Information and Learning in Markets: The Impact of Market Microstructure. By Xavier Vives. Princeton and Oxford: Princeton University Press, 2008. Pp. xii, 406. $65.00. ISBN 978–0–691–12743–9.

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It is fair to say that the jury is still out on the question of whether or not rational market microstructure models can explain interesting market phenomena. Professor Vives joins Professor Markus K. Brunnermeier (2001) before him with the maintained hypothesis that they can. This book stretches the rational expectations paradigm in every direction in order to show the varied results that the models can deliver. It is a worthwhile endeavor.

Upon first reading, I was struck by the subtitle of the book: the impact of market microstructure. In fact, while mentioned, a detailed discussion of standard market microstructure models does not show up until the ninth and last substantive chapter. Yet, Professor Vives takes a broader and quite appropriate view of what market microstructure means. Here, microstructure refers not to transaction prices, but to the details of the rules of the game. As he looks at various models of financial asset prices with asymmetric information, Professor Vives alters the microstructure by varying the kinds of orders the agents can use (market and limit), the timing of moves (quote driven

versus order driven), and the population of agents (marketmakers or not, large traders or not).

It is completely fitting that information and market microstructure should go together in the title. While there can be bad markets or bad microstructure for securities with many information problems, the same is not true for securities with few information problems. As long as there is active competition among market participants, securities without private information problems will trade just fine and there is little point to worrying about the details of market microstructure. Of course, market microstructure may be important in insuring that there is active competition, but that is not the focus of this book.

The book starts with a discussion of information about supply and demand shocks in an otherwise simple model of Cournot competition. Much of this material will be familiar from Professor Vives's earlier book on oligopolies, but the purpose is different here. In a setting otherwise familiar to microeconomists, Professor Vives can establish the basics of the analysis that will be applied to financial markets. Computation of equilibria in rational expectations asset pricing models frequently requires an educated guess about what the equilibrium will look like. The simpler models of production provide some hints as to what those guesses should look like. It is also here that results are presented on the convergence of large economies to continuum economies, which are the primary sort used in the rest of the book, and foundations are laid for welfare analysis that will be, from time to time, employed later.

With these first three chapters, the book takes off on the analysis of financial asset pricing with a standard competitive rational expectations equilibrium model. This is augmented with rational expectations models with more of a microstructure flavor—some agents bring demand schedules (i.e., a very long—a continuum, in fact—list of limit orders) while others post market orders. In other models, price may be set by a fringe of risk neutral traders (i.e., marketmakers). The next chapter studies the effect of strategic or large traders. Again, a variety of market microstructure assumptions are employed.

The first half of the book is concerned with information, but learning is not the focus. There are results about how much information gets into prices in the static models, but this is a side dish, not the main course. Learning, an essentially dynamic process, is the focus of the second half of the book. The discussion starts with models with no learning (informational cascades) and then examines slow learning. As the book moves to a presentation of dynamic learning, the topic is introduced with dynamic models of a continuum of Cournot firms with asymmetric information. This is done, as it was in the first few chapters, to present the learning dynamics in the simplest context. Basically, exogenous parameters of these models become endogenous functions of parameters in the more complex asset pricing models. For example, customers of the firm do not change their individual demands as a result of the firms learning about aggregate demand. In contrast, buyers of shares care much about what suppliers of shares know, and vice versa.

The eighth chapter deals with dynamic rational expectations models with intriguing analyses of traders with different investment horizons. It also includes a discussion of models with rational crashes and other coordination problems. The book concludes, in chapter 9, with a discussion of traditional market microstructure models (mostly of the Kyle type) and manipulation, a sort of "anti-learning." There is also a very complete mathematical appendix that explains the results used in the analysis of the models.

While providing an excellent survey of the literature, this book is more than that. Almost all significant results are presented with the details of a model and a rough outline of the steps needed to solve it. There are many equations, but, as a result, the reader with pad and pencil can become quite familiar with the models. What this means, though, is that the book is less about real world economics and more about economic models.

This last sentence sounds harsher than I intend it. The models themselves can be very useful for analyzing real economic problems but the book does not, for the most part, choose to provide specific examples. The book discusses the solution of models and leaves the application and testing of the models to others. Essentially, this book tells us how the models work. That makes it easier for others to choose the models that accomplish what is needed. Second, my statement should not be

taken to mean that the book never examines specific economic questions. For example, the book presents a very interesting discussion of the welfare effects of insider trading laws using the static rational expectations paradigm.

This book could have had the far less commercial but just as descriptive title, "Explorations of linear normal models." Virtually all of the asset pricing models involve agents with exponential utility and everything normally distributed. While references to the shortcomings of this type of model are made here and there, it might have been nice to see a more critical discussion. For example, the criticism that prices can be negative in such models is here (and elsewhere) brushed off by saying that making the mean high enough makes the probability of negative prices arbitrarily small. True, but for the securities that are likely to have the most interesting informational problems this may be an inappropriate assumption—the probability of bankruptcy might not be trivial.

While I appreciate that the book is about theory, I think that some calibration would have been useful to indicate how big the effects are and to guide future researchers. Such calibration is rare in the literature, however, so Professor Vives should not be faulted. Perhaps the next edition could add this.

I must comment on the writing since it is excellent. While it is true that I find these sorts of models inherently interesting and am predisposed to reading about them, reading Professor Vives's prose was a joy. His explanations for why various results obtain are clear and the flow from model to model is natural. Results in later chapters are frequently related to results in earlier chapters, tying the whole book together.

Will I have this book on my shelf? Of course, since I received a reviewer copy and cannot sell it; but I would have bought it if that were not the case for it is an excellent reference. In comparison with *Asset Pricing under Asymmetric Information* (Brunnermeier 2001), this book is substitute and complement. On the topics of microstructure models, herding and crashes, I will still turn to Professor Brunnermeier's book. On just about everything else having to do with rational expectations models, I will turn to Professor Vives's presentation.

As I have stressed, this is a very technical book and, hence, its audience is realistically restricted to graduate students and their professors. It is clearly a work of theory, but empiricists should be interested as well. While traditional empirical market microstructure research has had some success in teasing out the tracks of asymmetric information in securities markets, some of the dynamic models discussed in this book could form the basis for further looks at the data.

References

Brunnermeier, Markus K. 2001. *Asset Pricing under Asymmetric Information: Bubbles, Crashes, Technical Analysis, and Herding.* Oxford and New York: Oxford University Press.

Lawrence R. Glosten
Columbia University