place.

And with the **Pearson eText 2.0 mobile app** students can now access the Enhanced eText and all of its functionality from their computer, tablet, or mobile phone. Because students' progress is synced across all of their devices, they can stop what they're doing on one device and pick up again later on another one—without breaking their stride.

Digital Interactives

Economic principles are not static ideas, and learning them shouldn't be a static process. Digital Interactives are dynamic and engaging assessment activities that promote critical thinking and application of key economic principles.

Each Digital Interactive has 3 to 5 progressive levels and requires approximately 20 minutes to explore, apply, compare, and analyze each topic. Many Digital Interactives include real-time data from FRED™ allowing professors and students to display, in graph and table form, up-to-the-minute data on key macro variables.

Digital Interactives can be assigned and graded within MyEconLab or used as a lecture tool to encourage engagement, classroom conversation, and group work.

Learning Catalytics

Learning Catalytics helps you generate class discussion, customize your lecture, and promote peer-to-peer learning with real-time analytics. As a student response tool, Learning Catalytics uses students' smartphones, tablets, or laptops to engage them in more interactive tasks and thinking.

- Help your students develop critical thinking skills.
- Monitor responses to find out where your students are struggling.
- Rely on real-time data to adjust your teaching strategy.
- Automatically group students for discussion, teamwork, and peer-to-peer learning.

LMS Integration

You can now link from Blackboard Learn, Brightspace by D2L, Canvas, or Moodle to Pearson MyEconLab. Access assignments, rosters, and resources, and synchronize grades with your LMS gradebook.

For students, single sign-on provides access to all the personalized learning resources that make studying more efficient and effective.

Instructor Resources

The **Instructor's Manual** for *Microeconomics* was updated by James Hornsten of Northwestern University and includes:

- A chapter-by-chapter outline of the text
- Lecture notes highlighting the big ideas and concepts from each chapter
- Teaching Tips on how to motivate the lecture
- Common Mistakes or Misunderstandings students often make and how to correct them
- Short, real-world Alternative Teaching Examples, different from those in the text

Active Learning Exercises, included online and at the end of each Instructor's Manual chapter, were updated by James Hornsten and include:

- 5 to 10 Active Learning Exercises per chapter that are ideal for in-class discussions and group work

The **Solutions Manual**, updated by Scott Ogawa of Northwestern University, includes solutions to all end-of-chapter Questions and Problems in the text. It is available as downloadable Word documents and PDFs.

Three flexible **PowerPoint Presentation** packages make it easy for instructors to design presentation slides that best suit their style and needs:

- Lecture notes with some animated text figures and tables, as well as alternative examples with original static figures
- Figures from the text with step-by-step animation
- Static versions of all text figures and tables

Each presentation maps to the chapter's structure and organization and uses terminology used in the text. Nathan Kemper of University of Arkansas updated the Lecture PowerPoint presentation. Paul Graf of Indiana University, Bloomington, scripted and recorded the animations in MyEconLab.

The **Test Bank** for *Microeconomics* was updated by Daijiro Okada of Rutgers University, Jean-François Mercier of Loyola Marymount University, and Leila Farivar of Ohio State University, and edited and reviewed by Ross vanWassenhove of University of Houston. The Test Bank contains approximately 2,400 multiple-choice, numerical, short-answer, and essay questions. These have been edited and reviewed to ensure accuracy and clarity, and include terminology used in the book. Each question can be sorted by difficulty, book topic, concept covered, and AACSB learning standard to enhance ease of use. The Test Bank is available in Word, PDF, and TestGen formats.

TestGen is a computerized test generation program, available exclusively from Pearson, that allows instructors to easily create and administer tests on paper, electronically, or online. Instructors can select test items from the publisher-supplied test bank, which is organized by chapter and based on the associated textbook material, or create their own questions from scratch. With both quick-and-simple test creation and flexible and robust editing tools, TestGen is a complete test generator system for today's educators.

Instructor's Resource Center

Instructor resources are available online via our centralized supplements Web site, the Instructor Resource Center (www.pearsonhighered.com/irc). For access or more information, contact your local Pearson representative or request access online at the Instructor Resource Center.

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As the three of us worked on this project, we taught each other a lot about economics, teaching, and writing. But we learned even more from the hundreds of other people who helped us along the way. For their guidance, we are thankful and deeply humbled. Their contributions turned out to be critical in ways that we never imagined when we started, and our own ideas were greatly improved by their insights and advice.

Our reviewers, focus group participants, and class testers showed us how to better formulate our ideas and helped us sharpen our writing. Through their frequently brilliant feedback, they corrected our economic misconceptions, improved our conceptual vision, and showed us how to write more clearly. Their contributions appear in almost every paragraph of this book. All of their names are listed below.

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Microeconomics: Flexibility Chart

Traditional Approach	Theoretical Approach	Applied Approach
Chapter 1: The Principles and Practice of Economics	Chapter 1: The Principles and Practice of Economics	Chapter 1: The Principles and Practice of Economics
Chapter 2: Economic Methods and Economic Questions (optional)	Chapter 2: Economic Methods and Economic Questions	Chapter 2: Economic Methods and Economic Questions (optional)
Chapter 2 Appendix: Constructing and Interpreting Graphs	Chapter 2 Appendix: Constructing and Interpreting Graphs	Chapter 2 Appendix: Constructing and Interpreting Graphs
Chapter 3: Optimization: Doing the Best You Can (optional)	Chapter 3: Optimization: Doing the Best You Can	Chapter 3: Optimization: Doing the Best You Can (optional)
Chapter 4: Demand, Supply, and Equilibrium	Chapter 4: Demand, Supply, and Equilibrium	Chapter 4: Demand, Supply, and Equilibrium
Chapter 5: Consumers and Incentives	Chapter 5: Consumers and Incentives Chapter 5 Appendix: Representing Preferences with Indifference Curves	Section 5.4: Consumer Surplus (optional) Section 5.6: Demand Elasticities (optional)
Chapter 6: Sellers and Incentives	Chapter 6: Sellers and Incentives Chapter 6 Appendix: When Firms Have Different Cost Structures	Section 6.4: Producer Surplus (optional)
Chapter 7: Perfect Competition and the Invisible Hand	Chapter 7: Perfect Competition and the Invisible Hand	Chapter 7: Perfect Competition and the Invisible Hand
Chapter 8: Trade	Chapter 11: Markets for Factors of Production	Chapter 8: Trade
Chapter 9: Externalities and Public Goods	Chapter 12: Monopoly	Chapter 9: Externalities and Public Goods
Chapter 10: The Government in the Economy: Taxation and Regulation	Chapter 13: Game Theory and Strategic Play	Chapter 10: The Government in the Economy: Taxation and Regulation
Chapter 11: Markets for Factors of Production	Chapter 14: Oligopoly and Monopolistic Competition	Chapter 11: Markets for Factors of Production (optional)
Chapter 12: Monopoly	Chapter 8: Trade	Chapter 12: Monopoly
Chapter 13: Game Theory and Strategic Play	Chapter 9: Externalities and Public Goods	Chapter 13: Game Theory and Strategic Play
Chapter 14: Oligopoly and Monopolistic Competition	Chapter 10: The Government in the Economy: Taxation and Regulation	Chapter 14: Oligopoly and Monopolistic Competition
Chapter 15: Trade-offs Involving Time and Risk (optional)	Chapter 15: Trade-offs Involving Time and Risk (optional)	Chapter 15: Trade-offs Involving Time and Risk (optional)
Chapter 16: The Economics of Information (optional)	Chapter 16: The Economics of Information (optional)	Chapter 16: The Economics of Information (optional)
Chapter 17: Auctions and Bargaining (optional)	Chapter 17: Auctions and Bargaining (optional)	Chapter 17: Auctions and Bargaining (optional)
Chapter 18: Social Economics (optional)	Chapter 18: Social Economics (optional)	Chapter 18: Social Economics (optional)

1

The Principles and Practice of Economics



Is Facebook free?

Facebook doesn't charge you a penny, so it's tempting to say "it's free."

Here's another way to think about it: what do you give up when you use Facebook?

Facebook may not take your money, but it does take your time. If you spend an hour each day on Facebook, you are giving up some alternative use of that time. You could spend that time playing soccer, watching Netflix, napping, studying, or listening to music. You could also spend it *making* money. A typical U.S. college student employed 7 hours per week earns almost \$4,000 in a year—enough to pay the annual lease on a sports car. A part-time job is just one alternative way to use the time that you spend on Facebook. In your view, what is the best alternative use of *your* Facebook time? That's the economic way of thinking about the cost of Facebook.

In this chapter, we introduce you to the economic way of thinking about the world. Economists study the choices that people make, from big decisions like choosing a career to daily decisions like logging onto Facebook. To understand those choices, they often focus on the costs and benefits involved.

CHAPTER OUTLINE

1.1	1.2	1.3	EBE	1.4	1.5	1.6
The Scope of Economics	Three Principles of Economics	The First Principle of Economics: Optimization	Is Facebook free?	The Second Principle of Economics: Equilibrium	The Third Principle of Economics: Empiricism	Is Economics Good for You?

KEY IDEAS

- Economics is the study of people's choices.
- The first principle of economics is that people try to *optimize*: they try to choose the best available option.
- The second principle of economics is that economic systems tend to be in *equilibrium*, a situation in which nobody would benefit by changing his or her own behavior.
- The third principle of economics is *empiricism*—analysis that uses data. Economists use data to test theories and to determine what is causing things to happen in the world.

1.1 The Scope of Economics

Economics involves far more than money. Economists study *all* human behavior, from a person's decision to lease a new sports car, to the speed the new driver chooses as she rounds a hairpin corner, to her decision not to wear a seat belt. These are all choices, and they are all fair game to economists. Choice—not money—is the unifying feature of all the things that economists study.

Choice—not money—is the unifying feature of all the things that economists study.

In fact, economists think of almost all human behavior as the outcome of choices. For instance, imagine that Dad tells his teenage daughter that she *must* wash the family car. The daughter has several options: she can wash it, she can negotiate for an easier chore, she can refuse to wash it and suffer the consequences, or she can move out (a drastic response, sure, but still an option). Obeying your parents is a choice, though it may not always feel like one.

Economic Agents and Economic Resources

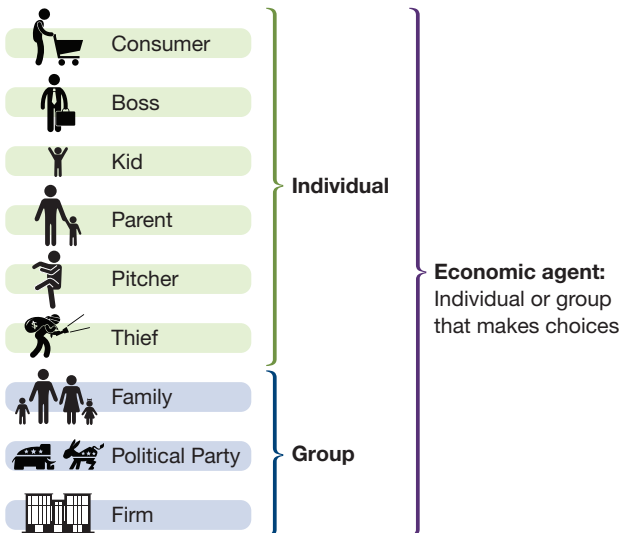
Saying that economics is all about choices is an easy way to remember what economics is. To give you a more precise definition, we first need to introduce two important concepts: *economic agents* and *resource allocation*.

An **economic agent** is an individual or a group that makes choices.

An **economic agent** is an individual or a group that makes choices. Let's start with a few types of individual economic agents. For example, a *consumer* chooses to eat bacon cheeseburgers or tofu burgers. A *parent* chooses to enroll her children in public school or private school. A *student* chooses to attend his classes or to skip them. A *citizen* chooses whether or not to vote, and if so, which candidate to support. A *worker* chooses to do her job or pretend to work while texting. A *criminal* chooses to hotwire cars or mug little old ladies. A *business leader* chooses to open a new factory in Chile or in China. A *senator* chooses to vote for or against a bill. Of course, you are also an economic agent, because you make an enormous number of choices every day.

Not all economic agents, however, are individuals. An economic agent can also be a group—a government, an army, a firm, a university, a political party, a labor union, a sports team, or a street gang (Exhibit 1.1). Sometimes economists simplify their analysis by treating these groups as a single decision maker, without worrying about the details of how the different individuals in the group contributed to the decision. For example, an economist might say that Apple prices the iPhone to maximize its profits, glossing over the fact that many employees participated in the analysis—including the arguments and disagreements—that led to the choice of the price.

Exhibit 1.1 Examples of Economic Agents



Scarce resources are things that people want, where the quantity that people want exceeds the quantity that is available.

Scarcity is the situation of having unlimited wants in a world of limited resources.

The second important concept to understand is that economics studies the allocation of *scarce resources*. **Scarce resources** are things that people want, where the quantity that people want (if the resources were being given away for free) exceeds the quantity that is available. Gold wedding bands, Shiatsu massages, Coach handbags, California peaches, iPhones, triple-chocolate-fudge ice cream, and rooms with a view are all scarce resources. But a resource doesn't need to be luxurious to be scarce—everyday goods are also scarce, like toilet paper, subway seats, and clean drinking water. **Scarcity** exists because people have unlimited wants in a world of limited resources. The world does not have enough resources to give everyone *everything* they want (for free). Consider sports cars: if sports cars were given away at a zero price, there would not be enough of them to go around. So how does society determine who gets the limited supply of sports cars? In general, how does society allocate all of the scarce resources in the economy?

In a modern economy, consumers like you play a key role in this resource allocation process. You have 24 hours to allocate each day—this is your daily budget of time. You choose how many of those 24 hours you will allocate to Facebook. You choose how many of those 24 hours you will allocate to other activities, including school work and/or a job. If you have a job, you choose whether to spend your hard-earned wages on a sports car. These types of decisions determine how scarce resources are allocated in a modern economy: to the consumers who are able and willing to pay for them.

Economists don't want to impose our tastes for sports cars, hybrids, electric vehicles, SUVs, or public transportation on you. We are interested in teaching you how to use economic reasoning so that *you* can compare the costs and benefits of the alternative options and make the choices that are best for you.

Definition of Economics

Economics is the study of how agents choose to allocate scarce resources and how those choices affect society.

We are now ready to define economics precisely. **Economics** is the study of how agents choose to allocate scarce resources and how those choices affect society.

Our earlier examples all emphasized people's *choices*, and choices play a key role in the formal definition of economics. However, the definition of economics also adds a new element to our discussion: the effects of any individual agent's choices on society. For example, the sale of a new sports car doesn't just affect the person driving off the dealer's lot. The sale generates sales tax, which the government uses to fund projects like highways and hospitals. The purchase of the new car also generates some congestion—that's one more car in rush-hour gridlock. It's another car that might grab the last parking spot on your street. If the new owner drives recklessly, the car may generate risks to other drivers. Economists study the original choice and its multiple consequences for other people in the world.



Economics is the study of choice.

Positive economics is analysis that generates objective descriptions or predictions, which can be verified with data.

Normative economics is analysis that recommends what an individual or society ought to do.

Positive Economics and Normative Economics

We now have an idea of what economics is about: people's choices. But why study these choices? Part of the answer is that economists are just curious, but that's only a small piece of the picture. Understanding people's choices is practically useful for two key reasons. Economic analysis

1. Describes what people *actually* do (positive economics)
2. Recommends what people, including society, *ought* to do (normative economics)

The first application is descriptive, and the second is advisory.

Positive Economics Describes What People Actually Do Descriptions of what people actually do are *objective* statements about the world—in other words, statements that can be confirmed or tested with data. For instance, it is a fact that in 2014, 50 percent of U.S. households earned less than \$54,462 per year.¹ Of course, these earnings were related to the choices that those households made, including whether to work for pay, which jobs to apply for, and how many hours to work at those jobs. Describing what has happened or predicting what will happen is referred to as **positive economics** or positive economic analysis.

For instance, consider the prediction that in 2025, U.S. households will invest about half of their retirement savings in the stock market. This forecast can be compared to future data and either confirmed or disproven. Because a prediction is eventually testable—after the passage of time—it is part of positive economics.

Normative Economics Recommends What People Ought to Do **Normative economics**, the second of the two types of economic analysis, advises individuals and society on their choices. Normative economics is about what people ought to do. Normative economics is almost always dependent on *subjective* judgments, which means that normative analysis depends at least in part on personal feelings, tastes, or opinions. So whose subjective judgments do we try to use? Economists believe that the people being advised should determine the preferences to be used.

For example, consider an economist who is helping a worker to decide how much risk to take in her investments. The economist might ask the worker about her own preferences regarding investment risk. Suppose the worker said that she wouldn't sleep well at night if her retirement savings were invested in the stock market, which does fall sharply from time to time. The economist would explain that eliminating risk comes at a cost—riskless investments have a lower average rate of return than investments in the stock market. Stocks have had an annual average return that is about 6 percentage points higher per year than the return on riskless investments. If the worker acknowledged this difference and still wanted the riskless investments, the economist would help the worker find such riskless investments. Here the economist plays the role of engineer, finding the investment portfolio that will deliver the level of risk that the worker wants.

And that's the key—*what the worker wants*. In the mind of most economists, it is legitimate for the worker to choose any level of risk, as long as she understands the implications of that risk for her average rate of return—less risk implies a lower average rate of return. When economic analysis is used to help *individual* economic agents choose what is in their personal best interest, this type of normative economics is referred to as *prescriptive economics*.

Sometimes the normative analysis gets more complicated, because there are many economic agents in the picture. We turn to these harder normative analyses next.

Normative Analysis and Public Policy Normative analysis also generates advice to society in general. For example, economists are often asked to evaluate public policies, like taxes or regulations. When public policies create winners and losers, citizens tend to have opposing views about the desirability of the government program. One person's migratory bird sanctuary is another person's mosquito-infested swamp. Protecting a wetland with environmental regulations benefits bird-watchers but harms landowners who would like to develop that land.

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Economic agents have divergent views on the future of this swamp. The owner of the property wants to build housing units. An environmentalist wants to preserve the wetland to protect the whooping crane, an endangered species. What should happen?

Microeconomics is the study of how individuals, households, firms, and governments make choices, and how those choices affect prices, the allocation of resources, and the well-being of other agents.

Macroeconomics is the study of the economy as a whole. Macroeconomists study economy-wide phenomena, like the growth rate of a country's total economic output, the inflation rate, or the unemployment rate.

When a government policy creates winners and losers, economists need to make some ethical judgments to conduct normative analysis. Economists must make ethical judgments when evaluating policies that make one group worse off so another group can be made better off.

Ethical judgments are usually unavoidable when economists think about government policies, because there are few policies that make everyone better off. Deciding whether the costs experienced by the losers are justified by the benefits experienced by the winners is partly an ethical judgment. Is it ethical to create environmental regulations that prevent a real estate developer from draining a swamp so he can build new homes? What if those environmental regulations protect migratory birds that other people value? Are there possible compromises—should the government, for example, try to buy the land from the real estate developer? These public policy questions—which all ask what society *should* do—are normative economic questions.

Microeconomics and Macroeconomics

There is one other distinction that you need to know to understand the scope of economics. Economics can be divided into two broad fields of study, though many economists do a bit of both.

Microeconomics is the study of how individuals, households, firms, and governments make choices, and how those choices affect prices, the allocation of resources, and the well-being of other agents. In general, microeconomists are called on when we want to understand a small piece of the overall economy, like the market for coal-fired electricity generation.

For example, some microeconomists study pollution generated by coal-fired power plants. A microeconomist might predict the level of coal-based pollution over the next decade, basing her forecast on the overall demand for electricity and likely technological developments in the energy industry—including solar- and wind-energy substitutes for coal-fired power plants. Predicting future levels of pollution from coal-fired plants is part of positive economic analysis.

Some microeconomists undertake normative analysis of coal-based pollution. For example, because global warming is largely caused by carbon emissions from coal, oil, and other fossil fuels, microeconomists design new government policies that attempt to reduce the use of these fuels. For example, a “carbon tax” targets carbon emissions. Under a carbon tax, relatively carbon-intensive energy sources—like coal-fired power plants—pay more tax per unit of energy produced than energy sources with lower carbon emissions—like wind farms. Some microeconomists have the job of designing interventions like carbon taxes and determining how such interventions will affect the energy choices of households and firms.

Macroeconomics is the study of the economy as a whole. Macroeconomists study economy-wide phenomena, like the growth rate of a country's total economic output, the percentage increase in overall prices (the inflation rate), or the fraction of the labor force that is looking for work but cannot find a job (the unemployment rate). Macroeconomists design government policies that improve overall, or “aggregate,” economic performance.

For example, macroeconomists try to identify the best policies for stimulating an economy that is experiencing a sustained period of negative growth—in other words, an economy in recession. During the 2007–2009 financial crisis, when housing prices were plummeting and banks were failing, macroeconomists had their hands full. It was their job to explain why the economy was contracting and to recommend policies that would bring it back to life.

1.2 Three Principles of Economics

You now have a sense of what economics is about. But you might be wondering what distinguishes it from the other social sciences, including anthropology, history, political science, psychology, and sociology. All social sciences study human behavior, so what sets economics apart?

Optimization means picking the best feasible option, given whatever (limited) information, knowledge, experience, and training the economic agent has. Economists believe that economic agents try to optimize but sometimes make mistakes.

People make choices that are motivated by calculations of benefits and costs.

Equilibrium is the special situation in which everyone is simultaneously optimizing, so nobody would benefit personally by changing his or her own behavior, given the choices of others.

Empiricism is analysis that uses data—evidence-based analysis. Economists use data to develop theories, to test theories, to evaluate the success of different government policies, and to determine what is causing things to happen in the world.

Economists emphasize three key concepts.

1. Optimization: We have explained economics as the study of people’s choices. The study of all human choices may initially seem like an impossibly huge and diverse topic. At first glance, your decision to log on to Facebook tonight does not appear to have much in common with a corporate executive’s decision to build a \$500 million laptop factory in China. However, economists have identified some powerful concepts that unify the enormous range of choices that economic agents make. One such insight is that most choices are tied together by the concept of *optimization*: picking the best feasible option. Economists do *not* believe that people actually do pick the best feasible option. Rather, economists believe that people *try* to pick the best feasible option. People don’t always succeed in optimizing—we are not calculating machines—but people generally try to optimize. There is a great deal of discussion among economists about how well people optimize, a discussion that we will return to in Chapter 2.

Optimization is the first principle of economics. Economists believe that people’s goal of optimization—picking the best feasible option—explains most choices that people make, including minor decisions like accepting an invitation to see a movie and major decisions like deciding whom to marry. Of course, these decisions aren’t made with a crystal ball. People often make mistakes, but they try to do as well as they can, given the limited information, knowledge, experience, and training that they have.

2. Equilibrium: The second principle of economics holds that economic systems tend to be in *equilibrium*, a situation in which no agent would benefit personally by changing his or her own behavior, given the choices of others. The economic system is in equilibrium when each agent cannot do any better by picking another course of action. In other words, equilibrium is a situation in which everyone is simultaneously optimizing.

3. Empiricism: The third principle of economics is an emphasis on *empiricism*—evidence-based analysis. In other words, analysis that uses data. Economists use data to develop theories, to test theories, to evaluate the success of different government policies, and to determine what is causing things to happen in the world.

1.3 The First Principle of Economics: Optimization

Let’s now consider our first principle in more detail. Economics is the study of choices, and economists have a leading theory about how choices are made. Economists believe that people try to optimize, meaning that economic agents try to choose the best feasible option, given whatever (limited) information, knowledge, experience, and training the economic agents have. Feasible options are those that are available and affordable to an economic agent. If you have \$10 in your wallet and no credit/debit/ATM cards, then a \$5 burrito is a feasible dinner option, while a \$50 lobster is not.

The concept of feasibility goes beyond the financial budget of the agent. Many different constraints can determine what is feasible. For instance, it is not feasible to work more than 24 hours in a day. It is not feasible to attend meetings (in person) in New York and Beijing at the same time.

In the cases where agents make mistakes, normative economic analysis can help them realize their mistakes and make better choices in the future.

Any decision can depend only on the information available at the time of the choice. For example, if you choose to drive from San Diego to Los Angeles and your car is hit by a drunk driver, you are unlucky, but you haven’t necessarily failed to optimize. Optimization means that you weigh the information that you have, not that you perfectly foresee the future. When someone chooses the best feasible option *given the information that is available*, economists say that the decision maker is being rational or, equivalently, that he or she is exhibiting rationality. Rational action does not require a crystal ball, just a logical appraisal of the costs, benefits, and risks that are known to the economic agent.

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However, if you decide to let a friend drive you from San Diego to Los Angeles and you know that your friend has just had a few beers, this is likely a case in which you are not choosing the best feasible option. Again, evaluating the rationality of a decision means examining the quality of your initial decision, not the outcome. Even if you and your drunk driver arrive at your destination without a crash, your choice to let your friend drive is still a suboptimal choice. Fortunately, you got lucky despite making a bad decision.

We devote much of this book to the analysis of optimization. We explain how to choose the best feasible option, and we discuss some evidence that supports the theory that economic agents often do choose the best feasible option (or something close to it). We also discuss important cases where people fail to choose the best feasible option. In cases where agents make mistakes, prescriptive economic analysis can help them realize their mistakes and make better choices in the future.

Finally, it is important to note that *what* we optimize varies from person to person and group to group. Most firms try to maximize profits, but most individual people are not trying to maximize their personal income. If that were our goal, we'd all work far more than 40 hours per week and we'd keep working well past retirement age. Most households are trying to maximize their overall well-being, which involves a mix of income, leisure, health, and a host of other factors, like social networks and a sense of purpose in life. Most governments, meanwhile, are optimizing a complex mix of policy goals. For most economic agents, then, optimization is about much more than money.

Trade-offs and Budget Constraints

An economic agent faces a **trade-off** when the agent needs to give up one thing to get something else.

A **budget constraint** shows the bundles of goods or services that a consumer can choose given her limited budget.

All optimization problems involve trade-offs. **Trade-offs** arise when some benefits must be given up in order to gain others. Think about Facebook. If you spend an hour on Facebook, then you cannot spend that hour doing other things. For example, you cannot work at most part-time jobs at the same time you are editing your Facebook profile.

Economists use budget constraints to describe trade-offs. A **budget constraint** is the set of things that a person can choose to do (or buy) without breaking her budget.

Here's an illustration. To keep the analysis simple, suppose that you can do only one of two activities with your free time: surf the Web or work at a part-time job. Suppose that you have 5 free hours in a day (once we take away necessities like sleeping, eating, bathing, attending classes, doing problem sets, and studying for exams). Think of these 5 free hours as your budget of free time. Then your budget constraint would be:

$$5 \text{ hours} = \text{Hours surfing the Web} + \text{Hours working at part-time job.}$$

This budget constraint equation implies that you face a trade-off. If you spend an extra hour surfing the Web, you need to spend one less hour working at a part-time job (unless you secretly use Facebook while you are being paid for a job—in this case, keep your boss off your friend list). Likewise, if you spend an extra hour working at the part-time job, you need to spend one less hour surfing the Web. More of one activity implies less of the other. We can see this in Exhibit 1.2, where we list all the ways that you could allocate your 5 free hours.

Exhibit 1.2 Possible Allocations of 5 Free Hours (Round Numbers Only)

Each row reports a different way that a person could allocate 5 free hours, assuming that the time must be divided between surfing the Web and working at a part-time job. To keep things simple, the table only reports allocations in round numbers.

Budget	Hours Surfing the Web	Hours at Part-Time Job
5 hours	0 hours	5 hours
5 hours	1 hours	4 hours
5 hours	2 hours	3 hours
5 hours	3 hours	2 hours
5 hours	4 hours	1 hours
5 hours	5 hours	0 hours

Budget constraints are useful economic tools, because they quantify trade-offs. When economists talk about the choices that people make, the economist always takes into account the budget constraint. It's important to identify the feasible options and the trade-offs—the budget constraint gives us that information.

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Opportunity Cost

We are now ready to introduce another critical tool in the optimization toolbox: opportunity cost. Our Web surfing example provides an illustration of the concept. The time that we spend on the Web is time that we could have spent in some other way. In the illustrative example just discussed, the only two alternative activities were surfing the Web and working at a part-time job. But in real life, there are an enormous number of activities that might get squeezed out when you surf the Web—for instance, playing soccer, jogging, daydreaming, sleeping, calling a friend, catching up on e-mail, texting, or working on a problem set. You implicitly sacrifice time on some alternative activities when you spend time surfing the Web.

1.3

Generate your own list of alternative activities that are squeezed out when you surf the Web. Think about the best alternative to Web surfing, and put that at the top. Pause here and write that alternative activity down. Calling a friend? Studying for an exam? Going for a jog? What is your best alternative to an hour of Web surfing?

1.4

We face trade-offs whenever we allocate our time. When we do one thing, something else gets squeezed out. Joining the fencing team might mean dropping lacrosse. During exam week, an extra hour of sleep means one less hour spent studying or decompressing with friends. You can't write a term paper and update your Facebook page at the same moment. And postponement is not an escape hatch from this economic logic. For example, even if you only postpone writing that term paper, something has got to give when the paper deadline rolls around. (Perhaps studying for your economics final?)

1.5

Evaluating trade-offs can be difficult, because so many options are under consideration. Economists tend to focus on the *best* alternative activity. We refer to this best alternative activity as the **opportunity cost**. This is what an optimizer is effectively giving up when she allocates an hour of her time. Recall your own best alternative to surfing the Web. That's your opportunity cost of time online.

1.6

Here's another example to drive home the concept. Assume that your family is taking a vacation over spring break. Your choices are a Caribbean cruise, a trip to Miami, or a trip to Los Angeles. (Assume that they all have the same monetary cost and use the same amount of time.) If your first choice is the cruise and your *second* choice is Miami, then your opportunity cost of taking the cruise is the Miami trip.

The concept of opportunity cost applies to all trade-offs, not just your time budget of 24 hours each day. Suppose that a woodworker has a beautiful piece of maple that can be used to make a sculpture, a bowl, or a picture frame. (Assume that they all use the same amount of wood and take the same amount of time.) If the woodworker's first choice is the sculpture and the second choice is the bowl, then the bowl is the opportunity cost of making the sculpture.

Assigning a Monetary Value to an Opportunity Cost Economists often try to put a monetary value on opportunity cost. One way to estimate the monetary value of an hour of your time is to analyze the consequences of taking a part-time job or working additional hours at the part-time job you already have.

The opportunity cost of an hour of your time is at least the value that you would receive from an hour of work at a job, assuming that you can find one that fits your schedule. Here's why. A part-time job is one item in the long list of alternatives to surfing the Web. If the part-time job is at the top of your list, then it's the best alternative, and the part-time job is your opportunity cost of surfing the Web. What if the part-time job is not at the top of your list, so it's not the best alternative? Then the best alternative is even better than the part-time job, so the best alternative is worth more than the part-time job. To sum up, your opportunity cost is either the value of a part-time job or a value that is even greater than that. To turn these insights into something quantitative, it helps to note that the median wage for U.S. workers between 16 and 24 years of age was \$11.00 per hour in 2015—this statistic is from the U.S. Bureau of Labor Statistics. A job has many

Opportunity cost is the best alternative use of a resource.