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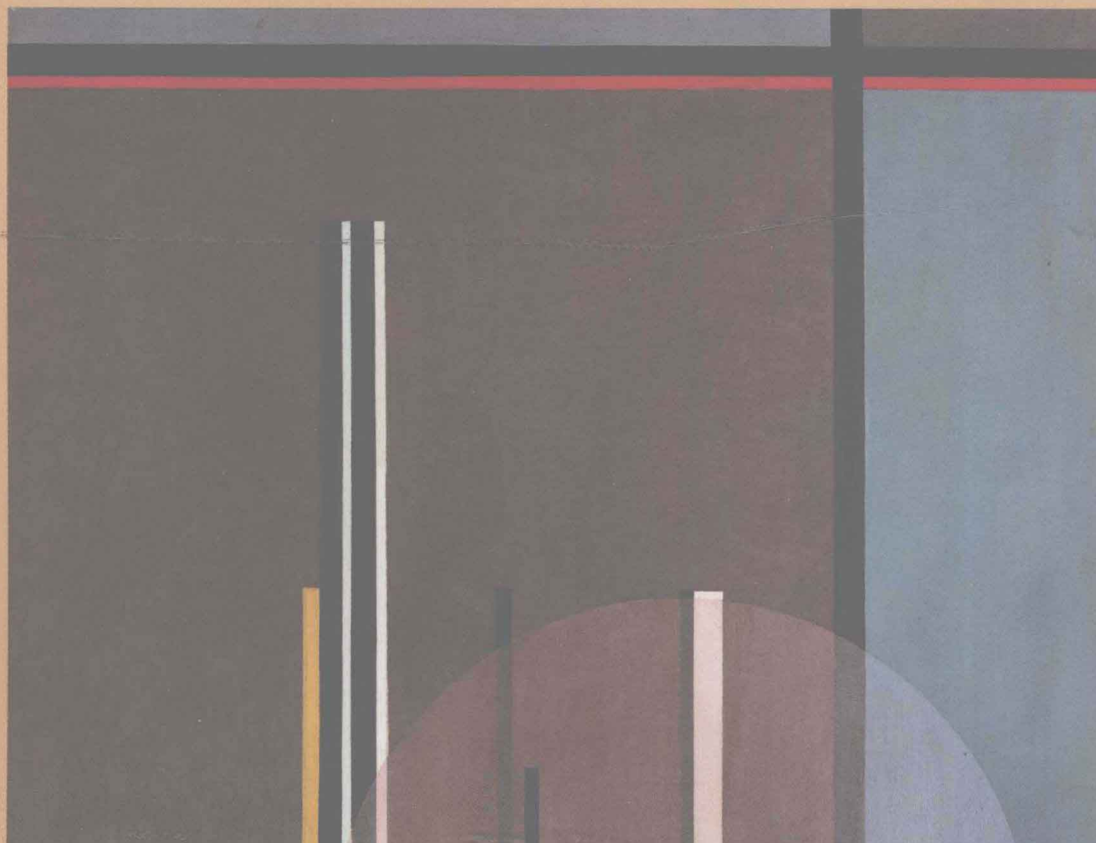

PRINCIPLES OF MICRO-ECONOMICS

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JOSEPH E. STIGLITZ

STANFORD UNIVERSITY

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To Jane,
my harshest critic and best friend,
from whom I have learned the strengths and limits of economics;

and to
Julia, Jed, Michael, and Siobhan
in the hope, and belief, that a better understanding of economics
will lead to a better world for them to inherit.

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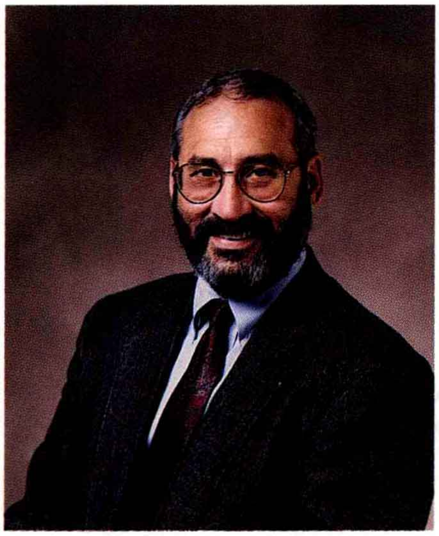

ABOUT THE AUTHOR:

Internationally recognized as one of the leading economists of his generation, Joseph Stiglitz has made important contributions to virtually all of the major subdisciplines of economics: macroeconomics, monetary economics, public and corporate finance, trade, development, and industrial organization. He is professor of economics at Stanford University, where he currently teaches Economics 1, one of the most popular courses on campus. He is the author and editor of hundreds of scholarly articles and books, including the best-selling undergraduate text *Economics of the Public Sector* (Norton) and, with Anthony Atkinson, *Lectures in Public Economics.* Professor Stiglitz is the founding editor of the *Journal of Economic Perspectives,* established in 1987 to lower the barriers of specialization erected by other major economic journals, and a former vice president of the American Economic Association. Among his many prizes and awards, Professor Stiglitz has received the American Economic Association's John Bates Clark Award, given to the economist under forty who has made the most significant contributions to economics. Joe Stiglitz lives in Palo Alto with his wife and four children.

PREFACE

The last fifty years have been an exciting time for economics. The world has changed in so many fundamental ways. And the discipline of economics has changed in fundamental ways too, partly to reflect these changes.

In the years immediately following World War II, the United States dominated the world economy. International trade was relatively unimportant, in part because of the prevalence of trade barriers. American firms were investing widely abroad, helping to rebuild a Europe that had been devastated by the war. The Cold War put the market economies of the United States and Western Europe in military and economic competition with the Soviet Union, with its very different form of economy. These postwar years saw the U.S. economy growing vigorously and living standards rising rapidly. Countries in Asia and Africa, freed from their colonial status, looked forward as well to rising living standards that they believed would accompany their newly acquired freedom.

All of this has changed. The economies of the former Soviet Union nations have collapsed, along with their political systems. International trade has grown in importance, and Japan and other countries of east Asia and Europe now provide formidable competition for American firms. The United States has lost its lead in the growth sweepstakes: while the rates of growth in east Asia were phenomenal, virtually unprecedented in the history of mankind, the rate of increase of productivity in the United States and Western Europe has slowed down markedly. Indeed, wages of less skilled workers in these Western countries have actually been falling during the past two decades. The dream that each generation would be better off than its parents has been lost. The

United States has gone from being the largest creditor nation in the world—foreigners owed it billions of dollars—to being the largest debtor nation; the country now owes foreigners hundreds of billions of dollars. A major part of the U.S. banking system, the savings and loan associations (S & L's), required a government bailout costing huge sums of money, and the banking systems of several other countries also appear to be on shaky ground.

International capital markets have played an important role in the globalization of the world economy, with hundreds of billions of dollars moving daily from one country to another. Multinational companies have grown beyond belief, to the point where the largest are now larger than many small countries. In the battles for the control of some of these large companies, the capital markets have provided the large sums of money required by the different contestants.

It is not only that the world has changed; expectations have changed as well. While there has been enormous improvement in the quality of air in cities like Pittsburgh and Gary, Indiana, and while Lake Erie has been rescued from becoming polluted to the point where life could not survive, our expectations about the environment have grown even faster; we have become increasingly aware of environmental costs. Longevity has increased, but our knowledge of how to prolong life has grown more rapidly, and rising medical costs have become a major political issue. The economic role of women has changed: not only have they taken a more active part in the labor force, there has been a revolution in expectations concerning the kinds of jobs women can hold.

And in virtually every one of the major issues facing the economy, there is a debate about the role of government. Government in the United States has grown enormously. Before World War II, government took less than one out of every five dollars; today it takes one out of three. There are differing views of government responsibility. For instance, people expect, even demand, that government do something about unemployment. But at the same time, there is a wider understanding of the limitations of government. The deficits over the past decade, the largest in America's peacetime history, have meant that the richest country in the world seems short of money to initiate needed public programs. Issues concerning the responsibility, capabilities, and strategies of government in economics have come to the center of the political debate.

These are exciting issues and events, and they fill the front pages of our newspapers and the evening television news shows. Yet in the past, as a teacher of the introductory course in economics, I felt frustrated: none of the textbooks really conveyed this sense of excitement. Try as they might, none seemed to prepare the student adequately for interpreting and understanding these important economic events.

As I thought about it more, one of the reasons for this became clear: the principles expounded in the classic textbook of Alfred Marshall of a hundred years ago, or that of Paul Samuelson, now almost fifty years old, were not the principles for today. The way we economists understand our discipline had changed to reflect the changing world, but the textbooks had not kept pace. Our professional discourse was built on a *modern* economics, but these new developments simply were not adequately reflected in any of the vast array of textbooks that were available to me as a teacher.

Indeed, changes in the economics discipline over the past half century have been as significant as the changes in world events. The basic competitive model of the economy was perfected in the 1950s. Since then, economists have gone beyond that model in several directions as they have come to better understand its limitations. Earlier researchers had paid lip service to the importance of incentives and to problems posed by limited information. However, it was only in the last two decades that real progress was made in understanding these issues, and the advances found immediate application. Both the collapse of the former Soviet bloc economies and the failure of the American S & L's can be viewed as consequences of the failure to provide appropriate incentives. A central question in the debate over growth and productivity has been, how can an economy provide stronger incentives for innovation? The debate over pollution and the environment centers around the relative merits of regulation and providing incentives not to pollute and to conserve resources.

The past fifty years have also seen a reexamination of the boundary between economics and business. Subjects like finance and management used to be relegated to business schools, where they were taught without reference to economic principles. Today we know that to understand how market economies actually work, we have to understand how firms finance and manage themselves. Tremendous insights can be gleaned through the application of basic economic principles, particularly those grounded in an understanding of incentives. Stories of corporate takeovers have been replaced on the front page by stories of bankruptcies as acquiring corporations have found themselves overextended. The 1990 Nobel Prize was awarded to three economists who had contributed most to the endeavor to integrate finance and economics. Yet the introductory textbooks had not yet built in the basic economics of finance and management.

We have also come to better appreciate the virtues of competition. We now understand, for instance, how the benefits of competition extend beyond price to competition for technological innovation. At the same time, we have come to see better why, in so many circumstances, competition appears limited. Again, as I looked over the available textbooks, none seemed to provide my students with a sense of this new understanding.

Samuelson's path-breaking textbook is credited with being the first to integrate successfully the (then) new insights of Keynesian economics with traditional microeconomics. Samuelson employed the concept of the neoclassical synthesis—the view that once the economy was restored to full employment, the old classical principles applied. In effect, there were two distinct regimes to the economy. In one, when the economy's resources were underemployed, macroeconomic principles applied; in the other, when the economy's resources were fully employed, microeconomic principles were relevant. That these were distinct and hardly related regimes was reflected in how texts were written and courses were taught; it made no difference whether micro was taught before macro, or vice versa. In the last few decades, economists came to question the split that had developed between microeconomics and macroeconomics. The profession as a whole came to believe that macroeconomic behavior had to be related to underlying microeconomic principles; there was one set of economic principles, not two. But this view simply was not reflected in any of the available texts.

Thus, as a teacher of introductory economics, I felt that none of the books provided an understanding of the *principles* of *modern* economics—both the principles that are necessary to understand how modern economists think about the world and the principles that are required to understand current economic issues. As we approach a new century, we need principles that go beyond those of Marshall and Samuelson. To be sure, *some*, even much, of what was contained in these older texts remains in this book.

Demand curves and supply curves are tools that have continued to be useful. A thorough understanding of concepts such as comparative advantage, opportunity costs, and marginal analysis is necessary if students are to adequately understand the problems facing market economies. One of the challenges I faced was how to integrate the new principles with the old.

Economics is often characterized as the science of choice. Writing a textbook involves many choices; there is limited space, and the subject matter is vast. As I wrote the book, I continually asked, "What are the basic principles every student of economics should know? What are the most relevant, current applications with which to illustrate each of these principles?" Let me illustrate some of my answers by mentioning several ways in which this text is different.

- The macroeconomic analysis is based on sound microeconomic principles, and the microeconomics is presented in a way that builds a foundation for macroeconomics. While it is fashionable today for most texts to be coauthored by two economists, one specializing in microeconomics and the other in macroeconomics, I have deliberately undertaken the more ambitious task of writing both, believing that doing so will result in a more integrated view of the entire subject. (This reflects my teaching over the past quarter century; I have regularly taught both parts, and have always attempted to show how each throws light on the other.)
- Finance is recognized as an important part of economics, in both the microeconomic and macroeconomic discussions. Chapter 6 introduces the basic ideas of time and risk, Chapter 10 presents "A Student's Guide to Investing," and Chapter 21 discusses how firms raise the funds they need for investment and relates finance to the struggles for corporate control.
- Problems of growth and international competitiveness are discussed at length. Chapter 18, for instance, provides an analysis of technological change.
- The importance of international trade and finance is recognized, and not just by adding more chapters or pages. For instance, the role of trade and exchange, including the gains from trade, is developed in Chapter 3, and the implications of international trade for antitrust policy are discussed in Chapter 17.
- Throughout, issues of incentives and the problems posed by incomplete information are given prominence. To take two of many examples, Chapter 22 discusses how firms try to motivate their managers and how managers try to motivate their workers—and the problems they encounter in doing so. Similarly, Chapter 10 takes up the problems investors face when they do not know which investments are likely to be successful.
- As our understanding of the limitations of markets has increased, so has our understanding of the limitations of government, and the age-old questions of the appropriate balance between government and the private sector have to be reexamined. This book looks at a wide range of policy issues, including what the government should do to preserve the environment (Chapter 23) and to promote greater equality (Chapter 24).

I emphasize in this book that most economic tasks are beyond the scope of any one individual. This lesson certainly applies to the writing of this text. In the years during which the book was being written, I benefited greatly from the reactions of my students in the introductory economics courses at Princeton and Stanford who

class-tested earlier versions. Their enthusiastic response to drafts of the manuscript provided much-needed boosts to motivate me at several critical stages.

I have also benefited from a large number of reviewers. Their enthusiasm too carried me on, and confirmed my judgment about the need for a new principles book of the kind I was attempting to write. Beyond that, they provided thoughtful criticism and suggestions about both substance and exposition. The book has been improved immeasurably from their advice—some of which, quite naturally, was conflicting. In particular, I would like to thank Robert T. Averitt, Smith College; Mohsen Bahmani-Oskooee, University of Wisconsin, Milwaukee; H. Scott Bierman, Carleton College; John Payne Bigelow, University of Missouri; Bruce R. Bolnick, Northeastern University; Michael D. Curley, Kennesaw State College; John Devereux, University of Miami; K. K. Fung, Memphis State; Christophre Georges, Hamilton College; Ronald D. Gilbert, Texas Tech University; Robert E. Graf, Jr., United States Military Academy; Glenn W. Harrison, University of South Carolina; Marc Hayford, Loyola University; Sheng Cheng Hu, Purdue University; Glenn Hubbard, Columbia University; Allen C. Kelley, Duke University; Michael M. Knetter, Dartmouth College; Stefan Lutz, Purdue University; Mark J. Machina, University of California, San Diego; Burton G. Malkiel, Princeton University; Lawrence Martin, Michigan State University; Thomas Mayer, University of California, Davis; Craig J. McCann, University of South Carolina; Henry N. McCarl, University of Alabama, Birmingham; Marshall H. Medoff, University of California, Irvine; Peter Mieszkowski, Rice University; W. Douglas Morgan, University of California, Santa Barbara; John S. Murphy, Canisius College; David H. Papell, University of Houston; James E. Price, Syracuse University; Daniel M. G. Raff, Harvard Business School; Christina D. Romer, University of California, Berkeley; Richard Rosenberg, Pennsylvania State University; Christopher J. Ruhm, Boston University; Suzanne A. Scotchmer, University of California, Berkeley; Andrei Shleifer, Harvard University; John L. Solow, University of Iowa; George Spiva, University of Tennessee; Raghu Sundaram, University of Rochester; Hal R. Varian, University of Michigan; Franklin V. Walker, State University of New York at Albany; James M. Walker, Indiana University; Andrew Weiss, Boston University; Gilbert R. Yochum, Old Dominion University.

It is a pleasure also to acknowledge the help of a number of research assistants. Many of them went well beyond the assigned tasks of looking up, assembling, and graphing data to providing helpful criticism of the manuscript. These include Edwin Lai, now at Vanderbilt University, Chulsoo Kim, now at Rutgers University, Alexander Dyck, Patricia Nabti, Andrés Rodgríguez, Marcie Smith, and Kevin Woodruff. I am particularly indebted to John Williams, who supervised and coordinated the final stages of preparation of the manuscript.

I have also been fortunate in having secretarial support from Linda Handelman and Jean Koentop. Not only did they make preparation of the manuscript easier, they improved it in the process by bringing an unusual degree of intelligence and concern to their work.

This is the second book I have written with Norton, a company that reflects many of the aspects of organizational design that I discuss in the text. This book would not be nearly the one it is without the care, attention, and, most important, deep thought devoted to my work by so many there. A few deserve special mention. Donald Lamm, Norton's president, not only manages to keep the incentives straight within his firm, but also found time to read drafts of this manuscript at several critical stages and offer his usual insightful suggestions. I cannot sufficiently acknowledge my indebtedness to

Drake McFeely, my editor on both books: he was concerned about the ideas *and* their presentation. He was a tough critic, but a constructive one, and was as convinced as I was about the importance of the project. The work of Susan Gaustad, the manuscript editor, was as energetic as it was cheerful. All three made my work harder, so that readers of this book would have an easier time. Three others at Norton also deserve mention: Kelly Nusser for her work on the photographs, Antonina Krass for the splendid design of the book, and Roy Tedoff for coordinating its production.

On the editorial front, there was one other person whose contribution was invaluable: Timothy Taylor. Tim's remarkable editorial skills are known to most members of the economics profession through his role as managing editor of the *Journal of Economic Perspectives*. He has long been committed to the notion that it is important that modern economic ideas be communicated widely, and that they *can* be in a way that is both enlightening and enjoyable. At Stanford, he has earned a reputation as one of the finest teachers of the introductory course. Within the wider San Francisco Bay area, he is known as a prolific writer of provocative and informed editorials on economic themes.

In this project, Tim has performed many roles. We have worked together on each draft. We have discussed extensively both the content and the exposition. His editorial skills have not only made the prose more lively, they have, I believe, enabled me to make accessible ideas that might otherwise appear to be difficult and complex. Finally, Tim applied his journalistic talents to the drafting of many of the boxed "Close-ups" that appear here. He did his job so well that many of the boxes he wrote for earlier drafts were incorporated into the main text in later drafts.

I owe special thanks to those who prepared the ancillary materials that accompany the text. Given the fact that this book represents a departure from the standard mold of the past, the tasks they faced were both more important and more difficult. They too shared with me a vision of what this new introductory textbook was about, and their enthusiasm, insight, and hard work has produced a set of truly superb ancillaries: Lawrence Martin of Michigan State prepared the Study Guide, Glenn Harrison and Elisabet Rutström of the University of South Carolina wrote the Instructor's Manual, Dale Bails of Iowa Wesleyan College prepared the test bank, and Stephen R. King and Rick M. McConnell are responsible for the unusual and effective computer tutorials.

It is common practice at this point in the preface to thank one's spouse and children, who have had to sacrifice so much (presumably time that the author would otherwise have spent with them). My debt goes beyond these commonplaces. My wife and children have motivated me, partly by the thirst for economic understanding they have evidenced by their questions about the rapidly changing economic scene, and partly by their challenging spirit—easy explanations, making heavy use of standard economics jargon, would not satisfy them. Moreover, in their perspective, the only justification for diverting my attention away from them and from my principal job as a teacher and researcher was the production of a textbook that would succeed in communicating the basic ideas of modern economics more effectively than those already available. I hope that what I—together with all of those who have helped me so much—have produced will please them.

PART ONE

INTRODUCTION

These days economics is big news. If we pick up a newspaper or turn on the television for the prime-time news report, we are likely to be bombarded with statistics on unemployment rates, inflation rates, exports, and imports. How well are we doing in competition with other countries, such as Japan? Everyone seems to want to know. Political fortunes as well as the fortunes of countries, firms, and individuals depend on how well the economy does.

What is economics all about? That is the subject of Part One. Chapter 1 uses the story of the automobile industry to illustrate many of the fundamental issues with which economics is concerned. The chapter describes the four basic questions at the heart of economics, and how economists attempt to answer those questions.

Chapter 2 introduces the economists' basic model and explains why notions of property, profits, prices, and cost play such a central role in economists' thinking.

A fact of life in the modern world is that individuals and countries are interdependent. Even a wealthy country like the United States is dependent on foreign countries for vital imports. Chapter 3 discusses the gains that result from trade; why trade, for instance, allows greater specialization, and why greater specialization results in increased productivity. It also explains the patterns of trade—why each country imports and exports the particular goods it does.

Prices play a central role in enabling economies to function. Chapters 4 and 5 take up the question of what determines prices. Also, what causes prices to change over time? Why is water, without which we cannot live, normally so inexpensive, while diamonds, which we surely can do without, are very expensive? What happens to the prices of beer and cigarettes if the government imposes a tax on these goods? Sometimes the government passes laws requiring firms to pay wages of at least so much, or forbidding landlords to charge rents that exceed a certain level. What are the consequences of these government interventions?

Chapter 6 introduces two important realities: economic life takes place not in a single moment of time but over long periods, and life is fraught with risk. Decisions today have effects on the future, and there is usually much uncertainty about what those effects will be. How do economists deal with problems posed by time and risk?

Finally, Chapter 7 turns to the pervasive role of the government in modern economies. Its focus is on why the government undertakes the economic roles it does and on the economic rationale for government actions. It also describes the various forms that government actions might take and the changing roles of the government over time.

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