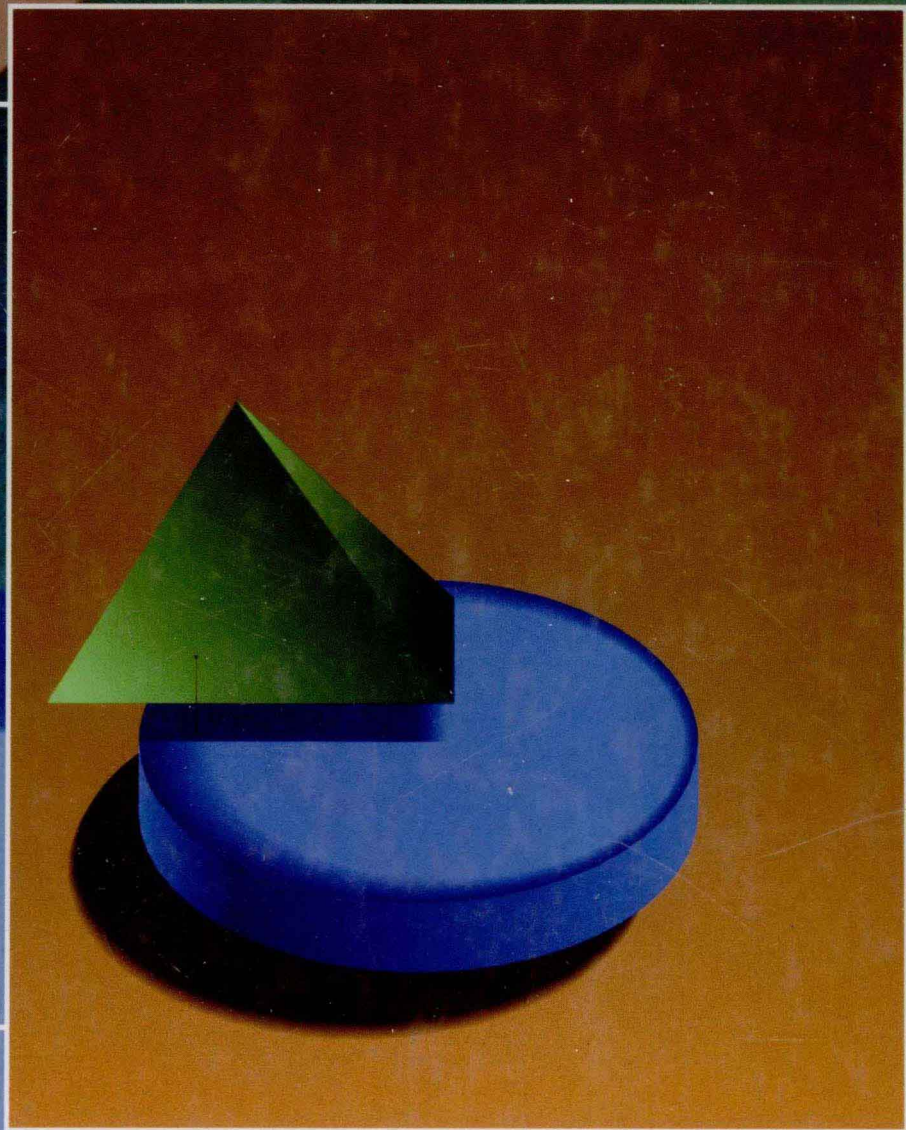


PRICE THEORY AND APPLICATIONS

FIFTH EDITION



JACK HIRSHLEIFER

AMIHAI GLAZER

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PREFACE

Theory is useless unless it leads to applications. The opposite side of the coin is that real world problems are a buzzing, blooming confusion if no systematic theory puts them in some intellectual order. Earlier editions of this book have pioneered, we believe, in weaving theory and applications in a way that shows how microeconomic analysis casts light on both intellectual questions and policy issues. The dozens of brief boxed examples throughout the book direct attention to a host of specific applications. These discussions, which usually describe recent research published in scholarly articles and books, also instruct the student about the scientific work that professional economists actually do. (Given the media picture of economists as a squabbling band of rival soothsayers—some of them saying business will be good, others predicting doom—students may be surprised to find that there are scientifically validated results in economics.) In addition, appropriate places in the text provide more extensive discussions of such applied topics as rationing in wartime, alleged monopolistic suppression of inventions, and minimum wage laws.

We made an effort to address two other methodological points. First, economics is not a body of facts or propositions to be memorized, but is instead a way of thinking. There are diligent students who say, “Prof, just tell me what pages you want me to learn and I guarantee I’ll know every word.” However, memorization is not enough; economic insight and intuition must also be cultivated. The wide variety of applications discussed throughout the text are designed to train the student’s intuition, which is not so much a matter of knowing economic propositions as it is applying the proper propositions in a specific context. On the other hand, not everything can be left to inspiration. Insight and intuition must be earned by hard intellectual labor.

Second, traditional economic theory has been guilty of tunnel vision in focusing so strictly on rationalistic individual behavior and on market interactions. But economics is really a universal science. An economic problem arises whenever the constraint of resource scarcity impinges upon life. Among the human decisions subject to the law of scarcity, and therefore amenable to economic analysis, are social choices (how many children to have, whether to live in the city or the suburbs, whom to seek as friends) and political ones (our nation must strike a balance, for example, between affluence and defense, between relief for persons unable or unwilling to work versus incentives to those who are productive, between regulation of improper behavior and greater freedom of the individual). Not all choices take place in a market context, and we all know that many of our decisions do not

meet a high standard of rationality. We have therefore made an effort to incorporate materials from scientific work in anthropology, psychology, political science, social biology, and other fields, wherever convenient for illustrating economic principles. To cite one instance, students object that businesspeople never engage in anything as subtle or complex as marginal analysis. But biologists have discovered that marginal analysis explains many aspects of the behavior of birds and bees, or of animals generally (see “Birds Do It! Bees Do It!” in Chapter 2), and businesspeople are surely more clever than birds and bees.

In terms of technique, only recently has the classic scientific method—the use of experimentation—begun to play an important role in economic research. This is an exciting development. Accordingly, we present several examples on experimental studies. One important instance: while the conditions of perfect competition are never fully satisfied in the real world, experiments have shown that even highly imperfect markets may produce results close to the competitive ideal (see Chapter 13).

As to coverage and level of difficulty, this is not a minimal “thin gruel” book. Our aims are to meet the needs of a range of users and build in growth potential: the text can serve as reference and guide for readers pursuing additional self-study or coursework beyond the intermediate level. But perhaps the main reason for the breadth of coverage is simply the wealth of fascinating applications and extensions of the basic theory. In consequence, there is more in this text than can usually be handled in a one-term microeconomics course. To meet the needs of instructors and students in more compact courses, a shorter book-within-the-book exists in the series of Core Chapters (Chapters 1 through 8 and 11 through 13). Also, if time pressures so dictate, several advanced or tangential discussions (indicated by asterisks in the Contents) can be omitted with little or no loss of continuity. Most of the text can be covered within a two-term undergraduate price theory course.

We made a special effort to provide three expository aids. First, detailed descriptive legends accompany the diagrams. The analytical high points of a chapter can often be efficiently reviewed by rereading these legends in sequence. Second, each chapter ends with a summary and two groups of questions—a first group for straightforward testing of recollection and recall, and a second group providing challenges for further thought and discussion. Third, the text includes many numerical exercises, with answer solutions.

Users of the previous edition will find that the organization of chapters remains substantially as before. However, the text has been completely rewritten in the interest of clarity. In addition, since this book is increasingly used in schools of business administration and management as well as departments of economics, we include topics of significance for business policy, such as the discussion of the Capital Asset Pricing Model in Chapter 14. Among the many other topics and applications covered in new or revised fashion in this edition are auctions (Chapter 8), the principal-agent problem (Chapter 8), product quality (Chapter 9), efficiency wages (Chapter 12), signaling in labor markets (Chapter 12), and the Coase Theorem (Chapter 15).

This text uses the exciting new analytical technique of game theory; our emphasis is on applications rather than on abstract theorems. Game theory is employed, in particular, when we address such topics as oligopoly, principal-agent problems, and free-riding in the provision of public goods. The vital and rapidly growing field of law and economics is covered at several points; in particular the discussion of product liability in Chapter 9 and the Coase Theorem in Chapter 15.

Several additional features of this book represent, we claim, improvements upon conventional textbook coverage:

1. Traditional intermediate texts offer no price-theoretic explanations for money. In Part Five the analysis of exchange as a costly economic activity provides the foundations

for understanding how a monetary commodity works. And even earlier, Part Three indicates that business firms exist because of the costliness of exchange.

2. “Monopolistic competition” is covered in Part Three under a more general heading—variation of product. This part also takes up equilibrium of product quality and equilibrium product assortment.
3. Saving and investment are tied to the underlying theory of intertemporal choice and equilibrium in Part Six. The coverage here provides a bridge to macroeconomics and to the business-finance literature.
4. Our discussion of political economy first treats the traditional normative issues of welfare economics in Chapter 15. The final Chapter 16 gives a positive analysis of government. Two views of the state, a voluntarist or public-choice model versus an exploitative or conflict model, are contrasted.

As in previous editions, calculus is used only in marked mathematical footnotes. However, the delta (Δ) notation used in defining marginal concepts will be readily interpreted in derivative or differential terms by students who know calculus. The instructor should of course warn students that further command of college math is needed for study of economics beyond the intermediate level.

Whether a proper balance has been struck between coverage and simplicity, between theory and application, between technical accuracy and intuitive suggestion, only the reader can judge. We will be grateful for guidance on this point from instructors and students, and also for specific corrections where errors appear. As in past editions, the Teacher’s Manual for this fifth edition of *Price Theory and Applications* is available to instructors, upon request, from the publisher. The Teacher’s Manual and the Study Guide have both been prepared by Michael Sproul.

In its several editions this text has had the benefit of helpful reviews by many colleagues, by now too many to be individually named here. We are particularly grateful to the teachers, students, and other readers who have independently taken the trouble to send valuable corrections and comments. We also thank research assistants over the years, who have worked mainly on the boxed examples and the questions and answers for the various chapters. Once again the number has grown too large for a complete listing, but we would especially like to name Charles Knoeber for his outstanding assistance on the initial edition of the book.



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CORE
CHAPTER 1
**THE NATURE AND
SCOPE OF ECONOMICS**

- 1.1 **ECONOMICS AS A SOCIAL SCIENCE**
 - Is Economics a Science?
 - The Scope of Economics
 - Positive Versus Normative Analysis: “Is” Versus “Ought”
 - 1.2 **THE INVISIBLE HAND**
 - 1.3 **ELEMENTS OF THE ECONOMIC SYSTEM**
 - Decision-Making Agents in the Economy
 - Scarcity, Objects of Choice, and Economic Activities
 - The Circular Flow
 - 1.4 **MICROECONOMICS AND MACROECONOMICS**
- SUMMARY**
QUESTIONS

E X A M P L E S

- | | |
|--------------------------------|----------------------------------|
| 1.1 Hydrology Versus Economics | 1.4 Rational Economics Students? |
| 1.2 Salaries | 1.5 Rational Criminals? |
| 1.3 Rational Psychotics? | 1.6 When Do Economists Disagree? |

Economics concerns decisions. To reach good decisions you must recognize that action has pros and cons, pluses and minuses, benefits and costs. For example, tennis may trim your figure and improve your disposition, but it will take time from your studies and could damage your joints. If you drop out of college now to earn money on a job, you will likely have lower income later in life. Similarly decisions in business and government—whether made by the corner grocer putting a price tag on potatoes or Congress voting on a declaration of war—will encounter arguments for and against. Faced with such opposed arguments, what criteria should individuals, firms, or governments use to choose among them? Economics shows how to determine the *best* action, through a systematic assessment of the pros and cons.

Economics also emphasizes that decisions are not made in a vacuum. Other people are likely to change their behavior in response to what you do. If a grocer raises the price of potatoes, customers may decide to buy less. So a higher price may not increase the grocer's profits after all. The same holds for social problems. When the likely responses of all the people affected are taken into account, the outcome is often much less attractive than it first appeared. Consider a law that aims to help the poor by requiring all grocers to cut food prices in half. Before concluding that this is a good idea we would need to know the reactions of the grocers and of their suppliers. Will they provide the groceries at the lower prices, or will shoppers find the store shelves bare? A law forcing sellers to cut prices in half may seem unlikely, but something similar occurs when rent-control legislation freezes apartment rents during a period of general inflation. If incomes and most other prices double, but the rent is fixed, then in *real* terms the rent has fallen by 50%.

Economics has been called the “dismal science” because economists often bring bad news. They point out that a superficially appealing project may turn out not to be such a great idea once the responses of all the affected individuals are considered.

Let's look at and consider some other examples. Table 1.1 lists a number of social problems with possible solutions. Notice that sometimes the same problem has diametrically opposed solutions. Take a moment to think of possible objections to each solution listed in the table. Then note the somewhat less obvious adverse consequences mentioned for each solution.

How many of these adverse consequences did you think of? Are there others that should be added? Finally, why are such consequences so often overlooked? Often it is because these consequences involve something not directly visible, *changes* in people's behavior as they react to the imposed solution.

Because people committed to one side of the question generally do not want to listen to contrary arguments, learning to think like an economist may not make you very popular. But it will make your private decisions more effective, and your views on social issues more balanced.

The economist is the opposite of the *advocate* who gives only arguments favoring his or her side of a question. There is a time and a place for advocacy. A person on trial for murder would probably not want his or her lawyer to present evidence for guilt with the same enthusiasm as the evidence for innocence. There is a time and place for balancing the pros and cons, and a time and place for action. And we all know people who can never stop saying “But on the other hand . . .,” when they should be taking action. Nor can economists replace prophets and poets who inspire us with ideals and goals. Society needs prophets and poets, men and women of action, and even advocates. But it also needs economists.

TABLE 1.1 Finding Solutions to Social Problems

Social Problems	Possible Solutions	Consequences
1. Our country's steel producers are threatened by competition from imports.	Impose a tariff on imported steel.	a. Since the price of steel will rise, steel-using industries will have higher costs and will have to raise prices to consumers. b. Foreigners, since they will be selling less steel to us, will buy less of our country's exports.
2. Apartment rents are rising, putting decent housing out of reach for the poor.	Freeze apartment rents.	a. Landlords will skimp on upkeep and repair of apartments. b. In the longer run, fewer rental units will be constructed.
3. Women's wages are less than men's.	Adopt "comparable worth" laws requiring equal pay for men and women doing comparable jobs.	a. Employers will become less willing to hire women. b. Costly bureaucratic and judicial proceedings will be involved in setting wages.
4. Commercial fishing for tuna kills large numbers of dolphins.	Require domestic fishermen to use special nets that let dolphins escape.	a. Consumers will have to pay more for tuna. b. Foreign fishermen not subject to our laws will take over more of the tuna trade.
5. Medical costs are very high.	Require government to pay a share of medical bills, especially for the poor.	a. Doctors' bills and hospital charges will rise even more than they have previously. b. Taxes will have to rise.
6. Many people are addicted to drugs.	Toughen enforcement of narcotics laws.	a. Street prices of narcotics will rise, forcing addicts to steal to feed the habit. b. Huge financial stakes in the narcotics trade will lead to more corruption of the police and judiciary.
7. Many people are addicted to drugs.	Abandon enforcement of narcotics laws.	Increased availability and lower prices of narcotics will increase usage and addiction.

1.1 ECONOMICS AS A SOCIAL SCIENCE

The economist has essentially the same outlook as the scientist. And indeed this text presents economics as a science: as a body of models (theories) that explain the real world. More specifically, economics is a *social* science; it aims to explain how human beings interact with one another.

Is Economics a Science?

Is economics really a science? One cynic might offer this opinion: "Anyone who reads the papers knows that economists always disagree with one another—that doesn't give me much

confidence that economics has arrived at scientific truth. Furthermore, if economists can scientifically predict financial and commercial events, why aren't they all rich?"

It is easy to misinterpret how much economists disagree, because the mass media rarely discuss issues on which economists largely agree. The findings that are subject to wide agreement—price controls lead to shortages, free trade improves the international division of labor, firms will not invest if they are not allowed sufficient profits—make for little drama on a television show. Nor do differences among economists necessarily mean that economics is unscientific. All sciences advance through disagreement. In astronomy the geocentric model of Ptolemy was opposed by the new heliocentric model of Copernicus. In chemistry Priestley supported the phlogiston theory of combustion while Lavoisier supported the oxidation theory. And in biology creationism was countered by Darwin's theory of evolution. It is not universal agreement but rather the willingness to examine evidence that characterizes science. For Galileo's opponents to challenge the theory of Jupiter's moons was not unscientific of itself; it was unscientific for them to refuse to look through his telescope and see. The important issues of economics—for example, the monetarist versus fiscalist hypotheses in macroeconomics and the effectiveness of centralized planning for achieving economic growth—are under continuous scientific evaluation. Scientists may disagree because the problems are complex or the investigators incompetent, but there will always be unresolved issues in any living science.¹

Observers often exaggerate not only the extent of disagreement among economists but also the degree to which the natural sciences have been mastered. In applied physics few topics have been so well studied as strength of materials. Yet engineers, after making their calculations, commonly add a huge safety factor (50 percent or even 100 percent) before building a bridge or a dam. And even so, bridges still collapse and dams wash away. If economists predicting the rate of inflation were permitted a safety factor as wide as engineers, they would rarely go astray.

EXAMPLE 1.1 Hydrology Versus Economics

In 1955 the New York City Board of Water Supply projected that the city's future rate of water use would reach 1,320 MGD (million gallons per day) as of 1960, rising further to 1,500 MGD by 1970. The city's hydrologists confidently estimated the "safe yield" from existing water sources to be 1,550 MGD. With only a thin safety margin ($1550 - 1500 = 50$ MGD) anticipated by 1970, the Board of Water Supply decided to acquire a new water source.

A team of economists reviewed this decision in 1960. They concluded that the Board's projections of water use were much too high; the economists predicted that actual water use in New York City would surely not reach 1,500 MGD by 1970, if ever. Since the "safe yield" supposedly guaranteed by hydrologic science already equaled 1,550 MGD, the economists concluded that an enormously expensive new supply was not warranted.

After 1960, the economists' prediction about actual use was confirmed. Water consumption in New York City stabilized well below 1,300 MGD, far under the Board's projected rate of 1,500 MGD, and never approached the supposed "safe yield" of 1,550 MGD. So

¹*Scientific* consensus need not imply general agreement about *policy*, however. See the section on "Positive Versus Normative Analysis," p. 9

all should have been well. Instead, the city was hit by a catastrophic water shortage. What had happened? Throughout the early 1960s the actual yield of water sources was far below the hydrologists' "safe yield." In the four successive years (1962–65), the highest actual water yield was only 1,204 MGD. Economics, one of the social sciences, thus proved to be immensely more reliable than one of the vaunted natural sciences.^a

COMMENT In making policy recommendations, the economist may have to evaluate the reliability of other sciences as well as his own.

^aSee J. Hirshleifer and J.W. Milliman, "Urban Water Supply: A Second Look," *American Economic Review*, v. 47 (May 1967), pp. 169–78.

What about the charge that if economics were truly a science, economists would all be rich? Several answers can be offered. It is sometimes argued that scientific knowledge of economics need not lead to financial success. If Hank Aaron had studied the aerodynamic equations governing the motion of spheroidal missiles, would that have helped him beat Babe Ruth's home-run career record? This argument should not be pressed too far, however. After all, what is the use of economics (or of aerodynamic knowledge, for that matter) if it does not lead to some *practical* result? Economics is useful, certainly, for understanding market phenomena; such knowledge ought to lead to higher cash income. Although most people can hardly be expected to match the life achievements of geniuses like Hank Aaron or J. Paul Getty in their respective fields, there ought to be some observable effect of economics training upon income. And, as Example 1.2 shows, to some degree there is.

EXAMPLE 1.2 Salaries

This table shows salaries for individuals with college or graduate degrees in different fields in 1984.

Mean Monthly Earnings (1984)

Field	Mean Monthly Earnings	Field	Mean Monthly Earnings
Business/Management	\$1,986	Law	\$3,338
Economics	2,366	Math/Statistics	1,855
Education	1,211	Medicine/Dentistry	3,060
Engineering	2,258	Psychology	1,350
English/Journalism	1,184		

Source: *Statistical Abstract of the United States*, 1989, p. 159.

COMMENT Economists have high salaries in the United States (third highest in this table). Only law and medicine, which require professional degrees, yield higher incomes.