PREFACE TO THE HANDBOOK OF INDUSTRIAL ORGANIZATION, VOLUME 3

This volume is the third in the *Handbook of Industrial Organization* series (hereafter, the HIO). The first two volumes were published simultaneously in 1989, under the editorship of Richard Schmalensee and Robert Willig. The first two volumes were quite successful, by several measures. Many of the chapters were widely cited, many chapters appeared on graduate reading lists, some have continued to appear even recently, and we understand that the two volumes are among the best sellers in the Handbook of Economics Series. However, the field of industrial organization has evolved since then. Moreover, as Schmalensee and Willig acknowledge in their Preface, the original HIO volumes had some gaps. The purpose of this volume is to fill in some of those gaps, and to report on recent developments. The aim is to serve as a source, reference and teaching supplement for industrial organization, or industrial economics, the microeconomics field that focuses on business behavior and its implications for both market structures and processes, and for related public policies.

The first two volumes of the HIO appeared at roughly the same time as Jean Tirole's (1988) book. Together, they helped revolutionize the teaching of industrial organization, and they provided an excellent summary of the state of the art. Tirole's book explicitly is concerned with the relevant theory, and several commentators noted that the first two HIO volumes contained much more discussion of the theoretical literature than of the empirical literature. In most respects, this imbalance was an accurate reflection of the state of the field. Since then, the empirical literature has flourished, while the theoretical literature has continued to grow, although probably not at the pace of the preceding 15 years.

This volume consists of ten chapters, presented in the alphabetic order of their authors. We briefly summarize them, and indicate how they correspond to chapters in the first two volumes of the HIO.

Mark Armstrong and David Sappington describe developments in regulation. Their chapter can be viewed as a successor to the chapter by David Baron in the original HIO, and to a lesser extent those by Ronald Braeutigam and by Roger Noll. Relative to the Baron chapter, this chapter focuses more on practical regulatory policies and on multi-firm regulation.

Kyle Bagwell discusses advertising, which received a brief treatment only in passing in the first two HIO volumes. More generally, this chapter fills a larger gap, as we know of no thorough modern survey of this literature.

Steven Berry and Peter Reiss describe empirical models of entry and exit that infer aspects of firms' competitive environment from the number of competitors in a market.

The focus is on within industry comparisons, say for example on differences across separate geographical markets for the same product.

As dynamic theoretical models increase in complexity, in order to reflect a wide variety of possible economic environments, it has become increasingly difficult to obtain analytic characterizations of equilibrium outcomes. Ulrich Doraszelski and Ariel Pakes survey methods for deriving numerical solutions in such games. With increases in computer processing speed and memory, it has become possible to analyze a richer set of environments, and to revisit issues such as mergers, where long run effects on entry and investment may be paramount. Applications of these numerical solution methods have just begun to be introduced in the empirical analysis of dynamic oligopoly games, and we believe that some important advances will occur in the near future.

Joseph Farrell and Paul Klemperer discuss lock-in and compatibility. These issues are prominent in markets where there are either direct or indirect benefits to purchasing the same product as many other customers, or where there are other costs associated with switching products. Again, this topic was not covered substantively in the first two HIO volumes.

Ken Hendricks and Robert Porter describe the empirical literature on auction markets. Auctions are an important trading process, and they have been widely adopted in sales of public assets. Economics has informed the design of auction mechanisms, as well as the analysis of bidding, such as the detection of collusion.

Patrick Rey and Jean Tirole discuss the literature on foreclosure, whereby output in one market is restricted by the exercise of market power in another market. Related chapters in the earlier HIO, by Martin Perry, by Janusz Ordover and Garth Saloner and by Michael Katz, touch on these issues. There have been a number of subsequent developments, spurred on in part by several antitrust cases.

Lars Stole discusses price discrimination. His chapter expands on Hal Varian's earlier chapter in the HIO. Varian's discussion largely focuses on monopoly price discrimination, while Stole's chapter is primarily devoted to the more recent literature on price discrimination in oligopoly markets.

John Sutton describes the determinants of market structure, including the size distribution of firms and industry turnover. In contrast to the related chapter by Berry and Reiss, the focus is largely on differences across industries. This chapter is a successor to the chapters by John Panzar, by Richard Schmalensee, and by Wesley Cohen and Richard Levin in the original HIO volumes.

Finally, Michael Whinston discusses horizontal integration. His companion book [Whinston (2006)] also discusses vertical integration and vertical restraints and related antitrust policies. This chapter succeeds that by Alexis Jacquemin and Margaret Slade in the original HIO volumes. It provides an up-to-date account of the latest theory in the area, as well as coverage of empirical techniques which are now used in antitrust policy.

The ten chapters cover a wide range of material, but there remain some important subjects that are not covered in this volume or the prior two HIO volumes. We had hoped that there would be a chapter on the intersection between industrial organization and corporate finance. There is also no discussion of the large empirical literature on estimating demand for differentiated products. Ackerberg et al. (2007), Nevo (2000) and Reiss and Wolak (2007) provide useful discussions, all emphasizing econometric issues. Another unfilled gap is the empirical literature on research and development, expanding on the earlier HIO surveys by Jennifer Reinganum on the theory and by Cohen and Levin on empirical work. Finally, a remaining gap is "behavioral IO", i.e., the study of markets in which consumers and/or firms exhibit myopia, hyperbolic discounting, or some other form of bounded rationality. This area is still in its infancy, but Ellison (2006) provides an initial survey of the terrain.

Acknowledgements

This volume has had a checkered history. It was originally to have been edited by Tim Bresnahan and John Vickers. Tim and John commissioned about a dozen chapters. However, before many had advanced beyond a rough outline, both Tim and John stepped down in order to take government positions in Washington and London, respectively. We agreed to succeed them, but the transition process resulted in some delays. We retained several of the original chapters, and commissioned some new chapters. Tim and John deserve credit for much of the important groundwork. We owe a large debt to the authors of the following chapters, who have taken their assignments seriously, and who were responsive to the various comments and suggestions they received. We would also like to thank Kenneth Arrow and Michael Intriligator for their support in providing guidance throughout the process. Valerie Teng of North-Holland capably provided administrative assistance at various stages of this project.

MARK ARMSTRONG
University College London

ROBERT PORTER
Northwestern University

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