Topics in Microeconomics

INDUSTRIAL ORGANIZATION, AUCTIONS, AND INCENTIVES

ELMAR WOLFSTETTER

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Preface

Purpose

The book is designed as a main textbook in *advanced undergraduate* courses on *microeconomics, information economics,* and *industrial organization* or as a supplementary textbook in the first-year *graduate course* on *microeconomic theory.*

The book distinguishes itself from other textbooks in that it focuses on an in-depth treatment of a few core topics, rather than on a complete self-contained overview of the entire field of microeconomics.

Another distinct feature is that the book breaks with tradition and completely ignores the standard competitive analysis, and instead focuses on the more modern themes of imperfect competition, uncertainty and incomplete information, auctions, and incentives.

Prerequisites

The core sections of the book should be accessible to students with a working knowledge of intermediate microeconomics. Mathematical prerequisites are at an introductory/intermediate level, though openness towards mathematical thinking is essential. Given these prerequisites, a good part of the book should be well suited as a main textbook in advanced microeconomics, industrial organization, or information economics.

In an advanced *undergraduate* class one would make a selection from the core material and stay away from supplementary and more demanding topics marked "*". The variety of issues leaves the instructor with a wide range of choices. Of course, in a *graduate* class one should include the starred sections, which are a substantial part of the book, depending upon the instructor's interests in the selection of topics.

By making different selections, the book can be used as textbook in *microeconomics* or in courses with an emphasis on *industrial organization, information economics, applications of game theory,* or *auctions and incentives.* THE book is also of potential interest to students and researchers who want to study certain topics independently, as an introduction to their research.

Outline of the Book

Chapter 1 (Monopoly) is ideally suited for the first sessions of the micro sequence because it starts with intermediate-level material that can be skimmed through quickly, and then gradually turns to more advanced topics and methods such as a simple version of the incomplete-information theory of price discrimination, the durable-goods monopoly problem, and bargaining. I usually start out the micro sequence with this material because students find it accessible from their undergraduate background and appealing to economic common sense.

Chapter 2 (Regulation of Monopoly) is a more specialized topic that one would not necessarily treat in the micro sequence. However, the sections on normative theories of regulation should be considered for inclusion because they offer a nice and simple introduction to the modern mechanism design approach.

Chapter 3 (Oligopoly and Industrial Organization) contains some core micro sequence material plus a great deal of supplementary material for use in a specialized course on industrial organization. In the micro sequence I use only the first two sections plus Section 3.5. However, in a course that emphasizes industrial organization one would cover also cover in detail Sections 3.3 and 3.6.

Chapters 4, 5, and 6 (Risk, Stochastic Dominance, and Risk Aversion) introduce basic concepts and results of stochastic dominance rankings of probability distributions and present the theory of comparative statics of risk. This material is useful in many decision problems under uncertainty, though some of details may be too involved for a standard micro sequence.

The exposition of the basic theory is followed by a sample of fully worked-out applications of the comparative statics of risk, drawn form various areas in economics – from portfolio selection to labor supply, entry in oligopolistic markets, auctions, and the ranking of income distributions.

In the micro sequence I usually go over most of Chapter 4, then select two or three applications from Chapter 5, and cover the core sections (without "*") of Chapter 6. In a course on information economics, I cover Chapter 6 in full detail.

Chapter 7 (Matching: The Marriage Problem) opens the detailed coverage of incomplete information. The topic is two-sided matching of the members of two distinct groups, and the focus is on marriage.

In a standard micro sequence one will probably not use this material, and some people may find its inclusion a bit extravagant. However, in my own teaching I tend to use this brief chapter as "warm-up" material, ideally after a semester break. The topic is somewhat entertaining, and although the exposition is not loaded with technicalities, it has rigor and beauty.

Chapter 8 (Auctions) gives a comprehensive introduction to auction theory and surveys a great deal of the auction literature.[1] Auctions are increasingly important

[1] This chapter is an extended version of my survey, Wolfstetter (1996).

as a market mechanism, and auction theory is an ideal topic to exercise many of the tools and tricks of modern economic theory. This is why I strongly recommend it for inclusion in the micro sequence.

Many of the competing texts do not cover auctions at all or in sufficient detail. Of course, in the micro sequence one should not cover the entire chapter. One should use Sections 8.1–8.4 and 8.6, and leave the other material for a more specialized course.

Chapter 9 (Hidden Information and Averse Selection) surveys adverse-selection models and elaborates some standard applications, from insurance to labor, credit, price discrimination, and education. Most of the material is at a fairly elementary level, except the analysis of price discrimination. The latter generalizes the two-type model of hidden information and second-degree price discrimination in Chapter 1 to a continuum of types.

In the micro sequence I usually go quickly over the basic material, and then spend time exercising more advanced techniques using the example of price discrimination with a continuum of customer types.

Chapter 10 (Hidden Information and Signaling) surveys signaling models, using the famous education game, shows how signaling games are plagued by multiplicity-of-equilibria problems, and evaluates various proposed equilibrium refinements. Again, in the micro sequence I cover all core sections of this chapter.

Chapter 11 (Hidden Action and Moral Hazard) gives an introduction to the principal–agent problem and its various ramifications. Two basic models are distinguished: the *risk-vs.-incentives* model and the *limited-liability* model. The simplicity of the latter makes it a good framework for the analysis of the interrelationship between optimal contracts and optimal monitoring. Attention is also paid to the renegotiation problem and possible solutions to the disturbing lack of renegotiation-proofness of standard optimal contracts.

Nowadays, most micro courses include some coverage of the principal-agent problem. In an advanced undergraduate course one would probably only use the two-state, two-efforts models, whereas in a graduate course one should cover at least one of the generalizations, and possibly the analysis of optimal monitoring.

Chapter 12 (Rank-Order Tournaments) explains and debates incentive systems that are based on relative performance measures. This introduces the reader into the important area of principal–agent relationships between one principal and *many* agents.

Technical Supplements The book comes with several *technical supplements* (appendixes) that review basic concepts and results of *nonlinear optimization theory* (Appendixes A and B), *convexity and generalizations* (Appendix C), and *expected values and order statistics* (Appendix C). The emphasis is on basic concepts and results, mostly without proofs. These surveys should be useful for the working economist, even though the material is not required for the other parts of the book.

Most graduate programs have specialized math courses and assign one of the many excellent textbooks on optimization theory. The technical supplements included here are by no means a substitute for such a text.

Complementary Texts In recent years many good texts were published that one might combine with the present book. When I teach the graduate micro sequence, industrial organization, applied game theory, and auctions and incentives, I also assign parts of Fudenberg and Tirole (1991), Varian (1992), Kreps (1990), Tirole (1989), Milgrom and Roberts (1992), and Mas–Colell, Whinston, and Green (1995).

Why No Competitive Analysis? I close with a word of explanation for the absence of competitive analysis in this text. Over the years of teaching the micro sequence I found myself putting less and less emphasis on the relatively uninspiring competitive analysis, which is well covered in Varian (1992) and in other texts. This reflects not just my own preferences, but a general shift of emphasis in research. This fact, combined with the availability of good texts on competitive analysis, made me decide to put together a micro text that excludes competitive analysis altogether.

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During the years that elapsed between the conception of the book and its final completion, many people helped me with encouragement, pointing out errors, and making detailed recommendations.

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The typescript was typeset by the author using Aleksander Simonic's marvelous WinEdt together with the Y&Y–TeX implementation of LaTeX, and the diagrams were made with PiCTeX.

Of course I appreciate being notified of errata. E-mail can be sent to: elmar.wolfstetter@rz.hu-berlin.de. Exercises to accompany each chapter of the book can be downloaded from: http://www.wiwi.hu-berlin.de/wt1/topics.

Contents

Part I

Imperfect Competition

1

Monopoly

The best of all monopoly profits is a quiet life.
Sir John Hicks

1.1 Introduction

In this chapter we analyze the supply and pricing decisions of a pure, single-product monopolist facing a large number of price-taking buyers. We take the firm's choice of product as given and assume that consumers know all about product characteristics and quality. Moreover, we assume that the monopolist's market is sufficiently self-contained to allow us to neglect the strategic interdependency between markets. The strategic interdependency between markets is the subject matter of the theory of oligopoly with product differentiation.

Monopolies do exist. In the early days of photocopying, Rank Xerox was the exclusive supplier – some still use "xeroxing" as a synonym for "photocopying." Postal and rail services are (or have been) monopolized (things are changing fast in these sectors), and so are public utilities (gas and electricity) and computer operating systems, to name just a few. One can even find inconspicuous products that are subject to monopolization. For example, in Germany matches were exclusively supplied by a single Swedish supplier who had acquired a monopoly license from the German government during World War I, when the German government was hard pressed for foreign currencies. Similarly, gambling licenses are often issued by states to raise revenue. Moreover, there are many local monopolies, like the single hardware store in a small community, the bus line exclusively served by Greyhound, or the flight route, say from Ithaca to New York City, served by a single airline.

As these examples suggest, monopolization has a lot to do with the size of a market, but also with licensing, patent protection, and regulation – supported by law. If entry into a monopolized market is not prohibited, a monopoly has little chance to survive unless the market is too small to support more than one firm. Monopoly profits attract new entrants. And even if entry is prohibited, eventually patent rights expire, or rival firms spend resources to develop similar products and technologies or even to gain political influence to raid the monopoly license. Therefore, a monopoly