Volume Title: The Industrial Organization and Regulation of the Securities Industry

Volume Author/Editor: Andrew W. Lo, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-48847-0

Volume URL: http://www.nber.org/books/lo__96-1

Conference Date: January 19-22, 1994

Publication Date: January 1996

Chapter Title: Introduction to "The Industrial Organization and Regulation of the Securities Industry"

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Chapter URL: http://www.nber.org/chapters/c8099

Chapter pages in book: (p. 1 - 8)

Introduction

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On January 1, 1989, the Swedish government implemented a transactions tax on fixed-income securities and associated derivatives. In comparison to its equity counterparts, the fixed-income tax was rather small, reaching a maximum of only fifteen basis points of the notional amount traded. Nevertheless, during the first week of the tax, trading volume for bonds dropped by 85 percent, trading volume for futures on bonds and bills dropped by 98 percent, and trading in fixed-income derivatives all but disappeared (see Campbell and Froot 1994). This was accompanied by an *increase* in the variety and trading volume of nontaxable substitute securities, securities with almost identical risk/return profiles to their taxable counterparts, for example, Swedish debentures, variable-rate notes, forward-rate agreements, and swaps. On April 15, 1990, the tax was abolished, and trading volume quickly returned to pre-1989 levels.

The Swedish experience is only one of many recent examples that illustrate the flexibility and creativity with which financial systems adapt to changes in their operating environments, sometimes with unanticipated and unintended consequences. It also illustrates the complexities that face regulators in their attempts to correct market failures and improve social welfare. Regulating financial markets is not unlike managing an artificial ecology: in both cases, the goals are multifaceted and not always mutually consistent, the regulatory instruments are relatively few and blunt, and the agents react and adapt to changes in their environment in sophisticated ways that are not entirely understood or predictable. Moreover, the principles governing economic systems are considerably more fickle than those governing biological and physical systems.

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These challenges provided the motivation for the NBER's conference "The Industrial Organization and Regulation of the Securities Industry," held January 20–22, 1994, in Key Largo, Florida. A smaller preconference planning meeting was held in Cambridge on July 17, 1992, to solicit ideas for the scope and organization of the conference.

Although the study of regulation has become an important part of the industrial organization literature, and although it has played a tremendous role in determining the fate of the airlines, telecommunications, transportation, and public utilities industries, relatively little attention has been paid to the industrial organization and regulation of the securities industry.

Of course, this is not to say that financial market regulation is new—indeed, regulations covering financial transactions can be found in the recorded histories of even the most ancient civilizations. But the notion that economic principles can be successfully applied to the design and implementation of regulatory structures is a relatively modern one. And while economists have figured prominently in many regulatory debates—Ronald Coase, Alfred Kahn, and George Stigler, to name just a few—their domain has not yet broadened to include financial market regulation, which has been dominated historically by lawyers, legislators, lobbyists, and an occasional practitioner or two. It is only very recently, and most visibly at this NBER conference, that financial regulation has begun to be discussed and debated in the jargon of traditional regulation economics: market failure, monopoly power, price discrimination, externalities, barriers to entry, and so forth.

The series of breakthroughs in our understanding of financial market risks and returns that economists have achieved over the past thirty years, coupled with the recent explosion of financial innovation in the securities industry, suggests that the time is ripe for economists to turn their attention to the securities industry. Contributions by Merton (1993) and Ross (1989) and those in Lehn and Kamphuis (1993) may signal the start of such a trend.

To encourage and support this trend, the NBER held a preconference meeting to engage industrial organization economists, financial economists, and practitioners in a dialogue about the most pressing issues facing financial market participants and regulators today. This dialogue grew quickly in scope and depth, and this conference volume is the culmination of the many ideas and issues that surfaced at that initial meeting.

Like many other NBER conferences, this conference was organized around the ten papers selected for presentation, with two discussants assigned to each paper. However, there was one very important difference. Because of the novelty of the conference topic, and because there was an underlying intention to spark research collaboration among three well-developed but rather insular academic disciplines—industrial organization, finance, and law—the conference participants were carefully selected to represent all three disciplines, with additional representation from regulatory agencies and the securities industry. In addition to the usual complement of economists from academia, the audi-

ence and discussants included practicing lawyers and legal scholars of securities law, portfolio managers, brokers and market makers, stock exchange officials, several former and current commissioners of the Commodity Futures Trading Commission and the Securities and Exchange Commission, the chief economist of the SEC, and the supreme court justice of the state of Delaware. The papers and the discussants' comments contained in this volume will provide readers with only a small glimpse of the exhilarating and dynamic exchanges among speakers, discussants, and the audience.

In chapter 1, William Albrecht, Corinne Bronfman, and Harold Messenheimer develop a framework for analyzing the efficiency of various regulatory structures. They begin with the premise that there are three goals of efficient financial regulation: (1) customer protection; (2) financial system integrity; and (3) market price integrity. However, typical regulatory incentives are not always consistent with these goals; hence some changes in the structure of financial services regulation may improve efficiency. For example, they find that increasing competition among regulatory agencies of substitute markets increases efficiency, but increasing competition among regulatory agencies of complement markets decreases efficiency. They conclude that the construction of efficient regulatory structures must include a careful analysis of the incentives facing regulators and the degree of complementarity or substitutability of the products to be regulated.

In chapter 2, Kathleen Hagerty and Robert McDonald focus on market fragmentation, an issue of increasing importance as financial markets become more highly computerized and payment for order flow becomes more prevalent. Market fragmentation refers to the splintering of securities trading across many different markets and dealers, resulting in less liquidity than if the trading were centralized. Hagerty and McDonald propose a model of market fragmentation in which some investors have valuable private information and others do not, and the efficient economic response to this asymmetry of information is what we perceive as fragmentation. They show that fragmentation may be a reflection of increased price competition among dealers, and that a fragmented market may provide better prices for customers than a less fragmented monopolistic dealer market. While their model does not capture every aspect of the market fragmentation issue, it does provide an important insight: central markets and brokerage markets serve different needs for different investors; hence reducing fragmentation may not necessarily improve market efficiency.

To complement Hagerty and McDonald's theoretical analysis, in chapter 3 Thomas McInish and Robert Wood provide an empirical analysis of fragmentation in which they use bid-ask spreads and other price data to measure the potential costs of dispersing orders among multiple market centers. Using transaction data from 1991, they form five equity portfolios that are nearly identical in those attributes that should affect their spreads, premiums (the difference between the transactions prices and the midpoint of their correspond-

ing bid-ask spreads), and volatility, but as different as possible in the fragmentation of their orders. By comparing the properties of these portfolios, one can better observe the effects of fragmentation while controlling for economic factors that might otherwise confound the comparison. McInish and Wood find that bid-ask spreads and premiums are reduced by a decrease in fragmentation, while volatility seems unaffected. However, while the reduction in spreads is statistically significant, the range of the spread across the five portfolios is only 0.6 cent.

The impact of technology on financial markets is further underscored by Ian Domowitz's study on computer-automated equity trading systems in chapter 4. Trading systems such as Instinet, POSIT, and the Arizona Stock Exchange have stretched the limits of existing securities regulation, much of which was drafted before the personal computer and workstation revolution. Domowitz begins with a brief historical review of such trading systems and then turns his attention to how they are classified in the current regulatory environment, no small matter, since the classification of an automated trading system determines how it is to be regulated. The classification problem calls into question the very definition of a securities exchange, and Domowitz develops a more complete definition, distilled from legislative, legal, and SEC decisions, that identifies trade execution, price quotes, price discovery, and liquidity as key characteristics. While such a definition blurs the exchange/nonexchange distinction, it suggests that Merton's (1993) "functional" approach to designing securities regulation may be more effective than current practice.

Another example of the impact of technology on the securities industry is provided by Peter Reiss and Ingrid Werner's study of trading costs on the London Stock Exchange (LSE) in chapter 5. In 1986, the LSE switched from a closed, floor-based broker-dealer market to an open electronic quotation system called SEAQ. This system operates much like the National Association of Securities Dealers' Nasdaq dealer system: competing market makers post bid and ask prices and guaranteed trading volumes, but while SEAQ also displays trade information, brokers and dealers still negotiate trades by phone. The introduction of SEAQ coincided with the LSE's adoption of best execution rules and elimination of fixed commissions.

Reiss and Werner present a thorough empirical analysis of these liquidity-enhancing innovations of the LSE, using newly available 1991 SEAQ intraday quotation and transaction data. They develop a new measure of transaction costs that incorporates information on dealers' quotes and investors' transactions to capture the hypothetical cost of an immediate round-trip transaction. Using this measure, they find that medium and large trades often receive a discount off the best or "touch" bid-offer spread, whereas small and very large trades pay the touch or more. For wider touches, the discounts are larger. And finally, dealers and market makers treat customer trades differently: dealers tend to discount medium and large trades routinely, whereas market makers discount only very large trades. These patterns raise several interesting issues

for further study, particularly in the context of information- or inventory-based theories of marketing making in which discounts have not yet played a role.

In chapter 6, Robert Neal and David Reiffen present an empirical analysis of the potential impact of the vertical integration of broker-dealers with specialists on trading costs. Although changes in the degree of vertical integration within a firm are rare and often triggered by unobserved events, in 1986 the New York Stock Exchange and American Stock Exchange relaxed their rules concerning the relationship between brokerage firms and specialists. Neal and Reiffen take advantage of this structural change in exchange policy by examining data on combinations of broker-dealer and specialist units on the New York, American, and Philadelphia Stock Exchanges between 1987 and 1993. Common objections to this type of vertical integration center on the possibility of increased trading costs for investors, due to moral hazard (brokers directing order to their own specialists rather than searching for the best price), or because integration "forecloses" a share of the market otherwise open to competition. Neal and Reiffen find that neither of these theories is supported by post-integration transaction data. Average trade sizes decline on the integrated exchanges, and there is some evidence for a divergence of order flow, but there is little evidence of a statistically significant increase in trading costs subsequent to integration.

Defining the regulatory environment of the securities industry is a nontrivial endeavor because of the industry's global reach. Each sovereign nation has its own regulatory agencies, with unique charters, incentives, and organizational structures, and these agencies must often operate across geopolitical boundaries. In chapter 7, Lawrence White addresses these issues by asking whether regulatory regimes should be harmonized internationally or be allowed to compete—harmonization can create a "level playing field," but competition may enhance the efficiency of capital flows. Using the concepts of market failure (externalities, market power, asymmetric information, etc.) and government failure (rent-seeking behavior, rent-creating capture, weak incentives, etc.), White argues that competition should be a "default": in the absence of substantial market and government failures, competition among regulatory regimes will lead to more efficient outcomes. But when market and government failures do exist, harmonization can be critical to correcting these failures.

Another important factor that governs and sometimes restricts the coordination of regulatory regimes across countries is the indigenous institutional environment of each country, which often changes slowly through time. Kenneth Singleton's study in chapter 8 highlights this factor by comparing the behavior of cash and futures prices for government bonds in Germany, Japan, and the United States. These three countries are at different stages of the financial liberalization process, and have different market structures, market-making costs, and liquidity. Singleton uses the joint distribution of cash and futures prices as a yardstick to measure the differences across these three countries. Using daily and weekly bond data from October 1, 1991, to November 30, 1993, he finds

that the institutional settings in Germany and Japan, which contain considerably more frictions, are reflected in fatter-tailed distributions and, in the case of Japan, higher serial correlation for changes in bond yields. The presence of frictions in the cash market also imply a much more important price discovery role for the more liquid futures market, with Japan providing the extreme example where cash prices are priced almost exactly off the futures price. These patterns underscore the important link between the institutional environment in which price discovery occurs and the time-series properties of fixed-income yields.

The fact that institutional differences can be very significant indeed is also highlighted by Bruce Lehmann and David Modest's detailed analysis of liquidity on the Tokyo Stock Exchange (TSE) in chapter 9. Contrary to most organized equity exchanges in which designated market makers provide liquidity continuously, the TSE has a public limit order book in which incoming orders are matched according to strict priority rules based on price, time, and size. Therefore, it is the investor public that absorbs temporary imbalances between supply and demand, not designated market makers. When order imbalances are too large in either direction, the TSE provides warning and special quote (*chui* and *tokubetsu kehai*) mechanisms to flag such imbalances and to halt trading to attract orders to correct the imbalance. Using TSE transactions data from January 1, 1991, to November 30, 1991, and February 1, 1992, to April 30, 1993—yielding a staggering 25,863,726 transactions—Lehmann and Modest conclude that trading halts are seldom triggered by investors, and when they are, the investors usually execute all or part of their order at the warning quote, a price known in advance. Moreover, trading volume is similar when orders do and do not result in trading halts. Although it is tempting to infer from this that designated market makers may not provide as much liquidity as we thought, Lehmann and Modest are quick to point out that it is impossible to distinguish between the success of the TSE market mechanisms and investors who have learned to put up with their idiosyncrasies.

In chapter 10, Stephen Pruitt and Maurice Tse revisit the controversial debate concerning the effects of changes in Federal Reserve margin requirements on stock prices, volatility, and liquidity. Recent studies have focused on the behavior of the S&P Composite index in response to changes in margin levels, but since all securities in this index were listed on either the New York or American Stock Exchange over the 1937 to 1974 interval, they all faced the same margin constraints at all times. In particular, the extent to which changes in margin levels affect marginable stocks relative to their nonmarginable counterparts—a statement about cross-sectional differences—cannot be answered by comparing the performance of the same market index over different intervals of calendar time—a statement about time-series differences.

To perform the cross-sectional comparison, Pruitt and Tse exploit a 1969 amendment to the Securities Exchange Act of 1934, which allows securities dealers and brokers to extend margin credit on certain unlisted (OTC) equity

securities. They collect daily price data for twenty marginable OTC securities, and for twenty matching nonmarginable OTC securities during each of the four post-1969 amendment margin changes (matched by industry, market capitalization, and debt/equity ratio), yielding 160 firms in their sample. By comparing the properties of portfolios of marginable and nonmarginable securities before and after margin changes, Pruitt and Tse conclude that prices, volatility, and liquidity are generally unaffected by margin changes, and any reactions to such changes are due to information effects only, and not to changes in investors' margin-imposed binding constraints.

As with most successful conferences, this conference concluded with many more new questions than new answers. The unprecedented breadth of interest in the issues surrounding the industrial organization and regulation of the securities industry, from such a diverse group of participants, may foreshadow the beginnings of a new discipline that, while truly interdisciplinary by its nature, has as its main focus the application of economic principles to policy issues in the securities industry. It has been my privilege to witness what may have been the birth of such a discipline at this NBER conference, and I hope this volume will encourage others to participate in this most exciting new venture.

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