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高级微观经济学：选择与竞争性市场

(英文版)

Microeconomic Foundations I: Choice and Competitive Markets

戴维·M·克雷普斯（David M. Kreps） 著

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出版说明

入世十年，我国已完全融入到经济全球化的浪潮中。党的十六大确立了“引进来，走出去”的发展战略，使得“国际化”复合型人才的需求不断增加。这就对我国一般本科院校多年来所采取的单一语言（母语）教学提出了严峻挑战，经济类专业双语教学改革迫在眉睫。

为配合高校经济类专业双语教学改革，中国人民大学出版社携手培生、麦格劳-希尔、圣智等众多国际知名出版公司，倾情打造了该套“经济类双语系列教材”。本套教材包括：经济管理类专业开设的核心课程、经济学专业开设的主干课程以及财政金融专业和国际贸易专业的主要课程。所选教材均为国外最优秀的本科层次经济类教材。

我们在组织、引进和出版该系列教材的过程中，严把质量关。聘请国内著名经济学家、学者以及一线授课教师审核国外原版教材，广泛听取意见，努力做到把国外真正高水平的适合国内实际教学需求的优秀教材引进来，供国内广大师生参考、研究和学习。

本系列教材主要有以下特点：

第一，教材体系设计完整。本系列教材全部为国外知名出版公司的优秀教材，涵盖了经济类专业的所有主要课程。

第二，保持英文原版教材特色。本系列教材依据国内实际教学需要以及广泛的适应性，部分对原版教材进行了全文影印，部分在保持原版教材体系结构和内容特色的基础上进行了适当删减。

第三，内容紧扣学科前沿。本系列教材在原著选择上紧扣国外教学前沿，基本上都是国外最流行教材的最新版本。

第四，篇幅合理、价格适中。本系列教材一方面在内容和篇幅上很好地适应了国内双语教学的实际需要，另一方面，低定价策略又避免了国外原版图书高额的购买费用。

第五，提供强大的教学支持。依托国外知名出版公司的资源，本系列教材为教师提供丰富的配套教辅资源，如教师手册、PPT 课堂演示文稿、试题库等，并配套有内容丰富的网络资源，使教学更为便利。

本系列教材既适合高等院校经济类专业的本科教学使用，也适合从事经济类工作和研究的广大从业者阅读和学习。我们在选书、改编过程中虽然全面听取了专家、学者和教师的意见，努力做到满足广大读者的需求，但由于各教材的作者所处的政治、经济和文化背景不同，书中内容仍可能有不妥之处，我们真诚希望广大读者提出宝贵意见和建议，以便我们在以后的版本中不断改进和完善。

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Preface

This book is for aspiring academic economists and those in related fields. It provides a rigorous treatment of some of the basic tools of economic modeling and reasoning, bundled together with enough commentary and reflection so that the reader can appreciate both the strengths and weaknesses of these tools. The target audience (to whom this preface is directly addressed) consists of first-year graduate students who are taking the standard "theory sequence" and would like to go more deeply into a selection of foundational issues, as well as students who, having taken a first-year graduate course out of one of the standard textbooks, would like a deeper dive. At the Stanford Graduate School of Business, this book (more or less) has been the basis of the first-quarter, first-year theory course for Ph.D. students, many of whom had taken a course out of the admirable textbook by Mas-Colell, Whinston, and Green,[1] and so for whom this is an opportunity to review and extend their command of that material.

The objective of the book is captured by the word "command." In my experience, most students emerge from the standard first-year graduate theory course with an understanding of the material that is good but not great. There is little doubt that almost any student would benefit from a structured review of this material using her original text. But, in my opinion, the standard textbooks are not written with command or mastery of the material as their primary objective. Because they are written to serve very broad audiences, breadth of coverage is stressed over depth, and the authors sometimes omit technical details, to avoid panicking less well-prepared readers. This book sacrifices breadth for depth, avoids compromises about details (with a few exceptions), and tries to explain to the reader both why economic foundations are done the way they are done and what are some of the limitations in how things are done.

Clearly, words like "command" and "mastery" must be taken with many grains of salt. If your career objectives are to do research in any topic covered by this book, the coverage here is inadequate to bring you to the level of understanding you will require. Every chapter in this book could be expanded to a book-length treatment on its own and, even then, important work on the topic would be left out. In some cases, the book comes closer to the research frontier than in others; perhaps not surprisingly, this is true on topics on which I myself have made contributions. But in no case will you finish a chapter and be prepared to tackle frontier research on the topic of that chapter.

Instead, when I use the terms "command" and "mastery," I have in mind something less ambitious. The foundations of economics are abstract and mathematical (more about this momentarily), and as with any abstract, mathematics-based dis-

[1] *Microeconomic Theory*, Oxford: Oxford University Press, 1995.

cipline, the more comfortable you are with the foundations, the more likely it is that you will use those foundations well. Errors in thought are much more likely the closer you are working to the frontiers of your understanding. If you ever find yourself leaning on formal mathematics that you don't fully understand—if you find yourself thinking, "I'm not sure why my model generates this result, but that's what emerges"—you are in grave danger. You should understand the tools you use deeply enough so that you aren't fooled by them.

So that's the objective here: to bring you (closer) to command level on a relatively limited set of results, rather than to a nodding-acquaintance level with a broader set. *If* you understand a few things deeply, you will understand what it means to acquire deep understanding, and then you can strive for a similar depth of understanding on whatever (other) subject is of interest to you. My objective is to turn that "if" into a "when," while covering a selection of important microeconomic foundations.

Given this objective, can this book be used as a primary text in the first-graduate-theory course? It is used that way for some of the students at the Stanford GSB, so of course I think the answer is yes. But bear in mind the book's trade-off of breadth for depth. You should complement this book with one that provides broader coverage. Indeed, since this material is part of the foundation of what (I expect) you hope to be your career, you should in any case invest in multiple perspectives. And, having given you that advice in general, let me be a bit more specific: One of the many virtues of Mas-Colell, Whinston, and Green (*ibid.*) is its enormous breadth. You ought to have a copy on your shelf, if not your desk.[2]

Volume I?

The title is *Microeconomic Foundations I* with subtitle *Choice and Competitive Markets*, suggesting that further volumes are in preparation. "In preparation" is an overstatement, as I write these words; "planned" is more accurate, and I plan not only *II: Strategic Interaction, Information, and Imperfect Competition*, but also *III: Institutions and Behavior*. The volume you are holding deals with economic foundations that existed in (nearly) finished form in the mid 1970s: various models of individual choice; consumer and producer theory (for price-taking or competitive consumers and firms); and (some) general equilibrium theory. The intended second volume will cover material that entered the mainstream of economic thought and practice from the mid 1970s to, say, 1990: information economics and noncooperative game theory, in particular. The third piece is the most speculative: I have in mind a volume that will wrap together developments in behavioral and institutional economics, with (perhaps) transaction cost economics playing a central (but not *the* central) role. I am trying to write this so that each volume would correspond to one ten-week course, fitting the academic calendar of Stanford University. But that's an ambitious agenda; only time will tell if the second and third parts ever appear.

[2] Of course, many other excellent treatments of these topics can be found; I make no attempt to list them all. But one resource that may be harder to find is a sequence of excellent notes on a variety of topics in microeconomics and related mathematics, prepared by Kim Border. Go to the URL http://www.hss.caltech.edu/~kcb/Notes.shtml for a list of these notes.

Mathematics in this book and in economics

The approach of this book is resolutely mathematical, because the foundations of economics are resolutely mathematical. The level of mathematics required is not *extremely* high; nearly everything takes place within finite-dimensional Euclidean space. This is a deliberate choice: I have tried to hold the mathematics employed to a level that most graduate students in economics will have. With exceptions limited to a few topics, to navigate this book you must know the sort of mathematics covered in an undergraduate course on real analysis, plus the first few weeks of an undergraduate course in abstract algebra (concerning binary relations).[3] You will need to know more about some specific mathematics, notably some convex analysis, some theory of correspondences, and basics of constrained optimization. But most of the prerequisite mathematics and all of these specific topics are reviewed in a series of appendices at the end of the book.[4]

However, while high-level mathematics is not required, what is commonly called "mathematical sophistication" is needed from start to finish. To make it through the book, you need to be comfortable with mathematical abstraction and with a definition–proposition–proof style of presentation. For students with a strong background in mathematics, this will not be problematic and may even be comforting; but for many students, this will be the real barrier to using this book. I make no apologies for imposing this hurdle, because this, in my opinion, is essential to command-level understanding of the mathematical tools economists employ. I take proofs seriously, providing in most cases details or at least an outline of the proof. (I will sometimes skip steps or "leave the proof to the reader." In every case where this happens, if you aren't sure you see how to fill in the gaps, then you really should take the time to figure out how to do so.)

Each chapter comes with some problems, often including requests that you provide proofs that I leave to the reader. You won't achieve mastery of this material if you don't do them. So do them. Answers to problems with asterisks—as in, *2.3, meaning Problem 3 in Chapter 2—are provided in a *Student's Guide*, which also gives summaries of each chapter. (This includes roughly half the problems and, in most cases, problems where I ask you to fill in gaps left in the text.) You can freely download chapter-by-chapter pieces of the *Student's Guide* at the URL http://www.microfoundations1.stanford.edu/student.[5]

Concerning mathematics and its role in economics: Some first-year graduate

3 So my earlier claim that I have tried to avoid compromises is, at best, a relative statement. And sometimes the lure of going beyond finite-dimensional Euclidean spaces is irresistable: in a very few places, I employ some measure-theoretic probability theory; to do some of the problems, you must know some theory of stochastic processes; toward the end of the book, I informally discuss economies with a continuum of agents. But none of this material is essential for the main expositional flow of the text. I also expect all readers to be reasonably facile with spreadsheets; I employ MSExcel.

4 I also provide a very detailed appendix on the methods of dynamic programming, which I expect few readers will have seen before. This material is not used in this book except in the problems connected to Chapter 7, but these are useful tools in modern macroeconomics and in topics to be discussed in the second volume, and it seemed appropriate to cover these methods in connection with Chapter 7, which concerns dynamic choice.

5 Solutions to the other problems are provided in an *Instructor's Manual*, which also provides my

students are utterly turned off by their first-year theory courses. They have come to the study of economics to understand real-world phenomena and, perhaps, to make a difference in the real world, not to study mathematics. To those students, my response is that if you plan to use economic techniques to understand the real world and to see how to make a difference, your effectiveness will depend in part on how well you understand those techniques; doing all this math builds your understanding of the techniques. Aspiring novelists or essayists may not see the value in learning to diagram sentences in fifth grade, but if diagramming sentences in fifth grade improves the clarity of their sentences—and I think it does—it is an important drill along the way to becoming a novelist or essayist.

A different objection is that economics is a poorer discipline *because of* its reliance on mathematical models. To be tractable—a word you are likely to come to dislike—mathematical models must be relatively simple. So mathematics forces all sorts of simplifications on economic models that make the models less realistic. Because of this, some critics decry the study of mathematical models in economics; they say it is indoctrination of the young into a false and limiting faith.

Mathematical modeling is a mixed blessing for economics. Mathematical modeling provides real advantages in terms of precision of thought, in seeing how assumptions are linked to conclusions, in generating and communicating insights, in generalizing propositions, and in exporting knowledge from one context to another. In my opinion, these advantages are monumental, far outweighing the costs. But the costs are not zero. Mathematical modeling limits what can be tackled and what is considered legitimate inquiry. You may decide, with experience, that the sorts of models in this book do not help you understand the economic phenomena that you want to understand. Since, as I write these lines, I don't know what phenomena you want to understand, I can't say that you are surely wrong. And the position is defensible. But, based on my own experiences, you are probably wrong. In any case, you are more likely to succeed in convincing others and changing the way economists as a whole do business if you have mastered the sort of mathematical models presented here, which continue to be the foundation of modern economics.

Conventions

Within each chapter, propositions, definitions, lemmas, and so forth are numbered sequentially. That is, if the first such item in Chapter 6 is a definition, it is Definition 6.1; if the second such item in Chapter 6 is a proposition, it is Proposition 6.2. Figures in a chapter are also numbered sequentially, but in a different list. So the first figure in Chapter 6 is Figure 6.1. Problems are numbered sequentially in still another list, and equations in still another list.

The use of third-person singular pronouns in books such as this has become an exercise in political correctness. I use *she*, *her*, and *hers* when only one actor is

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recommendations about teaching out of this volume. The *Instructor's Manual* is also available via the internet, but access is limited: instructors who wish access can get more information at the URL http://www.microfoundations1.stanford.edu/instructor.

involved; the second actor is *he, him,* and *his.* Keeping with PC requirements, when there are two actors and a logical status ordering, *she* has higher status, as in: *she is the employer, he is the employee.* With a tip of the hat to Robert Aumann, in some places she is Alice and he is Bob.

Having paid my dues to PC as outlined in the previous paragraph, the dollar is the standard currency in this book.

Acknowledgments

Many generations of Ph.D. students at the Stanford Graduate School of Business have suffered through typo-laden drafts of pieces of this volume, and they have done quite a lot to reduce (not to zero, I'm sorry to say) the number of typos. I thank them.

As I was wrapping up the final version of the manuscript, Alejandro Francetich took on the task of reading for internal consistency. He did much more, finding a host of both typos and think-os, including some that are best described as howlers. I don't know that he got them all, but he improved the final product immensely.

In a world of email, it is very easy to "reach out" to colleagues with a specific question. When writing a book of this sort, which encompasses a lot of material about which I am *not* an expert, the urge to ask colleagues who are experts has been too much for me to resist, and the equally good grace and advice of many colleagues have made this a far better book. I am bound to have forgotten some individuals in this category (to whom I apologize), but among those who have been generous with their time and expertise are Kenneth Arrow, Susan Athey, Robert Aumann, Kim Border, Eddie Dekel, Erwin Diewert, Yossi Feinberg, Faruk Gul, Matt Jackson, Jim Jordan, Vijay Krishna, Sunil Kumar, Mark Machina, Michael Ostrovsky, Phil Reny, John Roberts, Tom Sargent, José Scheinkman, Andy Skrzypacz, Hugo Sonnenschein, and Peter Wakker.

The production of this book required the efforts of a number of folks at Princeton University Press, who were very patient with a crazy, opinionated, and stubborn author. I'm particularly grateful to acquisition editor Seth Ditchik, production editors Ben Holmes and Kathleen Cioffi, copy editor Richard Isomaki, indexer Sheila Bodell, and senior book designer Lorraine Doneker.

I produced this book using TeXtures, an implementation of TeX by Blue Sky TeX Systems. The people at Blue Sky have always been there for me when I have had technical issues. Figures were produced using Adobe Illustrator.

This volume records the contributions of many economists, some of whom it has been my privilege to know as role models and friends. I am grateful to them all, and I take this opportunity to recognize one in particular:

Given the nature of this book and my unbounded admiration for both the individual and his work, it is a pleasure and honor to dedicate this volume to Kenneth Arrow.

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