Princeton University

Bendheim Center for Finance

Annual Report
2003

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Director's Introduction

The mission of Princeton University's Bendheim Center for Finance is twofold: first, to develop new courses and programs in finance that will afford exciting learning opportunities to Princeton students; and second, to establish a leading center for modern financial research.

Under the aegis of the BCF, Princeton's existing finance curriculum is being expanded and improved, and two new academic programs have been created: an undergraduate Certificate in Finance in 1999 and a Master Program in Finance in 2001. Center-affiliated faculty teach in both programs as well as in a variety of contexts in their home departments across the University. By bringing together outstanding scholars from a wide variety of disciplines in a well-equipped setting that encourages dialogue and interaction, the BCF is a powerful environment in which to conduct significant research in finance. It also serves as a major venue where the world's leading experts in finance from academia, government and the private sector can meet regularly to exchange views and information.

Proximity to Wall Street and other important centers of private-sector financial research provide an additional source of intellectual stimulation and interchange for the BCF. Students are able to explore internships and longer-term job opportunities in a wide variety of finance-related areas. The BCF also encourages students at all levels to conduct finance-related research at the University by providing such services as funding senior thesis projects, serving as a clearinghouse and major source of data and providing expert faculty advisors.

Faculty

The scholars in the BCF are chosen for their ability to deploy cutting-edge methodologies to a wide range of finance-related topics, from stock-price determination to public policy toward financial markets to the role of financial institutions in economic growth. The Center supports these leading scholars by encouraging their individual, collaborative and multidisciplinary research and by providing facilities (including computer and data support), research assistance, financial resources and venues for the exchange of ideas (such as weekly seminars and conferences). The University's existing strengths in areas such as economics, mathematics and statistics, operations research and psychology provide a serious disciplinary basis for this research, leveraging the newly committed resources to produce a truly distinguished program. To promote maximum interchange among disciplines, all Center faculty have appointments in regular University departments as well as in the BCF.

Thirty faculty members, representing six different departments, are currently affiliated with the BCF. Our new senior hires this year are Harrison Hong (from Stanford Business School) who spent the academic year 2002-03 as a Visiting Professor and is now joining us through the Department of Economics while Jianqing Fan (from UNC Chapel Hill and Hong Kong UST) is joining us through the Department of ORFE. Patrick Cheridito (from ETH Zürich) who spent the academic year 2002-03 as a BCF Postdoctoral Fellow and Victoria Henderson (from the University of Oxford) are also joining us this summer as Assistant Professors in the Department of ORFE.

Harrison Hong's interests focus on behavioral finance, asset pricing with differences of opinion and short-sales constraints, asset pricing with market imperfections, career concerns and herding, social interaction and investor behavior in stock markets, and mutual funds. He received his Ph.D. from MIT in 1997.

Jianqing Fan's current research focuses on quantitative finance and risk management, high dimensional data analyses, likelihood theory, nonparametric tests, wavelets, generalized linear models, analysis of longitudinal data, nonlinear time series, model selections, data-analytic modeling, survival analysis and statistical decision. He is an associate editor of *The Annals of Statistics*, the *Journal of the American Statistical Association*, and *Statistica Sinica*. He is an elected member of the International Statistical Institute, an elected fellow of the American Statistics Association and Institute of Mathematical Statistics, and a member of the International Chinese Statistical Association. He holds an M.A. in Statistics from the Institute of Applied Mathematics, Academia Sinica, Beijing, China and he received his Ph.D. in Statistics from the University of California at Berkeley in 1989.

Patrick Cheridito received his PhD from ETH Zürich (Switzerland) in 2001 and visited universities in Vienna (Austria), Paris (France), Barcelona (Spain) and Pisa (Italy) in the academic year 2001-02, before visiting the BCF in 2002-03. His research interests center on the theory of stochastic processes and their applications to finance. At Princeton, he conducted joint work with colleagues Damir Filipović and Robert Kimmel on affine models for interest rates. In other work, he is studying the problem of hedging a contingent claim under gamma constraints and has introduced coherent and convex risk measures for continuous-time stochastic processes.

Victoria Henderson, a specialist in asset pricing, has been a Nomura Research Fellow at the University of Oxford since 2001. She also has served as a senior research fellow at Warwick Business School in England and as a post-doctoral researcher at the Swiss Federal Institute of Technology. A graduate of the University of Technology in Australia, she earned her doctoral degree from the University of Bath in England in 1999.

In addition to Harrison Hong, the Center welcomed H. Franklin Allen, a corporate finance specialist from the Wharton School at the University of Pennsylvania, as a faculty visitor during the academic year 2002-03. Finally, in addition to Patrick Cheridito, the BCF also welcomed two other visiting fellows: Andre Monteiro from Galanto Economics Research in Brazil and Marcello Pericoli from the Research Department of the Bank of Italy.

Ph.D. Students

Ph.D. students in the Bendheim Center for Finance are admitted through the Department of Economics, the Department of Operations Research and Financial Engineering or the Program in Applied and Computational Mathematics.

Three students graduated in 2002-03: Pavel Diko from the Department of ORFE, Marcelo Pinheiro from the Economics Department and Michael Tehranchi from the Program in Applied and Computational

Mathematics. Pavel Diko's thesis deals with precipitation derivatives for which he developed a pricing technique based on utility indifference, under the supervision of René Carmona. Marcelo Pinheiro's thesis, dealing with the financial implications of loyalty, peer group effects and social interactions was written under the supervision of José Scheinkman. Michael Tehranchi's thesis, titled "Applications of Infinite Dimensional Stochastic Analysis to Problems in Fixed Income Markets," was written under the supervision of René Carmona. They left for jobs at Electrabel, one of Europe's largest utility company based in Brussels, and postodoctoral fellowships at the University of Chicago's Economics Department and the Mathematics Department at the University of Texas at Austin respectively.

This brings to six the number of Ph.D. graduates in financial economics since the BCF was established. Our two graduates in 2000-01, Christopher Hennessy and Ernst Schaumburg accepted positions as Assistant Professor of Finance at the University of California – Berkeley and Northwestern University respectively. Our 2002-03 graduate, Ken Ayotte, accepted a position as Assistant Professor of Finance at Columbia University. Although the numbers so far are small, these are very high quality placements which will raise the visibility of the Center in the world of academic finance.

Undergraduate Certificate in Finance

Now in its fifth year, the Undergraduate Certificate in Finance continues to do extremely well. We enrolled **135 juniors** from the Class of 2004, a sharp increase from the numbers of the previous years (Class of '00: 61, '01: 82, '02: 85, '03: 122), bringing our **total number** of undergraduate students (juniors and seniors) in the program to **350** this year.

Also encouraging is the fact that the students earning the Certificate are drawn from a wide cross-section of departments on campus, testifying both to the interdisciplinary flavor of the program and its wide appeal. The breakdown by major for the Class of '03 is as follows.

Comparative Literature	1
Computer Science	10
Economics	58
Engineering (other than ORFE and Computer Science)	8
English	2
History	1
ORFE	33
Philosophy	1
Physics	2
Psychology	1
Woodrow Wilson School	7

Our new senior thesis or independent work requirement is implemented as follows:

- Economics/Operations Research Majors have to write a senior thesis on a finance topic.
- All other majors have to either:

- Integrate finance into departmental senior thesis. For example, a student in the class of 2002 wrote a history thesis on how "the French Bourse functioned in the late 18th century and its political and social ramifications", or
- Submit an independent research paper. For example, an art history major, in the class of 2003, wrote on "art as a portfolio diversification tool, comparing repeat sales models with hedonic models".

Some recent senior theses topics are:

Christian Bryzinski: Venture Capital in Germany: Innovation Stimulus or Ineffective Imitator

Emily Gopstein: Standing Out From The Crowd: Career Concerns and Risk-Taking in Security Analysts' Earnings Forecasts

Marianne Yip: Dangerous Liaisons: Do Investment Banking Relationships Affect the Objectivity of Research Analyst Recommendations and Earnings Forecasts?

Ashley Heise: Private Equity: An Evolutionary Analysis of the Market and Decision

Aaron Husock: Style and Size-Timing Models: Deconstructing Return Variation Across Market Segments

Tyler Waterhouse: Super Commercials: An Analysis of Super Bowl Advertisements In an Investor Relations Framework

Certificate in Finance students have received an extraordinary proportion of the prizes awarded by their respective departments in 2003. 28 finance certificate recipients received either a general or departmental prize – 23% of the finance students of the class of '03.

- Of the 11 senior thesis prizes awarded to **Economics** majors, 9 were finance certificate recipients:
  - Finance Prize: Kwesi Adofo Mensa and Ashley Heise, Runnerup: Marianne Yip
  - International Finance Prize: Christian Bryzinski
  - Empirical Economics Prize: Adam Schwartz, Runnerup: Tyler Waterhouse
  - Health, Education and Welfare: Edward Zysik
  - Walter Sauer Prize (joint with Woodrow Wilson School): Natalie Nicolaou
  - Best Overall Thesis in Economics: Adam Nebesar
- The following general prizes were awarded to finance certificate recipients:

- Class of 1901 Medal and the Sanderson Detwiler 1903 Prize: Catherine Farmer
- Frederick Douglas Service Award: Yashih Wu
- Achievement Award of the New Jersey Chapter of the American Concrete Institute: Jean Paul Ciardullo

- The following departmental prizes were awarded to finance certificate recipients:
  - Middleton Miller Prize in **Mathematics**: Rahul Bhargava
  - **Applied and Computational Mathematics** Independent Project Prize: Adam Nebesar and Emmanuel Sharef
  - Allen Shenstone Prize in **Physics**: Costin Bontas
  - Joseph Clifton Prize in the **Engineering** School: Cynthia Lin and James McQuade
  - Charles Ira Young Prize in **Electrical Engineering** and the Memorial Prize in Engineering: Elizabeth Smythe
  - Frank Castellana Prize in **ORFE**: Joshua Nichols
  - Ahmet Cakmak Prize in **ORFE**: Elizabeth Danaher
  - Sigma Xi Book Award in **ORFE**: Laura Kornhauser and Dan Nash
  - Kenneth Condit Prize in **ORFE**: Emmanuel Sharef and Jeanne Lindsay
  - George Bienkowski Memorial Prize in **Mechanical and Aerospace Engineering**: Shannon Okuyama
  - Best Thesis Prize in **Mechanical Engineering**: Shannon Okuyama, Runnerup: Ryan Kiskis
  - Richard Challener Senior Thesis Prize in **Canadian Studies**: Sonali Shah
  - **Comparative Literature** Senior Thesis Prize: Heather Morr
  - **Near Eastern Studies** Thesis Prize: Tricia Hearne

Master in Finance

The first full class of the Center's Master in Finance (MFin) graduated in June 2003. Reflecting the interdisciplinary nature of the BCF, the MFin program is nearly unique in producing students with extensive training in both quantitative methods (drawing on the strengths of our Engineering, Computer Science, Mathematics and other departments) and in Economics. This set of skills makes our Master students highly sought after in the job market despite the difficult recruiting environment on Wall Street.

Because business schools do not generally offer so specialized a program, or expect their students to have such a strong mathematical background, Princeton's MFin offers students a significant advantage in obtaining coveted positions in investment banking, brokerage houses, and similar firms. BCF faculty also benefit from the program because it provides a forum in which they can develop an active intellectual interchange with leading private-sector financial researchers and practitioners.

The program is designed to be completed in four semesters, but students with strong backgrounds will be able to finish more quickly, in as little as one year. We intend to continue keeping the program small and selective.

MFin applications for 2003-04 continued at the high pace of approximately 250 applicants. Out of 250 applicants, we admitted 13 students this year, and 9 will be enrolling this coming Fall. Our selectivity rate continues to be exceptionally high, with our program admitting about 5% of its applicant pool. This is a substantially smaller percentage than our peer programs in quantitative finance (NYU, Columbia, Carnegie-Mellon, Berkeley, Chicago, etc.) and one that is comparable to the most selective business schools (such as Stanford Business School). Overall, this is a very good sign for the continued success of our program.

One change we made to our admission process in 2002-03 is the addition of one, and in some instances two, interviews for a pre-selected subset of our applicant pool (25 applicants). We conducted interviews using our Advisory Board to ascertain which of the strong academic candidates we had identified through their written applications also excelled in areas such as communication and leadership. In addition to the obvious benefit of collecting very useful information about potential students, we get a positive "halo" effect with the strongest candidates who get to meet our industry leading Advisory Board members. In part, this effect is responsible for our strong acceptance yield (9 acceptances out of 13 offers of admission).

We have continued to invest heavily in the placement of our graduating students, with the addition of one person to our placement staff. Our excellent placement results, despite the challenging economic environment, are a testimony both to the quality of our students and the value added of our program. As of the end of June, of the 23 MFin students graduating, 22 have obtained permanent employment as follows:

Goldman Sachs	4 graduates	Equity research in Hong Kong Derivatives trading in London Options trading in Chicago Private Client Strategy in New York

Hedge Funds	3 graduates	Citadel in Chicago Start up in London Start up in New York
PhD Programs	3 graduates	Princeton University Northwestern University London Business School
Citicorp	2 graduates	Currency trading in New York Fixed income analysis in New York

and 1 graduate each at:

Bank of Italy	Banking supervision in Milan
Derivatech	Software for derivatives pricing in New York
Gleacher & Co.	Mergers and acquisitions in New York
JP Morgan Chase	Equity derivatives trading in New York
Lehman Brothers	Fixed income analytics MBS/ABS in New York
Merrill Lynch	Capital markets analytical associate in New York
Morgan Stanley	Emerging markets securities trading in New York
NY Federal Reserve	Banking supervision in New York
Putnam Investments	Quantitative asset management analysis in Boston
Sanford Bernstein	Strategist for quantitative asset management in New York

New Course Offerings

With the new resources of the BCF, course offerings in finance continue to be expanded to accommodate the Certificate and Master students.

In 1999 and 2000, we introduced new courses focused on Asset Allocation and Portfolio Management; Options, Swaps, and Futures; Financial Institutions; International Financial Markets; Organization and Regulation of Financial Markets; Corporate Finance, Corporate Governance, and Banking; Financial Reform in Developing and Transition Economies; and a seminar in Financial Research, to list just some of them.

In 2001-02, we introduced new courses on Venture Capital and Private Equity; Alternative Investments and Hedge Funds; Politics and Finance; Financial Econometrics; Corporate Finance and Accounting; and a new Freshman Seminar entitled "Modern Financial Markets."

In 2002-03, we introduced two new courses on fixed income instruments and markets, one at the undergraduate level in the Economics department and one at the graduate level in the ORFE department.

The existence of the Certificate and Master allows us to offer a richer set of courses for both sets of students. The Master's courses are also available as advanced electives for undergraduate students in the finance certificate who choose to take a more demanding academic course load. The Master's courses are also available to Ph.D. students who need to fill a gap in their knowledge of a specific area.

Fund Raising

Looking forward, I believe our greatest challenge will be to continue to recruit and retain top-flight faculty. To be successful in this very competitive market, we have found it necessary to make commitments to provide research support for faculty members. Faculty recruitment and retainment is essential to our new educational initiatives and for continued expansion of course offerings. All of this requires active fund raising and we continue to work closely with the Development Office to increase the Center's resources.

- Major Capital Gifts: We received in 2002-03 a gift in the amount of $1,000,000 from our Advisory Council member J. Michael Evans '80.

- Corporate Affiliates: Under this program, financial firms are asked to make annual gifts to the Center. In exchange, member firms are given certain privileges, such as the right to receive Center publications, to send representatives to Center events, and to receive assistance in recruiting our students (both undergraduate and master students) for internships and permanent jobs. Current members include Crédit Suisse First Boston, Deutsche Bank, Goldman Sachs, Lehman Brothers, Merrill Lynch, Morgan Stanley and Salomon Smith Barney.

Advisory Council

The Center relies on the help and advice of prominent alumni working in the financial sector. The fifth annual meeting of the Advisory Council took place on campus on May 15, 2003. The agenda was centered on the placement of future Master students, and the design of the benefits offered to Corporate Affiliates. Council members were pleased to note the continued success of the Center's programs.

Conclusion

Finance is important to Princeton's continued success as an educational and research institution because of increasing demands for training in these areas by our students at all levels and because these fields have become central to research efforts in diverse disciplines, including economics. As one of the world's leading research and teaching universities, Princeton has much to offer to the future development and effective application of finance, including distinguished academic programs that can provide support in such areas as operations research, mathematics and statistics, decision science, and organizational theory. It is not Princeton's objective to create a simulacrum of a business school. Rather, our strategy is to focus on those portions of the conventional business school curriculum in which it has existing strengths, such as fields that can be solidly grounded in analytical, discipline-based research, and emphasize interdisciplinary research. Indeed, research and teaching in finance with an essential interdisciplinary component constitutes the distinguishing feature of the BCF.

By helping to attract outstanding new faculty, by encouraging and supporting the work of existing faculty, and by bringing to campus outstanding scholars and practitioners from private industry, the Center continues to stimulate exciting new research, dialogue and collaboration. And through its educational programs, the Center enhances the education, training and career opportunities of many of the world's very best students.

Yacine Aït-Sahalia
Otto A. Hack '03 Professor of Finance and Economics
Director, Bendheim Center for Finance
August 2003

Dilip Abreu

Dilip Abreu is a Professor of Economics. His research interests include behavioral economics and finance, economic theory and game theory. He is a Fellow of the Econometric Society and a current member of it's Council, and a Fellow of the American Academy of Arts and Sciences. He received a B.A. from Bombay University, an M.Phil from Oxford University and a Ph.D. in Economics from Princeton.

Graduate Students advised:

- Attila Ambrus, " Coalitional Rationalizability"

Undergraduate students advised:

- Adam Nebesar, "Oil and War: New Methods for Estimating the Macroeconomic Effects of Oil Shocks, Using War in Iraq as a Case Study"
- Howard Deutsch, "On-Campus Recruiting as a Two-Sided Matching Problem or, How I Managed to Find a Job"

Representative publications:

- "Evolutionary Stability in a Reputational Model of Bargaining,", *Games and Economic Behavior,* forthcoming (with R. Sethi)."
- Bubbles and Crashes," *Econometrica* 71 (1), January 2003, pp. 173—204 (with M. Brunnermeier).
- "Synchronization Risk and Delayed Arbitrage," *Journal of Financial Economics* 66, pp. 341-360, December 2002 (with M. Brunnermeier).
- "Bargaining and Reputation," *Econometrica* 68 (1), January 2000, pp. 85-117 (with F.Gul).
- "On the Theory of Infinitely Repeated Games with Discounting," *Econometrica* 56(2), pp. 383-396, March 1988.

Yacine Aït-Sahalia

Yacine Aït-Sahalia is the Otto A. Hack '03 Professor of Finance and Economics and the Director of the Bendheim Center for Finance at Princeton University. He was previously a professor at the University of Chicago's Graduate School of Business. A past Sloan Research Fellow, he was named an outstanding faculty by Business Week's 1997 Guide to the Best Business Schools and is the recipient of the 1997 Michael Brennan Award, the 1998 Cornerstone Research Award and the 2001 FAME Research Award. He is a Fellow of the Econometric Society and a Research Associate for the National Bureau of Economic Research. He received his Ph.D. in Economics from MIT in 1993 and his undergraduate degree from France's Ecole Polytechnique.

Courses taught:

- ECO 575/FIN 575: Topics in Financial Economics

Graduate students advised:

- Ernst Schaumburg, "Maximum Likelihood Estimation of Levy Processes"
- Jialin Yu, "Saddlepoint Methods in Finance"

Representative publications:

- "Nonparametric Pricing of Interest Rate Derivative Securities," *Econometrica*, 1996.
- "Variable Selection for Portfolio Choice," *Journal of Finance,* 2001 (with Michael Brandt.)
- "Maximum-Likelihood Estimation of Discretely-Sampled Diffusions: A Closed-Form Approximation Approach," *Econometrica*, 2002.
- "Telling From Discrete Data Whether the Underlying Continuous-Time Model is a Diffusion," *Journal of Finance*, 2002.
- "The Effects of Random and Discrete Sampling When Estimating Continuous-Time Diffusions," *Econometrica*, 2003 (with Per Mykland).

Ben S. Bernanke

Ben S. Bernanke taught at the Stanford Graduate School of Business before coming to Princeton in 1985. He is currently on leave from his position as the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs. His research focuses primarily on monetary policy, the role of financial markets in the macroeconomy, and economic history. Bernanke is a Fellow of the Econometric Society, a Fellow of the American Academy of Arts and Sciences, a Research Associate of the National Bureau of Economic Research, and a Guggenheim Fellow. Ben took the oath of office as a member of the Board of Governors of the Federal Reserve System in August 2002; that term will expire January 31, 2004. He is the editor of the *American Economic Review*. He earned his Ph.D. from the Massachusetts Institute of Technology in 1979.

Representative publications:

- "Is Growth Exogenous? Taking Mankiw, Romer, and Weil Seriously," forthcoming in *NBER Macroeconomics Annual* 2001 (with Refet Gurkaynak).
- "Should Central Banks Respond to Movements in Asset Prices?", *American Economic Review*, May 2001 (with Mark Gertler).
- "Measuring Monetary Policy," *Quarterly Journal of Economics,* August 1998, vol. 113, no. 3, pp. 869-902 (with Ilian Mihov).

- *Inflation Targeting: Lessons from the International Experience*, 1998. Princeton: Princeton University Press (with Thomas Laubach, Frederic Mishkin, and Adam Posen).
- *Essays on the Great Depression*, 2000. Princeton: Princeton University Press.

Swati Bhatt

Swati Bhatt has been at Princeton since September 1992, teaching at the Woodrow Wilson School and in the Department of Economics. She obtained her Ph.D. in economics from Princeton University in 1986 and worked as a research economist at the Federal Reserve Bank of New York until 1990. She then taught at the Stern School of Business prior to joining Princeton in 1992. She is currently Director of Student Programs (undergraduate and graduate) at the Bendheim Center. Her research interests center on empirical corporate finance, venture capital and the entrepreneurship process.

Courses taught:

- ECO320: Financial Derivatives and Arbitrage
- WWS582: Topics in Financial Markets

Undergraduate students advised:

- Christian Bryzinski "Venture Capital in Germany: Innovation Stimulus or Ineffective American Imitator?" (awarded the prize for best international finance thesis in 2003)
- Marianne Yip, "Dangerous Liaisons: Do Investment Banking Relationships Affect the Objectivity of Research Analyst Recommendations and Earnings" (awarded 2nd prize for best finance thesis in 2003)
- Caroline Churchill, "Runaway CEOs: Executive Compensation and the Agency Problem"
- Michael Vaugh, "The Long-Term Performance of Internet IPOs: A Behavioral Finance Approach"
- Lauren Goldsmith, "Verizon: Will This Baby Grow Up To Replace Its Ma?"
- Jenna Mariano, "September 11, 2001: Tragic Market Failure in the Airline Industry"
- Gray Dougherty, "System Overload: An Analysis of Electricity Market Deregulation"
- Emily Yee, "Financial Contracting Theory Applied to Angel Investing" (awarded the prize for best finance thesis in 2001)
- Adam Saunders, "Calixa.com: Enhancing the Efficiency of Canadian Labor Markets" (awarded the prize for best thesis on Canadian markets in 2001)
- David Silverman, "A Real Options Valuation Model for Multi-State Venture Investing"
- Arjun Venkatraman, "Cisco Systems' Acquisition Strategy and its Effect on Shareholder Value"

David Blair

David Blair is Director of Corporate Relations for the Bendheim Center for Finance. Previously he had been a Managing Director with Morgan Stanley and, prior thereto, a partner in the law firm of White &

Case. His responsibilities with the Center include i) managing the Corporate Affiliates program which seeks support for the Bendheim Center from firms interested in finance and which works with corporations to build partnerships investigating financial topics of mutual interest, ii) advising undergraduates and Master in Finance candidates on career issues, including the development of applied finance programs and interview enhancement techniques for the Master in Finance program, iii) facilitating the recruiting activities of Corporate Affiliates by coordinating on campus recruiting presentations and organization of events at the Bendheim Center and iv) developing and teaching a special seminar in applied finance. He received his undergraduate degree from Princeton and graduate degrees in law and business from Columbia University.

Courses taught:

- Freshman Seminar FRS 124: Modern Financial Markets

Undergraduate students advised:

- Thomas Einhorn, "Deconstructing the Internet Bubble: A Case for Rational Exuberance"
- Cassidy Traub, "A Century and a Half of Global Investing: Is the Affair Over?"

Alan S. Blinder

Alan Blinder is the Gordon S. Rentschler Memorial Professor of Economics. He is also the Director of the Center for Economic Policy Studies at Princeton University, which he founded in 1989. He is former Vice Chairman of the Board of Governors of the Federal Reserve System (1994-1996) and before that was a member of President Clinton's original Council of Economic Advisers (1993-1994). He also served briefly as Deputy Assistant Director of the Congressional Budget Office in 1975. He is a partner in the Promontory Financial Group, Vice Chairman of the G7 Group, a Trustee of the Russell Sage Foundation, and has been elected to the American Philosophical Society and the American Academy of Arts and Sciences. He is the author or co-author of 17 books and has written scores of scholarly articles on topics such as fiscal policy, monetary policy, and the distribution of income. He received his Ph.D. from the Massachusetts Institute of Technology.

Courses taught:

- ECO 101: The National Economy
- WWS593a: The Political Economy of Central Banking

Graduate students advised:

- Wade Pfau, "Simulating Changes in Social Security Policy"

Representative publications:

- "Eight Steps to a New Financial Order," *Foreign Affairs*, September/October 1999, pp. 50-63.
- "Central Bank Credibility: Why Do We Care? How Do We Build It?", *American Economic Review*, December 2000.
- *The Fabulous Decade: Macroeconomic Lessons from the 1990s*, The Century Fund, 2001 (with Janet Yellen).
- *How Do Central Banks Talk?, Geneva Report on the World Economy No. 3*, International Center for Monetary and Banking Studies, 2001 (with C. Goodhart, P. Hildebrand, D. Lipton, and C. Wyplosz).
- *The Quiet Revolution: Central Banking Goes Modern*, Yale University Press, 2003.
- *Downsizing in America*, Russell Sage Foundation, 2003 (with W. Baumol and E. Wolff).

Patrick Bolton

Patrick Bolton is the John H. Scully '66 Professor of Finance and Economics at Princeton University. Professor Bolton has both a Ph.D. in Economics and a M.Sc. in Mathematical Economics and Econometrics from the London School of Economics. He is a Fellow of the Econometric Society, and a Fellow of CEPR, ECGI and NBER. He is a member of the Editorial Board of the *Review of Economic Studies*, the *Journal of Financial Intermediation*, and a previous member of the Editorial Boards of *Econometrica*, *Annales d'Economie et de Statistique* and *Economic Policy*. He is a managing editor of the *Journal of the European Economic Association (JEEA)* and a former Managing Editor of the *Berkeley Electronic Journals in Theoretical Economics* and the *Review of Economic Studies*. Professor Bolton's main research interests are in Contact Theory, Corporate Finance, Political Economy and Industrial Organization.

Courses taught:

- ECO512: Advanced Economic Theory
- ECO526: Graduate Corporate Finance
- ECO541: Industrial Organization

Graduate students advised:

- Ken Ayotte, "Essays on Bankruptcy"
- Mariagiovanna Baccara, "Essays on Information Leakage"
- Claudia Choi, "Essays in Financial Economics and Industrial Organization"
- Christopher Hennessy, "Agency Problems under Debt Finance"
- Gilat Levy, "Essays on Strategic Information Transmission"
- Galina Schwartz, "Two Game-Theoretic Essays on Contract Incompleteness, Contractual Enforcement and Investment Incentives"
- Joel Shapiro, "Inequality and Public Policy: Theoretical Investigations"
- Eric Wang, "Capital Structure, Taxes, and Inflation"
- Xiaodong Wu, "Three Essays on Multinational Firms"
- Jeongson Yun
- David Skeie

- Andrei Hagiu
- Chunhui Miao

Representative publications:

- "Predatory Pricing: Strategic Theory and Legal Policy," *The Georgetown Law Journal*, 88, 8, pp. 2239-2330, August 2000 (with Joseph Brodley and Michael Riordan).
- "The Great Divide and Beyond: Financial Architecture in Transition," *Journal of Economic Perspectives*, Vol. 16, No. 1, Winter 2002 (with Erik Berglof).
- "Political Intervention in Debt Contracts," *Journal of Political Economy*, 110, 1103-34, October 2002 (with Howard Rosenthal).
- "Strategic Experimentation," *Econometrica*, March 1999 (with Christopher Harris).

Markus Brunnermeier

Markus Brunnermeier is an Assistant Professor in the Department of Economics. He was awarded his Ph.D. by the London School of Economics (LSE), where he was also affiliated with its Financial Markets Group. His research focuses on stock market bubbles, limits to arbitrage and behavioral finance. His book *Asset Pricing Under Asymmetric Information* surveys the literature on bubbles, crashes, herding and technical analysis. His recent papers explain the persistence of bubbles. They show that sophisticated traders prefer to ride a stock market bubble rather than to attack it. His current research proposes a shift away from the "rational expectations paradigm" towards a general framework of "optimal expectations." His research won him a spot on the prestigious Review of Economic Studies Lecture Tour in 1999 and has been supported by grants from the National Science Foundation, the European Union, Economic & Social Research Council, and Economica.

Courses taught:

- FIN501: Asset Pricing I: Pricing Models and Derivatives

Representative publications:

- *Asset Pricing under Asymmetric Information: Bubbles, Crashes, Technical Analysis, and Herding*, Oxford University Press, January 2001.
- "Bubbles and Crashes," *Econometrica*, 2003, 71(1), pp. 173-204 (with Dilip Abreu).
- "Synchronization Risk and Delayed Arbitrage," *Journal of Financial Economics*, 2002, 66, pp. 341-360 (with Dilip Abreu).
- "Learning to Re-optimize Consumption at New Income Levels: A Rationale for Prospect Theory," *Journal of European Economic Association* (forthcoming).
- "Disclosure Requirements and Stock Exchange Listing in an International Context," *Journal of Accounting and Economics*, 1999, 1-3, pp. 237-269 (with John Hughes and Steven Huddar).

René Carmona

René Carmona, Paul Wythes '55 Professor of Engineering and Finance, is with the Department of Operations Research and Financial Engineering. As Director of Graduate Studies of the Bendheim Center, he is responsible for the Master Program in Finance. He joined Princeton University in 1995. He was granted the "Agregation" of Mathematics (federal degree) in June 1969, and a "These d'Etat" in Probability from the University of Marseille in June 1977. He was elected fellow of the Institute of Mathematical Statistics in 1984. He is a member of the American Mathematical Society, the Society for Industrial and Applied Mathematics and the Institute of Mathematical Statistics. His research interests center on stochastic partial differential equations, statistical analysis of financial data, pricing in incomplete markets, weather derivatives, and energy trading and risk management.

Courses taught:

- ORF 405: Regression and Time Series
- ORF504/FIN504: Financial Econometrics
- ORF 515: Stochastic Calculus & Financial Applications
- ORF 557: Malliavin Calculus and Applications to Finance

Undergraduate students advised:

- Alec Hanson, "Applications of the Malliavin Calculus to Finance"
- Imran Chaudary: "Modeling Extreme Rainfall in Lahore, Pakistan, Using Extreme Values Theory and Copulas"
- Greg Larkin, "Energy Risk Management for the University Power Plant"
- Bradley Morgan, "Designing Weather Derivatives: Hedging the Weather Risk for the Philadelphia Zoo"
- Alex Urdea, "Estimating Default Correlations"
- Brian Nachtigall, "Price Volatility Risk Management in the Ethanol Industry"
- David Nielsen, "The Correlation between SO2 Allowance Transactions and Emission Rates"

Master in Finance students advised:

- Dario Villani, "Weather Derivatives"
- David Steckl, "Principal Component Analysis for the Futures Markets"
- Gaetan Ciampini, "Gas Storage Valuation by Optimal Stochastic Control"
- Julio Cacho Diaz, "Affine Models for the Mexican Fixed Income Markets"

Ph.D. students advised:

- Albina Danilova, "Indifference Pricing for Weather Derivatives"
- Pavel Diko, "Stochastic Models for Weather Derivatives"
- Valdo Durrleman, "Pricing Spreads"

- Mike Ludkowski, "Convenience Yield: Estimation and Model Calibration"
- Julia Morrisson, "Extreme Value Distributions for Financial Applications"
- Anastasia Papavasiliou, "Particle Methods for Nonlinear Filtering and Financial Applications"
- Manuel Sales, "Credit Indexes and Calibration of Interest Rate Models"
- Michael Tehranchi, "Infinite Dimensional Analysis and Fixed Income Securities"
- Lixin Wang, "Applications of the Malliavin Calculus to the Analysis of Stochastic Partial Differential Equations"

Representative publications:

- "Pricing and Hedging Spread Options, *SIAM Review*, forthcoming (with V. Durrleman).
- "Pricing and Hedging Spread Options in a Log-normal Model," *The Journal of Computation Finance* (submitted, with V. Durrleman).
- "A Characterization of Hedging Portfolios for Interest Rate Contingent Claims," *Annals of Applied Probability*, forthcoming (with M. Tehranchi).
- "Optimal Multiple Stopping and Valuation of Swing Options," *Review of Financial Studies* (submitted, with N. Touzi).
- "Optimal Multiple Stopping of Linear Diffusions and Valuation of Swing Options, *Annals of Applied Probability* (submitted, with S. Dayanik).
- *Statistical Analysis of Financial Data in Splus.*
- "Interest Rate Models: From Parametric Statistics to Infinite Dimensional Stochastic Analysis," *SIAM*, Philadellphia (forthcoming).

Gregory Chow

Gregory Chow is Professor of Economics and Class of 1913 Professor of Political Economy, Emeritus, at Princeton University. He was Manager of Economic Research at the I.B.M. Thomas J. Watson Research Center from 1962-1970, and Director of the Econometric Research Program at Princeton University from 1970-1997. Professor Chow is a member of the American Philosophical Society and of Academia Sinica and a Fellow of the American Statistical Association and of the Econometric Society. He has served as Associate Editor or Co-editor of the *American Economic Review*, *China Economic Review*, *International Economic Review*, *Journal of Economic Dynamics and Control*, *MOCT-MOST*, and the *Review of Economics and Statistics*. Professor Chow's contributions to economics cover three main areas: 1) econometrics, including the often used "Chow test" for parameter stability, the estimation of simultaneous stochastic equations and criteria for model section; 2) dynamic economics, including spectral methods and optimal control methods for the analysis of econometric models and dynamic optimization under uncertainty as a constrained maximization problem to be solved by the method of Lagrange multipliers (replacing the method of dynamic programming); and 3) the Chinese economy in a theoretical quantitative approach to its study. He received his Ph.D. from the University of Chicago.

Course taught:

- ECO 340: The Chinese Economy

Undergraduate students advised:

- Caroline C. Lawler, "Are the Shanghai and New York Stock Exchanges Integrated? An Analysis of Volatility and Rate of Return"

Representative publications:

- *Dynamic Economics: Optimzation by the Lagrange Method*. New York: Oxford University Press, 1997.
- *China's Economic Transformation*. Oxford: Blackwell Publishers, 2002.
- "Equity Premium and Consumption Sensitivity when the Consumer-Investor Allows for Unfavorable Circumstances," *Journal of Economic Dynamics and Control*, vol. 26, nos. 9-10, August 2002, pp. 1417-1429 (with Lihui Zheng).
- "Accounting for Economic Growth in Taiwan and Mainland China: A Comparative Analysis," *Journal of Comparative Economics*, September 2002, pp. 507-530 (with Anloh Lin).
- "The Impact of Joining WTO on China's Economic, Legal and Political Institutions," *Pacific Economic Review*, vol. 9, no. 2, June 2003.

Erhan Çinlar

Erhan Çinlar first came to Princeton University as a Visiting Professor of Statistics in 1979-80. He is currently the Chair of Operations Research and Financial Engineering and also holds the Norman J. Sollenberger Professor of Engineering chair. He is a Fellow of the Institute of Mathematical Statistics, an elected member of the International Statistical Institute and is the recipient of the Science Prize of TUBITAK. He has served as editor or associate editor of over 12 journals on probability theory and its applications. His research interests center on martingales, Markov processes, stochastic differential equations, dynamic point processes, mass transport by stochastic flows, and their applications to mathematics of insurance and finance, reliability of complex systems, and modeling and estimation of natural hazards.

Courses taught:

- ORF 309: Proabability and Stochastic Systems
- ORF 526: Stochastic Modeling
- ORF 551/APC 521: Probability Theory
- ORF554: Markov Processes
- ORF 557: Stochastic Analysis Seminar

Undergraduate students advised:

- Adam Buchwald," "Option Valuation under Stochastic Stock Price Volatility: The Constant Elasticity of Variance Model"
- Richard Koshgerian, "Forecasting Professional Football Scores and Optimizing a Portfolio of Wagers on NFL Games"
- Benjamin Taylor, "Card Counting: A Case Study under the Current Atlantic City Rules"

Graduate students advised:

- Muammer Cakir, "Stochastic Tornado Modeling"
- Husnu Kipçak, "Semimarkov Processes in Finance"

Representative publications:

- "Dispersion of Particle Systems in Brownian Flows," *Advances in Applied Probability*, 28, 53-74, 1996 (with C.L. Zirbel).
- "Mass Transport by Brownian Flows," in *Stochastic Models in Geosystems*, edited by S. A. Molchanov. IMA Volumes in Mathematics and Its Applications, Springer-Verlag, 1996 (with C. L. Zirbel).
- "Spectral Expansion of the Occupation Measure for Birth and Death on a Flow," *Stochastic Processes and Their Applications*, 74, 203-215, 1998 (with J. Kao).
- "Lyapunov Exponents of Poisson Shot-Noise Velocity Fields," *Stochastic Processes and Their Applications*, 94, 29-49, 2001 (with M. Caglar).

Savas Dayanik

Savas Dayanik joined Princeton's ORFE Department in September 2002. His research interests center on applied probability, stochastic processes and modeling, optimal stopping, optimal stochastic control, with applications to finance, investment decision analysis and operations management. He received his Ph.D. from Columbia University in 2002 in Operations Research with concentration in Applied Probability. He received the first prize in the INFORMS 2002 George E. Nicholson Student Paper Competition in November 2002. He is a member of Institute for Operations Research and the Management Sciences (INFORMS), and Society for Industrial and Applied Mathematics (SIAM).

Kian Esteghamat

Kian Esteghamat is an Assistant Professor in the Department of Operations Research and Financial Engineering. His research interests center on security pricing and financial risk management. Current research activities include development of models for pricing and control of credit risk and valuation and investigation of investment strategies for capital assets. He received his Ph.D. from Stanford University in 1999.

Courses taught:

- ORF 245: Fundamentals of Engineering Statistics
- FIN 535 / ORF 535: Financial Risk Management
- ORF 572: Risk Management Seminar

Undergraduate students advised:

- David Green, "Arbitrage Valuation in Incomplete Markets: A Study of Employee Stock Options"
- Anjum Hususain, "A Comparative Analysis of Credit Risk Models and Their Implications for Capital Adequacy"
- Jeanne Lindsay, "The Value of Developed Real Estate using Real Options"
- Samuel Rosenberg, "Stochastic Models for Electricity Prices and Their Application to Valuation and Risk Management"
- Erin Tunstill, "The Influence of Nationally Recognized Statistical Rating Organizations: An Analysis of the Effects of Different Types of Moody's Rating Downgrades on the Equity Market"

Graduate students advised:

- Masahiko Egami, on synthetic credit derivatives
- Adrian Garcia, on estimating default processes

Representative publications:

- "A Boundary Crossing Model of Counterparty Risk," *Journal of Economic Dynamics and Control*, 2003, vol. 27/10, pp. 1771-1799.
- "Performance and Structure of the Chemical Industry under Regulation," in Arora, R. Landau, and N. Rosenberg, editors, *Chemicals and Long-Term Economic Growth: Insights from the Chemical Industry* (John Wiley & Sons: New York, 1998)

Damir Filipović

Damir Filipović was a Visiting Research Fellow at the Bendheim Center for Finance from February until April 2001. He then joined Operations Research and Financial Engineering department at Princeton University in February 2002 as an assistant professor. He received his Ph.D. from ETH Zürich in March of 2000. His research interests are stochastic finance, credit and interest rate risk, affine processes.

Courses taught:

- ORF515/FIN585: Stochastic Calculus for Engineering and Finance

- ORF527: Stochastic Calculus and Finance
- ORF555: Fixed Income Models

Representative publications:

- "Exponential-polynomial Families and the Term Structure of Interest Rates," *Bernoulli* 6, 2000, pp. 1-27.
- "Invariant Manifolds for Weak Solutions to Stochastic Equations," *Probability Theory Related Fields* 118, 2000, pp. 323-341.
- "A General Characterization of One Factor Affine Term Structure Models," *Finance and Stochastics* 5, 2001, 389-412.
- *Consistency Problems for Heath-Jarrow-Morton Interest Rate Models*, Lecture Notes in Mathematics, vol. 1760, Springer-Verlag, Berlin, 2001.
- "Markovian Term Structure Models in Discrete Time," *(with J. Zabczyk), Annals of Applied Probability* 12, 2002, pp. 710-729.
- "Separable Term Structures and the Maximal Degree Problem," *Mathematical Finance* 12, 2002, pp. 341-349.

Daniel Kahneman

Daniel Kahneman is the Eugene Higgins Professor of Psychology and Professor of Public Affairs in the Woodrow Wilson School since 1993. He is the co-recipient of the **2002 Nobel Prize in Economic Sciences.** He is a member of the National Academy of Sciences, and in 2002 received (together with his late colleague Amos Tversky) the prestigious Grawemeyer Award in Psychology. He is a Fellow of the American Academy of Arts and Sciences, the Econometric Society, the American Psychological Association and the Canadian Psychological Association. He is currently on the Editorial Boards of the *Journal of Behavioral Decision Making*, *Thinking and Reasoning*, and *Economics and Philosophy*. He received his Ph.D. in 1961 from the University of California.

Courses taught:

- PSY 101: Introduction to Psychology
- WWS 312/PSY 321: The Psychology of Decision Making and Judgment
- PSY528/WWS 519: Negotiation, Persuasion, and Social Influence: Theory and Practice
- WWS515/PSY 529: Conceptions of the Human Agent: Implications for Policy
- WWS 502: Psychology for Policy Analysis and Implementation

Representative publications:

- *Choices, Values and Frames,* New York: Cambridge University Press and the Russell Sage Foundation, summer 2000 (with A. Tversky).
- "Economic Preferences or Attitude Expressions? An Analysis of Dollar Responses to Public Issues," *Journal of Risk and Uncertainty,* 1999, 19, 220-242.

- *Well-Being: Foundations of Hedonic Psychology*, Russell Sage Foundation Press: New York, 1999 (ed. with E. Diener and N. Schwarz).
- "Does Living in California Make People Happy? A Focusing Illusion in Judgments of Life Satisfaction," *Psychological Science,* 9, 1998, pp. 340-346 (with D. Schkade).
- "Aspects of Investor Psychology," *The Journal of Portfolio Management,* 24, 1998, pp. 52-65 (with M. Riepe).

Robert Kimmel

Robert Kimmel received his Ph.D. in Finance from the University of Chicago, Graduate School of Business in 2001. Prior to that, he also received an M.B.A. from the University of Chicago, Graduate School of Business, concentrating in Analytic Finance and Econometrics; an M.S. in Computer Science from Columbia University; and a B.S.E. in Computer Science and Engineering from the University of Pennsylvania. His research interests are focused mainly on new approaches to term structure modeling and estimation of continuous time stochastic processes.

Courses taught:

- ECO 333: The Development and Use of Accounting Data
- ECO 415/FIN 515: Portfolio Theory and Asset Management
- FIN502: Corporate Finance and Financial Accounting

Undergraduate students advised:

- Mark Boey, "An Assessment of Technical Trading Rules in the Hong Kong Stock Market"
- Matthew Douglas, "Britain and the EMU: An Economic Analysis"
- Garth Fealey, "Repricing of the S&P 500 Index in Response to Macroeconomic Information"
- Jack Halliday, "Online Trading and Stock Market Volatility"
- Bryan Johnson, "The Perfect Storm 2000: Crisis Caused by the Convergence of Failures in California's Wholesale Electricity Market"
- Cameron Jones, "Napstered! The Digital Music Revolution and the Future of the Record Industry"
- Geoffrey Kao, "GenFashion. Using Online Auctions to Enhance Apparel Liquidation"
- Christopher Nam, "An ISP Pricing Game with Switching Costs"
- Josh Ordway, "Trouble from the Top: An Analysis of the Causes and Deterrents of Illegal Executive Activity"
- Donald Park, "International Transmission of Stock Market Corrections: A Study of Market Integration in Times of Financial Crisis"
- Craig Sarembock, "Baseball Economics: Causes of and Remedies for Competitive Imbalance in Major League Baseball"
- Karim Savul, "A Specification Test for the Internet Bubble"
- Douglas Scherrer, "Credit Default Swap Pricing Based on the Structure Credit Risk Model"

- Christopher Ward, "The Short-Term Relationship between Returns in U.S. Equity and Debt Markets: Theoretical Frameworks and Empirical Tests"

Representative publications:

- "Modeling the Term Structure of Interest Rates: A New Approach," *Journal of Financial Economics*, forthcoming.

Paul Krugman

Paul Krugman is the author or editor of dozens of books and several hundred articles, primarily about international trade and international finance. Krugman is also nationally known for his twice-weekly columns in *The New York Times*. He was the Ford International Professor of International Economics at the Massachusetts Institute of Technology and has served on the staff of the U.S. Council of Economic Advisers. He was the recipient of the 1991 John Bates Clark Medal, an award given every two years by the American Economic Association to an economist under 40. Krugman received his Ph.D. from Massachusetts Institute of Technology. He holds a joint appointment with the Economics Department and the Woodrow Wilson School of Public and International Affairs.

Courses taught:

- WWS524: Advanced Macroeconomics: Domestic Policy Issues

Undergraduate students advised:

- Guneet Banga, "The Economics of Crisis and Recovery: A Study of Thailand and Malaysia during the Asian Financial Crisis"
- Olympia McNerney, "The Crisis is Even Worse Than You Think: An Empirical Analysis of Recent Currency Crises in Developing Countries"
- Kristine Klaveness, "Economic Reasons Why Norway does not Enter the European Union: A Comparison with Sweden and Iceland"

Representative publications:

- *The Return of Depression Economics*, Norton, 1999.
- *The Spatial Economy*, MIT Press, 1999 (with M. Fujita and A. Venables).
- *Currency Crises* (ed.), University of Chicago Press, 2000.

Burton Malkiel

Burton Malkiel has been the Chemical Bank Chairman's Professor of Economics at Princeton since 1988. His research interests center on financial markets, asset pricing, and investment strategies. He is a regular

op-ed page writer for *The Wall Street Journal*. He also serves on the boards of several financial and non-financial corporations. He has been awarded the Honorary Doctor of Humane Letters Degree from the University of Hartford (June 1971), Phi Beta Kappa, and the Harvard Business School Alumni Achievement Award for 1984. He received his Ph.D. from Princeton University.

Courses taught:

- ECO 317: Financial Markets

Undergraduate students advised:

- Shaifali Aggarwal, "The Benefit of Diversifying Traditional Portfolios with Nontraditional Asset Classes"
- Julian Bynum, "In Search of Excess Risk-Adjusted Stock Returns: The Efficiency Market Hypothesis Revisited"

Graduate students advised:

- Aaron Husock, "Style and Size-Timing Models: Deconstructing Return Variation Across Market Segments"
- Adam Shwartz, "Stock Market Predictability Versus Efficient Markets: The Enhanced Indexing Synthesis"
- Basak Yeltekin, "Can Hedge Funds Beat the Market? A Study of Returns and Risks"

Representative publications:

- "Returns from Investing in Equity Mutual Funds 1971-1991," *Journal of Finance*, Vol. L, No. 2, June 1995, pp. 549-572.
- *Global Bargain Hunting: The Investor's Guide to Profits in Emerging Markets,* New York: Simon & Schuster, January 1998 (with J. P. Mei).
- *A Random Walk Down Wall Street,* W. W. Norton & Co., New York, 1999; 8th edition paperback, April 2003.
- "Have Individual Stocks Become More Volatile?" *Journal of Finance,* February 2001 (with John Campbell, Martin Lettau and Yexiao Xu). [First Prize paper for the Smith Breeden Prizes for 2002]
- "The Growth of Index Funds and the Pricing of Equity Securities," *Journal of Portfolio Management*, vol. 27, no. 2, Winter 2001 (with Aleksander Radisich). [Best Article for the Third Annual Bernstein Fabozzi/Jacobs Levy Awards]

John Mulvey

John Mulvey is Professor of Operations Research and Financial Engineering. He was the Director of Graduate Studies for that department during the 2002/2003 school year. His research interests center on

designing integrated financial planning systems for institutions (e.g. insurance companies, pensions plans) and individual investors; implementing asset-liability management systems for large organizations; combining financial optimization and stochastic models; stochastic optimization algorithms and decentralized risk management. He was a Finalist for the Edelman prize for Towers Perrin-Tillinghast investment system in 1999. He received his Ph.D. in Management from the University of California, Los Angeles.

Courses taught:

- ORF 523: Nonlinear Programming
- ORF 311: Optimization Under Uncertainty
- WWS 514: Financial Planning Models

Undergraduate students advised:

- Chris Connolly
- Jon Nuger

Graduate students advised:

- Taisuke Sughino, "Multi-period Stochastic Programs for International Fixed Income Investments under Liability Constraints"
- Koray Simsek, "Integrating Pension and Financial Planning."
- Batur Bicer, "Style Analysis of Financial Organizations."
- Gaye Erkan, "Decentralized Risk Management for Global Financial Companies."
- Cenk Ural, "Applying Stochastic Optimization for Statistical Arbitrage Investment Strategies."
- Jamey Thompson, "Optimizing Non-parametric Scoring Models in Finance."
- Z. Zhang, "Stochastic Programming Models for Rebalancing Investment Portfolios."

Representative publications:

- "Advantages of Multiperiod Portfolio Models," *Journal of Portfolio Management*, Winter 2003 (with W. Pauling and R. Madey).
- "A Stochastic Network Approach for Integrating Pension and Corporate Financial Planning," *Innovations in Financial and Economic Networks*, 2003 (with K. Simsek and W. Pauling).
- "Rebalancing Strategies for Long-term Investors," *Computational Methods in Decision Making, Economics and* Finance, 2002 (with K. Simsek).
- "Trend-Following Hedge Funds and Multi-period Asset Allocation," *Quantitative Finance*, 2002 (with D. Darius, A. Ilhan, K. Simsek, and R. Sircar).
- "Rebalancing Strategies for Multi-period Asset Allocation," *Wealth Magazine*, Fall 2001 (with N. Lu and J. Sweemer).
- "Financial Optimization," *Encyclopedia of Optimization* (C. Floudas and P. Pardalos, editors), Kluwer, 2001 (with B. Shetty).

Jonathan Parker

Jonathan A. Parker is an Assistant Professor of Economics and Public Affairs at Princeton University where he is affiliated with the Department of Economics, the Bendheim Center for Finance, and the Woodrow Wilson School of Public and International Affairs. Dr. Parker received his Ph.D. in economics from the Massachusetts Institute of Technology where he was awarded the Robert Solow Endowment Prize for excellence in research and teaching. Prior to his present position at Princeton, Dr. Parker held positions at the University of Michigan Business School, where he was a Society of Scholars Fellow, and at the Department of Economics at the University of Wisconsin, where he was the Maude P. and Milton J. Shoemaker Fellow. Since coming to Princeton, Professor Parker has been named an Alfred P. Sloan research fellow and a National Bureau of Economics Aging and Health Economics Fellow, and his research receives support from the National Science Foundation. He is also a National Bureau of Economic Research Faculty Research Fellow, an Associate Editor for the *Journal of Money Credit and Banking*, and a member of the American Economic Association and Econometric Society. Professor Parker's research focuses on the macroeconomics of consumption, saving, and investment. His work develops, estimates, and tests the central implications of economic models, taking into account the potential richness of the real world and possible weaknesses of the available data. His research has addressed: how wages adjust in recessions; the extent to which tax cuts stimulate consumption spending; how the saving behavior of households is altered by income risk; what has caused the decline in the U.S. saving rate; how to measure the risk of the stock market and judge the appropriateness of the average return on equity; and the impact of taxes on retained corporate earnings on economic growth.

Courses taught:

- ECO503: Macroeconomic Theory I
- ECO521: Advanced Macroeconomics I
- ECO562: Topics in Development
- WWS512c: Macroeconomic Analysis Advanced

Representative publications:

- "Consumption Over the Life Cycle," *Econometrica*, 70(1), January 2002, pp. 47-89 (with P. O. Gourinchas).
- "The Consumption Risk of the Stock Market," *Brookings Papers on Economic Activity*, 2, 2001, pp. 279-348.
- "Spendthrift in America? On Two Decades of Decline in the U.S. Saving Rate," in B. Bernanke and J. Rotemberg, eds., *NBER Macroeconomics Annual*, 1999, pp. 317-70.
- "The Reaction of Household Consumption to Predictable Changes in Social Security Taxes," *American Economic Review*, 89(4), September 1999, pp. 959-973.
- "Measuring the Cyclicality of Real Wages: How Important is the Composition Bias?" *Quarterly Journal of Economics*, 109(1), February 1994, pp. 1-25 (with G. Solon and R. Barsky).

Hélène Rey

Hélène Rey received her Ph.D. from the London School of Economics and from the Ecole de Hautes Etudes en Sciences Sociales in 1998. She first came to Princeton as a Visiting Scholar in April 1998; she returned in 2000 as an Assistant Professor. She is currently a Faculty Research Fellow in International Finance and Macroeconomics for the National Bureau of Economic Research. She is also a Research Affiliate in International Macroeconomics for the Centre for Economic Policy Research. Her research interests focus mainly on iinternational capital flows, exchange rates and financial crises.

Courses taught:

- WWS544: International Macroeconomics
- ECO552: International Monetary Theory and Policy
- ECO553: International Monetary Theory and Policy II

Graduate students advised:

- Monica De Bolle
- Alejandro Justiniano
- Deniz Igan

Representative publications:

- "International Trade and Currency Exchange," *Review of Economic Studies* 68(2), April 2001.
- "Financial Integration and Asset Returns," *European Economic Review*, 44(7), June 2000 (with P. Martin).
- "Exchange Rates, Equity Prices and Capital Flows," NBER Working Paper 9398, CEPR DP 3735, 2002 (with Harald Hau).

Ailsa Roell

Ailsa Roell has been a Senior Research Economist in the Department of Economics at Princeton University since 1997. She did her graduate studies at Johns Hopkins University in the Department of Political Economy. She was a postdoctoral associate at MIT, a lecturer in economics at the London School of Economics, a chercheur FNRS and chargée de cours at Université Libre de Bruxelles, and a professor of finance at Tilburg University. She was awarded the BACOB prize for European research in finance (joint with Marco Pagano) in 1997. Her current research interests are the competition among exchanges in attracting listings and liquidity, and corporate governance issues.

Courses taught:

- ECO 412: Trading and Securities Markets

- ECO 416: Topics in Corporate Finance, Corporate Governance and Banking

Undergraduate students advised:

- Tyler Wren, "The Pennsylvania New Economy Tax Credit Program: A Proposal to Help Pennsylvania Retain More College Graduates"
- Dustin Kuehn, "The Ins and Outs of 403(b) and 457 Defined Contribution Plans: Making a Solid Tax-Deferred Retirement Investment"

Representative publications:

- "The Choice of Stock Ownership Structure: Agency Costs, Monitoring and Liquidity," *Quarterly Journal of Economics*, 1998 (with Marco Pagano).
- "Blockholdings in Europe: An International Comparison," co-author Marco Becht, *European Economic Review* (1999).
- "Ownership and Control in the Netherlands," co-authors A. de Jong, R. Kabir and T. Marra, forthcoming in F. Barca and M. Becht (eds.), *Ownership and Control: A European Perspective*.
- "The Geography of Equity Listing: Why Do European Companies List Abroad?" *Journal of Finance* 57:6, December 2002 (co-authored with Macro Pagano and Josef Zechner).
- "Market Making with Costly Monitoring: An Analysis of the SOES Controversy," *Review of Financial Studies*, 2003 (co-authored with Thierry Foucault and Patrik Sandas).
- "Corporate Governance and Control," in G. Constantinides, M. Harris and R. Stulz (eds.), *Handbook of the Economics of Finance*, forthcoming, North-Holland 2003 (co-authored with Marco Becht and Patrick Bolton).

José Scheinkman

José Scheinkman joined Princeton as the Theodore Wells '29 Professor of Economics in 1999. He received an M.S. in Mathematics from the Instituto de Matemática Pura e Aplicada, Brazil, and an M.A. and a Ph.D. in Economics from the University of Rochester. Scheinkman is a fellow of the American Academy of Arts and Sciences and of the Econometric Society, and a "docteur honoris-causa" from the University of Paris-Dauphine. From 1973 to 1998 he taught at the University of Chicago, where he was from 1995 to 1998 the Chairman of the Economics Department, and since 1997 the Alvin H. Baum Distinguished Service Professor of Economics. From June 1987 to December 1988 Scheinkman was Vice President, Financial Strategies Group, Goldman, Sachs & Co. He has been a visiting professor at Princeton University, University of Paris-Dauphine, Instituto de Matemática Pura e Aplicada and E.P.G.E. (Brazil). During 2002, Scheinkman held a Blaise Pascal Research Chair (France). His current research interests are the study of asset-price bubbles, developing tools for empirical studies of asset markets, and the economics of social interactions.

Courses taught:

- ECO 526: Finance Theory II

Undergraduate students advised:

- Whitney Birdwell, "Risky Business: The 'Hot Issue' Market of the Late 1990's"
- Christopher Burnham, "The Economic Transmission of Inequality"
- Lauren Cabral, "An Empirical Analysis of the Long Run Performance of Initial Public Offerings & Seasoned Equity Offerings"
- Ian Heavers, "Geographic Proximity to Investment: A Study of U.S. Venture Funds"
- Scott Phillips, "An Analysis of Market Efficiency for Nasdaq Stocks in the 1990's: Do Investors Rationally Incorporate New Information into Securities Valuations?"

Representative publications:

- "Non-Market Interactions," in *Advances in Economics and Econometrics: Theory and Applications, Eight World Congress*, M. Dewatripont, L. P. Hansen, and S. Turnovsky (eds.), Cambridge University Press, 2002 (with Edward Glaeser).
- "Optimal Environmental Management in the Presence of Irreversibilities," *Journal of Economic Theory*, January 2001 (with Thaleia Zariphopoulou).
- Financial Intermediation without Exclusivity," *American Economic Review*, May 2001 (with Tano Santos).
- "Measuring Social Interactions," in *Social Dynamics*, S. Durlauf and P. Young, (eds.), MIT Press, Cambridge, 2001 (with Edward Glaeser).
- "Competition among Exchanges," *Quarterly Journal of Economics,* August 2001, pp. 1027-1062 (with Tano Santos).

Christopher Sims

Christopher Sims has been Professor of Economics at Princeton University since 1999. He received his Ph.D. from Harvard in 1968. He taught in the Economics Department of the University of Minnesota from 1969 to 1990, then moved to Yale where he taught from 1990 to 1999. He is a member of the National Academy of Sciences and a Fellow of the Econometric Society, for which he has also served as president and as a co-editor of *Econometrica*. He has intermittently served as adviser, consultant, and visitor to several regional Federal Reserve Banks. He has worked on econometric methods, economic theory, and empirical work, mostly related to macroeconomics and monetary policy.

Representative publications:

- "The Precarious Fiscal Foundations of EMU," *De Economist* 147(4), 1999, pp. 415-436.
- "Error Bands for Impulse Responses," *Econometrica* 67(5), 1999, pp. 1113-1156 (with Tao Zha).
- "The Role of Models and Probabilities in the Monetary Policy Process," *Brookings Papers on Economic* Activity, 2002(2), pp. 1-60.

- "What Does Monetary Policy Do?", *Brookings Papers on Economic Activity* 2, 1996, pp. 1-63 (with Eric Leeper and Tao Zha).
- "Rational Inattention," *Journal of Monetary* Economics, 50(3), April 2003.

K. Ronnie Sircar

Ronnie Sircar received his doctorate in 1967 from Stanford University. He taught for three years at the University of Michigan in the Department of Mathematics before coming to Princeton's ORFE Department as an Assistant Professor. He has been the recipient of National Science Foundation Research Grants during the period 1998-2003. He was a first-time recipient of the E-Council Excellence in Teaching Award for his teaching spring term 2002. His research interests center on stochastic models in finance, particularly for market volatility and also on optimization under volatility uncertainty.

Courses taught:

- ORF335/ECO335: Introduction to Financial Engineering
- ORF512: Stochastic Modeling
- ORF515: Stochastic Calculus for Finance & Engineering

Graduate students advised:

- Aytac Ilhan
- Dries Darius

Representative publications:

- *Derivatives in Financial Markets with Stochastic Volatility*, Cambridge University Press, 2000.
- "Trend-Following Hedge Funds and Multi-Period Asset Allocation," *Quantitative Finance* 2 (5), October 2002.
- "Optimal Investment Problems and Volatility Homogenization Approximations," in *Modern Methods in Scientific Computing and Applications*, A. Bourlioux, M. Gander & G. Sabidussi (eds.), NATO Science Series II, vol. 75, Kluwer, August 2002.
- "Partial Hedging in a Stochastic Volatility Environment," *Mathematical Finance* 12(4), October 2002.
- "Stochastic Volatility Corrections for Interest Rate Derivatives," *Mathematical Finance*, 2003
- "Singular Perturbations in Option Pricing," *SIAM Journal on Applied Mathematics*, 2003..

Kenneth Steiglitz

Kenneth Steiglitz received his doctorate in 1963 from New York University and has been teaching at Princeton ever since. He was promoted to associate professor in 1967 and professor in 1973. He is a Fellow of the IEEE (1981), a Fellow of the ACM (1997) and has been awarded the Technical Achievement Award of the Signal Processing Society (1981), the Signal Processing Society Award (1986), the IEEE

Centennial Medal in 1984, the School of Engineering Distinguished Teacher Award in 1997 and the IEEE Third Millennium Medal in 2000. His research interests are in agent-based modeling of markets and auctions, and in computing using soliton collisions.

Courses taught:

- COS 444: Electronic Auctions
- COS 323: Computing for the Physical and Social Sciences
- COS 576: Nonstandard Computation

Undergraduate students advised:

- Aaron Sarfatti, "An Agent-Based Market Simulation"
- George Reis, "An Auction Simulator for the Study of Competitive and Profit-Maximizing Auctions"
- Eric Lasceles, "Commodities vs. Collectibles on eBay"

Graduate students advised:

- M. J. Jakubowski, "Computing with Solitons in Bulk Media"

Representative publications:

- "The Spite Motive and Equilibrium Behavior in Auctions," *Contributions to Economic Analysis & Policy*, vol. 2, No. 1, Article 5, 2003 (with J. Morgan and G. Reis).
- "Effects of Price Signal Choices on Market Stability," *Journal of Economic Behavior and Organization*, vol. 1530, 2003, in press (with H. Mizuta and E. Lirov).
- "Simulating the Madness of Crowds: Price Bubbles in an Auction-Mediated Robot Market," *Computational Economics*, vol. 12, pp. 35-59, 1998 (with D. Shapiro).
- "Collisions of Two Solitons in an Arbitrary Number of Coupled Nonlinear Schroedinger Equations," *Phys. Rev. Lett.*, in press (with M. Soljacic, S. Sears, M. Segev, M. Jakubowski, and R. Squier).
- "Computing with Solitons: A Review and Prospectus," *Multiple-Valued Logic*, vol. 6, nos. 5-6, pp. 439-462, 2001. Also, Chapter 10 in *Collision-Based Computing*, Adamatzky (ed.), Springer, 2002 (with M. H. Jakubowski and R. K. Squier).

Lars Svensson

Lars E. O. Svensson joined the Economics Department in the fall of 2001. He had been Professor of International Economics at the Institute for International Economic Studies, Stockholm University, since 1984. He has published extensively in scholarly journals on monetary economics and monetary policy, exchange rate theory and policy, and general international macroeconomics. He has lectured and visited at universities, central banks and international organizations in many countries. He is a member of the

Prize Committee for the Alfred Nobel Memorial Prize in Economic Sciences, a member of the Royal Swedish Academy of Sciences, a member of Academia Europae, a foreign member of the Finnish Academy of Science and Letters, a foreign honorary member of the American Academy of Arts and Sciences, a fellow of the Econometric Society, a research associate of the National Bureau of Economic Research, and a research fellow of the Centre for Economic Policy Research, London. He was a member of the Prize Committee for the Alfred Nobel Memorial Prize in Economic Sciences through 2002 and its chair during 1999-2001. He is active as advisory to Sveriges Riksbank (Bank of Sweden) and regularly consults for international, U.S. and Swedish agencies and organizations. In 2000-2001 he undertook a review of monetary policy in New Zealand, commissioned by the New Zealand government. In 2002 he chaired a committee evaluating monetary policy in Norway.

Courses taught:

- ECO 504: Macroeconomic Theory II
- ECO 553: International Monetary Theory and Policy II

Undergraduate students advised:

- Peter Lee, "Banking and the Welfare State: A Study of Two Crises Rooted in Banking, Politics and Regulation"
- Brian O'Toole, "Revitalizing Japan: Japanese Reforms Based on Swedish Experience"
- Basak Yeltekin, "Hard Peg or Clean Float"

Graduate students advised:

- Giovanni Favara, Institute for International Economic Studies, Stockholm University
- Alessandro Flamini, Graduate Institute of International Studies, Geneva
- Alejandro Justiniano, "Sources and Propagation Mechanisms of Foreign Disturbances in Small Open Economies: A Dynamic Factor Analysis"
- Fabio Milani
- Bruce Preston, "Adaptive Learning and the Use of Forecasts in Monetary Policy"
- Giorgia Primiceri
- Andrea Tambalotti, "Optimal Monetary Policy and Productivity Growth"
- Thomas Wu

Representative publications:

- "New Techniques to Extract Market Expectations from Financial Instruments," *Journal of Monetary Economics* 40 (2), 1997, pp. 383-429 (with Paul Söderlind, Stockholm School of Economics).
- "Inflation Targeting as a Monetary Policy Rule," *Journal of Monetary Economics* 43, 1999, pp. 607-654.
- "The Zero Bound in an Open-Economy: A Foolproof Way of Escaping from a Liquidity Trap," *Monetary and Economic Studies* 19 (S-1), February 2001, pp. 277-312.

- "Transparency and Credibility: Monetary Policy with Unobservable Goals," *International Economic Review* 42, 2001, pp. 369-397 (with Jon Faust, Federal Reserve Board).
- "Eurosystem Monetary Targeting: Lessons from U.S. Data," *European Economic Review* 46, 2002, pp. 417-442 (with Glenn Rudebusch, Federal Reserve Board).

Erik VanMarcke

Erik VanMarcke is Professor of Civil and Environmental Engineering. He was on the faculty of the Massachusetts Institute of Technology until 1985, since receiving his doctorate there in 1970. At MIT, he was the Gilbert W. Winslow Career Development Professor and served as the Director of the Civil Engineering Systems Methodology Group. He held visiting appointments at Harvard University and the University of Louvain (Belgium), his undergraduate alma mater, and was the Shimizu Corporation Visiting Professor at Stanford University. His principal expertise is in engineering risk assessment and applied systems science. He authored *Random Fields: Analysis and Synthesis*, published by the MIT Press, and extended this work to modeling space-time processes and complex systems. He won several research prizes of the American Society of Civil Engineers, was awarded a Senior Scientist Fellowship from the Japanese Society for the Promotion of Science, and is a foreign member of the Royal Academy of Arts and Sciences of Belgium.

Courses taught:

- CEE 360 & 548: Risk Assessment and Management
- CEE 558: Random Fields and Random Media

Undergraduate students advised:

- Rolando Amaya, "Assessing and Reducing the Risk of Terrorist Attacks on Municipal Water Distribution Systems"
- Harris H. Syed, "The Pakistan Stock Market: Efficiency, Return and Beyond"
- Geoffrey P. Adamson, "Catastrophic Risk of Florida Landfalling Hurricanes: The Effect of El Nino on Financial Engineering Applications"
- Allison L. Smitten, "Cost-Effectiveness Models and Decision Analysis in Health and Medicine"

Graduate students advised:

- Nan Ding, "Enterprise Risk Management: Applications in Software Development and Data Security"

Representative publications:

- *Acceptable Risk Processes: Lifelines and Natural Hazards*, Monograph No. 21, Council on Disaster Reduction and Technical Council on Lifeline Earthquake Engineering, Published by the American Society of Civil Engineers, ISBN 0-7844-0623-5, March 2002 (with C. Taylor).
- "Evaluating Models of Risks from Natural Disasters for Insurance and Government," in *Paying the Price: The Status and Role of Insurance against Natural Hazards in the United States*, Eds. R. Roth & H. Kunreuther, Joseph Henry Press (N.A.S.), pp. 239-249, 1999 (with C. Taylor and J. Davis).
- *Random Fields: Analysis and Synthesis,* The MIT Press, 1983; Second (Web) Edition by Rare Book Services, Princeton NJ, 1998; see www.princeton.edu/evm/.
- *Quantum Origins of Cosmic Structure,* A.A. Balkema Publishers, Rotterdam, The Netherlands & Brookfield, VT, 1997.

Mark Watson

Mark Watson is Professor of Economics and Public Affairs in the Economics Department and the Woodrow Wilson School. His research interests include Econometrics, Macroeconomics and Forecasting. He is a research associate at the National Bureau of Economic Research and a Fellow of the Econometric Society. He has been awarded National Science Foundation Research Grants from 1982-2004 and has received the Galbraith Award for Graduate Teaching in 1986. He holds a Ph.D. in Economics from the University of California, San Diego and his past credentials include posts at Northwestern University and Harvard University.

Courses taught:

- WWS507b: Quantitative Analysis
- Economics 513: Advanced Econometrics: Time Series Models

Representative publications:

- "Forecasting Using Principal Components from a Large Number of Predictors," *Journal of the American Statistical Association*, 2003 (with James H. Stock).
- "Macroeconomic Forecasting Using Many Predictors." in *Advances in Economics and Econometrics* (Dewatripont/Hansen/Turnovsky editors) Cambridge University Press, 2002.
- "Has the Business Cycle Changed and Why?" *NBER Macroeconomics Annual 2002*, Mark Gertler and Ken Rogoff (eds.) (with James H. Stock).

Michael Woodford

Michael Woodford is the Harold H. Helm '20 Professor of Economics and Banking. He received a J.D. from Yale Law School in 1980 and his Ph.D. in Economics from the Massachusetts Institute of Technology in 1983. He taught at Columbia University and the University of Chicago before joining the Princeton faculty in 1995, and is also a Fellow of the Econometric Society and Research Associate of the National Bureau of Economic Research. He was awarded a John Simon Guggenheim Fellowship in 1998-99. He has written extensively in the areas of intertemporal general equilibrium theory, business cycle theory, and monetary economics. His current research deals primarily with the theory of monetary policy. On leave 2002-03.

Undergraduate students advised:

- Jill Wong, "Monetary Policy and the Effects of Terms-of-Trade Shocks: A VAR Analysis of Singapore and New Zealand"
- Jonathan Meer, "Optimal Capital Taxation in a Model with Heterogeneous Agents"

Graduate students advised:

- Gauti Eggertsson, "Policies to Deal with a Liquidity Trap"
- Bruce Preston, "Monetary Policy and Learning"
- Andrea Tambalotti, "Optimal Monetary Policy and Technological Progress"

Representative publications:

- *Handbook of Macroeconomics,* Amsterdam: North-Holland, 3 volumes, 1999 (Editor, with J. B. Taylor).
- "Fiscal Requirements for Price Stability," *Journal of Money, Credit and Banking*, August 2001.
- "How Forward-Looking is Optimal Monetary Policy?" (with L. E. O. Svensson), *Journal of Monetary Economics*, forthcoming 2003.
- "The Zero Interest-Rate Bound and Optimal Monetary Policy," *Brookings Papers on Economic Activity*, forthcoming, 2003 (with G. B. Eggertson).
- "Optimal Monetary and Fiscal Ppolicy: A Linear-Quadratic Approach," *NBER Macroeconomic Annual*, forthcoming 2003 (with P. Benigno).
- *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton: Princeton University Press, forthcoming 2003.

Wei Xiong

Wei Xiong is an Assistant Professor in the Economics Department. He received his Ph.D. from the Fuqua School of Business, Duke University, in 2001. His research interests center on speculative bubbles, financial market crisis, executive stock options and behavioral finance. His recent papers provide a framework to analyze speculative behavior of investors and its implications for stock price dynamics and

managerial incentives. His earlier papers analyze the contagion and market liquidity during the Long-Term Capital Management crisis. He has been invited by the *Review of Economic Studies* to present his research on its annual European tour in 2000.

Courses taught:

- ECO 320: Financial Derivatives and Arbitrage
- ECO S500: Mathematics for Economists

Undergraduate students advised:

- Yishan Cao, "An Empirical Study of News Events and Stock Price Comovement: 1997-2001"
- Whitney Lamberson, "Long-Term Capital Management: From Riches to Rags"

Representative publications:

- "Convergence Trading with Wealth Effects," *Journal of Financial Economics*, 2001 (with Albert S. Kyle).
- "Contagion as a Wealth Effect," *Journal of Finance*, 2001 (with Albert S. Kyle).
- "Overconfidence and Speculative Bubbles," *Journal of Political Economy*, 2003 (with José Scheinkman).

Visiting Faculty

During the academic year 2002-03, the BCF welcomed the following visiting faculty:

Franklin Allen is currently the Co-Director of the Wharton Financial Institutions Center and Nippon Life Professor of Finance and Economics at the University of Pennsylvania. He is also the Director of The Corporation for the Relief of the Widows and Children of the Widows and Children of Clergymen in the Communion of the Protestant Episcopal Church in the Commonwealth of Pennsylvania. His research interests are in the areas of corporate finance, asset pricing, comparing financial systems, and financial crises. He is Advisory Editor of *Journal of Financial Markets* and *Journal of Financial Services Research*, and Associate Editor of *Financial Management* and *Journal of Financial Intermediation*.

Courses taught:

- ECO 318: Corporate Finance
- ECO 575/FIN 575: Topics in Financial Economics

Representative publications:

- "A Theory of Dividends Based on Tax Clienteles," *Journal of Finance*, 55, pp. 2499-2536, 2000 (joint with Antonio Bernardo and Ivo Welch).
- "Financial Contagion," *Journal of Political Economy*, 108, pp. 1-33, 2000 (joint with D. Gale).
- "Bubbles and Crises," *Economic Journal*, 110, pp. 236-255, 2000 (joint with D. Gale).
- *Comparing Financial Systems*, MIT Press, 2000 (with D. Gale).
- "Finance Applications of Game Theory," in *Advances in Business Applications of Game Theory*, edited by K. Chatterjee and W. Samuelson, Kluwer Academic Publishers, Boston, 2001, pp. 17-48 (with S. Morris).

Harrison Hong is joining Princeton in 2003 as a Professor of Economics and Finance after having spent the year visiting us from the Graduate School of Business at Stanford University. Harrison's interests focus on behavioral finance, asset pricing with differences of opinion and short-sales constraints, asset pricing with market imperfections, career concerns and herding, social interaction and investor behavior in stock markets, and mutual funds. He is a member of the American Economic Association, American Finance Association, and the Western Finance Association. He received his Ph.D. from MIT in 1997.

Course taught:

- ECO415/FIN515: Portfolio Theory and Asset Management

- ECO 525: Financial Economics I

Representative publications:

- "Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies," *Journal of Finance*, February 2000.
- "Security Analyst Career Concerns and Herding of Earnings Forecasts," *Rand Journal of Economics*, Spring 2000.
- "A Model of Returns and Trading in Futures Markets," *Journal of Finance*, April 2000.
- "A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets," *Journal of Finance*, December 1999.

Louis LeGuyader

Louis P. LeGuyader is a Visiting Lecturer in the Department of Economics and has been associated with the Bendheim Center for Finance since 2003. He was previously an adjunct Assistant Professor at Columbia Business School, Columbia University, where he offered courses in introductory accounting and accounting for derivatives. At Columbia he was the Coopers and Lybrand Scholar and a Chazen Institute research award winner; prior to that he was a member of the Price Waterhouse program at Cornell University's Johnson School. He has pursued his academic and professional interest in the fields of risk management, capital markets and financial instruments for over 25 years. At PricewaterhouseCoopers he was a founding member of the firm's Financial Risk Management Group and a member of the firm's National Office for Accounting Policy. At BNP-Paribas and AG Becker he was a senior banker in the bank's international capital markets group. He received his Ph.D. from Columbia in 1998, his M.B.A. from the University of Virginia in 1981 and his A.B. from Princeton in 1977. He holds a CPA (New York) and is a member of the American Accounting Association and the American Institute of Certified Public Accountants.

Courses taught

- ECO 333: Financial Accounting
- WWS 582e: The Accounting and Management Process in the Public Sector

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John Quigley began teaching at Princeton in 2001. His *Venture Capital & Private Equity Investing* (ECO 417/FIN 517) seminar is offered in the fall semester for seniors and M.Fin. students. Mr. Quigley has been part of the Princeton community since 1995, when he helped launch Nassau Capital, the independent firm established to manage the private investment program of the University's endowment. Mr. Quigley has an extensive background in private equity and venture capital. He began his career in 1980 as an attorney with Kirkland & Ellis in Chicago. A few years later, Mr. Quigley left Kirkland to be a founder of LBO sponsor Adler & Shaykin, where he was a partner throughout the 1980s leveraged buyout boom. As the 1990s commenced, Mr. Quigley took an "academic sabbatical" as a Ph.D. candidate in an interdisciplinary economics program at Columbia. He returned to the investment business in 1992 (alas, with dissertation unfinished…) to help establish Clipper Capital Partners, an independent merchant

banking fund sponsored by Crédit Suisse First Boston. He was with Clipper until the formation of Nassau Capital in 1995. Mr. Quigley has headed Nassau's direct investment program since the firm's inception, investing in a broad range of growth equity, buyout, recapitalization and venture capital transactions. Mr. Quigley is a graduate of Georgetown (A.B., *summa cum laude*, 1976), Stanford (J.D., M.B.A., 1980) and Columbia (M.Phil., 1992). He is presently on the boards of KMC Telecommunications, Inc. (Vice Chairman), Comphealth Inc., Dry Bulk Shipping (BVI) Limited and The Audax Group, and has previously served as a director of companies in the specialty retailing, equipment rental, pharmaceuticals, coal mining machinery and newspaper publishing business. Prior to teaching at Princeton, Mr. Quigley had taught MBA and law students for over ten years as an adjunct faculty member at NYU's Stern School of Business and Columbia Law School. He is a member of the Georgetown College Board of Advisors and the Stanford Law School Dean's Strategic Council.

Courses taught:

- ECO 417/FIN 517: Venture Capital and Private Equity

Undergraduate students advised:

- Ashley Heise, "Private Equity: An Evolutionary Analysis of the Market and Decision Making"

O. Griffith Sexton was, until 1995, a Managing Director of Morgan Stanley and Director of the Corporate Restructuring Group within the firm's Financing and Advisory Services Department. Mr. Sexton graduated from Princeton University in 1965. Following six years of service as an aviator in the U.S. Navy, he attended the Stanford Graduate School of Business where he received his MBA. He joined Morgan Stanley in 1973 and spent his career there involved in a broad range of the firm's financing and advisory activities. In May 1995 Mr. Sexton became an active Advisory Director of Morgan Stanley. In September 1995, Mr. Sexton became an Adjunct Professor at Columbia University's Graduate School of Business, teaching two courses in the subject of Corporate Finance. In the spring of 2000, he became a Visiting Lecturer at Princeton University. Mr. Sexton is a Director of Investor AB, a publicly traded company based in Stockholm, Sweden.

Courses taught:

- ECO 419/FIN 519: Corporate Restructuring

Visiting Fellows

The Center welcomed the following visiting fellows during the academic year 2002-03:

Patrick Cheridito

Patrick Cheridito received his PhD from ETH Zurich (Switzerland) in 2001 and visited universities in Vienna (Austria), Paris (France), Barcelona (Spain) and Pisa (Italy) in the academic year 2001-02, before visiting the BCF in 2002-03. His research interests center on the theory of stochastic processes and their applications to finance.

Cheridito received a grant of the Swiss National Science Foundation to spend a year at the Bendheim center for Finance. He worked on the following three projects. Together with Damir Filipović (ORFE, Princeton) and Robert Kimmel (Bendheim Center) he worked on affine models for interest rates. With Mete Soner (Koc University in Istanbul, Turkey) and Nizar Touzi (Crest in Paris, France) he studied the problem of hedging a contingent claim under gamma constraints. With Freddy Delbaen and Michael Kupper (both ETH Zurich, Switzerland) he introduced coherent and convex risk measures for continuous-time stochastic processes.

Andre Monteiro received his PhD from Catholic University of Rio de Janeiro (PUC-Rio) in 2002 and wrote his thesis on term structure of interest rate models. The focus of his research interest is finance and international macroeconomics. He also worked as chief-economist and risk manager in Icatu Investment Bank during 2000-2002.

He spent the Spring 2003 at Bendheim Center for Finance invited by Professor José Scheinkman. During this period, he worked on two issues: term structure of country risk premium and style investing. He developed an alternative country risk premium term structure for the Brazilian economy based on US dollar-denominated interest rate future contracts negotiated in Brazilian markets which possesses some financial and statistical advantages compared to the usual sovereign-bond-based curve. The estimation is possible under the non-arbitrage assumption behind the currency-risk-adjusted covered interest parity. His theoretical research on style investing, still in progress, seeks to formulate it as a three-step microeconomic decision making: categorization of the available assets based on their similarity in order to generate styles, asset selection per style and portfolio allocation.

Marcello Pericoli

Marcello Pericoli has been working as a senior economist in the International Division of the Research Department at Bank of Italy since 1997. During 1996 and 1997 he worked in London as a market economist and fixed income analyst in the UK subsidiary of the most large Italian private bank. He

received his undergraduate degree from the University of Rome, his M.A. from the University of Pennsylvania and his Ph.D. from the University of Rome. During the academic year 2002-03, he visited the Bendheim Center for Finance. His research focuses on economics and applied financial econometrics with the aim of drawing policy implications.

His research interests center on the information content of asset prices. He developed a non-parametric methodology to estimate the probability density function implied in short term interest rate futures options in order to assess the market forecasting power on interest rate changes just before central bank periodic meetings. He evaluates the time series of these functions and presents some event studies. In other work joint with Professor Giancarlo Corsetti of the University of Rome III and European University Institute and Massimo Sbracia of the Bank of Italy, he developed a new set of test for detecting structural breaks across stock markets in order to identify episodes of "flight to quality" as well as excessive co-movements of stock returns. Their single factor model presents an analysis of the correlation coefficient with a correction aimed at ruling out the bias due to the change in volatility of the common factor.

Graduating Ph.D. Students

Ph.D. students in the Bendheim Center for Finance are admitted through the Department of Economics, the Department of Operations Research and Financial Engineering or the Program in Applied and Computational Mathematics. Three students graduated in 2002-03.

Pavel Diko

Pavel Diko graduated from the Department of ORFE. His thesis deals with precipitation derivatives for which he developed a pricing technique based on utility indifference, under the supervision of René Carmona. He is now a quantitative trader for energy products at Electrabel s.a., one of Europe's largest utility company based in Brussels, Belgium. He builds pricing models and trades non-standard energy products such as exotic options, cross-commodity and cross-location products.

Marcelo Pinheiro

Marcelo Pinheiro received his Ph.D. from the Economics Department. He is moving to the University of Chicago's Economics Department as a Postdoctoral Fellow. His thesis, dealing with the financial implications of loyalty, peer group effects and social interactions was written under the supervision of José Scheinkman.

Michael Tehranchi

Michael Tehranchi received his Ph.D. from the Program in Applied and Computational Mathematics. He is currently a VIGRE Postdoctoral Fellow and Instructor of Mathematics at the University of Texas at Austin. His research interests are in financial mathematics and stochastic analysis. His thesis, titled "Applications of Infinite Dimensional Stochastic Analysis to Problems in Fixed Income Markets," was written under the supervision of René Carmona.

Advisory Council

The Advisory Council for the Bendheim Center is comprised of a group of distinguished leaders in the financial industry.

Mr. Gerhard R. Andlinger
Chairman of the Board
Andlinger & Company, Inc.

Mr. John C. Bogle
President
Bogle Financial Markets Research Center,
The Vanguard Group

Mr. John L. Cecil
Managing Director and Chief Financial and Administrative Officer
Lehman Brothers

Mr. Christopher A. Cole
Managing Director
Goldman Sachs & Co.

Mr. E. Robert Cotter, III
Global Head of Mergers and Acquisitions
Deutsche Bank Alex.Brown

Mr. Howard E. Cox, Jr.
General Partner
Greylock Management Corporation

Mr. David A. DeNunzio
Managing Director
Crédit Suisse First Boston, LLC

Mr. J. Michael Evans
Partner and Managing Director
Goldman Sachs & Co.

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Morgan Stanley & Co., Inc.

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Vice Chairman
Morgan Stanley Group (Europe), P.L.C.

Mr. William H. Heyman
Executive Vice President & Chief Investment Officer
The St. Paul Companies

Mr. John A. Mayer, Jr.
Chief Financial Officer (Retired)
J.P. Morgan & Company

Mr. Michael McCaffery
President and Chief Executive Officer
Stanford Management Company

Ms. Heidi G. Miller
Executive Vice President & Chief Financial Officer
Bank One

Ms. Sharmin Mossavar-Rahmani
Managing Director
Goldman Sachs & Co.

Mr. Jeffrey M. Peek
Vice Chairman
Crédit Suisse First Boston

Mr. John S. Weinberg
Managing Director
Goldman Sachs & Co.

Mr. Paul M. Wythes
Founding General Partner
Sutter Hill Ventures

Finance Seminars

Each week, the Bendheim Center for Finance organizes a seminar where academics are invited to present their latest research to the faculty and Ph.D. students of the Center.

Civitas Foundation Finance Seminar Fall 2002

September 18	Campbell Harvey Duke University	"Does Financial Liberalization Spur Growth?"
September 25	Marcelo Pinheiro Princeton University	"Loyalty, Peer Group Effects, and 401K"
October 2	Jeremy Stein Harvard University	"When Does the Market Matter? Stock Prices and the Investment of Equity-Dependent Firms"
October 9	Philip Bond Northwestern University	"Regulating Exclusion from Financial Markets"
October 16	Patrik Sandas University of Pennsylvania	"Liquidity Supply and Demand in Limit Order Markets"
October 23	Kose John New York University	"Design of Corporate Governance"
November 6	Stefan Nagel London Business School	"Arbitrage at Its Limits: Hedge Funds and the Technology Bubble"
November 13	Jonathan Parker Princeton University	"Consumption Risk and Cross-Sectional Returns"
November 20	Michael Dempster University of Cambridge	"Evolution on the FX Trading Floor"
December 4	David Hirshleifer Ohio State University	"Disclosure to a Credulous Audience: The Role of Limited Attention"
December 11	Per Mykland University of Chicago	"When Dutch Book Meets No Arbitrage: Statistical Inference and the Pricing of Options"

Civitas Foundation Finance Seminar Spring 2003

February 19	Monika Piazzesi UCLA	"Housing, Consumption and Asset Pricing"
February 26	Danny Kahneman Princeton University	"A Psychologist's Updated List of Possibly Relevant Facts"
March 5	Elyes Jouini Universite de Paris-Dauphine	"Aggregation and Intertemporal Asset Pricing under Heterogeneous Beliefs"
March 12	José Scheinkman Princeton University	"Overconfidence, Speculative Trading, and Valuation in Financial Markets"
March 26	Peter Blair Henry Stanford University	"Risk Sharing and Asset Prices: Evidence from a Natural Experiment"
April 2	Filippo Altissimo European Central Bank	"Simulated Nonparametric Estimation of Continuous Time Models of Asset Prices and Returns"
April 9	Jeffrey Wurgler New York University	"Why are Dividends Disappearing? An Empirical Analysis"
April 16	Hamid Mehran Federal Reserve Bank of New York	"Board Structure, Banking Firm Performance and the Bank Holding Company Organizational Form"
April 23	Nick Barberis University of Chicago	"Individual Preferences, Monetary Gambles and the Equity Premium"
May 7	Robert Engle New York University	"Asymmetric Dynamics in the Correlations of Global Equity and Bond Returns"
May 14	Jean Jacod Universite de Paris VI	"Arbitrage and Completeness for Levy-driven Term Structure Models"

Conferences

During the past few months, the Bendheim Center for Finance organized the following conferences and events on campus.

The Princeton Lectures in Finance

The BCF organizes each year a series of public lectures, *The Princeton Lectures in Finance*, delivered by a leader in the field of finance. The author is invited to the BCF to deliver the contents of his or her book in the form of three two-hour lectures to the Center's faculty and students. The lectures form the basis of a book to be subsequently published by Princeton University Press.

The first lecturer and author was Professor **Stephen A. Ross**, the Franco Modigliani Professor of Financial Economics at M.I.T. Professor Ross is widely considered to be a leader in the field and one of the few contenders for a Nobel Prize in Economics for his contributions to finance. He delivered his lectures at the BCF on the theme of *Arbitrage and Finance*:

The second lecturer and author was Professor **Myron Scholes**, Emeritus Professor at Stanford University and 1997 Nobel Laureate. He delivered his lectures at the BCF on the theme of *Liquidity and Finance* on May 20, 21 and 22, 2002.

There were no lectures in 2003. The 2004 Princeton Lectures in Finance will be given by William Sharpe, Professor Emeritus at Stanford University, the 1990 Nobel Laureate in Economics. The 2005 Princeton Lectures in Finance will be given by Douglas Diamond of the University of Chicago.

Oxford-Princeton Workshop on Financial Mathematics & Stochastic Analysis

This workshop took place on October 17-18, 2002. It was part of the Oxford-Princeton collaboration and was designed for an informal exchange of ideas between the Mathematical Finance group at Oxford and the Financial Engineering group at Princeton.

Speakers were René Carmona (Princeton), John Chadam (Pittsburgh), Damir Filipović (Princeton), Pat Hagan (Bear Stearns), Vicky Henderson (Oxford), Sam Howison (Oxford), Terry Lyons (Oxford), John Mulvey (Princeton), Ronnie Sircar (Princeton).

The workshop was organized by René Carmona, Sam Howison and Ronnie Sircar.

BCF-CEPS Symposium on Land Mines in Finance

This symposium took place on October 18-19, 2002. On Friday, BCF Advisory Council member John Bogle, founder and former CEO of the Vanguard Group, delivered the keynote address. The next day, panelists discussed the economic outlook, the credibility of accounting statements, alternative investments and whether or not the stock market remains overvalued. Speakers at the Saturday conference included: Andrew Golden of Princeton University Investment Company, Robert Litan of the Brookings Institution, Robert Shiller of Yale University, John (Launny) Steffens of Spring Mountain Capital, Jeremy Stein of Harvard University, Neal Soss of CSFB, and Burton Malkiel and Uwe Reinhardt of Princeton. The Saturday panels were held in Bowen Hall from 9:00 am until 4:00 pm:

8:30: Continental Breakfast

9:00: Economic Outlook: Neal Soss, Crédit Suisse First Boston Corporation

10:15: Break

10:30: The Credibility of Accounting Statements: Robert Litan, The Brookings Institution and Uwe Reinhardt, Princeton University

12:00: Lunch

1:30: Alternative Investments: An Incipient Bubble? Andrew Golden, Princeton University Investment Company, John L. Steffens, Spring Mountain Capital, L.P. and Jeremy Stein, Harvard University

2:45: Is the Stock Market Still Overvalued? Burton Malkiel, Princeton University, Robert Shiller, Yale University

4:00: Adjourn

This event was by invitation only.

Restructuring/Leveraged Buyouts and Private Equity in the New Millenium

This mini-conference was held at the Bendheim Center for Finance on March 31, 2003.

2:00-2:15 p.m. Introduction and Opening Remarks by Professor John Quigley

2:15-2:45 p.m. James Andersen '84 (Civil Engineering), Managing Partner, Clearview Capital LLC, Wilton, CT

2:45-3:15 p.m. Robert Wages '85 (Chemistry), Managing Director, Castle Harlan Inc., New York City

3:15-3:45 p.m. Peter Askey '86 (Mechanical Engineering), Principal of Private Capital, Berwind Financial Group, Philadelphia

3:45-4:15 p.m. Discussion and Closing Remarks by John Quigley

Credit Markets for the Poor Conference

This conference, organized by Professors Patrick Bolton and Howard Rosenthal, took place at the Mamdouha Bobst Center for Peace and Justice, 83 Prospect Avenue, on May 2-3, 2003.

Papers were presented by:

Tim Bates, Wayne State (discussant, Peter Tufano, Harvard Business School): The Credit Market for Microenterprises

John Caskey, Swarthmore (discussant Ngina Chiteji, Skidmore): Fringe Banking 10 Years Later

Daniela Fabbri, Lausanne and Mario Padula, Salerno (discussant, Ailsa Röell, Princeton): Does Poor Legal Enforcement Cause Households to be Credit Constrained?

Malgosia Madajewicz, Columbia (discussant, Gerard Roland, University of California, Berkeley): Peer-Monitoring of Loans

Howard Rosenthal, Princeton (discussant Erik Maskin, Institute for Advanced Study): Credit Markets and Inequality

Loic Sadoulet, ECARES, Free University of Brussels (discussant, Erik Berglöf, Stockholm School of Economics and World Bank): Repayment Insurance

Michael H. Schill, New York University, Susan M. Wachter, Pennsylvania, Elizabeth Warren, Harvard, Raisa Bahchieva, New York City Department of Housing Preservation and Development (discussant José Scheinkman, Princeton): Homeowners in Bankruptcy

Lisa Servon, New School and Robert Kaestner, University of Illinois, Chicago (discussant Paul DiMaggio, Princeton): The Internet and Use of Financial Services by Low-Income Customers

Robert Townsend, Chicago, (discussant Erica Field, Princeton): Financing Small Businesses in Chicago's Ethnic Neighborhoods

Introduction to Finance Lecture Series

The Bendheim Center for Finance presented a series of evening lectures on topics of current interest in finance. Master in Finance students were welcome and encouraged to attend.

- September 23, 2002, 5:30pm-8:00pm, Introduction to Investment Banking and Asset Management, by David Blair
- September 30, 2002, 7:00pm-9:00pm, Introduction to Fixed Income, by Robert Kimmel
- October 7, 2002, 7:00pm-9:00pm, Introduction to Behavioral Finance, by Harrison Hong
- October 14, 2002, 7:00pm-9:00pm, Introduction to Accounting: Scandals, Judgment and Ethics, by Louis LeGuyader
- November 4, 2002, 7:00pm-9:00pm, Introduction to Derivatives, by Wei Xiong
- November 14, 2002, 7:00pm-9:00pm, Introduction to Negotiation, by John Darley and Thayne Pittman (Department of Psychology)

The lectures were held in the BCF 103 classroom, with the exception of the Negotiation lecture which was held in the Department of Psychology.

BCF Finance Seminar Series

The Princeton Entrepreneurship Club and the Princeton Pre-Business Society assisted Swati Bhatt in organizing these seminars. Speakers for this seminar series were invited from the financial and corporate world.

October 18, 2002: Dan von Kohorn '97, Technology Partners Holdings, spoke about contracting capital markets, the state of entrepreneurship, the increasing cost of equity capital, the decreasing cost of debt, and the globalization of Venture finance. Dan is Managing Director and Chief Technical Officer at Technology Partners (Holdings) LLC, a private merchant bank specializing in advisory, financing, and M&A for high-tech and media companies. He evaluates technology companies and advises on development and integration strategy, capitalization, and deal structures. The company works primarily in the sectors of software, media, informatics, AI applications, and networked devices.

November 12, 2002: James Furnivall '87, General Partner of Canaan Partners, gave a talk on "Venture Capital After the Bubble: Back to Basics." Jim's work focuses on software and infrastructure investing out of Canaan's East Coast office. Prior to joining Canaan in 1996, he specialized in information technology as an Associate Director in Bear Stearns' Investment Banking Department.

November 25, 2002: Michael Peterson '86, Principal and Senior Research Analyst for Pzena Investment Management LLC spoke on "(Buyside) Equity Research: A Year in the Life." Mike is looking for THE prodigy equity research analyst, so this was a must-attend talk if you were interested in this area. On September 30, 2002, PIM had $2.8 billion in assets under management. Prior to joining the firm in 1998, Peterson was an Engagement Manager at McKinsey & Company, where he was a member of the Financial Institutions Group as well as the Pricing Practice.

December 9, 2002: Terry Benzschawel, Director of Quantitative Credit Modeling Strategies at Salomon Smith Barney, gave a talk on "Trading Financial Assets using Neural Networks." Terry described development, testing and actual performance of neural network models for trading U.S. Treasury securities and foreign currencies. Terry gave an overview of the Fixed Income Quantitative Research Department at Salomon Smith Barney, focused on their mission as well as the composition of their staff in terms of educational levels and areas of expertise. He provided a breakdown of the various areas within the research department and some of the important topics of current research. He received his Ph.D. in Experimental Psychology from Indiana University in 1980.

February 10, 2003: David Geliebter, Managing Partner of Carrot Capital LLC, a New York-based venture capital firm that invests in seed and early stage businesses spoke of his experiences. Carrot Capital seeks out entrepreneurs with brilliant ideas for a business and provides capital and management expertise to help them succeed. David also serves at the President of the Carrot Capital Education Foundation, a non-profit 501©(3) corporation, that is affiliated with Carrot Capital LLC. The Carrot Capital Education Foundation runs the Carrot Capital Business Plan Challenge ("Challenge"), a national business plan competition for undergraduate and graduate students. David was named Entrepreneur of the Year for New York in 1993 by Inc. magazine and Ernst & Young.

February 24, 2003: Gerald Rosenfeld, CEO of Rothschild North America. He spoke on "A Random Walk Through Investment Banking." Rosenfeld was a former General Partner of Lazard Freres, Head of Investment Banking at Bankers Trust and Managing Director, CFO at Salomon Brothers. He began his business career at McKinsey & Co. He received his Ph.D. in Applied Mathematics from New York University.

March 14, 2003: Bob Schena, Co-Founder, President and CEO of Future Vision, spoke about his experience with start-ups. Bob consistently comes up with ideas for companies and has experienced varying degrees of success. A few examples include: AirClic, Digital Broadbank Applications Corp, Rajant, 3rdWire, Silicon Stemcell, and FutureVision. Bob is the visionary responsible for ongoing business development, capital financing, stakeholder relationships, and assembly of the Management Team and exit strategies. Schena has a strong record of achievement in multiple entrepreneurial endeavors in areas including operations, the integration of sophisticated digital broadbank technology, building alliances with technology vendors and strategic partners, fund raising, content acquisition, negotiations with regulators, development of billing and provisioning systems, and public relations.

Mini-Course on Financial Modelling, Valuation and Analysis Using Excel

This four-session, not-for-credit, mini-course, taught by John G. Quigley, taught students the fundamentals of constructing financial models in Microsoft Excel. It was designed to provide real experience in applying financial concepts to valuation models, and taught the basic mechanics involved in financial modeling. In the process, students were better able to recognize the intuition behind financial concepts that they have already been taught in other finance courses.

Students gained a proficiency in Microsoft Excel and its use as a tool for rigorous financial analysis. They also were presented with certain commonly accepted methodologies of presentation in the areas of financial analysis and valuation. As a result of this class, students were better able to construct a variety of financial analyses such as projections and valuations. This valuable skill will be applicable in areas as diverse as investment analysis, government service, and financial management of non-profit organizations.

All Undergraduate Certificate in Finance and Master in Finance students were strongly encouraged to attend.

The four lectures took place from 7:30pm until 9:00pm, in the Friend Center Room 101, on October 9, November 6, 13 and 21.

On-line tutorials in Microsoft Excel were provided to all students prior to the start of the course. There were also two Excel hands-on tutorial sessions on October 7 and 8. For details, log on to the Blackboard course site FIN01.

Brief homework projects were assigned, and solutions were provided. Students were expected to complete the assignments prior to class. While homework was not collected or graded, completion of the assignments obviously facilitated a more complete understanding of the material covered in class.

The two teaching assistants for the course were Jeff Tuder and Thayer Patterson.

Undergraduate Certificate in Finance

The BCF started offering in 1999 an Undergraduate Certificate in Finance. Under its auspices, Princeton undergraduates may earn a certificate that attests to their proficiency in the discipline of finance. The certificate program in finance has four major components:

- First, there are prerequisites in mathematics, economics, and probability and statistics, as necessary for the study of finance at a sophisticated level. These prerequisite courses are to be completed during the freshman and sophomore years.
- Second, two required core courses, during the junior year, provide an integrated overview and background in modern finance.
- Third, students are required to take three elective courses.
- Fourth, a significant piece of independent work must relate to issues or methods of finance. This takes the form of a senior thesis. For non-Economics or ORFE majors only, if there is no possibility of finance content in their senior thesis, a separate, shorter piece of independent work is required instead.

Now in its fifth year, the Undergraduate Certificate in Finance continues to do extremely well. We enrolled **135 juniors** from the Class of 2004, a sharp increase from the numbers of the previous years (Class of '00: 61, '01: 82, '02: 85, '03: 122), bringing our **total number** of undergraduate students in the program (juniors and seniors) to **350** this year.

Also encouraging is the fact that the students earning the Certificate are drawn from a wide cross-section of departments on campus, testifying both to the interdisciplinary flavor of the program and its wide appeal. The breakdown by major is given in the following two tables.

Class of '03

Total number of certificates awarded: **126**

Major	Number of Students
Comparative Literature	1
Computer science	10
Economics	58
Engineering (other than ORFE and Computer Science)	8
English	2
History	1
Mathematics	2
Molecular Biology	0
Operations research & financial engineering	33
Philosophy	1
Physics	2
Psychology	1
Woodrow Wilson School	7

Class of '04

Total expected number of certificates to be awarded: **136**

Major	Number of Students
Art History	1
Computer science	5
Economics	52
Engineering (other than ORFE & CS)	11
English	1
History	4
Mathematics	7
Operations research & financial engineering	34
Philosophy	2
Physics	2
Politics	6
Sociology	1
Woodrow Wilson School	10

Undergraduate Prizes

Certificate in Finance students have received an extraordinary proportion of the prizes awarded by their respective departments in 2003. 28 finance certificate recipients received either a general or departmental prize – 23% of the finance students of the class of '03.

- Of the 11 senior thesis prizes awarded to **Economics** majors, 9 were finance certificate recipients:
    - Finance Prize: Kwesi Adofo Mensa and Ashley Heise, Runnerup: Marianne Yip
    - International Finance Prize: Christian Bryzinski
    - Empirical Economics Prize: Adam Schwartz, Runnerup: Tyler Waterhouse
    - Health, Education and Welfare: Edward Zysik
    - Walter Sauer Prize (joint with Woodrow Wilson School): Natalie Nicolaou
    - Best Overall Thesis in Economics: Adam Nebesar
- The following general prizes were awarded to finance certificate recipients:
    - Class of 1901 Medal and the Sanderson Detwiler 1903 Prize: Catherine Farmer
    - Frederick Douglas Service Award: Yashih Wu
    - Achievement Award of the New Jersey Chapter of the American Concrete Institute: Jean Paul Ciardullo
- The following departmental prizes were awarded to finance certificate recipients:
    - Middleton Miller Prize in **Mathematics**: Rahul Bhargava
    - **Applied and Computational Mathematics** Independent Project Prize: Adam Nebesar and Emmanuel Sharef
    - Allen Shenstone Prize in **Physics**: Costin Bontas
    - Joseph Clifton Prize in the **Engineering** School: Cynthia Lin and James McQuade
    - Charles Ira Young Prize in **Electrical Engineering** and the Memorial Prize in Engineering: Elizabeth Smythe
    - Frank Castellana Prize in **ORFE**: Joshua Nichols

- Ahmet Cakmak Prize in **ORFE**: Elizabeth Danaher
- Sigma Xi Book Award in **ORFE**: Laura Kornhauser and Dan Nash
- Kenneth Condit Prize in **ORFE**: Emmanuel Sharef and Jeanne Lindsay
- George Bienkowski Memorial Prize in **Mechanical and Aerospace Engineering**: Shannon Okuyama
- Best Thesis Prize in **Mechanical Engineering**: Shannon Okuyama, Runnerup: Ryan Kiskis
- Richard Challener Senior Thesis Prize in **Canadian Studies**: Sonali Shah
- **Comparative Literature** Senior Thesis Prize: Heather Morr
- **Near Eastern Studies** Thesis Prize: Tricia Hearne

Senior Theses of the Class of '03

This table shows the titles of the senior theses of all Economics majors awarded the Undergraduate Certificate in May 2003.

Kwesi Adofo-Mensah	Act First, Ask Later: A Study About the Flight to Quality Reaction of the Bond Market in Response to Credit Rating Changes
Ari Benjamin	Equity Allocation as a Mechanism Through Which 401(k)s Increase Wealth Accumulation
Ryan Brown	Opportunity in Waiting: Building the Case for Diversification in the Financial Services Industry through an Examination of Leading Securities Firms since the Gramm-Leach-Bliley Act of 1999
Christian Bryzinski	Venture Capital in Germany: Innovation Stimulus or Ineffective American Imitator?
Cameron Carr	Changing REIT Markets: A Study of Fluctuating Market Atmosphere and REIT Structure
Diana Chang	Unraveling Mutual Fund Flow Patterns: An Empirical Study of Institutional Effects on the Flow-Performance Relationship
Yee Wai Chong	Bubble and Cross-Autocorrelation in the Chinese A and B Share Markets
Caroline Churchill	Runaway CEOs: Executive Compensation and the Agency Problem
Patrick Donohue	The Stock Listing Game: An Attempt to Model the Stocks Added to the Standard and Poor's 500 Index

Thomas Einhorn	Deconstructing the Internet Bubble: A Case for Rational Exuberance
Farth Fealey	Re-Pricing of the S&P 500 Index in Response to Macroeconomic Information Events: An Empirical Analysis
Kerry Flannery-Reilly	Betting on Market Efficiency
Emily Gopstein	Standing Out from the Crowd: Career Concerns and Risk Taking in Security Analysts' Earnings Forecasts
Dov Haselkorn	Absolute Versus Squared Deviation. A Historical Comparison of Hedging Strategies
Tricia Hearne	The Economics of Crisis Prediction, Prevention, and Recovery: An In-Depth Analysis of the Recent Turkish Financial Crisis
Ashley Heise	Private Equity: An Evolutionary Analysis of the Market and Decision-Making
Aaron Husock	Style and Size-Timing Models: Deconstructing Return Variation Across Market Segments
Leonard Kostovetsky	"Hedging the Hedge Funds": A Comprehensive Examination of Negative Insurance Risk
James Moberg	Volatile Volatility? Examining the B-S Constant Volatility Assumption for Long-Term Index Options
Adam Nebesar	Oil and War: New Methods for Estimating the Macroeconomic Effects of Oil Shocks, Using War in Iraq as a Case Study
Adam Rilander	Developing a Portfolio Strategy to Profit from the Returns Associated with Securities Added to the S&P 500
Karim Savul	A Specification Test for The Internet Bubble
Richard Scarinci	Does Management Structure Affect Fund Returns? A Look at Team versus Individual Managed Funds
Douglas Scherrer	Credit Default Swap Pricing Based on the Structural Credit Risk Model
Adam Schwartz	Stock Market Predictability Versus Efficient Markets: The Enhanced Indexing Synthesis
Alan Sykes	The Rise of the Exchange-Traded Fund Industry
Frederic Thate	Corporate Stock Splits: The Effect of Splits on Long-Run Returns and Shareholder Liquidity
Cassidy Traub	A Century-and-a-Half of Global Investing: Is the Affair Over?
Qing Wang	Information Diffusion among Individual Investors: The Geography of Information Transmission and its Effects on Portfolio Allocation
Tyler Waterhouse	"Super" Commercials: An Analysis of Super Bowl Advertisements In an Investor Relations Framework

Basak Yeltekin	Can Hedge Funds Beat the Market? A Study of Returns and Risks
Marianne Yip	Dangerous Liaisons: Do Investment Banking Relationships Affect the Objectivity of Research Analyst Recommendations and Earnings Forecasts?

Master in Finance

The interdisciplinary Bendheim Center for Finance offers a Master in Finance degree. The distinctive feature of Princeton's Master in Finance program is its strong emphasis on financial economics in addition to financial engineering and computational methods. Graduates of our program will have a solid understanding of the fundamental quantitative tools from economic theory, probability, statistics, optimization and computer science, all of which are becoming increasingly vital in the financial industry. To a greater degree than at any time in the past, there now exists a body of knowledge that is widely agreed to be essential for the proper analysis and management of financial securities and portfolios. A driving force behind these developments is a lively exchange of ideas between academia and the financial industry, a collaboration that is the closest parallel in the social sciences to the academic-private sector interactions routinely seen in engineering and the applied sciences.

The Master in Finance program is intended to prepare students for a wide range of careers both inside and outside the financial industry, including financial engineering and risk management, quantitative asset management, macroeconomic and financial forecasting, quantitative trading, and applied research. The program does not require prior work experience, although it can be a plus. The BCF provides career assistance to students, including help with internships and job placement, through its own staff. The program does not offer tuition grants or scholarships. However, eligible students may apply for federal and private student loans through existing programs for Princeton graduate students.

The curriculum is designed to be completed in four semesters. However, students with a high degree of preparation can complete the curriculum in two semesters. This flexible format allows exceptionally well-prepared students to complete the program in as little as one academic year. The program will additionally accept very qualified and motivated part-time students, who will be allowed up to eight semesters to complete the program requirements, subject to annual review of the student's progress.

Princeton's Master's program draws upon the combined strength of a variety of departments at Princeton, including the Department of Economics, the Department of Operations Research and Financial Engineering, the Department of Computer Science, and others. The program has two major course components. First, required *core courses* will provide (1) the prerequisite skills in mathematics, economics, and probability and statistics necessary for the study of finance at a sophisticated level and (2) an integrated introduction to modern financial analysis. Second, a wide range of *elective courses*, drawn from many departments, will allow students to tailor the program to fit their own needs and interests. These courses will permit a range of opportunities for specialization and in-depth study of topics of interest to the student, along a number of coherent "tracks."

Admission Requirements

The Master in Finance program is designed both for students with mathematical (or physics and engineering) training, who want to make finance their main field of application, and for students with an economics (or business or social science) background, who want to acquire the quantitative skills

essential for a well-rounded training in finance. In either case students must have an interest in, and be able to handle the combination of economic analysis, mathematics, econometrics, and computer science that are pervasive in modern finance. An intensive two-week review course covering probability and topics in mathematics, as required for the core courses, will be offered to students prior to the beginning of classes in the Fall.

Applicants must take either the GRE general test or the GMAT. Applicants whose native language is not English and who have not received their undergraduate education in a school where English is the language of instruction must take the TOEFL.

Statistics on the Admission Process

	Applications	Offers	Acceptances
Jan. 01	126	29	15
May 01	91	13	10
Jan. 02	194	14	8
May 02	105	4	2
Jan 03	202	13	8
May 03	41	0	0

Highest Degree Before Applying to Princeton's M.Fin.

	Bachelor	Master	Ph.D.
Jan. 01	96	30	0
May 01	55	33	3
Jan. 02	172	22	0
May 02	87	16	2
Jan 03	158	41	3
May 03	33	7	1

Applicant Profile: Gender & Age

	Female	Male	Median Age
Jan. 01	38	88	25
May 01	18	73	27
Jan. 02	57	137	25
May 02	28	77	25.5

Jan 03	64	138	25
May 03	13	28	27

Applicant Profile: GRE Scores

	Analytical Mean (Median)	Quantitative Mean (Median)	Verbal Mean (Median)
Current Class: 2001-02	723 (710)	780 (800)	580 (590)
Jan. 02 Applicants	721 (730)	783 (790)	775 (605)
May 02 Applicants	667 (700)	754 (770)	494 (460)
Jan 03 Applicants			
May 03 Applicants			

Program Requirements

The program requirements consist of 6 core courses and 10 elective courses (see list below), with the following provisions:

- At least 5 of the elective courses must be at the level 500 or higher.
- At least 5 of the elective courses must be taken from List 1 below.
- The program can be completed in one or two years: admission letters will specify the expected length of study. Individual meetings between students admitted in the program and the Director of Graduate Studies will determine which courses need to be taken on the basis of courses previously completed at Princeton or another institution.
- Students must maintain an overall grade average of B or better as well as earn a passing grade in all core and elective courses.
- Audited courses cannot be used to fulfill the program's requirements.
- While no Master's thesis is required, students interested in independent research may work with a Bendheim Center-affiliated faculty member on a topic relevant to finance, and by enrolling in the appropriate courses (FIN560/561), they can receive academic credit equivalent to one or two elective courses (thereby reducing the number of required electives).

Core Courses

The core courses of the Master in Finance provide students with analytical fundamentals of modern finance, both theoretical and empirical.

Fall Semester

- **ECO 317**: Financial Investments
- **FIN 501/ORF514**: Asset Pricing I: Pricing Models and Derivatives
- **FIN505/ORF505:** Regression and Applied Time Series

Spring Semester

- **FIN502:** Corporate Finance and Financial Accounting
- **FIN503/ORF515**: Asset Pricing II: Stochastic Calculus and Advanced Derivatives
- **FIN504/ORF504**: Financial Econometrics

Elective Courses

In addition to core courses, which provide a broad survey of topics and techniques of modern finance, the program will offer students the opportunity to choose among a variety of elective courses. Some of these courses have prerequisites, or require permission of the respective instructors.

List 1: Finance Applications Courses

- FIN 512: Trading and Securities Markets
- FIN 515: Portfolio Theory and Asset Management
- FIN 516: Topics in Corporate Finance, Corporate Governance and Banking
- FIN 517: Venture Capital and Private Equity Investment
- FIN 518: International Financial Markets
- FIN 519: Corporate Restructuring, Mergers and Acquisitions
- FIN 521: Fixed Income: Models and Applications
- FIN522: Options, Futures and Financial Derivatives
- FIN 523: Applied Time Series: Macroeconomic and Financial Forecasting
- FIN 560: Master's Project I
- FIN 561: Master's Project II
- ECO 420: Introduction to Economic Dynamics
- ECO 525/FIN 595: Financial Economics I
- ECO 526/FIN 596: Financial Economics II
- ECO575/FIN575: Topics in Financial Economics
- MAT 392: Topics in Financial Mathematics, or
  ORF 335/ECO 335: Introduction to Financial Engineering
- ORF 530: Statistical Analysis of Large Financial Datasets
- ORF 534/FIN 534: Financial Engineering
- ORF 535/FIN 535: Financial Risk Management
- ORF 555: Fixed Income Models
- ORF 569: Special Topics: Risk Management in the Energy Markets

List 2: General Methodology for Finance

- APC 350: Partial Differential Equations
- APC 503: Analytical Techniques in Differential Equations
- APC 518/ORF 518: Applied Stochastic Analysis and Methods
- CEE 548: Risk Assessment and Management
- COS 318: Operating Systems
- COS 323: Computing for the Physical and Social Sciences
- COS 333: Advanced Programming Techniques
- COS 423: Theory of Algorithms
- COS 425: Database Systems
- COS 432: Information Security
- COS 436: Human-Computer Interface Technology
- COS 444/ECO444: Electronic Auctions
- COS 461: Distributed Computing
- ECO 304: Macroeconomics: A Mathematical Approach
- ECO 323: International Monetary Economics
- ECO 327: The Economics of Uncertainty
- ECO 411: Strategy and Information
- ECO 503: Macroeconomic Theory I
- ECO 504: Macroeconomic Theory II
- ECO 517: Econometric Theory I
- ECO 512: Auction Theory
- ECO 513: Advanced Econometrics: Time Series Models
- ECO 517: Econometric Theory I
- ECO 518: Econometric Theory II
- ECO 519: Topics in Econometrics
- ECO 521: Advanced Macroeconomic Theory I
- ECO 522: Advanced Macroeconomic Theory II
- ECO 523: Public Finance I
- ECO 524: Public Finance II
- ECO 531: Economics of Labor
- ECO 541: Contract Theory: Firms, Contracts and Vertical Restraints
- ECO 551: International Trade I
- ECO 552: International Trade II
- ECO 553: International Monetary Theory and Policy I
- ECO 554: International Monetary Theory and Policy II
- ELE 491: High-Tech Entrepreneurship
- MAE 507: Basic Numerical Methods for Ordinary and Partial Differential Equations
- MAT 304: Introduction to Partial Differential Equations
- MAT 305: Mathematical Programming
- MAT 331: Numerical Analysis

- MAT 533/MAT 534: Elliptic and Parabolic Differential Equations
- MAT584/APC584: Wavelets: An Introduction
- MAT 591/MAT 592: Applied Partial Differential Equations
- ORF 307: Optimization
- ORF 311: Optimization under Uncertainty
- ORF 401: Electronic Commerce
- ORF 474: Special Topics in Operations Research and Financial Engineering
- ORF 522: Linear Optimization
- ORF 523: Nonlinear Optimization
- ORF 526: Stochastic Modeling
- ORF 542: Controlled Markov Processes
- ORF 547: Dynamic Programming
- ORF 549: Stochastic Programming
- ORF 551: Probability Theory
- ORF 553: Stochastic Differential Equations
- ORF 554: Markov Processes

Tracks

Elective courses can be chosen according to either individual needs and preferences, or to conform to one of the suggested tracks, listed below. It is not necessary for a student to designate or complete a particular track to satisfy the Master's requirements, the tracks listed below are merely illustrations of coherent courses of study that students might choose. Beyond the tracks listed below, we offer a number of electives in corporate finance, dealing with the choice and financing of investment projects, firms' determination of dividend policy, optimal capital structure, financial reorganization, mergers and acquisitions, start-up financing, deal structure, incentive design, valuation of high risk projects, initial public offerings, etc. However, we believe that our students' comparative advantage lies in other areas encompassed within the modern investment bank such as asset management, risk management, derivatives pricing and trading, fixed income analytics and other areas where a quantitative background in theoretical and practical aspects of modern finance is essential.

Financial Engineering and Risk Management Track

Financial engineers design and evaluate products that help organizations manage risk-return tradeoffs. Financial engineering is no longer limited to quantitative traders and derivatives specialists, but is now used widely throughout the private sector for purposes including hedging foreign currency exposures, financing real investment, and managing real and financial risks. The aim of this track is to provide students with the background they need to be leaders and innovators in this growing field. The track includes courses in probability, optimization under uncertainty, stochastic calculus, dynamic programming, and financial economics. Special attention is given to the development of the efficient computational techniques that are needed in "real-time" computing environments. In addition, students can elect to focus on the computer-based technologies that are becoming increasingly important in finance, such as the design of efficient trading systems, algorithms, interfaces, large databases, and the security of computer networks. Several courses provide students with the opportunity to acquire practical experience. In particular, full-time students will have the opportunity to work in a small group on actual financial engineering problems under the joint guidance of a faculty member and a high-level industry practitioner.

Quantitative Asset Management and Macroeconomic Forecasting Track

Highly trained financial specialists are increasingly utilized in the fields of portfolio management and macroeconomic forecasting. Among the quantitative tools used in this area are "attribute" screening, analysis of earnings revisions, and quantitative forecasting methods. Quantitative techniques are widely employed to control portfolio risk and to establish portfolios balanced with different assets (stocks, bonds, real estate, etc.) so as to minimize the variance of returns. Finally, the major commercial banks, life insurance companies, securities firms, asset managers, etc. all employ financial economists to formulate strategies consistent with the expected performance of the macroeconomy; required skills include expertise in applied time series analysis and an understanding of the major statistical macro models.

Financial Technologies

Computer-based technologies are becoming increasingly important in finance, such as efficient trading systems, algorithms, multimedia and web interfaces, large databases, parallel processing and the security of computer networks. The continued development of e-commerce, the growth of computer-based

trading and the renewed emphasis on risk management in all firms are creating a new competitive environment where increasing the speed and lowering the costs of trading and other financial operations become essential components of success. This track gives students access to the latest tools and techniques of computer science and computational methods applied to finance.

Seminars and Computing Environment

Students will be involved in regular seminars offered by academic researchers and industry representatives, and they will have the opportunity to participate in collaborative projects in some of the elective courses. The Financial Engineering Laboratory (equipped with personal computers, workstations, and financial data feeds) has been set up to facilitate such projects. The program provides a standardized computing environment based on Mathematica, Matlab, S-Plus and Microsoft Office. Computational skills will be taught in a series of workshops.

Some Course Descriptions

ORF335: Introduction to Financial Engineering
Financial engineers design and analyze financial products. These products improve the efficiency of markets and create novel mechanisms for reducing risks. This course is an introduction to financial engineering. The treatment is largely self-contained except that it requires microeconomics at the level of ECO 102. The course does not require ECO 320 and it may be taken concurrently with or as a follow on to ECO 320. It can be used to satisfy the technical requirements of the Engineering and Management Systems Program.

ORF 505/FIN 505: Regression and Applied Time Series
The goal of this course is to acquaint the student with the language, the mathematics, the applications and the practice of regression and time series analysis. Simple and multiple regressions will be introduced in the framework of statistical linear models. Robust and nonparametric procedures will be analyzed and implemented in the context of time series forecasting. The classical models of time series (AR, MA, ARMA, ARIMA, ...) will be presented and recast in the class of state space models for which Kalman filtering theory will be developed. The results will be compared to the more traditional approaches based on model identification and/or spectral estimation. Financial time series examples will be introduced to motivate the analysis of ARCH and GARCH models. The examples and data sets will be chosen from the financial arena. The computations / homework / simulations will use the Splus computer environment.

ORF 535/FIN 535: Financial Risk Management
This course is about measuring and managing risks for individuals and financial organizations. It introduces the variety of instruments that are used to this effect and the methods of designing and evaluating such instruments. Topics covered include risk diversification, planning models, market and non-market risks, and portfolio effects.

FIN 501: Asset Pricing I: Pricing Models and Derivatives
Provides an introduction to the modern theory of asset pricing. Topics include: (i) No arbitrage, Arrow-Debreu prices and equivalent martingale measures, (ii) security structure and market completeness, (iii) mean-variance analysis, Beta-pricing, CAPM, (iv) introduction to derivative pricing.

FIN 502: Corporate Finance and Financial Accounting
Covers the basics of financial statements, the analysis and recording of transactions, and the underlying concepts and procedures. In addition, a more detailed study of some aspects of financial accounting that have widespread significance is undertaken, such as inventories, longterm productive assets, bond and other liabilities, stockholders equity, and the statement of changes in financial position. The course provides students the skills necessary to become informed users of financial statements. Problem sets will emphasize an ability to interpret and analyze financial statement disclosures. Prerequisites: none. This course will be offered every year.

ORF504/FIN 504: Financial Econometrics
This course covers the econometric methods as applied to finance. Topics include: (i) measurement issues in finance; (ii) the predictability of asset returns; (iii) estimation of multifactor asset pricing models and portfolio problems; (iv) econometric methods for option pricing and models for implied volatilities and risk-neutral densities; (v) estimation methods for continuous-time models; (vi) maximum-likelihood methods in finance; (vii): nonlinearities in financial data and nonparametric methods. Course format: two lectures, one precept. Grades are based on problem sets (20%), a midterm exam (30%) and a final exam (50%). Prerequisites: ECO 306 or ORF 405. This course will be offered every year. Sample Text: Campbell, J.Y., Lo, A.W. and MacKinlay, A.C., *The Econometrics of Financial Markets*, Princeton University Press.

ORF505/FIN505: Regression and Applied Time Series
Statistical analysis of financial data: Density estimation, heavy tail distributions and dependence. Regression: linear, nonlinear, nonparametric. Time series analysis: classical models (AR, MA, ARMA, ..), state space systems and filtering, and stochastic volatility models (ARCH, GARCH, …). This course shares lectures with ORF405.

FIN 512: Trading and Securities Markets
The organization and regulation of stock markets; price formation, volatility, and liquidity in the secondary market (market microstructure). The course will also focus on stock market crashes, Keynes beauty contest comparison, and herding behavior. The listing decision and the primary market for raising equity capital for firms.

FIN 515: Portfolio Theory and Asset Management
This course covers a number of advanced topics related to asset management and asset pricing. Topics include mean-variance analysis, CAPM, APT, market efficiency, delegated money management, stock return predictability, bubbles and crashes, social interaction and investor behavior, security analysts and investor relations, and mutual fund performance and organization.

FIN 516: Topics in Corporate Finance, Corporate Governance and Banking
The course covers agency and control issues in corporate finance such as managerial compensation, the role of corporate boards, takeovers, leveraged buyouts and bankruptcy. It also studies the role of banks and other intermediaries' activities in facilitating investment and promoting sound corporate governance.

FIN 517: Venture Capital & Private Equity Investing
This course will concern itself with the central issues related to venture capital and private equity investing. Topics to be covered include the following: the contractual arrangements between entrepreneurs and venture capital providers: the structure and governance of investment funds; valuation, pricing and structuring of investment transactions; and the current state of the private equity/venture capital industry (including analysis of the trends behind the explosive growth of the pool of capital available for so-called "alternative" investments). This course is intended for Master in Finance students, but not for Ph.D. students.

FIN 518: International Financial Markets
The worldwide division of labor and economic integration require vast and efficient International Financial Markets. Presence of two or more national currencies is the main difference between a National

vs. an International Financial Market. As a result the International Financial Markets' instruments are priced using at least one exchange rate. The course will focus on the Markets and on the financial instruments traded across these Markets. On the Markets' side we shall study the market-making institutions, the market conventions and market practices.

FIN 519: Corporate Restructuring, Mergers and Acquisitions
This course will examine some of the most popular restructuring options available to corporate managers and will construct a framework to evaluate the implications they may have to Shareholder Value.

FIN 521: Fixed Income Models: Models and Applications
This course deals with the valuation for fixed income securities. Topics include: (i) interest rate contracts: zero-coupon bonds, coupon bonds, floating rate notes, yields, forwards and futures, swaps, options, caps, swaptions; (ii) arbitrage free pricing in discrete time: Vasicek model, Ho-Lee model, Black-Derman-Toy model; (iii) introduction to continuous-time fixed income modelling: Black model, Heath-Jarrow-Morton; (iv) applications of arbitrage free models to pricing of interest rate contracts, (v) credit risk; (vi) mortgage-backed securities. Course format: two lectures, one precept. Grades are based on problem sets (20%), a midterm exam (30%) and a final exam (50%). Prerequisites: FIN 501. This course will be offered every other year. Sample Texts: Jarrow, R. and Turnbull, S., *Derivative Securities*: Chapters 13-18 and, Hull, J., *Options, Futures, and Other Derivatives*: Chapters 16,17 and 20.

FIN522: Options, Futures and Financial Derivatives
The objective of this course is to study the essential techniques of pricing financial derivatives. These techniques include the Black-Scholes formula (awarded 1997 Nobel prize in economics), binomial tree method and risk-neutral valuation method. We will also discuss extensively trading strategies associated financial derivatives for different purposes, and potential problem that can arise in the application of financial derivatives. This course is technical by nature, and requires extensive use of calculus, statistics and Excel spreadsheet programming.

ORF534/FIN 534: Financial Engineering
A survey of central topics in the area of financial engineering and multi-period financial planning systems. Pricing methodologies integrated with financial planning systems. Linking asset and liability strategies to maximize surplus-wealth over time. We model the organization as a multi stage stochastic program with decision strategies.

ORF535/FIN535: Financial Risk Management
This course is about measuring, modeling and managing financial risks. It introduces the variety of instruments that are used to this effect and the methods of designing and evaluating such instruments. Topics covered include risk diversification, planning models, market and nonmarket risks, and portfolio effects. Lectures meet concurrently with ORF 435. Credit for graduate course requires completion of additional assignments.

ORF555/FIN555: Fixed Income Models
Introduction to continuous-time models for the arbitrage-free pricing of interest rate derivatives. Topics include primitives of the bond market and the relation between their dynamics, short rate models, the

Health-Jarrow-Morton methodology and related consistency problems, LIBOR market models, affine term structure models, risk of default.

ORF515: Stochastic Calculus for Engineering and Finance
This course begins with an overview of basic probability theory and covers the elements of stochastic calculus and stochastic differential equations that are widely used in modern financial applications. Topics include the Poisson process, Brownian motion, martingales, diffusions and their connection with partial differentiation equations. Examples from applications include the Black-Scholes option pricing and hedging theory, bond pricing and stochastic volatility models.

ECO525/FIN 595: Financial Economics I
Asset pricing in competitive markets where traders have homogeneous information. Empirical tests of asset-pricing models and associated "anomalies" are also surveyed. Measures of riskiness and risk aversion, intertemporal asset-pricing models, dynamic portfolio choice, option pricing and the term structure of interest rates, corporate investment and financing decisions, and taxation are studied.

ECO526/FIN 596: Financial Economics II
Theories and empirical evidence regarding financial markets and institutions that focus on asymmetric information, transaction costs, or both; and rational expectation models of asset pricing under asymmetric information, dynamic models of market making, portfolio manager performance evaluation, principal-agent models of firm managerial structure, takeover bids, capital structure, and regulation of financial markets are studied.

ECO575/FIN575: Topics in Financial Economics
This course is intended for Ph.D. students who have already completed the year-long Ph.D. sequence in finance (ECO525 and 526) and who intend to write their dissertation in finance. Topics vary by year, focusing on recent developments in the field.

FIN 560/561: Master's Project I & II
Under the direction of a Bendheim affiliated faculty member, students carry out a Master's project, write a report, and present the results in the form of a poster or an oral presentation in front of an examining committee.

FIN562: Extramural Summer Project
A summer research project designed in conjunction with the student's advisor and an industrial, or government sponsor that will provide practical experience relevant to the student's course of study.

Master in Finance: Placement Record

We have continued to invest heavily in the placement of our graduating students, with the addition of one person to our placement staff, Swati Bhatt as Director of Student Programs. The candidates for the Master in Finance degree get support and assistance with their post-graduate career planning from a coordinated program of resources, including Princeton's Office of Career Services, David H. Blair who as BCF's Director of Corporate Relations has developed a program to prepare for the recruiting process offering several sessions to MFin candidates beginning in October. Through their networking with BCF Corporate Affiliates and recruiters at the undergraduate level, David H. Blair and Swati Bhatt have multiple sources of current information about financial service industry jobs and have been working to assure widespread employer familiarity with the high level of skills and training represented by graduates of the Master in Finance.

Our excellent placement results, despite the challenging economic environment, are a testimony both to the high caliber of our students, the value added of our program and the quality of our placement effort. As of the end of June, of the 23 MFin students graduating, 22 have obtained permanent employment as follows:

Goldman Sachs	4 graduates	Equity research in Hong Kong Derivatives trading in London Options trading in Chicago Private Client Strategy in New York
Hedge Funds	3 graduates	Citadel in Chicago Start up in London Start up in New York
PhD Programs	3 graduates	Princeton University Northwestern University London Business School
Citicorp	2 graduates	Currency trading in New York Fixed income analysis in New York

and 1 graduate each at:

Bank of Italy	Banking supervision in Milan
Derivatech	Software for derivatives pricing in New York
Gleacher & Co.	Mergers and acquisitions in New York
JP Morgan Chase	Equity derivatives trading in New York
Lehman Brothers	Fixed income analytics MBS/ABS in New York
Merrill Lynch	Capital markets analytical associate in New York

Morgan Stanley	Emerging markets securities trading in New York
NY Federal Reserve	Banking supervision in New York
Putnam Investments	Quantitative asset management analysis in Boston
Sanford Bernstein	Strategist for quantitative asset management in New York

We have 6 first year students, 5 of whom sought summer internships (the sixth is pursuing a PhD) and all 5 have been successful in securing a summer 2003 internship as follows:

Goldman Sachs	Strategy analytics in New York
BankOne	Risk management in Chicago
Hedge fund	Trading analytics in New York
Tyco International	Finance department in New Jersey
US Dept of Commerce	Assistant to the Secretary in Wasington

In 2002, our 14 two-year returning students had spent the summer in internships at:

Bank One	Risk management division in Chicago (3 students)
Deutsche Bank	Asset management division in New York
Dynegy	Trading energy derivatives in Houston
Goldman Sachs	Investment research in Hong Kong
Goldman Sachs	Equities trading in Hong Kong
Merrill Lynch	Asset management in New York
Morgan Stanley	Emerging markets in New York
Morgan Stanley	Risk management/infrastructure group in New York
Salomon Smith Barney	Currency trading in New York
Scudder Investments	Quantitative asset management analysis in Boston
Trident Capital	Venture capital firm in Palo Alto, California
Wells Fargo Bank	Commercial bank in San Francisco

Corporate Affiliates Program

The annual Corporate Affiliates Program offers companies an opportunity to build a significant relationship with the BCF faculty and students. Corporate affiliates gain a strong presence and visibility in the BCF, interact with faculty and students, learn about important faculty research, and secure a competitive recruiting advantage.

2002-03 Partners

- Crédit Suisse First Boston
- Deutsche Bank
- Goldman Sachs
- Lehman Brothers
- Merrill Lynch
- Morgan Stanley
- Salomon Smith Barney

Specific Levels and Benefits

Associate Partner

- Annual Report of the BCF
- Opportunity to advertise internships and employment opportunities to both Undergraduate Certificate in Finance (163 in 2000-2001, 168 in 2001-2002) and Master in Finance students (26 in 2001-2002)
- Opportunity to use the BCF facilities to host recruiting events
- Access to the BCF Director of Corporate Relations as a resource for recruiting
- Recognition in the publicly disseminated materials of the BCF, including the Center's reports and web site which both list corporate affiliates and provide a hyperlink to each member's website

Partner

- All of the previous benefits, plus:
- Access to all research authored by the Center's affiliated faculty within the academic year
- Access to BCF faculty for internal or client presentations or for sponsored research
- Opportunity to work with BCF faculty and staff to create customized training programs and to design and access distance learning courses and events such as special lectures and conferences
- Invitation to deliver a guest lecture on campus or to participate as a presenter at BCF sponsored conferences
- Invitation and two reserved seats for all public events hosted by the Center
- Invitation and two reserved seats for all *Center for Economic Policy Studies* symposia and special events. The day-long symposia bring on campus key leaders from business, government and academia:. Recent events include:

- May 3-4, 2002: Norman Ornstein of the American Enterprise Institute gave the keynote address on **Energy Policy**. Panelists discussed the outlook on energy prices, the future of the automobile, the future of power supply, and health and the environment. Other speakers included: Daniel Yergin of Cambridge Energy Research Associates, Robert Crandall of The Brookings Institution, Kenneth Hass of the Ford Motor Company, Howard Gruenspecht of Resources for the Future, United States Congressman Rush Holt, Michael Greenstone of the University of Chicago, Randall Kroszner of the Council of Economic Advisers, Richard Schmalensee of the Massachusetts Institute of Technology, and Robert Williams and Robert Willig of Princeton.

- October 18-19, 2002: BCF Advisory Council member, John Bogle, delivered the keynote address on **Land Mines in Finance**. The next day, panelists discussed the economic outlook, the credibility of accounting statements, alternative investments, and whether or not the stock market is overvalued. Other speakers included: Neal Soss of Crédit Suisse First Boston, Andrew Golden of Princeton University Investment Company, Robert Litan of the Brookings Institution, Robert Shiller of Yale University, John Steffens of Spring Mountain Capital, Jeremy Stein of Harvard University, Burton Malkiel and Uwe Reinhardt of Princeton University.

- March 28-29, 2003: The Honorable Robert Rubin of Citigroup, Inc, delivered a public keynote address on **International Economic Policy: 2003**. Marina Whitman of the University of Michigan and Alan Blinder of Princeton led a discussion of issues raised in Mr. Rubin's lecture. The next day, panelists discussed the economic outlook, the credibility of accounting statements, alternative investments, and whether or not the stock market is overvalued. Other speakers included: John Lipsky of JP Morgan Chase & Co., Gene Grossman of Princeton University, Lawrence Mishel of the Economic Policy Institute, Robert Hormats of Goldman Sachs, Karen Johnson of The Federal Reserve Board, Arun Motianey of Citigroup Inc., Allan Meltzer of the American Enterprise Institute and Jeffrey Shafer of Salomon Smith Barney.

Gift Opportunities

Early in 1998, a $10 million gift from the Lowenstein Foundation enabled Princeton to launch The Bendheim Center for Finance. To establish the University as a national resource for innovative thinking on finance and finance-related topics, the BCF brings together leading experts in teaching and scholarship in financial economics. But to realize this vision, significant support beyond the generous Bendheim gift is needed for faculty, curriculum development and facilities. True excellence in financial economics requires a critical mass of finance researchers, approaching the size of a finance department in a leading business school, as well as important educational initiatives in a state-of-the-art setting.

Physical Space

Terrace	*$250,000*
Director's Office	*$100,000*
Graduate Student Suite	*$100,000*

Academic Personnel

Senior Professorships (5 committed, 2 additional needed)	*$3,000,000*
Senior Visiting Professorship (1 needed)	*$1,500,000*
Postdoctoral Fellows (1 needed)	*$1,000,000*
Junior Faculty Fellow (1 committed, 1 additional needed)	*$1,000,000*

Fellowships

Graduate Fellowships (3 committed, 7 additional needed)	*$250,000*

Support of Financial Research and Teaching

Research and Course Development Funds	*$2,500,000*

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