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FINANCIAL MARKETS

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FINANCIAL MARKETS RESEARCH CENTER • 1995

Conference on

Financial Markets' Reform

This year's Financial Markets Research Center conference, the "academic version of Wrestlemania," according to the local newspaper, produced sometimes heated discussion of the Nasdaq Stock Market. The degree of competition among dealers in the Nasdaq market came under attack from Bill Christie of Vanderbilt University and Paul Schultz of Ohio State University in their two papers published in the December 1994 issue of the *Journal of Finance.* The conference, held April 6 and 7 at Vanderbilt, provided the first occasion at which consultants to the Nasdaq Stock Market and to the Nasdaq dealers defending lawsuits alleging collusion and price fixing presented a defense of the Nasdaq Stock Market and a rebuttal to Christie and Schultz.

The conference, however, focused not only on the Nasdaq Stock Market but also on derivatives and risk management. It proved to be one of the few occasions in which the discussion of derivatives was the least controversial topic of the day! In the end, the conference met its basic objective - to discuss current issues facing the financial markets and the academic evidence bearing on those issues.

Ricki Tigert Helfer, chairman of the Federal Deposit Insurance Corporation, kicked off the conference with a speech on "Bank Supervision in a New World of Risk." Chairman Helfer noted that bank examiners are devoting increased attention to the many forms of risk - market risk, counterparty risk, operational risk, legal risk, settlement risk, and systemic risk - that have been associated with the greater use of over-the-counter derivatives. According to Chairman Helfer, the FDIC is reviewing its supervisory approach, its contingency planning, and the information required to fulfill its principal task of protecting the deposit insurance fund.

After the morning coffee break, **Robert Davis**, director of economics and research at America's Community Bankers, chaired a two-part session on derivatives. In part one, **Dennis Klejna**, director of enforcement at the Commodity Futures Trading Commission, spoke on sales practices. He reviewed the CFTC's December 1994 settlement with Bankers Trust arising out of the Gibson Greeting Cards case. In that settlement, Bankers Trust was found to be a commodity trading advisor by virtue of giving advice on OTC futures-like derivative contracts and,

FDIC Chairman, Ricki Helfer with Dewey Daane and Hans Stoll

therefore, subject to CFTC anti-fraud provisions. At the same time, a settlement with the SEC found that two OTC derivatives contracts sold to Gibson were "securities," which made Bankers Trust subject to SEC anti-fraud provisions. Klejna commented on the jurisdictional issues and noted that the CFTC did not claim that Bankers Trust was trading in futures, over which the CFTC has exclusive jurisdiction. He further noted that the CFTC has exemptive authority that allows futures to exist outside of CFTC jurisdiction.

In a commentary on regulation of sales practices, **Henry Hu**, professor of law at the University of Texas, noted some of the costs of increased sales practice regulation. These costs include adverse

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FROM THE DIRECTOR

The Financial Markets Research Center, founded eight years ago, continues its objective to stimulate and support research in financial markets, financial institutions, and financial instruments. With funding from its members and from grants, the Center maintains a research program on a variety of subjects detailed later in this newsletter. Through conferences and seminars, it also brings together academics, practitioners, and regulators to stimulate clear thinking on issues facing the financial markets.

This year's conference on Financial Markets' Reform, held on April 7th and 8th and described in greater detail elsewhere in this newsletter, attracted an unusual level of media attention because of its coverage of the Nasdaq Stock Market controversy. Financial economists are used to working in relative obscurity, and they expect their mutterings to have an influence only after they are long defunct. Not so. Recent papers by Center faculty associate Bill Christie and Paul Schultz of Ohio State University stirred up a substantial debate on the workings of the Nasdaq Stock Market. The latest chapter in that debate took place at the conference, as consultants to the Nasdaq Stock Market and to 33 Nasdaq dealers presented a response to the Christie/Schultz findings. The conference also dealt with recent derivatives issues, including the Barings collapse, but, probably for the first time, the derivatives issue was overshadowed by another matter.

Center faculty continue their research in derivatives, in stock market microstructure, and in other areas of finance and related fields. Current projects include an investigation of unit root problems in the estimation of interest rate processes that underlie many derivatives contracts, lead/lag relations in the returns of different stocks, a general approach to modeling the components of the bid-ask spread, the cost of executing trades on the New York Stock Exchange, the sources of violations of purchasing power parity, regulatory risk-based capital requirements, and other topics.

Recent additions to Center faculty include Luke Froeb, who teaches economics and does research in industrial organization and econometrics, and Debra Jeter, who teaches accounting and does research in financial accounting. The work of the Center continues to be ably supported by Pat Scott, administrative assistant, and Ziyong Cai, research associate, who is responsible for maintaining the Center's data sets and overseeing computer programming support. Hao Zhang, who has been working as a research associate at the Center and has received a Master's Degree in Economics and an MBA degree from the Owen School, recently resigned to join his wife in the Chicago area. We wish him well and thank him for his contributions to the work of the Center. ■

Daane Invitational Tennis Tournament

Perfect weather and a record turnout heightened the sense of excitement at the Dewey Daane Invitational Tennis Tournament. Tournament doubles partners were selected according to random number drawings. The winners of the contents of the Daane Cup, Jim Cheek (first place) and George Yowell (second place), raised the level of tennis at this tournament to a new height. Daane asked for an investigation of how the random numbers were assigned.

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GOALS

The Financial Markets Research Center at Vanderbilt University fosters scholarly research in financial markets, financial instruments, and financial institutions.

FUNDING

The Center is funded by its members and by outside research grants. Funds are used to maintain financial markets data bases and to support the Center's research projects. Members sit on the advisory board, participate in all activities of the Center, receive research reports, and give advice on the activities and research direction of the Center. Research grants for specific projects are sought from various research sponsors including foundations, government agencies, trade organizations, and corporations.

Current Center members are:

- America's Community Bankers
- Bankers Trust Company
- The Chicago Board Options Exchange
- The Chicago Mercantile Exchange
- Hull Trading Company
- J. C. Bradford & Company
- The New York Stock Exchange, Inc.
- Refco Group, Ltd.
- Timber Hill Incorporated
- Tudor Investment Corporation
- Van Hedge Fund Advisors, Inc.

Financial Markets' Reform *(continued)*

incentive effects on the buyers of derivative contracts and an increased number of suits from dissatisfied buyers of derivative contracts. Hu wondered whether it would be possible in the future to buy the product - an OTC derivative - without at the same time buying advice, or whether the Bankers Trust settlement forces the product and the advice to be linked.

In part two of the derivatives session, **Pat Parkinson**, associate director of the Division of Research and Statistics at the Federal Reserve Board, spoke on some of the regulatory issues raised by the collapse of Barings. While there was, in fact, no local or global systemic risk problem because the collapse was quickly isolated, Parkinson did wonder what the effect of a failure of the Singapore International Monetary Exchange (SIMEX) might have been. He noted a variety of concerns with respect to each of the institutions involved in the Barings failure. First, Barings violated its own lending limit of 25 percent of capital by financing Nicholas Leeson, the Singapore trader responsible for the collapse. The SIMEX let its own position limits be violated and failed to analyze the components of an omnibus clearing account, which hid the activity of Leeson. The Osaka Exchange does not require segregation of customer funds from proprietary funds, which slowed the transfer of customer funds from Barings to viable firms. **Todd Petzel**, executive vice president of the Chicago Mercantile Exchange, noted that the SIMEX had never been involved in a failure of a major clearing firm and consequently was slow to respond. Of particular concern to U.S. firms was the slowness with which customer funds were transferred from Barings to other viable clearing members. The Barings failure has caused a number of studies to be initiated: the Bank of England study is due at the end of May. In the United States, the Futures Industry Association is conducting a study focusing on the operation of clearing houses and the protection of customer funds. The Simex has formed a panel to review its operations.

Todd Petzel discussing the Barings collapse.

Fortified with lunch, conference participants returned to do battle on the Nasdaq market. **Gregg Jarrell**, professor of finance at the University of Rochester, chaired the afternoon's first session on "How Competitive Is the Stock Market?" **Bill Christie** presented the key results of his paper with Paul Schultz, "Why do Nasdaq market makers avoid odd-eighth quotes?" He stressed the fact that many (but not all) Nasdaq stocks are quoted virtually exclusively in even eighths, which implies a spread of at least one quarter dollar. Christie and Schultz find it surprising that not one of many market makers (over 50 in active stocks) finds it desirable to quote at an odd eighth inside the prevailing even eighth quote. Christie and Schultz sought but could not find an economic rationale for the exclusive use of even eighths. While they provide no direct evidence that spreads are too high in even eighths stocks on the Nasdaq Stock Market, Christie and Schultz argue that economic factors that have explained spreads in other studies do not explain differences in the use of odd eighths and even eighths. Consequently, they argue that the use of even eighths is not a function of costs and other economic factors that explain differences in spreads. Christie and Schultz conclude that "tacit collusion" is the most likely source of the even eights phenomenon.

Blair Hull, managing partner of Hull Trading Company, an automated options and equities trading firm, commented on the Christie/Schultz findings. Citing some of his firm's experiences in the Nasdaq market, Hull concluded that there is collusion in the Nasdaq market that is consistent with the findings reported by Christie and Schultz. In fact, he noted that there tends to be collusion on most trading floors. To offset the natural tendency of businessmen to collude, Hull made a case for price improvement procedures and the exposure of limit orders. In particular, he argued for a greater use of "intelligent automated quote updating," something that is now not permitted under Nasdaq rules. **Stephen Wells**, chief economist at the London Stock Exchange, provided a second commentary on the Christie/Schultz results. He argued that spreads are a somewhat arbitrary number and a defense mechanism that allows the market maker to do his job. The spread is the starting point for negotiation, and many trades take place within the spread. He concluded that the Christie/Schultz phenomenon was not evidence of collusion but only evidence of inefficiency, and he noted that the London Stock Exchange, like Nasdaq, has struggled with ways to maintain the quality of quotes. In London, market makers that are first to improve the price are given some priorities on the screen. Second, London market makers must maintain their best quotes on the Seaq System and are not allowed to offer better quotes on some other public system.

Bill Christie and Paul Schultz, an even pair

After a break for coffee, the last session of the day, chaired by **Duke Chapman**, chairman of the Chicago Board Options Exchange, focused on several responses to Christie and Schultz. **Merton H. Miller**, professor of finance at the Graduate School of Business of the University of Chicago, Nobel laureate, intellectual father of modern finance, graduate school teacher of Christie and Schultz, and consultant to Nasdaq, criticized Christie and Schultz for jumping to the collusion conclusion. He argued that a market accepted as noncollusive - the

Duke Chapman recognizing a questioner.

Merton H. Miller discussing the frequency of even eighths.

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Financial Markets' Reform *(continued)*

interbank currency market - also quotes much more frequently in evens than in odds. Miller argued that spreads are wide for a number of economic reasons, including the problem of dealing with informed traders. Institutions negotiate transactions inside the spread and small investors also pay less than the spread because their brokers are paid for order flow. **Dean Furbush**, senior economist at Economists Incorporated and a consultant to Nasdaq, focused on industrial organization issues and measures of concentration. He noted that, by accepted measures of concentration, the market for the provision of trading services in Nasdaq stocks is highly competitive with no barriers to entry.

In the final presentations of the day, **Robert Willig**, professor of economics and public affairs at Princeton University, and **Allan Kleidon**, consulting professor in the School of Law at Stanford University and vice president of Cornerstone Research, presented their paper, "Why do Christie and Schultz infer collusion from their data?" Kleidon and Willig are consultants to the some 33 Nasdaq dealers that have been sued on the basis of the Christie/Schultz paper. Kleidon and Willig argue that the conclusion that spreads are wide because they are quoted in even eighths has the causality wrong. Instead, even eighths are used when spreads are wide. They argue that there are good economic reasons for wide spreads in the Nasdaq market. Kleidon and Willig also contest the Christie/Schultz conclusion that differences in the use of odd eighths cannot be explained by economic factors and must, therefore, be due to tacit collusion.

By the end of the afternoon, little opportunity remained for a balanced discussion, unfettered by consulting contracts and legal disputes. Such a discussion might have reached a common conclusion that the Nasdaq market is less efficient and less competitive than it might be. The dealer system, as it has developed in the Nasdaq market and in the London market, seems to provide insufficient incentive to improve quotes. The evidence produced by Christie and Schultz and their critics does not establish how much of the even eighths phenomenon is due to collusion, to an inefficient system, or to real economic factors.

Thursday ended on a lighter note with a cruise and dinner show on the General Jackson Riverboat. The highlight of the conference was the appearance of one of our group on stage with the ventriloquist and the dummy.

The Friday morning session focused on recent academic research in the two areas discussed on the prior day: dealer markets and derivatives risk. The first morning session on the Structure of Dealer Markets was chaired by **Hans Stoll**, professor of finance at Vanderbilt University and director of the Financial Markets Research Center. **Chris Lamoureux** of the University of Arizona presented the paper, "When it's not the only game in town: the effect of bilateral search on the quality of a dealer market," (with Charles Schnitzlein) that describes an experimental dealer market. They show that dealer market spreads decline substantially when bilateral search opportunities are added to that market. After a lively discussion of the Lamoureux presentation, some of the attendees at the conference gave a brief description of their work in dealer markets. **Geoffrey Booth** of Louisiana State University described a paper, "Market structure and bid-ask spreads: Nasdaq vs. the German Stock Market," (written with P. Iversen, S. Sarkar, H. Schmidt, and A. Young) in which they compare spreads in Germany to spreads on the Nasdaq market. They find that spreads are lower on the floor of the Frankfurt Stock Exchange and on the IBIS system than on Nasdaq. **Sunil Wahal**, assistant professor at Purdue University, reported on the preliminary results of his paper, "Entry, exit, market makers and the bid-ask spread," which analyzes the behavior of spreads before and after the entry of dealers in the Nasdaq market. **Paul Laux** reported on his forthcoming paper, "Trading costs and the trading systems for Nasdaq stocks," (with M. Kothare). They find that Nasdaq spreads have risen dramatically in the period 1988 to 1991, and they ascribe this to the increase in institutional trading.

The last session of the conference, chaired by **Jim Shapiro** of the New York Stock Exchange, focused on the issue of risk and capital. **Kobi Boudoukh** of New York University gave a detailed overview of the portfolio approach to the risk management of large banks and other financial institu-

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Finance Student Activities

Elizabeth Burton and Sherry Hawkins presenting the Owen Finance Association's Financial Executive of the Year award to Ronald Terry.

Owen School Finance Association

The goal of the Finance Association is to enhance Owen students' knowledge of current topics in finance as well as provide a link to the financial community. During the year the Association hosted several speakers on finance topics, and, as has become customary, the year was capped off with the presentation of the Owen Finance Association's Executive of the Year award. This year Ronald Terry, Chairman of First Tennessee National Corporation and First Tennessee Bank National Association, was selected as the award recipient. ■

Max Adler Student Investment Fund

The primary purpose of the Max Adler Student Investment Club is the active management of the fund created by the generous gift of Mrs. Mimi Adler in memory of her late husband, the founder of Spencer Gifts. Students gain practical experience in selecting investments and in actively managing a portfolio. This practical experience is supplemented by club sponsored investment contests and speakers from the investment community who discuss current topics and trends in the industry. ■

Guest Speakers

An important aspect of the education of MBA students and the faculty at the Owen School is the opportunity to listen to and question senior executives from financial industries. Outside speakers are sponsored directly by the Financial Markets Research Center, the Owen Lecture Series, or the Finance Association, or are invited as an integral part of courses such as Monetary and Fiscal Policy and Financial Institutions. Guest speakers during the 1994-95 academic year were:

J. Alfred Broaddus, Jr., president, *Federal Reserve Bank of Richmond*
Kathleen B. Cooper, chief economist, *Exxon Corporation*
Linnet Deily, chairman, president, and CEO, *First Interstate Bank of Texas*
Robert P. Forrestal, president, *Federal Reserve Bank of Atlanta*
Ricki Tigert Helfer, chairman, *Federal Deposit Insurance Corporation*
William Hoagland, staff director, *Senate Budget Committee*
Thomas M. Hoenig, president, *Federal Reserve Bank of Kansas City*
David M. Jones, executive vice president and chief economist, *Aubrey G. Lanston & Co.*
Edward W. Kelley, Jr., member, *Board of Governors of the Federal Reserve System*
Donald L. Kohn, director, Monetary Affairs, *Board of Governors of the Federal Reserve System*
Eugene A. Leonard, president, *Corporation for Financial Risk Management*, St. Louis
David A. Lereah, chief economist and staff vice president, *Mortgage Bankers Association of America*
Scott E. Pardee, chairman, *Yamaichi International (America) Inc.*
Rudolph G. Penner, director of economic studies, *KPMG Peat Marwick*
Helmut Schlesinger, president, *Deutsche Bundesbank* (retired) and J.F. Dulles Visiting Professor, School of Public and International Affairs, *Princeton University*
Ronald Terry, chairman of the board, *First Tennessee National Corporation* and *First Tennessee Bank National Association*
George P. Van, chairman, *Van Hedge Fund Advisors, Inc.* ■

Research Workshops

Workshops conducted at the Owen School throughout the year provide a forum for the exchange and testing of new ideas in areas of current research. During 1994-95 the following researchers presented work on finance topics:

Seema Arora, *Owen School*: "Voluntary Environmental Regulation: A Case Study of Participation in the EPA 33/50 Program"
Kerry Back, *Washington University*: "Long-Lived Information, Price Pressure, and Volatility"
Timothy N. Cason, *University of Southern California*: "An Experimental Investigation of the Seller Incentives in EPA's Emission Trading Auction"
Paul K. Chaney, *Owen School*: "The Use of Accruals in Income Smoothing" and "Client-Auditor Realignments and Accounting Board Solicitation Rules"
Myeong-Hyeon Cho, *Owen School*: "Ownership Structure, Investment and Performance"
Tarun Chordia, *Owen School*: "Imperfect Competition, Diffusion of Information into Security Prices, and the Adverse Selection Costs of Trading: Some Empirical Evidence"
William G. Christie, *Owen School*: "Why Did Nasdaq Market Makers Suddenly Begin Using Odd-Eighth Quotes?"
Jennifer Conrad, *University of North Carolina*: "An Anatomy of Trading Strategies"
Patricia Dechow, *Wharton School*: "Causes and Consequences of Aggressive Financial Reporting Policies"
Luke M. Froeb, *Owen School*: "An Innovation Variance Ratio Test: Tick Size and the Information Content of Price Changes"
Mark Grinblatt, *UCLA*: "Financial Innovation and the Role of Derivative Securities: An Empirical Analysis of the Treasury Strips Program"
Chris Hogan, *Owen School*: "The Market for Audit Services: When Firms Go Public"
Roger D. Huang/Ronald W. Masulis, *Owen School*: "Spreads, Dealer Competition, and Market Regimes: A Market Microstructure Analysis of FX Trading"
Craig M. Lewis, *Owen School*: "An Empirical Analysis of Convertible Debt Financing by NYSE/AMEX and NASDAQ Firms" and "The Information Content of Value Line Convertible Bond Rankings"
Thomas Noe, *Georgia State*: "Debtor-in-Possession Financing and the Resolution of Uncertainty in Chapter 11 Reorganizations"
David C. Parsley, *Owen School*: "Purchasing Power Disparity During the Floating Rate Period: Exchange Rate Volatility, Trade Barriers and Other Culprits"
Rick Simpson, *Vanderbilt*: "Order Placement Strategy in a Continuous Auction Market"
Jeremy Stein, *MIT*: "The Impact of Monetary Policy on Bank Balance Sheets"
Jiang Wang, *MIT*: "Differential Information and Dynamic Behavior of Stock Trading Volume" ■

Financial Markets' Reform *(continued)*

tions. He discussed various approaches to estimating the underlying volatility of different sources of risk and of estimating the covariances across sources of risk. Boudoukh focused on J.P. Morgan's riskmetrics system but noted that other institutions were using similar systems. **Paul Kupiec**, senior economist at the Federal Reserve Board, spoke on the problem facing regulators in establishing risk-based capital requirements. He noted that regulators divide the bank into two parts - a traditional part in which assets are not marked to market and the trading side of the bank in which assets are marked to market. Three approaches have been proposed for setting risk-based capital for the trading side of the bank. The April 1993 Basle proposal recommended capital requirements for individual asset categories without regard to portfolio considerations. A more recent approach, espoused by the Federal Reserve Board and recently endorsed by the BIS, allows banks to use their internal models (such as riskmetrics) in establishing regulatory capital. A third approach presented by Kupiec asks banks to precommit to a certain level of capital based on their anticipated losses and enforces that commitment with heavy penalties if capital proves to be inadequate. ■

Current Activities of Center Faculty

Clifford A. Ball, associate professor (finance and statistics). M.Sc., Ph.D., mathematics (New Mexico, 1980).

Conducts research in options, bond, and futures pricing and statistical applications to finance. Current research topics: pricing interest-rate contingent claims; the European Monetary System; statistical estimation of diffusion processes employed in financial modeling. Prior to joining the Owen School in 1990, Ball was a faculty member at the University of Michigan Business School and the London Business School. He also has served as a consultant with the investment firm of Shearson, Lehman & Hutton. Ball teaches finance and statistics and was a finalist for the James A. Webb award for excellence in teaching.

Last summer Ball presented seminars on stochastic volatility at Goldman Sachs. In March 1995, he participated in the High Frequency Data in Finance Conference held in Zurich, Switzerland, and in May he took part in the Chicago Board of Trade conference in Chicago. Ball's paper, "Stochastic Volatility Option Pricing," (with Antonio Roma) appeared in the December 1994 edition of the *Journal of Financial and Quantitative Analysis.* He also serves as a referee for numerous research journals.

Paul K. Chaney, associate professor (accounting). M.B.A., Ph.D. (Indiana, 1983), C.P.A., C.M.A.

Conducts research on the economic consequences and capital-market effects of accounting information. Chaney recently had two papers accepted for publication. "Direct Solicitation and Large Audit Firm Dominance in the Audit Market" (with Debra Jeter and Pam Shaw) appeared in *Auditing: A Journal of Practice and Theory,* and "Accounting Earnings Management and Signalling" is forthcoming in the *Journal of Corporate Finance.* He presented his paper, "A Cost Analysis of Workforce Policies," at the 1995 Southeast American Accounting Association meetings.

Myeong-Hyeon Cho, assistant professor (economics and strategy). M.B.A. (ESSEC, 1989), M.A., Ph.D. (Cornell, 1992, 1994).

Fields of interest include business strategy, industrial organization, and corporate finance with special emphasis on multinational firms' competitive strategies and their implications for the value of the firm. His current research focuses on issues in corporate restructuring.

Cho teaches courses in the economics of organizations, strategy, and global strategic management.

Tarun Chordia, assistant professor (finance). M.B.A. (Tulane, 1987), Ph.D. (UCLA, 1993).

Research interests include financial institutions, corporate finance, and market microstructure. Chordia teaches investments and financial institutions classes. Prior to his doctoral studies, he worked for Citibank, Bombay as a relationship and credit manager in the Financial Institutions Group.

Chordia's paper, "Market Making, the Tick Size and Payment-for-Order-Flow: Theory and Evidence," (with Avanidhar Subrahmanyam) has been accepted for publication in the *Journal of Business.* He presented his paper, "Speed of Adjustment and Cross-Correlation in Stock Returns," (with Bhaskaran Swaminathan) at the Winter Finance Conference and at the South Western Finance Association and Eastern Finance Association meetings. He helped organize a session on Bid-Ask Spreads and was invited to be a session chair at the Financial Management Association meetings

William G. Christie, assistant professor (finance). M.B.A., Ph.D. (Chicago, 1980, 1989).

Conducts research in corporate finance and the structure of trading costs for equity traded in different market structures. His current research interests include the provision of liquidity during unusual price movements and the importance of economic versus regulatory factors in determining bid-ask spreads.

He recently had five papers appear in print. "Are Dividend Omissions Truly the Cruelest Cut of All?" appeared in the *Journal of Financial and Quantitative Analysis,* "Why Do Nasdaq Market Makers Avoid Odd-Eighth Quotes?" (with Paul H. Schultz), "Why Did Nasdaq Market Makers Stop Avoiding Odd-Eighth Quotes?" (with Jeffrey Harris and Paul H. Schultz), and "Free Cash Flow, Shareholder Value, and the Undistributed Profits Tax of 1936-37" (with Vikram Nanda) were published in the *Journal of Finance,* and "Market Structure and the Intraday Pattern of Bid-Ask Spreads for Nasdaq Securities" (with K. C. Chan and Paul H. Schultz) appeared in the *Journal of Business.* He also serves as a referee for a number of academic finance journals.

During the past year, Christie has presented his research at The Pennsylvania State University, Southern Methodist University, and the University of Texas at Austin. He has appeared on CNBC, CNN,

Wall Street Journal Television, NPR, and been cited in numerous national and international business publications concerning his work with Paul Schultz on the competitiveness of the Nasdaq market.

Christie teaches the core and advanced corporate finance classes in the regular M.B.A. program, and the core finance class in the Executive M.B.A. program. He received the James A. Webb, Jr. Award for Excellence in Teaching in 1994 and 1995, and the Executive M.B.A. Outstanding Professor Award in 1993 and 1994.

MARK A. COHEN, associate professor (economics). M.A., Ph.D. (Carnegie-Mellon, 1985).

Conducts research on government regulation, law and economics, white-collar and corporate crime, and environmental management. Before joining the faculty at the Owen School, Cohen was senior economist with the U.S. Sentencing Commission and earlier worked for the Federal Trade Commission, the U.S. Environmental Protection Agency, the U.S. Department of the Treasury, and the U.S. Senate Banking Committee. Cohen's writing has appeared in such publications as the *Journal of Law and Economics* and the *Yale Journal on Regulation.*

Cohen recently presented his paper, "Why Do Corporations Become Criminals?" (with Cindy Alexander) at Emory University, Louisiana State University, and the Rand Corporation. He also presented "Financial and Environmental Performance: Are They Related?" (with Scott Fenn and Jonathan Naimon of the Investor Responsibility Research Center) at the University of Illinois, and "Current and Future Trends in Federal Prosecution of Environmental Crimes," at the American Society of Criminology annual meetings in Miami, Florida. In March 1995, he gave a talk to the Chattanooga Area Chamber of Commerce on the "Greening of Corporate America."

In October, Cohen visited Oslo, Norway as a scholar in residence at the Centre for Advanced Studies, Norwegian Academy of Sciences. He presented two papers: "Optimal theory and Empirical Trends in Corporate Criminal Sanctions" at the University of Oslo Law School; and "Why do Corporations Become Criminals?" at the University of Oslo Department of Economics.

J. DEWEY DAANE, The Frank K. Houston Professor of Finance, Emeritus; senior advisor, Financial Markets Research Center. M.P.A., D.P.A. (Harvard, 1949).

Conducts research on monetary economics and international finance. Daane is a former member of the Board of Governors of the Federal Reserve System and is currently a public director and member of the Finance Committee and Special Committee on Disclosure of the National Futures Association. He is also a former public director of the Chicago Board of Trade and served for many years as chairman of the Money Market Committee and vice-chairman of the Trust Board of the Sovran Bank/Central South in Nashville.

In January, Daane participated as a discussant on the program of the North American Economics and Finance Association, "50 Year Anniversary of Bretton Woods," in Washington, DC. He attended NFA board and committee meetings in Chicago and New York in February and March, and in April he chaired a session of the Financial Markets Research Center conference held at Vanderbilt. During the spring semester, Daane hosted speakers for his Seminar on Monetary and Fiscal Policy.

He is currently engaged in writing a history of Equitable Securities Corporation, Nashville, Tennessee.

LUKE M. FROEB, associate professor (economics). Ph.D. (Wisconsin, 1983).

During the past year, Professor Froeb continued his research into computer aided merger simulation and presented papers on the topic at the American Economic Association meetings, the University of Virginia, the Federal Trade Commission, and the Western Economic Association meetings. He is pushing his simulation software to the enforcement agencies as an alternative to traditional structural analysis based on market shares. Although he hasn't yet convinced the FTC, the U.S. Department of Justice used it in a recent merger investigation.

This year Froeb, along with Craig Lewis, was the recipient of a grant to develop on-line teaching materials, and Froeb is putting a user friendly interface on the merger simulation software to make it accessible to the antitrust community at large. He is developing computer aided simulations on a variety of topics, like bidding and pricing, for his microeconomics class. He also came out with a new version of his "Click&Learn Regression" software which was featured in a live demonstration at the Western Economics Association meetings in July.

Froeb also continues his work analyzing the spectral properties of asset prices. He presented a paper at the Western Economic Association Meetings, "Tick size and the Information Content of Asset Prices," (with Tarun Chordia).

After Professor Froeb's on-line web site Antitrust Policy (http://www.vanderbilt.edu/Owen/froeb/antitrust/antitrust.html) was featured in Fortune Magazine (June 12, p. 32), the number of "hits" to the site increased from 300 to over 1000 a day. He used the on-line site in his spring regulation class and has recently added an interactive discussion area. With the flurry of recent antitrust activity (the alleged Nasdaq conspiracy and Microsoft's continuing problems with the Justice Department), the site's popularity continues to grow.

CHRIS E. HOGAN, assistant professor (accounting). M.B.A. (Ohio University, 1990), Ph.D. (The Ohio State University, 1994), C.P.A.

Prior to her graduate studies,

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Hogan worked as an auditor for Price Waterhouse in Columbus, Ohio and then in Chicago. Hogan's research interests include topics in auditing and financial accounting. Her current studies focus on auditor choice in initial public stock offerings and the affect that auditors have on the pricing of the offering.

Hogan presented a paper titled "The Market for Audit Services When Firms Go Public" at the Eleventh Symposium on Auditing Research held in September, 1994 at the University of Illinois.

ROGER D. HUANG, professor (finance). M.A., Ph.D. (Pennsylvania, 1980).

Conducts research on financial markets and international finance. Current research focuses on price behavior in financial markets. Huang is studying the costs of executing trades under alternative market structures, dealer competition in foreign exchange markets, the relation between oil and financial markets, the impact of open market operations on the financial markets, and most recently the pricing of American Depository Receipts.

During the past year, three of his papers were published. "Market Structures and Liquidity: A Transactions Data Study of Exchange Listings" (with William G. Christie) was published in the *Journal of Financial Intermediation,* "Market Microstructure and Stock Return Predictions" (with Hans R. Stoll) was published in the *Review of Financial Studies,* and "The Changing Functional Relation Between Stock Returns and Dividend Yields" (with (William G. Christie) was published in the *Journal of Empirical Finance.* His paper, "Data Frequency and the Number of Factors in Stock Returns," (with Hoje Jo) is forthcoming in the *Journal of Banking* and Finance, and his paper, "Following the Pied Piper: Do Individual Returns Herd Around the Market?" (with William G. Christie) is scheduled for publication in the *Financial Analysts Journal.*

Huang discussed a paper at the American Finance Association meetings in Washington, DC in January. In March, he presented his paper (with Ronald Masulis), "Spreads, Dealer Competition, and Market Regimes: A Market Microstructure Analysis of FX Trading," at the First International Conference on High Frequency Data in Finance in Zurich, Switzerland.

Huang is a past winner of best teacher awards voted by the Executive MBA program and the regular MBA program.

DEBRA C. JETER D., assistant professor (accounting). M.B.A. (Murray State, 1981), Ph.D. (Vanderbilt, 1990).

Conducts research on financial accounting and auditing, with specific interest in earnings response coefficients, components of earnings, modern manufacturing, and audit opinions.

Jeter has published two articles in spring journals, both of which deal with the effects of direct united solicitation on the market for audit services: "Direct Solicitation and Large Audit Firm Dominance in the Audit Market" (with Paul K. Chaney and Pamela Erikson Shaw) in *Auditing: A Journal of Practice and Theory;* and "Solicitation and Auditor Reporting Decisions" (with Shaw) in the *Accounting Review.* Jeter presented the first paper at the Southeast American Accounting Association Conference on April 9.

CRAIG M. LEWIS, associate professor (finance). M.S., Ph.D. (Wisconsin, 1986), C.P.A.

Conducts research on corporate financial policy, accounting earnings management, futures, and options. Current research topics include the time series behavior of volatility, margin policy, convertible debt policy, and earnings management.

Published papers by Lewis include the information content of implied volatilities, volatility forecasting, multiperiod corporate financial policy choices, the valuation of convertible debt, and recapitalization. His paper, "Earnings Management and Firm Valuation under Asymmetric Information Content," (with Paul Chaney) has been accepted for publication in the *Journal of Corporate Finance: Contracting, Governance, and Organization.*

Lewis presented his paper, "The Information content of Value Line Convertible Rankings," (with R. Rogalski and J. Seward) at the University of Virginia and the University of Utah. The paper, "An Empirical Analysis of Convertible Debt Financing by NYSE/AMEX and Nasdaq Firms," (with R. Rogalski and J. Seward) was presented at the National Bureau of Economic Research Conference on Corporate Finance. Lewis also discussed two papers at The American Finance Association conference in January and one at the Western Finance Association in June. He served as a referee for numerous journals during the past year.

RONALD W. MASULIS, The Frank K. Houston Professor of Finance M.B.A., Ph.D. (Chicago, 1978).

Conducts research in the fields of corporate finance, market microstructure, financial institutions, and most recently international finance. His research on capital structure changes and the security issuance process is widely referenced.

Prior to joining the Owen School in 1990, Masulis taught for many years at UCLA and worked as a financial economist at the Securities and Exchange Commission, the Federal Home Loan Bank Board and the Federal Savings and Loan Insurance Corporation. From 1986 to 1990, he was The James M. Collins Professor of Finance and executive director of the Center for the Study of Financial Institutions and Markets at SMU. Masulis has served on the board of directors of the American Finance Association and the executive committee of the Western Finance Association and is associate editor of a number of well known finance journals, including the *Journal of Finance.*

In October, Masulis was a panelist in the Doctoral Consortium, Financial Management Association annual meetings in St. Louis. The following month he presented "Overnight and Daytime Return Dynamics on the London Stock Exchange: The Impacts of 'Big Bang' and the 1987 Stock Market Crash" (with Victor Ng), which is forthcoming in the *Journal of Business and Economic Statistics*, at Columbia University. In December, he was a participant and discussant at the Conference on Corporate Finance, National Bureau of Economic Research in Boston. In January, he was a session chair at the American Finance Association annual meetings in Washington, DC. In February, he presented "Spreads, Dealer Competition, and Market Regimes: A Market Microstructure Analysis of FX Trading" (with Roger Huang) at Cornell University and the University of Rochester, and in March, he and Huang presented the paper at the First International Conference on High Frequency Data in Finance in Zurich, Switzerland. The first week in April he was a visiting scholar at Indiana University. Masulis also served on the program committee of the 1995 Western Finance Association annual meetings and the 1995 American Finance Association annual meetings in Washington.

DAVID C. PARSLEY, assistant professor (economics). A.M. (Indiana, 1979), Ph.D. (California, Berkeley, 1990).

Joined the Owen faculty in 1990 after completing his Ph.D. at the University of California at Berkeley. Prior to his doctoral studies, he worked as a research associate at the Federal Reserve Bank of San Francisco. Conducts research on the effects of exchange rates on price levels, convergence toward Purchasing Power Parity, and the effects of inflation on relative prices.

Parsley presented papers at the Western Economics Association in Vancouver in July, the American Economics Association meetings in January, and the Hong Kong Institute of Science and Technology in March. His current research studies the impact of Central Bank monetary policy actions on exchange rate pass-through and the evidence on convergence toward purchasing power parity during the floating exchange rate period. During the fall, two papers on exchange rate pass-through were accepted for publication: one in the *Review of International Economics* and another in the *International Review of Economics and Finance.*

DAVID T. SCHEFFMAN, The Justin Potter Professor of American Competitive Enterprise. Ph.D. (MIT, 1971).

Conducts research on business strategy, marketing, pricing, distribution, regulation, and antitrust. Current research topics include valuation of brand equity, the financial economics of the commercial aircraft industry, strategy in the airline industry, econometric problems arising from certain forms of data aggregation, and mergers in the electric power industry. He made a presentation on distribution strategy and antitrust to the Chicago Bar Association in April. He has been chosen by "The Executive Committee (TEC)," an international organization of CEO's of small to mid-sized companies to present a seminar on pricing to its members.

Scheffman has a paper forthcoming on vertical relationships in the telecommunications industry. He is editing a volume of the *Antitrust Bulletin* on the Department of Justice/FTC Guidelines for the Licensing of Intellectual Property. He is also organizing a conference on purchasing and supplier relations to be held at OGSM.

HANS R. STOLL, The Anne Marie and Thomas B. Walker Professor of Finance; and director, Financial Markets Research Center. M.B.A., Ph.D. (Chicago, 1966).

His current research interests include the measurement of transactions costs, the efficiency of dealer versus auction markets, and risk management.

Stoll spoke at the Futures and Options Expo held at Chicago in November on the subject, "Risk and Return in Managed Futures." He continues as a director of the Futures Industry Association and in January spoke at the association's planning conference on the subject of "Derivatives: Risk and Regulatory Approaches." Also in January, Stoll chaired a session on the topic, "Market Microstructure: Price Effects," at the American Finance Association meetings held in Washington, DC. Stoll presented the paper, "The Components of the Bid-Ask Spread: A General Approach," (with Roger Huang) at the University of Southern California in December, at the University of North Carolina in February, and at Rice University in March. On March 30, 1995 Stoll gave the American Association of Individual Investors Distinguished Lecture at the meeting of the Midwest Finance Association held in Cincinnati on the topic, "The Stock Market: History, Theory, Evidence, and Policy." On April 25, he participated in a roundtable on performance measurement of commodity funds, organized by the Chairman of the Commodities Futures Trading Commission in Washington, DC. On May 8, Stoll chaired a panel on Derivatives in Toronto.

H. MARTIN WEINGARTNER, The Brownlee O. Currey Professor of Finance. M.S., Ph.D. (Carnegie Mellon, 1962).

Specializes in the financial strategy of organizations - particularly entrepreneurial ventures. Weingartner has written extensively on the uses of mathematical models in financial decision making and approaches to capital budgeting and has consulted for major financial institutions and other organizations.

Weingartner teaches courses in negotiation, case studies in finance, financial decision making, and real estate finance. He is a past president of The Institute of Management Sciences and is associate editor of *Management Science.* His publications include *Mathematical Programming and the Analysis of Capital Budgeting Problems* and numerous articles. ■

Faculty Research Papers

Current working papers completed or revised since January 1994 are listed below. Individual copies may be obtained by writing Mrs. Pat Scott, Owen Graduate School of Management, Vanderbilt University, Nashville, TN 37203.

*91-64 "Unit Roots and the Estimation of Interest Rate Dynamics," by **Clifford A. Ball** and **Walter N. Torous**. (June 6, 1994)*

This paper investigates the time series estimation of Cox, Ingersoll, and Ross's square-root, mean-reverting specification for interest rate dynamics. For a priori reasonable mean reversion, the corresponding stochastic behavior of interest rates is sufficiently close to a non-stationary process with a unit root so that least squares, the generalized method of moments, as well as maximum likelihood estimation consistently provide upward biased estimates of the model's speed of adjustment coefficient. As a result, corresponding bond yields revert too quickly to their long-term means. These conclusions are robust to assuming multiple state variable specifications, such as Brennan and Schwartz's two factor model of interest rate dynamics. We also document conditions under which the unit root problem persists even if the cross-sectional restrictions of the Cox, Ingersoll, and Ross single factor term structure model are imposed.

*91-70 "Data Frequency and the Number of Factors in Stock Returns," by **Roger D. Huang** and Hoje Jo.* (Forthcoming in *Journal of Banking and Finance*)

Determining the number of factors that explain stock returns plays an important role in empirical tests of the Arbitrage Pricing Theory. This paper examines the sensitivity of the number of factors to different data frequencies using daily, weekly, and monthly returns. The empirical results are consistent with the null hypothesis that the number of factors is the same for different data frequencies once daily returns are adjusted for nonsynchronous trading. The evidence also identifies only one or two factors.

*92-18 "Why Do Corporations Become Criminals?" by Cindy Alexander and **Mark A. Cohen**. (December 1994)*

This paper presents empirical evidence on why firms become corporate criminals. We investigate the relationship between corporate ownership structure and the prior probability of observing corporate crime. This permits us to test the extent to which (i) shareholders tend to benefit from or be harmed by corporate crime and (ii) firms' top-level ownership and control structures affect conduct throughout the firm. The evidence is that ownership structure does influence the crime rate; the prior probability of observing crime declines as top management's ownership stake in the firm grows. Further analysis using data on the market's response to crime news demonstrates the robustness of this finding. The implication is that the expected overall cost to shareholders from inframarginal corporate criminal wrong-doing tends to exceed the gains that shareholders expect to receive. Put differently, crime does not "pay" from the shareholders' perspective. Our findings suggest that crimes by corporate employees are not random events beyond top management (and ultimately shareholder) control. Crime can be deterred by placing penalties on shareholders -- not just on guilty employees.

*92-25 "Exchange Rate Uncertainty and Traded Goods Prices," by **David C. Parsley** and Ziyong Cai.* (Forthcoming in *International Economic Journal*)

This paper studies the effects of exchange rate uncertainty on prices in an intertemporal context. That is, we focus on trade-offs between current and expected future volatility. We show that uncertainty matters even to risk neutral firms due to its effects on bid/ask spreads in foreign exchange. However, due to intertemporal considerations, firms may choose not to pass through increases in volatility to prices. Moreover, ignoring these intertemporal considerations in empirical analyses will generally bias the resulting ordinary least squares estimates of the effects of uncertainty.

*93-06 "The Structure of Mutual Fund Charges," by **Tarun Chordia**. (February 1, 1995)*

This paper considers three reasons for the increasing popularity of mutual funds: diversification, transaction cost savings and risk sharing. Mutual funds represent a commingling of assets and are required to pay each redeeming investor a pro-rata share of the net asset value of the fund. This results in a better allocation of the liquidity risk amongst the investors. However, investors who redeem their holdings in mutual funds impose an externality on those that don't. Mutual funds will thus seek to dissuade redemptions through front-end and back-end (redemption) load fees. The empirical evidence is consistent with the predictions of the model that load and redemption fees dissuade redemptions in open-end funds and that funds hold more cash when there is increased uncertainty about redemptions. Furthermore, funds with load and redemption fees hold less cash than their no-load counterparts. The results suggest that aggressive growth funds are sensitive to cash flows and are likely to rely on fees to dissuade redemptions because they hold more of the smaller, less liquid stocks.

*93-09 "Pricing in Foreign Markets: An Examination of Exchange Rate Pass-Through at the Commodity Level," by **David C. Parsley**.* (Forthcoming in the *Review of International Economics)*

This paper argues that the stability of exchange rate pass-through is not well tested in common econometric specifications of pass-through equations. This is because, theoretically, the expectation of future exchange rates is an important omitted variable from typical import price equations, and, empirically, the use of aggregate data has severe limitations in this context. Commodity level results presented here confirm the instability in pass-through found in studies examining aggregate data. Moreover, the observed instability is consistent with forward looking behavior as posited.

*93-11 "Energy Shocks and Financial Markets," by **Roger D. Huang, Ronald W. Masulis, and Hans R. Stoll.** (May 10, 1995)*

Oil is viewed as having an important real effect on the U.S. economy. If such an effect is present, returns in oil futures should affect aggregate stock returns. The paper examines the contemporaneous and lead-lag correlations between daily returns of oil futures contracts and stock returns. Surprisingly, in the period of the 1980s, there is virtually no correlation between oil futures returns and the returns of various stock indexes. In the case of specific oil stocks, there is contemporaneous correlation and a statistically significant one day lead of oil futures returns. However, the economic significance of the lead is small. A simple bivariate correlation of raw returns produces the same conclusions as a more sophisticated multivariate vector autoregressive approach. The association between oil volatility and stock market volatility is also investigated.

*93-21 "Inflation and Relative Price Variability: Evidence from a New Data Set," by **David C. Parsley.** (December 1994)*

This paper presents new evidence that a positive association exists between inflation and relative prices and relative inflation rates in very disaggregated data for the United States over the period 1975 through 1992. The relationship is studied using a number of measures of distortion and individual price series collected from forty-eight U.S. cities. The data set enables new tests to be performed examining previously ignored implications of the models generating inflation-relative price linkages. There is also evidence that the response of relative prices and relative inflation rates to inflation varies inversely with the information content of a given shock to inflation. Finally, this paper presents evidence of a long term impact of inflation on relative prices. This persistence is consistent with both the relative-aggregate confusion, and the menu cost models, and suggests substantial real effects of inflation not commonly discussed.

*93-46 "Overnight and Daytime Stock Return Dynamics on the London Stock Exchange: The Impacts of 'Big Bang' and the 1987 Stock Market Crash," by **Ronald W. Masulis** and Victor K. Ng.* (Forthcoming in the *Journal of Business and Economic Statistics)*

We explore the time series properties of stock returns on the London Stock Exchange around the 1986 market restructuring (Big Bang) and the 1987 stock market crash using a modified GARCH model. Using this general dynamic model, which allows: (1) intradaily returns to have different impacts and persistence on stock return volatility, (2) asymmetric return effects on volatility and (3) intradaily returns to follow conditional distributions with different fourth moments, we uncover important changes in return dynamics and conditional fourth moments following Big Bang and the 1987 Crash, not reported before.

*94-02 "Market Making, the Tick Size, and Payment-for-Order-Flow: Theory and Evidence," by **Tarun Chordia** and Avanidhar Subrahmanyam. (October 7, 1994)*

This paper analyzes the effects of a finite tick size and the practice of 'payment-for-order-flow' on competition between NYSE and non-NYSE market makers. Due to the presence of non-specialist market makers, order submitters find that their NYSE orders are sometimes executed at better than quoted prices. Our analysis implies that even if the NYSE reservation price is superior to its non-NYSE counterpart, brokers may, due to payment-for-order flow, prefer to execute orders off the NYSE floor. In accordance with the implications of the model, we provide empirical evidence that non-NYSE market makers trade a larger fraction of the smaller order sizes and offer fewer price improvement opportunities. Also, large companies appear to have enhanced price improvement opportunities on the NYSE, suggesting that the number of non-specialist market makers positively affects such opportunities.

*94-05 "What Does It Cost to Execute Trades? Evidence from the NYSE," by **Roger D. Huang and Hans R. Stoll.** (November 28, 1994)*

This paper measures the economic costs of executing trades net of information effects by a measure we term the "realized half-spread." The estimate of economic execution cost based on the complete record of all transactions for 343 stocks that are continuously listed in the S&P 500 on the New York Stock Exchange during the period 1987 to 1991 is 2.8 cents per share in 1991. The estimates are stable over time but are dramatically higher for block sales than for block purchases. The realized half-spread is reconciled with other measures of execution costs such as the quoted half-spread, the effective half-spread, and the Roll (1984) implied half-spread. We also provide an upper bound on execution costs, and we compare our execution cost measure, based on market transactions data, to a measure derived from the revenues of securities firms. That comparison suggests that limit orders are "picked off."

*94-06 "An Innovation Variance Ratio Test: Tick Size and the Information Content of Price Changes," by **Tarun Chordia and Luke M. Froeb.** (December 5, 1994)*

A test is derived for comparing the innovation variances of two time series. The test is easy to compute because it does not depend on estimation of the unknown ARMA structure of the series. Inference proceeds directly from the integrated log periodogram. We demonstrate the test using by estimating the innovation variance ratios of Nasdaq intraday stock prices surrounding May 27, 1994. On or near that date, several stocks suddenly began trading at odd eighths. We measure the effect of the decrease in spreads on the innovation variance in the quote and price series. We use this "natural experiment" to measure the increase in information relative to "spread noise" contained in price movements. We find that a 40% reduction in spread size roughly triples the size of the information content of stock price movements.

*94-12 "Naive, Biased, yet Bayesian: Can Juries Interpret Expert Testimony?" by **Luke M. Froeb and Bruce H. Kobayashi.** (January 22, 1995)*

In an idealized model of civil litigation, interested parties present evidence to a jury. The jury is naive in that it views evidence as a random sample when, in fact, it is selectively produced. In addition to being naive, the jury is also biased by prior beliefs that it carries into the courtroom. In spite of the jury's naivete and biasedness, the true level of damages is revealed.

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A sophisticated decision maker might voluntarily choose to adopt the decision rules implied by the naive and biased beliefs of the jury in order to reach a full information decision. The model underscores the potential importance of competitively-produced evidence in leading to full information decisions.

94-13 "Competitive Trading of NYSE Listed Stocks: Measurement and Interpretation of Trading Costs," by Roger D. Huang and Hans R. Stoll. (March 13, 1995)

Regulatory changes and technological developments have intensified the competition from regional exchanges and NASD market for order flow in NYSE listed stocks. In this study, the cost of executing transactions in these markets is compared on the basis of four measures: the quoted half-spread, the effective half-spread, the realized half-spread, and the perfect foresight half-spread. All transactions and quotes in 343 S&P 500 stocks are examined from 1987 to 1991. Consistent with previous studies, we find that measured trading costs are lower on the NYSE than on other markets. We then address the question of how markets trading the same assets with different cost structures could coexist. To provide an answer, we focus on competition from NASD market for order flow in NYSE stocks and take into account the different market structures and trading arrangements in the NYSE auction market and the NASD dealer market. Our analysis suggests an NASD market in which market-makers protect themselves from informed traders by choosing uninformed order flows and an auction/specialist market in which floor traders have the ability to shunt informed order flow on to limit orders.

94-17 "Speed of Adjustment and Cross-Correlations in Stock Returns," by Tarun Chordia and Bhaskaran Swaminathan. (July 5, 1994)

This paper provides an economic rationale for the cross-correlation patterns in stock returns. Information is incorporated into prices due to trading by informed traders and since stocks differ in the amount of informed trading, their prices react differently to common information. It is this difference in the speed of adjustment to common information that gives rise to the cross-correlation patterns. Since trading volume and spreads are related to informed trading, the model predicts that high trading volume stocks will lead low trading volume stocks and that low bid-ask spread stocks will lead high spread stocks. We find strong evidence that returns on stock portfolios with a higher turnover lead returns on stocks with a lower turnover and that returns on stock portfolios with a lower relative bid-ask spread lead returns on stocks with a higher relative bid-ask spread. The data suggests that turnover is a better proxy for the speed of adjustment than size, which in turn is a better proxy than the relative spread.

94-18 "The Impact of the Federal Reserve Bank's Open Market Operations," by Campbell R. Harvey and Roger D. Huang. (February 1994)

The Federal Reserve Bank has the ability to change the money supply and to shape the expectations of market participants through their open market operations. These operations may amount to 20% of the day's volume and are concentrated during the half hour known as 'Fed Time.' Using previously unavailable data on open market operations, our paper provides the first comprehensive examination of the impact of the Federal Reserve Bank's trading on both fixed income instruments and foreign currencies. Our results detail a dramatic increase in volatility during Fed Time. Surprisingly, the Fed Time volatility is higher on days when open market operations are absent. In addition, little systematic differences in market impact are observed for reserve-draining versus reserve-adding operations. These results suggest that the financial markets correctly anticipate the purpose of open market operations but are unable to forecast the timing of the operations.

94-19 "Is There Life After Crime? How the Market Penalizes Corporate Criminals," by Cindy Alexander and Mark A. Cohen. (May 1994)

What happens to firms that are convicted of corporate crime? Previous studies have shown that government-imposed penalties rarely exceed the harm caused by crime. Yet, a recent paper by Alexander and Cohen (1994) provides evidence that ex ante, crime does not pay for shareholders of firms later convicted of criminal wrongdoing. The reason that crime does not pay appears to be the fact that firms incur other substantial penalties besides criminal fines, including debarment from government contracts, criminal sanctions on individuals, and market-imposed penalties. Previous authors have provided empirical evidence on one of these market-imposed penalties - a reduction in the equity value of the firm during the time period immediately following the announcement of alleged wrongdoing. Some authors have attributed this loss in equity value to the legal costs associated with the criminal proceedings and the present value of future ill-gotten gains that the firm will no longer enjoy. Others attribute this loss to a reduction in reputation capital over and above any government-imposed sanction. This paper provides further evidence on the extent of market-imposed penalties for firms convicted of corporate crime. We provide some new evidence on the source of the stock market decline by relating it to both monetary sanctions and harm. We also examine other market-imposed sanctions, including changes in firm ownership (takeovers, LBO's, etc.), changes in the name of the firm, and turnover of CEO and other top-level managers.

94-20 "Theories of Punishment and Empirical Trends in Corporate Criminal Sanctions," by Mark A. Cohen. (Forthcoming in *Managerial and Decision Economics*)

Economists who have studied crime and punishment have long advocated imposing an "optimal penalty" equal to harm divided by the probability of detection. Recent theoretical advances have augmented this theory in the context of corporate crime, by examining the role of individuals within an organization convicted of crime. This revised theory takes into account the principal-agent relationship inherent in the employer-employee contract. This paper reviews optimal penalty theory as it applies to corporate crime, and derives its testable implications. These empirical implications are then tested against a sample of organizations convicted of federal crimes in the U.S. It is shown that current prosecutorial and sentencing practice is consistent with optimal penalty theory to the extent that it calls for (1) increased sanctions with increased harm, and (2) increased individual liability when the organization cannot afford to compensate for the harm imposed. Several other empirical issues are examined, including the penalty for going to trial and the "deep pocket" effect.

94-22 "Following the Pied Piper: Do Individual Returns Herd Around the Market?" by ***William G. Christie and Roger D. Huang.*** (Forthcoming in *Financial Analysts Journal)*

This paper tests for the presence of herd behavior in equity returns during periods of market stress. The statistic we use to capture herd behavior is dispersion, defined as the cross-sectional standard deviation of returns. When individual returns herd around the market consensus, dispersions are predicted to be relatively low. In contrast, rational asset pricing models predict an increase in dispersion since individual returns are repelled away from the market return when stocks differ in their sensitivity to market movements. Our results, using both daily and monthly returns, are inconsistent with the presence of herding during periods of large price movements. For example, during extreme down markets when herding is expected to be most prevalent, the magnitude of the increase in the dispersion of actual returns is mirrored by the increase in the dispersion of predicted returns that are estimated from a rational asset pricing model.

94-23 "The Response of Domestic Prices to Nominal Exchange Rate Changes in the Presence of an Active Central Bank: Recent U.S. Experience," by ***David Parsley and Helen Popper.*** *(April 19, 1995)*

This paper studies the impact of the monetary policy regime on the responsiveness of domestic prices to exchange rate changes. In the presence of an active central bank, inferences about market structure or firm behavior that are drawn from the observed relationship between currency movements and goods' prices can be seriously misleading if the central bank's role is ignored. We study a panel of 32 individual goods (and services) prices in 48 U.S. cities since 1975. We find that measures of the responsiveness of prices to exchange rates depend significantly on whether or not expected monetary policy is considered. We also find that estimated equations ignoring monetary policy are much more likely to appear unstable than those incorporating monetary policy variables.

94-26 "An Empirical Analysis of Convertible Debt Financing by NYSE/AMEX and NASDAQ Firms," by ***Craig Lewis,*** *R. Rogalski, and J. Seward. (August 1994)*

We study announcements of convertible debt issues by a large sample of 503 NYSE/AMEX and 303 NASDAQ firms. Pre-issue share price performance is abnormally good for both sets of firms, as is the case with firms that issue common equity. Announcement period returns are significantly negative for both sets of firms, and post-issue performance also is poor for both. We document a common set of factors that governs the design of convertible debt. Further, these factors are consistent with a bondholder-stockholder agency conflict explanation for the design of convertible debt. Finally, we examine a number of alternative theories that attempt to explain share price reactions to announcements of convertible debt offers. The factors that partially explain security price reactions differ across NYSE/AMEX and NASDAQ firms. Although no one theory appears to fully explain share price reactions, information asymmetries do influence the share price reactions of both sets of firms. However, we find that the source of the information asymmetry differs between NYSE/AMEX and NASDAQ firms.

94-33 "The Components of the Bid-Ask Spread: A General Approach," by ***Roger D. Huang and Hans R. Stoll.*** *(March 9, 1995)*

We construct a simple time-series market microstructure model that unifies numerous existing spread models. The model is used to show that the existing literature's covariance spread models fail to fully decompose the spread into its components. We then propose two alternative extensions of the basic model to identify the adverse selection, inventory holding, and order processing components of the spread. One extension relies on the serial correlation properties of the trade flow and the other on the contemporaneous cross-correlation in trade flows across stocks. The empirical results support the presence of both inventory holding and adverse selection costs, and reveal that estimates of the spread components are sensitive to the degree to which order flows are not matched one-for-one with trade flows.

94-34 "Dynamic Investment-Mode Strategy and Economic Performance," by ***Myeong-Hyeon Cho.*** (Forthcoming in *Strategic Management Journal)*

This research provides a theoretical argument on optimal investment-mode strategy under uncertainty, and presents empirical support for the argument. Theoretical analysis suggests that joint ventures tend to be the optimal mode of investment when firms make an initial investment in markets where they have no operating experience. On the other hand, acquisitions tend to be the optimal mode of investment when firms make subsequent investments in the markets where they have learned sufficiently through operating experience. This argument is supported by the empirical findings that, in case of investment in foreign markets, firms that choose the suggested optimal investment mode realize significantly higher economic gains than firms that do not.

94-36 "Ownership Structure and Investment Decisions: An Empirical Analysis," by ***Myeong-Hyeon Cho.*** (Forthcoming in *Journal of Financial Economics)*

This paper presents evidence that investment and dividend decisions are affected not only by firm's liquidity but also by its ownership structure, supporting Jensen's (1986) argument. Evidence also shows that ownership structure affects the value of the firm through the investment and dividend decisions, providing an extension to the existing studies on the relationship between ownership structure and the value of the firm. The results of the paper also validate, at least partially, Miller and Rock's (1985) argument that dividend signaling may lead to underinvestment.

94-48 "Client-Auditor Realignments and Accounting Board Solicitation Rules," by ***Paul K. Chaney, Debra C. Jeter,*** *and Pamela Erickson Shaw. (July 1995)*

94-49 "The Use of Accruals in Earnings Management: A Permament Earnings Hypothesis," by ***Paul K. Chaney, Debra C. Jeter, and Craig Lewis.*** *(July 1995)*

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*94-52 "Estimation of First Order Autoregressive/Unit Root Models with Rounding," by **Clifford A. Ball**. (May 1995)*

Time series observations are often rounded but are commonly estimated as if no rounding were present. In this paper we study first order autoregressive models subject to rounding. We examine simple adjustments to estimators that are calculated ignoring rounding. In addition, we implement maximum likelihood estimation of these models using rounded data. We also document the limiting distribution of autocorrelation statistics when the underlying time series is subject to unit roots and rounding. We investigate small sample properties of the estimators by simulation.

*95-01 "Regime Shifts in Short Term Interest Rates," by **Clifford A. Ball** and **Walter N. Torous**. (September 28, 1994)*

Many empirical studies confirm that the October 1979 change in Federal Reserve Board operating policy resulted in a structural break in the behavior of short term interest rates. In contrast, Chan, Karolyi, Longstaff, and Sanders (1992) using an alternative model of interest rate dynamics find no evidence of this structural break. To resolve these conflicting conclusions, this paper provides statistically more powerful tests for detecting deterministic regime shifts. We also put forward a stochastic volatility interest rate model which generalizes previous specifications and allows testing for stochastic regime shifts. We conclude that a Markov regime shifting model of interest rate dynamics provides a more accurate description of the behavior of U.S. short term riskless interest rates.

*95-02 "Purchasing Power Disparity: Exchange Volatility, Trade Barriers and Other Culprits," by **David C. Parsley** and **Shang-Jin Wei**. (April 1995)*

Using a panel of 12 tradable sectors in 14 OECD countries, we study the deviations from purchasing power parity during the recent floating exchange rate period. (1) We find some evidence that the deviations are positively related to exchange rate volatility as well as to transportation costs. (2) Once we have controlled for these two factors, free trade areas such as the EC and the EFTA do not seem to reduce significantly the deviations from PPP relative to other OECD countries. (3) Although using the post-1973 data, we are able to find strong evidence of mean reversion towards PPP. The random walk hyppothesis can be rejected at the one percent level. The estimated half lives of the deviation from PPP are about five years for the non-EMS countries in the sample, and four and a half years for EMS countries. (4) We find evidence of nonlinearity in the rate of mean reversion: The convergence occurs faster for country pairs with larger initial deviations. Finally, (5) although deviations from PPP are stationary, it appears that goods prices, not nominal exchange rates, carry out most of the adjustment.

*95-03 "Did Nasdaq Market Makers Implicitly Collude to Maintain Supra-Competitive Spreads?" by **William G. Christie** and **Paul H. Schultz**.* (Forthcoming in *Journal of Economic Perspectives*)

This paper chronicles the research that led to the conclusion that Nasdaq market makers implicitly colluded to maintain supra-competitive spreads (Christie and Schultz, Journal of Finance 49, 1813-1840). The paper provides a brief description of the differences between a dealer and an auction market, and highlights the result that Nasdaq market makers quoted a majority of large issues exclusively in even-eighths. The paper then provides a personalized description of the events that soon followed, including the publicity surrounding the article, the ensuing Antitrust investigation by the Department of Justice, and the abandonment of these agreements once the practice was disclosed.

*95-04 "Relative Performance Measurement: The Information in Equity Return Dispersions," by **William G. Christie** and **Roger D. Huang**. (February 1995)*

A firm's equity return is often measured against the average return of a benchmark portfolio to judge relative performance. These rankings are most meaningful if there is a wide dispersion of equity returns that can be attributed to managerial effort. However, the dispersion in total returns can arise not only from managerial effort, but also from the impact of common factors that drive asset returns. This paper examines the informativeness of equity return dispersions for identifying managerial effort by documenting the strength of the relation between equity dispersions and common factors. We find that the intertemporal variation in dispersions contains a seasonal component and is systematically related to business cycles and conditions. We also find that dispersions vary inversely and monotonically with size, but are relatively uniform across industries.

*95-05 "The Market for Audit Services When Firms Go Public," by **Chris E. Hogan**. (June 1995)*

This study examines the auditor choice decision for entrepreneurs of firms going public. Selecting a high quality auditor may reduce the amount of underpricing that is lost to the firm when trading commences; however, the marginal costs may also be greater for high quality auditors. This study posits that entrepreneurs are trading off these costs and benefits of high quality auditors when taking firms public.

This tradeoff between audit quality and cost is tested using self-selectivity analysis and a sample of initial public offerings registered during the period January 1990 through March 31, 1992. Results of the analysis are consistent with entrepreneurs selecting the type of auditor (Big Six versus non-Big Six) that minimizes the total costs of underpricing and auditor compensation.

*95-06 "Risk Avoidance in Audit Markets," by **Chris E. Hogan** and **David D. Williams**. (October 1994)*

This study examines the effect of perceived client risk on audit fees for Local, National, and Big Six auditing firms and the effect of client risk on the auditor selection decision. We find that audit fees for Big Six firms are increasing in perceived risk, and the probability of selecting a Big Six auditor is decreasing in risk for medium-sized firms. The results provide evidence that differential pricing of audit services due to risk considerations can affect the level of auditor credibility selected by client firms.

*95-13 "Environmental and Financial Performance: Are They Related?" by **Mark A. Cohen**, **Scott A. Fenn**, and **Jonathan S. Naimon**. (April 1995)*

Prior research on the relationship between financial and environmental performance has been contradictory. There are both theoretical and empirical reasons for this lack of consensus. Because complying with environmental regulation can be costly, it might hurt a firm's bottom line. On the other hand, a firm that is efficient at pollution prevention or control might also be more efficient at production. Moreover, a firm that does well financially can afford to spend more of its resources on cleaner technologies. Among the reasons for the past discrepancy in empirical findings has been a lack of objective criteria for evaluating environmental performance and a

variety of interpretations of what it means to be a "green" investor. Some authors have looked at subjective rankings by public interest groups, others have examined pollution control expenditures across industries, while others have compared the market returns of socially conscious mutual funds or environmental sector funds to overall market trends.

This Study reports on a new objective data set detailing the environmental performance of the Standard and Poor's 500 companies. Industry-balanced portfolios were constructed and the financial returns of the "high pollution" portfolios were compared to those of the "low pollution" portfolios. Overall, the study found no penalty for investing in a "green" portfolio and, in many cases, lower pollution portfolios achieved better returns than high pollution portfolios and the S&P 500 index. The study also examines the stock market reaction to new information on the environmental performance of individual firms, and provides a preliminary analysis of which comes first - good financial performance or good environmental performance.

*95-16 "Dealer Versus Auction Markets: A Paired Comparison of Execution Costs on Nasdaq and the NYSE," by **Roger D. Huang** and **Hans R. Stoll**. (June 11, 1995)*

Execution costs for a sample of Nasdaq stocks significantly exceed those for a matched sample of NYSE stocks. Execution costs are measured by the quoted spread, the effective spread (which accounts for trades inside the quotes), the realized spread (which measures revenues of suppliers of immediacy), the Roll (1984) implied spread, and a measure of post-trade variability. By these measures the Nasdaq execution cost is twice the NYSE cost. The difference is not due to differences in the stocks, for we match on stock characteristics. Nor is it due to the presence of informed traders, for we find that Nasdaq dealers lose a smaller fraction of the quoted spread than do NYSE suppliers of immediacy. We rule out differences in the frequency of even eighth quotes. The increase in affirmative obligation on dealers and the rise in institutional trading are eliminated as possible sources of the differential. Partial explanations are provided by the fact that Nasdaq dealers do not charge commissions to institutions and that limit orders cannot compete with dealers in Nasdaq. We conclude that the primary explanation is the internalization and preferencing of order flow on Nasdaq that limit the incentive to narrow spreads. Execution costs are large because there has been little incentive to reduce them.

*95-17 "Spreads, Dealer Competition, and Market Regimes: A Market Microstructure Analysis of FX Trading," by **Roger D. Huang** and **Ronald W. Masulis**. (February 22, 1995)*

Quote behavior in the spot FX market for DM/$ is examined using tick-by-tick inter-bank quotes from Reuter's FX screen for a one year period. We attribute the variation in FX bid-ask spreads primarily to the changing levels of market competition and inventory holding costs. We find that dealer bid-ask spreads decrease with greater numbers of competing dealers, as the ability to layoff undesirable inventory positions rises and as the dispersion of dealer inventory positions widens. Counteracting the decrease in bid-ask spreads is an increase associated with greater disagreement among dealers regarding the value of the underlying exchange rate. We also report and account for the strong seasonalities in the number of dealers, number of quotes, mid-point volatility, bid-ask spreads and spread dispersion that in part are induced by the development of different market regimes within a 24 hour period.

*95-18 "The Information Content of Value Line Convertible Bond Rankings," by **Craig M. Lewis**, Richard J. Rogalski, and James K. Seward. (March 1995)*

This paper examines the information content of Value Line's convertible bond recommendations. We document that Value Line recommendations do not contain incremental information beyond that already reflected in their common stock rankings. In fact, one does better using Value Line equity rankings to select convertible bonds rather than the convertible bond rankings.

*95-19 "Simulating the Effects of Mergers Among Noncooperative Oligopolists," by **Luke M. Froeb** and Gregory J. Werden.* (Forthcoming in *Economic and Financial Modelling with Mathematica*)

This paper illustrates use of the Mathematica package Merger.m that simulates the effects of mergers among noncooperative oligopolists. It is offered as an alternative to traditional structural analysis for evaluating mergers in both homogeneous and differentiated products industries.

*95-20 "Variance Components in Asset Prices," by **Luke M. Froeb** and James Baker. (June 1995)*

The variance of a stationary time series can be decomposed into two distinct components: that part which is due to the innovation variance of the series; and that due to the pattern of autocorrelation in the series. The availability of high frequency data in finance (daily, hourly, or trade-by-trade) means that researchers now confront data that are likely to exhibit significant autocorrelation. In some applications researchers draw inference from the strength and size of the autocorrelation, while in others, they are still focused on the variance. Decomposing variance into its two component pieces allows researchers greater flexibility and precision in framing and testing hypotheses, without relying on tenuous identifying assumptions necessary for estimating structural models. In this Mathematica notebook, we illustrate the variance decomposition and its application to some financial hypotheses. Mathematica is one of the few languages with both analytic and numeric capabilities strong enough to allow users to build, as well as test models.

*95-21 "Seasoned Equity Offerings: A Survey," by Espen Eckbo and **Ronald W. Masulis**.* (Forthcoming in *Handbook in Finance*)

*95-22 "Convergence to Purchasing Power Parity without Trade Barriers or Currency Fluctuations: An Upper Bound Estimate Using Commodity Prices within the United States," by **David C. Parsley** and Shang-Jin Wei. (June 1995)*

Using a panel of 52 prices from 48 U.S. cities we provide an upper bound estimate of the rate of convergence to PPP. We classify these goods into three groups: perishables; other tradables; and non-tradables. Our main findings are: (1) The variability of inter-city price differences is positively related to distance as predicted by gravity models of trade. This is true for all three groups, and the effect is especially pronounced for perishables; (2) Tradable goods (perishable and non-perishable categories) converge very fast to price parity. The average half life of the price gap is less than four months; (3) Convergence rates for non-tradables are considerably slower but still extremely rapid as compared to cross-country evidence. the half life of deviations from PPP is less than three quarters for all but one of the non-tradables studied; (4) There is some evidence that rates of convergence increase with the initial price differential, however the effect does not seem economically significant; and (5) Distance has an independent effect on the rate of convergence. After controlling for distance, rates of convergence rise significantly. ■

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