Prices and Quantities
Fundamentals of Microeconomics

Rakesh V. Vohra offers a unique approach to studying and understanding intermediate microeconomics by reversing the conventional order of treatment, starting with the topics that are mathematically simpler and progressing to the more complex. The book begins with monopoly, which requires single-variable rather than multivariable calculus and allows students to focus very clearly on the fundamental trade-off at the heart of economics: margin vs. volume. Imperfect competition and the contrast with monopoly follows, introducing the notion of Nash equilibrium. Perfect competition is addressed toward the end of the book, where it is framed as a model of non-strategic behavior by firms and agents. The last chapter is devoted to externalities, with an emphasis on how one might design competitive markets to price externalities and linking the difficulties to the problem of efficient provision of public goods. Real-life examples and anecdotes engage the reader while encouraging them to think critically about the interplay between model and reality.

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Lead, Kindly Light, amidst th’encircling gloom,
Lead Thou me on!
The night is dark, and I am far from home,
Lead Thou me on!
Keep Thou my feet; I do not ask to see
The distant scene; one step enough for me.

John Henry Newman

Stones are hard, water is wet and objects unsupported fall towards the earth’s center.

George Orwell
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I am a late in life convert to economics. I did not come to it in a rush but slowly, reluctantly. Impelled by curiosity, repelled by the subject’s apparent disconnect from reality. The experience of that long courtship informs this book. I understand, I think, why outsiders find the subject forbidding or treat it with skepticism or both. This is the audience I have written for.

This book exists because I made an impolitic remark about intermediate microeconomics in public. “It was remarkable,” I said, “that the nature of the course had not changed in half a century.” I went on to list the changes that I thought were needed. My chair obliged by giving me a chance to put the world to rights. Cornered, I could not demur.

Intermediate microeconomics is the gateway course into the economics major at most US universities. It differs from the more widely consumed “principles” course in the level of mathematics expected of students. At the University of Pennsylvania, students are required to have taken a course in multivariable calculus before or concurrently with intermediate microeconomics. This requirement is not intended to limit entry into the major, but is essential for understanding if one is interested in how multiple economic variables interact with each other. The demand for various goods, for example, is influenced by both their price and the buyer’s budget. Intermediate courses that do not presume a knowledge of multivariable calculus risk becoming a pastiche of pidgin calculus and cursory economic analysis.

This book assumes the reader is familiar with the relevant mathematics.\(^1\) It does not assume the reader is an undergraduate. The intended audience is anyone equipped with modest mathematical fluency, an appetite for close reasoning, and a curiosity about how markets work.

The use of mathematics in economics is often criticized as either physics envy or a conspiracy to maintain the status quo. I understand the criticisms. In my salad days, I believed them. They are wrong. For this reason the book emphasizes why mathematics is essential by using examples where words and intuition alone are insufficient to resolve the question at hand. Mathematics forces one to be both precise and explicit about the assumptions made. Students often recoil at the need for assumptions. In their minds it makes the subject less definitive. Other subjects also make assumptions, but conceal them. In economics, one holds them up to catch the light.

\(^1\) Appendix A contains an aide memoire on the relevant mathematics.
Main Features of the Book

This book differs from other intermediate micro books in the following ways.

**Less is more:** It is Lilliputian in comparison to current intermediate micro textbooks. It favors a “less is more” approach. I prefer the student to come away with a solid understanding of a small and important set of topics rather than a nodding acquaintance with a larger set. Adverse selection, for example, is not covered because an honest treatment requires students to have an understanding of probability, which is usually not a prerequisite for intermediate microeconomics. That some topics are not covered in the book does not mean that students are not exposed to them. They find their way into homework problems that both challenge and intrigue the students.

My experience suggests that students prefer the sense of having gone deeper into the material. Informal feedback from colleagues who teach follow-on courses suggests that students appear better prepared than they did before.

**A more student-friendly order of topics:** The book reverses the conventional order of topics. It begins with monopoly, followed by imperfect competition, consumer theory, perfect competition, and closes with externalities. In short, from the concrete to the abstract rather than the reverse.

Why begin with monopoly? It requires single-variable calculus rather than multi-variable, allowing the students to “warm up.” It allows one to focus very clearly on the fundamental trade-off at the heart of economics: margin and volume. Also, students enter thinking that firms “do things” like set prices. The conventional sequence assumes a world where no one does anything. Undergraduates are not yet, like the white queen, willing to believe six impossible things before breakfast.

The conventional sequence begins with the abstraction of preference orderings, which, early in the course, students find dry, dull, and pointless. Some may ask how one can begin without such a discussion, but quasi-linear preferences suffice. They are easy to convey, understand, and, up to a point, plausible. Astute students will ask about budget constraints and the plausibility of preferences being denominated in a common monetary scale. Excellent questions. Ones whose answers come later in the book. In this way the abstraction of preferences is teed up to be an answer to a problem that the students have. Following the conventional order is like asking the students to read the manual for their mobile phone before using it.

Imperfect competition follows naturally from the monopoly case. At this stage, the students themselves are curious about what happens if a firm’s demand depends not just on own price but a rival’s price as well. The notion of Nash equilibrium will be new to them, but the underlying mathematics is familiar as it is a sequence of monopoly pricing problems holding rivals’ actions fixed.

The subject of perfect competition comes towards the end of the book where it is properly framed as a model of non-strategic behavior by firms and agents. Importantly, the students, having been exposed to imperfect competition first, can now clearly see what the price-taking assumption entails. No less important is to convey what a full general equilibrium model can deliver that a partial equilibrium model of imperfect
competition cannot. Trying to understand the effect of automation on an economy is a powerful way to highlight this difference.

The last chapter, as with many books, is devoted to externalities. The novelty here is a greater focus on how one might design competitive markets to price externalities (auctioning off the right not to be vaccinated, perhaps), and linking the difficulties to the problem of efficient provision of public goods.

Substantive examples: I offer substantive examples that emphasize the interplay between model and reality. They begin with behavior that appears puzzling, then show how economic modeling can shed light on the puzzle. Many are specific to the book, as are the anecdotes used to motivate each chapter. For example, Amazon and Hachette’s struggle over e-book pricing models is used to illustrate the concepts of margin, volume, and elasticity of demand. Details of Mylan’s pricing of the EpiPen is used as a vehicle to discuss price discrimination. Real-life examples such as these are incorporated into each chapter to anchor the mathematical models in stories that will engage readers and encourage them to think critically about the distance between model and reality.

Practice problems with solutions: These are designed to help students learn modeling rather than simply practice algebra.

There are other differences whose virtues I could extoll. But the proof is in the “reading.”
Acknowledgments

Many thanks are due to the generations of students who have had to digest (or not) the material within these pages. Some of it is based on an earlier book called *Principles of Pricing* written with Lakshman Krishnamurthi, that was inspired by my experience of teaching managers. From them I learnt what was important and from my undergraduates I learnt what was hard.