

that the tour is only one of the theoretical work and not of the equally large, if not larger, body of empirical work, one is left with a real appreciation that a viable subfield of finance has been established.

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Financial Innovation and Risk Sharing. Franklin Allen and Douglas Gale, Cambridge, MA: MIT Press, 1994. 379 pp. \$40.00. ISBN 0-262-01141-7.*

In the last 30 years, new financial instruments have been introduced at an unprecedented rate. From standardized options and financial futures to mortgage-backed securities and interest rate swaps, the scope and the magnitude of financial innovations has been extraordinary. The theory which models financial innovation is still young, but is also beginning to experience rapid growth. Franklin, Allen and Douglas Gale's book could not be more timely. As the first book focused on the theory of financial innovation, it is almost assured to be a success¹ That success will be well deserved as Allen and Gale have done a nice job of laying the foundation for a theory of financial innovation built on the sharing of risk.

Financial Innovation and Risk Sharing offers a theoretical look at the endogenous introduction of securities. The book does not provide a comprehensive survey of the theoretical research relating to financial innovation,² nor does it extend that theory. Instead, the book motivates the authors' approach to studying financial innovation and then presents a coherent and directed look at that approach, based on the authors' collected works on the subject.

Allen and Gale use risk sharing as both the primary incentive for financial innovation, and the ruler by which the efficiency of innovation is judged. Markets are initially incomplete and wealth is randomly distributed across various states.

Investors trade securities in order to smooth their income across states. The authors analyze the choice of securities to be marketed un-

* Chester Spatt acted as Executive Editor for this review.

¹ There are other books which address issues of financial structure and innovation. For example, see Miller (1991) and Townsend (1990).

² Surveys exist which examine various issues dated to financial innovation. To mention a few: Allen (1989) (reprinted as Chapter 11) discuss the theory concerning the optimality of debt and equity, as well as the theory of financial innovation. Harris and Raviv (1992) survey contract theory. Duffie and Rahl (1995) present a broad look at the theory of financial innovation.

der various assumptions concerning the number of issuers, short-sales constraints, and first mover advantages. In variations of the approach, firms, intermediaries, exchanges, and governments may market securities. One of the authors' chief concerns is whether or not the equilibrium innovations are constrained efficient (where constrained efficiency answers the question of whether there is a Pareto improving reallocation of securities and consumption at the time of trade and subject to the given transactions costs). The constrained efficiency of the equilibrium turns out to depend in interesting ways on the variations of the model. The book contains numerous examples which make the material lucid and easily accessible. Other research is discussed as it pertains to, or complements, Allen and Gale's research.

Before offering opinions on the overall contributions of this book, let me provide a short summary of, and some comments on, the contents of the book.

The first chapter of the book is an introduction which takes a broad look at the factors which affect innovation. It begins with the role of markets as distributors of risk throughout an economy. This sets up the importance of the incentives to expand and complete markets. The authors stress that it is their intent to develop a theory which provides a general understanding of the process of innovation and its efficiency, rather than, for instance, one which offers an explanation for why the rate of innovation has increased so dramatically in recent years. The last part of the introduction offers an apology for the factors which influence innovation that are not incorporated into the theory, including issues of corporate control, information asymmetries between issuers and investors, and tax regulations.

The second chapter takes a historical and institutional look at financial innovation. It documents innovations from ancient Babylonia to modern trading floors. The first part of the chapter offers an extensive list of financial instruments, in each case describing the characteristics of the instrument and some of the circumstances surrounding its introduction. The list is impressive and shows the scope of the process of innovation. However, there is almost no discussion which relates the list of innovations to the questions they raise or the insight that they provide. I would prefer to see fewer innovations covered, but with a stronger tie-in to the authors' theory. The remainder of Chapter 2 provides a look at some of the empirical work on this subject. This part of the chapter is brief, but I found it more useful than the first part of the chapter since it directly pertains to the development of the theory. Among others, Allen and Gale discuss work by Jarrow and O'Hara (1989) documenting that splitting equity can increase shareholder value, as well as work by Conrad (1989) and Detemple and Jorion (1990) which found that the introduction of an option led to

an increase in the price (and a decrease in the variance of the return) of the underlying security. These findings pose direct questions for a theory of financial innovation.

In Chapter 3, Allen and Gale provide a synopsis of what the literature on industrial organization has to say about financial innovation. As the authors point out, the introduction of new products is a long-standing problem in industrial organization, and so we should not be surprised to find insight there concerning the introduction of new financial products. They discuss incentives for firms to develop cost-reducing technologies in competitive and monopolistic industries. They also discuss the role of patents as an attempt at restoring efficient innovation incentives. The concluding message of Chapter 3 is that these well-studied ideas from the literature on industrial organization are difficult to apply to financial innovation since financial products are easily copied, the business is reasonably competitive, and patent law currently ignores inventions which are ideas.

Chapter 4 is the heart of this book. It presents a unified treatment of most of the authors' papers on this subject, as well as a look at some related topics. The basis for Allen and Gale's theory is a set of investors who initially face undiversified risks concerning their future income (and thus consumption). These risks can be shared through the trade of financial instruments, thereby smoothing investors' second-period consumption. Such securities are initially absent and must be introduced. The first look at this problem is based on Allen and Gale (1988), which is reprinted as Chapter 6. It considers a set of competitive firms that have identical random future incomes, which they can split into separate claims and sell to investors. Short-sales constraints limit the availability of any single firm's securities.³ Firms maximize their market value, given that there are costs associated with issuing securities. In this version of the model, equilibria exist and are constrained efficient. A spanning theorem demonstrates that for any equilibrium there exists an equivalent allocation which uses only extremal (paying all or nothing, state by state) securities. The authors then move to analyzing the importance of the short-sales constraint. (This section is based on Allen and Gale (1991), reprinted in Chapter 7.) Allowing for limited short-sales introduces externalities, which can undermine efficiency. With unbounded short-sales, a single firm's securities can affect an otherwise competitive market. Allen and Gale argue that if an issuer is to have any incentive to innovate in the presence of unbounded short sales, then the equilibrium will necessarily be imperfectly com-

³ If unlimited short-sales are permitted, then investors themselves can issue additional units of the firm's security by short-selling the security.

petitive. The next two sections of Chapter 4 consider introduction of securities by intermediaries (e.g., investment banks) and exchanges. Following Allen and Gale (1990) (reprinted in Chapter 8), they discuss the incentives to open an options exchange by an owner who will gain from charging fees to traders. The discussion focuses on the equilibrium externalities present with the introduction of an option (e.g., the effect on the trade of the underlying security) and their impact on the efficient decision. Next, the authors discuss research by Duffie and Jackson (1989) on the design of futures contracts by imperfectly competitive exchanges who maximize their trading volume. The constrained efficiency issues there hinge on the number of exchanges issuing futures and whether or not there is dynamic trading. Chapter 4 concludes with short discussions of the models developed by Gale (1990, 1992) (reprinted as Chapters 9 and 10, respectively). The first considers Ricardian equivalence when a government issues debt in an overlapping generations model. The analysis shows that the equivalence depends on whether short-sales are constrained and whether units of new or existing securities are issued. The second model addresses issues of innovation when investors may incur costs in order to familiarize themselves with securities. In such a situation there are multiple equilibria which exhibit interesting standardization characteristics. Again, efficiency is not guaranteed.

In Chapter 5, the authors discuss issues which are important to a comprehensive theory of financial innovation, but which are not featured in their approach. Here they offer brief surveys of some of the literature on transactions costs, corporate control, and information asymmetry.

The remaining chapters, 6 through 11, collect the authors' papers on this subject. Chapters 6 through 10 contain the papers mentioned above, which serve as the basis for most of Chapter 4. Chapter 11 reprints Allen's (1989) paper *The Changing Nature of Debt and Equity: A Financial Perspective*. That paper surveys some of the literature which studies when debt and/or equity are optimal securities to issue, and then discusses the literature on optimal financial innovation.

The primary audience for this book is people doing research related to financial structure or innovation. The book is, however, easily accessible to a broader audience. Anyone with a background knowledge of general equilibrium theory (i.e., an understanding of the first and second welfare theorems) and a passing knowledge of some basic maximization principles should find the book easy to follow. A more technical background is necessary only to digest the appendixes to some of the reprinted papers.

The strengths of the book lie in Chapter 4. That chapter incorpo-

rates a perspective which the authors have obtained after extensive writing in this field, and which cannot be found by reading the papers separately. For instance, the understanding of the role of the short-sales constraint is made clear throughout the chapter, as it relates to the different variations of the model considered. One aspect of Chapter 4 which is particularly helpful is that much of it is illustrated in the context of variations on a leading example. This helps the reader to synthesize the various papers and develop a better understanding of the interrelationships between the multitude of factors affecting risk sharing and financial innovation.

The weaknesses of the book lie in parts where the authors stray furthest from their theory. The historical description of financial innovations presented in Chapter 2 plays no clear role in motivating or developing the theory to which the book is devoted. Chapter 3 presents ideas from industrial organization and then concludes that these will have little to add to a theory of financial innovation: a conclusion which leaves one wondering why a chapter was devoted to this. Finally, the book is at times repetitive. For instance, Chapter 4 begins by offering evidence supporting the importance of understanding financial innovation, echoing the introduction and Chapter 2.

A somewhat unusual aspect of the book is the collecting of the authors previously published papers, which more than doubles the length of the book. Although this results in some overlap with the preceeding chapters, it should be helpful to those who desire more detail than the overview provides.

In the end, the strengths of the book win out. On the basis of Chapter 4 alone the book deserves high marks.

Franklin Allen and Douglas Gale's studies of risk sharing as a fundamental aspect of the process of financial innovation have made them leading contributors to the theory of financial innovation. This book collects those studies and ties them together as a unified approach. *Financial Innovation and Risk Sharing* provides a solid theoretical foundation for much of the work that remains to be done in this area and should be invaluable to anyone in the field.

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Winner of the 1995 RFS Award

The editors are pleased to announce that the prize for the best paper published in Volume 7 of *The Review of Financial Studies* has been awarded to

Charles M. Jones, Gautam Kaul, and Marc L. Lipson

for their article

Transactions, Volume and Volatility

A Note from the Editor

In accordance with the bylaws of the Society for Financial Studies, the following associate editors end their terms with Volume 8, Issue 4 of the *Review*: Deborah Lucas, Daniel Nelson, Maureen O'Hara, and Duane Seppi.

After serving one year to fill a vacancy, Kerry Back has been reelected for a full three-year term starting with Volume 9, Issue 1 of the *Review*. New Associate Editors are Yacine Ait-Sahalia, Ananth Madhavan, Mitchell Petersen, and Raghu Rajan. In addition, Tim Bollerslev and Jiang Wang have been reelected for a three-year term after serving one year to fill vacancies.

-F.A.