BOOK REVIEWS

MODELS OF STRATEGIC RATIONALITY, by Reinhard Selten, Dordrecht, The Netherlands: Kluwer Academic Publishers, 1988, pp. xiii, 318, ISBN 90-277-2663-9.

This book is a collection of twelve of Selten's articles from various stages in his career. Given his productivity, the selection is by no means exhaustive, but several of his most important contributions are included. Apart from a very brief introduction, the book has no new material. Therefore its merit is that it brings together material from several hard-to-access sources.

The articles demonstrate the range of Selten's work on game theory, from discussions of equilibrium concepts, over applications, to comments on experimental results. Throughout the book, the analysis and exposition is rigorous without compromise, but the choice of topics is motivated by real-life problems.

It seems fair to suggest that Selten's more theoretical writings have had a bigger impact than his applied work. Since the target audience for the applied work is different, one could speculate that the writing style and the choice of publication outlets share the blame for this. The latter problem, but unfortunately not the first, can potentially be overcome by this book.

It is fitting that the first article is the much-cited piece, 'Reexamination of the Perfectness Concept for Equilibrium Points in Extensive Games'. Since Selten introduced it, the concept of perfection has become part of the standard tool kit in microeconomics. Of particular interest to the readers of this journal, the literature on dynamic oligopoly theory is almost completely dependent on concepts of perfection or derivates thereof.

An equally appropriate choice is made by letting 'The Chain Store Paradox' be the second paper in the book. This deals with a problem going back at least to Luce and Raiffa (1957), that actual play in the finitely repeated prisoner's dilemma is at odds with theoretical predictions. In particular, the experimental evidence can be interpreted as pointing to a weakness in the concept of perfect equilibrium. While most economists are aware that Selten has worked on the paradox, it is less well known that the paper contains an attempt to solve it by appeals to limited rationality. Although there are signs of change, the profession has been favoring the more orthodox solution proposed by Kreps *et al.* (1982). Given the dogmatism of most theorists, I was excited to see how this and other articles show Selten as in many ways less orthodox than the profession. Indeed, both in the introduction to the book and elsewhere (Selten, 1985), he emphasizes the need for an independent study of 'descriptive' as opposed to 'normative' game theory.

When reading the book I found myself most interested in Selten's applied papers, although these are significantly less well known. In 'A Simple Model of Imperfect Competition Where 4 are Few and 6 are Many' an unusual approach is taken to the study of collusion. The standard approach (e.g. Friedman, 1971) is to look at asymptotic folk theorems in the context of supergames. In contrast, Selten thinks of (essentially) a three-stage game. First, firms decide whether to participate in cartel bargaining or not. Second, cartel bargaining, which may be unsuccessful, takes place. Third, firms select which quantities to supply. This is obviously a different model and suggests a different institutional setting than the supergame approach. However, it would be interesting to explore the relationship between these models and the recent work on trading games by Gresik and Satterthwaite (1989).

Another interesting paper is 'A Model of Oligopolistic Size Structure and Profitability', originally published in the *European Economic Review*. The set-up here is more conventional. On the demand side there is a continuum of submarkets for different levels of technological complexity. A firm can sell to all markets below its level of technology. In the first stage, firms select levels of technology and incur fixed costs accordingly. In the second stage there is Cournot competition in each submarket. The model has some similarity to the well-known quality choice models (e.g. Moorthy, 1985), but the fixed costs add significant complexity. The results are very attractive in that they track the stylized empirical facts nicely. In particular, equilibrium shows a positive correlation between firm size and profit rate and between market concentration and profit rate. It is my impression that this paper has not had a lot of impact, and I am surprised.

After the section on applied game theory, the book contains two papers on co-operation. In my reading, this section is primarily interesting because it shows how Selten has been ahead of trends in the profession. The paper on 'Bargaining Under Incomplete Information: A Numerical Example' seems quite dated. Given the recent burgeoning literature on the topic, I found little of substantive interest in the paper. The second paper on 'A Noncooperative Model of Characteristic-Function Bargaining' explores the nonco-operative interpretation of co-operative game theory, an approach which is more commonplace today. With respect to both papers in this section, one could argue that Selten has done other more important work on the topic, but that this work is co-authored and therefore excluded from the book.

In the final section, three papers offer contributions to what Selten calls descriptive game theory. All three have the flavor of a theorist finding *post hoc* explanations for empirical observations. However, the first paper, 'The Equity Principle in Economic Behavior', and the third, 'Equal Division Payoff Bounds for Three-Person Characteristic Function Experiments', stand out as unorthodox. Both use the concept of aspiration levels to explain experimental results. I am not conversant with experimental economics and behavioral negotiation theory. However, as far as I can gather, this branch of Selten's work has not had the same level of impact as his theoretical pieces on normative game theory. To an outsider, the approach seems a bit *ad hoc*, but this may just be a result of my own conservatism.

In summary, the book contains a group of very high-quality papers on a wide range of topics. The level of rigor and the interest in real-life problems comes through in all of them. However, the book is best seen as an exposition of Selten's view of the proper role of game theory: the theoretical perspectives, the applications and the descriptive work. It is not focused on a particular area within game theory, nor is it about game theory as a whole. In my view, this limits the usefulness of the book. Few readers will be interested in the range of topics covered and at the same time it is not appropriate as a general teaching vehicle.

The book is carried by the quality of Selten's work. However, I would have preferred a more narrow selection, focusing on one stream of work. Given his productivity, this could easily have been done, perhaps by including co-authored articles. In its present form, the book is primarily a convenience; it makes it easier to access Selten's papers, some of which are published in relatively hard-to-get outlets. As such, I suspect that the book would be a good library investment.

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NATURAL MONOPOLY REGULATION: PRINCIPLES AND PRACTICE, by Sanford V. Berg and John Tschirhart

It has been some time since a well-written, comprehensive, and rigorous textbook has been available to students of regulation. Finally, such a book is here.

Natural Monopoly Regulation: Principles and Practice, written by Sanford V. Berg and John Tschirhart (hereafter B&T), is a textbook on regulation designed for graduate and advanced undergraduate students in economics. Its rigor and comprehensive coverage make the book of interest to the most sophisticated of these students. However, the authors also take great pains to take their discussion and analysis accessible to a much wider audience. Careful explanations of equations and derivations, along with frequent graphical illustrations and numerical examples, facilitate comprehension of the main findings by those without extensive mathematical expertise. Thus, the text is also a valuable tool for industry practitioners.

B&T's book presents a refreshing blend of theory and practice. The major 'advances' in the economic theory of regulation are assessed both in terms of their theoretical contribution and their practical importance. This approach facilitates an understanding of both the merits and shortfalls of the theory.

The authors frequently call upon their detailed knowledge of the telecommunications and energy industries to illustrate important arguments. The facts and institutional detail they cite are very useful and quite informative, providing life to what might otherwise come across as abstract theory.

In their preface (p. x), the authors acknowledge that their treatment of some issues may be idiosyncratic, and that they may have failed to cover some important issues. In my view, the authors have nothing to apologize for on these accounts. One of the most impressive features of this text is its comprehensive and up-to-date coverage of the field. Furthermore, I find no evidence that the text has been skewed significantly in the direction of the authors' own research interests.

B&T cover all the 'traditional' topics related to the regulation of a monopoly firm. In particular, they present thorough treatments of such issues as Ramsey prices, peak-load prices, cost allocation and rate-of-return regulation. Political theories of regulation are also afforded some attention. In addition, the authors provide detailed analyses of more recent developments in the theory of regulated industries. For example, they review in great detail the important insights derived in the literature on the *sustainability* of natural monopolies. They also discuss the general principles behind non-linear pricing, focusing on Pareto-dominating two-part tariffs. Optimal pricing in the presence of interruptible service is also analyzed. Furthermore, some thoughts are offered on the design of regulatory policy when the firm's information about its environment is superior to the regulator's information.

In virtually all of these areas, B&T present an informative summary of the main points in a very large literature. The 'traditional' topics in regulation along with the issue of sustainability are generally afforded the most extensive and rigorous treatment. In cases where the coverage is less detailed, a helpful intuitive explanation is provided for the important insights in the literature.