

Spring 2002 Research@Smith



We have dedicated this Research@Smith to reporting on some of the significant research conducted by three members of the Smith School finance faculty: Dilip Madan, Gregory Willard, and Nagpurnanand Prabhala.

Overall, our finance faculty has a record of scholarship and influence that is hard to match. They are published in and have served on the editorial boards of leading finance journals, including *Financial Management*, *Journal of Financial Services Research* (both housed at the University of Maryland), *Mathematical Finance*, *Journal of Finance*, and *Review of Financial Studies*. The department's biennial research symposium draws scholars from across the country to discuss critical issues in finance.

Members of Smith's finance faculty also are active in the leadership of professional organizations, including the American Finance Association, Western Finance Association, and the Bachelier Finance Society. And they are in demand as consultants and advisers by organizations and governments around the world.

In this newsletter, we can offer only a sample of some of the research currently under way by our finance faculty. For a comprehensive look at the group's work, I invite you to visit www.rhsmith.umd.edu/finance/.

- Howard Frank, Dean

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KNOWLEDGE SHARING

New books by Robert H. Smith School of Business faculty

Handbook of Cross-Cultural Management edited by Martin J. Gannon with Karne L. Newman. Blackwell Publishers Ltd., 2002. In his latest book, Gannon, professor of management and director of the Center for Global Business at the Smith School, and co-editor Newman (University of Richmond) outline primary research perspectives in cross-cultural management and discuss how theoretical perspectives and research findings can be applied to real situations.

The Foundations of Entrepreneurship edited by Scott Shane. Edward Elgar Publishing, 2002. Shane, professor of entrepreneurship and chair of the entrepreneurship department, has compiled 53 articles dating from 1934 to 2000 that investigate the discovery, assessment, and utilization of opportunities to produce future goods and services. The book provides a thorough examination of the effect of entrepreneurial activity on individuals, firms, and society.

Reconciling Trade and the Environment in the World Trade Organization by Peter Morici. Economic Strategy Institute (ESI), 2002. Morici, professor of international business and adjunct ESI Senior Fellow, assesses how the World Trade Organization (WTO) could be an effective forum for negotiating the requirements of WTO trade rules and international environmental law. The study was supported by a grant from the Rockefeller Foundation.

WORKING PAPERS

Doron Avramov, John Chao, and Tarun Chordia. "Hedging Against Liquidity Risk and Short Sale Constraints"

Judy Frels and P.K. Kannan. "The Effects of Reputation, Size of User Base and Customization on Consumers' Risk Perceptions in the Electronic Channel"

Oliver Kim, Taewoo Park, and Lei Zhou. "Constructing the Best Summary Forecast of Earnings"

Thorsten Beck, Aslı Demirgüç-Kunt, and Vojislav Maksimovic. "Financial and Legal Constraints to Firm Growth: Does Size Matter?"

Frank Heflin, Kenneth Shaw, and John Wild. "Disclosure Quality and Market Liquidity"

Bradley L. Kirkman, Benson Rosen, Cristina B. Gibson, Paul E. Tesluk, and Simon O. McPherson. "Seven Challenges to Virtual Team Performance: Lessons from Sabre, Inc."

Robert Kosowski, Allan Timmermann, Hal White, and Russ Wermers. "Can Mutual Fund 'Stars' Really Pick Stocks: New Evidence From a Bootstrap Analysis"

Ian O. Williamson and Daniel M. Cable. "Interfirm Network Ties, Interorganizational Imitation, and Organizational Hiring Patterns: The Case of Top Management Team Hiring Decisions"

KUDOS

Martin P. Loeb, professor of accounting and Deloitte & Touche Faculty Fellow, and Lawrence A. Gordon, Ernst & Young Alumni Professor of Managerial Accounting and director of the Ph.D. Program at the Smith School of Business, were named editor and editor-in-chief respectively of the Journal of Accounting and Public Policy in late 2001.

Venkatesh (Venky) Shankar, Ralph J. Tyser Fellow and associate professor of marketing, has been appointed to the editorial board of Marketing Science. Shankar is serving on the board with Smith faculty colleague Roland Rust, holder of the David Bruce Smith Chair in Marketing and chair of the marketing department.

M. Susan Taylor, professor of management and organization and director of Smith's Center for Human Capital, Innovation, and Technology, has been named a University of Maryland 2002-03 Distinguished Scholar-Teacher. The award recognizes her significant contributions to the academic community in both areas. Taylor is past chair of the Academy of Management Human Resource Division and a current member of its Board of Governors.

Anil K. Gupta has been named Ralph J. Tyser Professor of Business Strategy and Organization at the Smith School. Gupta is an internationally known scholar on strategic leadership, managing the diversified firm, managing knowledge, and global strategy.

G. (Anand) Anandalingam, Ralph J. Tyser Professor of Management Science and co-director of Smith's Center for Electronic Markets and Enterprises, has been appointed technology columnist of The Economic Times, considered the "Wall Street Journal" of India.

Challenging prevailing beliefs about asset pricing

Research by

Gregory A. Willard

Traditional financial economic theory suggests that arbitrage – an opportunity to make a sure profit from something that costs nothing – cannot exist in competitive equilibrium. But Smith School finance professor Gregory Willard argues arbitrage can exist in a rational model, and that there is a good reason it would. Willard, along with Mark Loewenstein of Boston University, makes the arguments in "Liquidity and Arbitrage," the third in a series of research papers challenging widely accepted assumptions about the equilibrium properties of asset prices.

"In this paper and our other work, we're trying to get at exactly how asset prices are determined, which has always been a difficult question to answer," says Willard.

"Many people presume that the neoclassical models of finance, which assume everyone is rational, are not sufficiently rich enough to describe or make predictions about the market prices we observe. We show that these models are far richer than many had thought."

Bucking conventional wisdom, Willard and Loewenstein argue that limited arbitrages can play an economically important role in a competitive equilibrium, in which all agents are rational and choose optimal investment strategies. Their model differs from the standard models studied in financial economics in that it assumes that some investors need to maintain a certain amount of "safe wealth." In Willard and Loewenstein's equilibrium, these investors – who might invest in bonds instead of stocks, for example – are willing to pay a premium for these assets. They are willing to accept a lower rate of return than that justified by its dividend risk because it lowers liquidity risk.

Willard and Loewenstein argue that the inclusion of this simple feature dramatically changes the implications of the neoclassical models of financial markets because it shows that limited arbitrage opportunities may arise in fully rational, competitive equilibrium. This feature also provides the "good" reason that arbitrages exist in a rational market: to motivate some market participants to provide liquidity.

"We show that a limited arbitrage can be a vital feature of a competitive equilibrium because it is a mechanism for transferring wealth from those who need liquidity to the agent who can provide it," says Willard.

"Liquidity and Arbitrage" is the latest in a series of research papers authored by Willard and Loewenstein showing that several of the phenomena seen in financial markets may be natural consequences of optimal and rational economic behavior. Willard's previous papers in this area include "Rational Equilibrium Asset-Pricing Bubbles in Continuous Trading Models," published in the *Journal of Economic Theory* (March 2000); and "Local Martingales, Arbitrage, and Viability," published in *Economic Theory* (2000). All three papers provide new insight into asset-pricing theory.

Not only does Willard's research suggest that traditional models – such as the Black-Scholes options pricing model – can fall short as tools for effectively determining asset prices, it also highlights problems in the approach taken by behavioral economists. This emerging group of academics generally asserts that asset prices are dependent, not only on the value of future dividends, but also on people's behavioral shortcomings, such as overconfidence in their investing skills. Willard's research shows that the popular behaviorist models, in which prices deviate from the value of their future dividends, are flawed.

"The behaviorists are ignoring the effects of market clearing, which require certain assets to be collectively held in an equilibrium. Market clearing helps determine whether asset prices in a competitive equilibrium can deviate from their fundamental values," says Willard.

Willard believes his research provides direction for future behavioral economics study and lays the groundwork for his own future research. Now that he and Loewenstein have identified ideas that can be applied to well-known finance models, Willard plans to dissect some of the models to "trace exactly where the money is going." And that, says Willard, is where the real surprises will be found.

Gregory A. Willard joined the Smith School of Business in 2001, after serving for four years as an assistant professor of finance at the Sloan School of Management, Massachusetts Institute of Technology. Willard has presented his research at the First World Congress of the Bachelier Finance Society, NBER Asset Pricing and Portfolio Allocation Conference, Society for the Advancement of Economic Theory Conference, and the Western Finance Association Meetings. For further information, e-mail gwillard@rhsmith.umd.edu.

Do underwriters favor institutional investors in allocating shares of "hot" IPOs?

Research by

Nagpurnanand R. Prabhala

In the U.S. market, underwriters have complete discretion in how they allocate the shares offered in initial public offerings (IPOs). Do underwriters use this discretion to favor their institutional customers? Because U.S. underwriters are not required to disclose IPO allocations to the public, there has been little evidence for this practice, until now.

In a paper forthcoming in the *Journal of Finance* (June 2002), Nagpurnanand R. Prabhala, assistant professor of finance at the Robert H. Smith School of Business, and co-authors Reena Aggarwal of Georgetown University and Manju Puri of Stanford University, study the relationship between institutional allocation and day-one IPO returns using a new dataset of U.S. offerings. The study is unique in the size, scope, and timeliness of data and in its findings.

The dataset compiled by the researchers consists of detailed information on more than 174 IPOs offered between May 1997 and June 1998. This information came from nine investment banks for the IPOs in which they served as lead managers.

"Our initial step was to discover whether institutions had a higher allocation of the more underpriced issues than retail investors," Prabhala explains. "We found this to be the case: Institutions held about three-quarters of the shares that shot up, about three times the allocation to individual investors." However, the research uncovered an asymmetry in these allocation patterns: Institutions dominate in underpriced IPOs but seem to be able to stay out of overpriced offerings. This finding differs from previous research in this area, which characterized institutional allocation in overpriced and underpriced IPOs as balanced. Prabhala and colleagues also demonstrate that part of the favorable treatment of institutions comes from the fact that underwriters give institutional investors more shares in IPOs with strong pre-market demand, which typically have higher day-one returns. This is consistent with book-building theories, according to which institutions get more shares in strong

pre- market IPOs as quid pro quo for giving underwriters favorable pricing information.

The researchers then considered whether this practice is the sole explanation for greater profits institutions realize on IPO investments or if institutional allocation is related to underpricing even after controlling for pre-market demand.

"We find that institutions do tend to earn more than retail investors in IPOs," they write. "However, the positive correlation between pre-market demand and allocation is only part of the explanation. Institutional allocation in underpriced IPOs also appears to reflect private information not evident in pre-market demand." This information may be held by underwriters and used to favor institutions beyond the advantage described in book-building theories, or it may be information gathered and held by the institutions themselves, allowing them to profit at the expense of retail customers.

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The research findings support the assumption that underwriters favor institutional clientele in allocating shares of IPOs beyond what book-building theories suggest. In addition to attracting media attention, this practice has spurred formal investigations by the U.S. Attorney's Office, Securities and Exchange Commission (SEC), and the regulatory arm of the National Association of Securities Dealers, NASD Regulation, Inc. (NASDR). While preferential treatment of institutional investors is certainly reasonable as quid pro quo for information that institutions give underwriters during the IPO book-building process, Prabhala, Aggarwal, and Puri point out, "Allocating more shares in 'hot' IPOs to favored clients in exchange for unusually large commissions in subsequent trades or other favors in the after-market

could violate NASDR rules requiring brokers and dealers to maintain standards of fair practice."

"Further research in this area remains to be done, to understand more fully the give-and-take in the IPO allocation process," Prabhala notes. "Our study supplies only one piece of the puzzle."

Nagpurnanand R. Prabhala joined the Smith School of Business finance faculty in 1999. Previously, he was an assistant professor of management at Yale University. In 2002, Prabhala was appointed associate editor of the Review of Financial Studies. This current work is part of his ongoing research in corporate finance. For further information, e-mail prabhala@rhsmith.umd.edu.

Enhancing the capabilities of options pricing models

Research by
Dilip B. Madan

Given the prevalence of the normal distribution in describing both test scores and natural phenomena, it should come as no surprise that the normal distribution has become the de facto standard for describing the distribution of various financial phenomena. This practice dates back to at least the beginning of the twentieth century, when Louis Bachelier used this distribution in his dissertation to describe share prices on the Paris Bourse. In developing a method for finding the fair value of an option, Bachelier proposed that Brownian motion be used to describe the way stock prices oscillate randomly over time.

Bachelier's intellectual descendants are numerous, and include MIT professor Robert Merton, who engineered a technique to hedge away the risks inherent in an options position, his colleagues Fisher Black and Myron Scholes, who developed the formula for pricing options that now bears their names, and Dilip Madan, professor of finance at the Robert H. Smith School of Business.

In the wake of the infamous market crash of 1987, flaws in the Black-Scholes model began to emerge. On the empirical side, the model began to lose its effectiveness in describing the way the market determines option prices. In response, researchers and practitioners alike began to question the applicability of the normal distribution underlying the model.

In 1990, Madan offered a radically different approach. He proposed that the Brownian motion assumption be replaced by the use of pure jump Lévy processes. Discovered by the French probability theorist Paul Lévy, Lévy processes are the natural generalizations of Brownian motion that drop the requirement that the process be continuous over time.

"The standard Brownian motion approach is stranger than most researchers realize," Madan states, describing the genesis of his idea that prices jump infinitely often. "To request that prices be both uncertain in the future and continuous over time is to posit a strange request."

The pure jump Lévy processes Madan suggested were discontinuous in the extreme. To a generation of financial economists trained in the mathematics of

continuous price processes, the idea that prices can jump (change dramatically) infinitely often was startling. However, any researcher who analyzes financial data knows that jumps become more visible as one samples the path more frequently. In the unattainable limit of continuous sampling, it is plausible that prices would actually exhibit infinite jump frequencies. To convince skeptics that his unorthodox ideas had practical merit, Madan showed that his construct, named the variance gamma model, outperformed all of the models living under the Merton-Black-Scholes umbrella.

Financial institutions that had been searching for an effective method to replace the earlier process of pricing options quickly latched on to the new approach. In the mid-90s Madan began a consulting relationship with the largest financial institution in the equity derivatives arena.

His ability to explain the ideas behind his theories also has made Madan an extremely popular speaker at industry conferences. Meanwhile, the academic community has slowly warmed to the new approach. His papers have now been published or accepted in prestigious academic journals such as *Mathematical Finance* and the *Journal of Business*. For these contributions and others, Madan was recently appointed as co-editor of *Mathematical Finance* and, in 2001, he was elected president of the Bachelier Finance Society, the international organization of mathematical finance.

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Working with academic and industry colleagues, Madan has continued to develop his options pricing model. "While previous research does a very good job at explaining variations in options pricing at various strikes at fixed maturity," he says, "my new research prices options across both strike and maturity, building on Lévy process structures called stochastic volatility models."

Dilip B. Madan works on improving the quality of financial valuation models, enhancing the performance of investment strategies, and efficient risk allocation in modern economies. His current research deals with the theory of stochastic processes' applications to risk

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DEAN

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