The Bendheim Center for FINANCE

PRINCETON UNIVERSITY

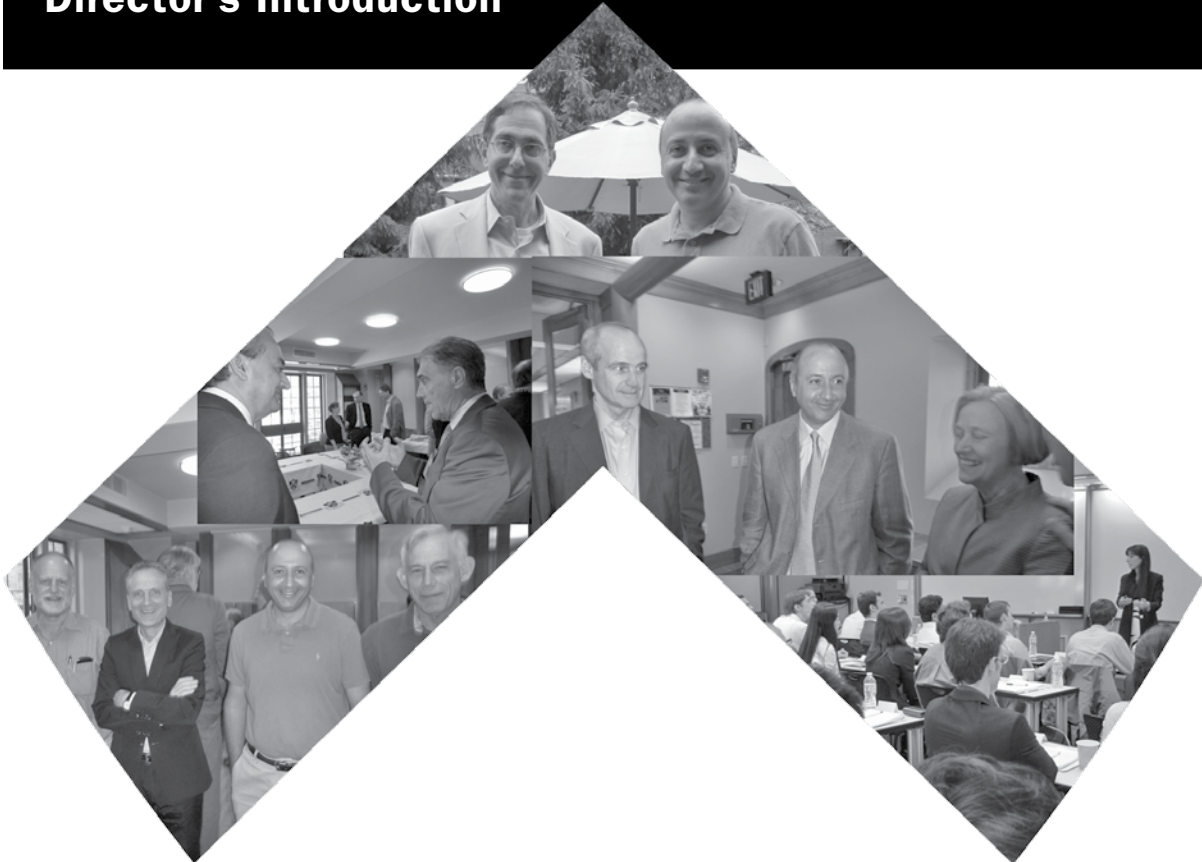ANNUAL REPORT 2013

PRINCETON UNIVERSITY

CONTENTS

YACINE AÏT-SAHALIA

Director's Introduction

Thirteen years ago, we opened the doors of the old Dial Lodge to the Bendheim Center for Finance to fulfill the same mission we have today: to develop new courses and programs in finance that will afford exciting learning opportunities to Princeton students, and to establish a leading center for research in modern finance.

Between banking and sovereign debt crises, this continues to be one of the most exciting times for research and teaching in finance. Princeton's existing finance curriculum has been expanded and improved with the introduction of the Undergraduate Certificate in Finance in 1999 and Master in Finance in 2001. Recently we have added courses on the rise of the Asian financial markets, history of financial crises, and regulation of international financial markets, to name a few.

Center-affiliated faculty members continue to 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 Bendheim Center for Finance has been an ideal environment in which to conduct significant research in finance. It also has served 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 continues to provide an additional source of intellectual stimulation and interchange for the Bendheim Center for Finance, and in recent years we have seen outreach and partnership with firms and alumni as far-flung as London, Hong Kong, Shanghai, and beyond. Our students are able to explore both internships and permanent job opportunities in an increasingly wide variety of finance-related areas, which have expanded from a few large Wall Street investment banks at the inception of the program to jobs in firms of all sizes and types around the world. The Bendheim Center for Finance also encourages students at all levels to conduct finance-related research at the University by providing such services as funding senior thesis projects, acting as a clearinghouse and major source of data, and providing expert faculty advisers for both undergraduate and master's research projects.

The scholars in the Bendheim Center for Finance are chosen for their ability to deploy cutting-edge methodologies to a wide range of finance-related topics, from stock-price determination and 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, computer science, psychology, and public policy provide a serious disciplinary basis for this research, leveraging our 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 Bendheim Center for Finance.

The past 13 years have proven finance's importance to Princeton's continued success as an educational and research institution, given 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 has never been 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 the University 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 Bendheim Center for Finance.

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

2012-2013 DEVELOPMENTS

Our faculty continue to be recognized for their expertise. Professor Wei Xiong won the Smith Breeden Prize for the best capital market paper published in the Journal of Finance. Jose Scheinkman was elected as a corresponding member of the Brazilian Academy of Sciences. Professor Jianqing Fan was elected for his contributions to Economics and Finance as Academician of Academia Sinica by the 30th Convocation of Academicians.

The BCF's Master in Finance program has been ranked in the top 10 programs (listed in alpha order) by Advanced Trading in their 2012 Rankings of top quantitative finance programs. Quantnet has also ranked Princeton as a top program.

Retired Advisory Council member, Jerome Powell '75, was confirmed by the Senate to the Federal Reserve Bank. He is one of two Princetonians named to the Federal Reserve Board.

MFin Alumnus Dario Villani, portfolio manager with BlueCrest Capital Management, returned to campus in the spring of 2013 to teach ORF574/FIN574, "Special Topics in Investment Science: Trading and Risk Management."

The department bid farewell to Jose Scheinkman, who retired from Princeton in June.

PH.D. STUDENTS

Five students with finance interests received their Ph.D. in 2013 and accepted the following positions:

- Edmond Choi, ORF, Senior Quantitative Analyst at TD Securities
- Wei Cui, ECO, University College London, assistant professor
- Tianhui Li, ORF, Foursquare, data scientist
- Yi Li, ECO, Federal Reserve Board, economist
- Weicheng Lian, ECO, International Monetary Fund, economist

MASTER IN FINANCE

The 11th class of the Center's Master in Finance (MFin) program graduated this month with 31 students. Years of investment in the placement of our graduating students continued to pay off in what remains a challenging job market, especially since our MFin students tend to all seek jobs with financial firms and have little desire to branch out outside that industry. The networking efforts of our Director of Corporate Relations, the strong support from our Corporate Affiliates and our Advisory Council, and the success enjoyed by our previous graduating classes have been reflected once again in 100 percent placement of our first-year students in summer internships and our graduating students in permanent positions. While costly in the short run in terms of faculty and staff involvement, in the long run, a successful placement record is critical to maintain the program's leading position which was recognized in industry surveys.

The number of MFin applications for 2013-14 decreased from 815 in January 2012 to 694 in January 2013, returning to the level of January 2011. We continued to interview the most promising subset of our applicant pool, a process that helps us ascertain which of the strong academic candidates we had identified through their written applications also excelled in areas such as communication and leadership. This year, we interviewed 116 of the applicants and made 32 offers of admission (compared to 48 last year). Our selectivity rate continues to be very high, with our program admitting less than 5% of its applicant pool. This is a much smaller percentage than our peer programs in quantitative finance (Carnegie Mellon University, Columbia University, Massachusetts Institute of Technology, New York University, Stanford University, University of California–Berkeley, University of Chicago, etc.), which typically admit 25% or more of their applicant pool.

Out of the 32 offers, we received 26 acceptances, compared to 41 out of 48 last year. Our yield this year was 81%, despite the absence in most cases of financial aid, which was limited to a total of seven half-semester fellowships for one year only, distributed among the 26 students.

A strong applicant pool and an exceptional yield reflect the recognition that the program is gaining in the wider quantitative finance community, including the employers of our students, and among the top undergraduate institutions that are providing us with applicants. We have continued to rely on our Advisory Council to help us recruit the most promising applicants: we ask our members to speak or meet with the admitted students in order to tell them about Princeton and help steer them in our direction.

UNDERGRADUATE CERTIFICATE IN FINANCE

Now in its 16th year, the Undergraduate Certificate in Finance (UCF) continues to do extremely well. We currently have 120 enrolled students in the Class of 2014 and will enroll 101 juniors from the Class of 2015. This will bring our total number of undergraduate students in the program (juniors and seniors) to 221 for the coming academic year, despite our grade-based cap in place. UCF students are drawn to the program from a wide variety of departments. Only about half of our students come from ECO and ORFE combined; the other half come this year from the following 17 departments, in decreasing order of numbers of students in the UCF: Mathematics, Woodrow Wilson School, Computer Science, Chemical and Biological Engineering, Physics, Electrical Engineering, Mechanical and Aerospace Engineering, Chemistry, Philosophy, Psychology, Molecular Biology, Near Eastern Studies, Art, Astrophysical Sciences, Classics, Comparative Literature, and Politics.

Not surprisingly given the demands of a multidisciplinary program in addition to those of their major, UCF students continue to be high achievers among the Princeton population and receive a high proportion of the prizes awarded by their respective departments. This year, of the 74 UCF seniors 6 received departmental prizes (two receiving two prizes); 7 UCF students were elected to Phi Beta Kappa Society; 19 UCF students were elected to membership in Society of Sigma Xi; 6 UCF students were elected to membership in Tau Beta Pi National Engineering Society;, while 6 UCF juniors received the Shapiro Prize for Academic Excellence,; and 32 UCF students received academic honors (6 cum laude, 9 magna cum laude, and 17 summa cum laude). 22 of our UCF students earned certificates in proficiency from 6 other departments or programs, 15 students earning 1 additional certificate, 5 earning 2 additional certificates and 2 earning 3 additional certificates.

FUNDRAISING AND ADVISORY COUNCIL

As in past years, our greatest challenge will be to continue to recruit and retain top-flight faculty. Faculty recruitment and retention is essential to our new educational initiatives and for continued expansion of course offerings. To be successful in this competitive market, we have found it necessary to make commitments to provide research support for faculty members. All of this requires active fundraising, and we continue to work closely with the Office of Development to increase the Center's resources. This year we give special thanks to David H. Blair '67, Howard E. Cox, Jr. '64, Robert R. Hermann, Jr. '75, Kenneth A. Hersh '85, William H. Heyman '70, William H. Janeway '65, and Jonathan F. Schachter, Ph.D. '94 for their generous gifts to the center.

Looking back, similar gifts from generous alumni have established conferences and symposia, enabled ongoing faculty development, provided scholarships to deserving young students, and refurbished physical spaces important for interaction both inside and outside the classroom.

As we had anticipated during the flush years, our Corporate Affiliates Program has slowed down due to the economic environment and the continued budgetary challenges facing the industry. Recognizing the effect of the economic environment, we have focused on maintaining and developing long-term relationships, as well as recruiting partnerships with a broader group of firms. The following firms have

remained active in recruiting efforts and have expressed a continued interest in our program: AXA Equitable, Barclays Capital, Citadel Investments Group, Citigroup, Crédit Suisse, DC Energy, Deutsche Bank, Edelman & Associates, Goldman Sachs, and Prediction Company, A Millennium Company.

Over the past 13 years, the Center has relied on the help and advice of prominent alumni working in the financial sector. The tenth annual meeting of the Advisory Council took place on campus on May 2-3, 2013. We are grateful for their leadership, involvement and counsel.

Yacine Aït-Sahalia
Otto A. Hack '03 Professor of Finance and Economics
Director, Bendheim Center for Finance, June 2013

FACULTY AND STAFF

2012-13

FACULTY

DILIP ABREU is the Edward E. Matthews, Class of 1953, Professor of Finance and 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 member of its council, and a fellow of the American Academy of Arts and Sciences. He received a B.A. from Bombay University, an M.Phil. from the University of Oxford, and a Ph.D. in economics from Princeton.

COURSES TAUGHT
- ECO 200: Advanced Principles of Economics
- ECO 418: Strategy and Information

GRADUATE STUDENTS ADVISED
- Benjamin Brook

REPRESENTATIVE PUBLICATIONS
- "Bargaining, Reputation, and Equilibrium Selection in Repeated Games with Contracts," *Econometrica* 75(3), May 2007 (with D. Pearce).
- "Bubbles and Crashes," *Econometrica* 71(1), January 2003 (with M. Brunnermeier).
- "Bargaining and Reputation," *Econometrica* 68(1), January 2000 (with F. Gul).
- "Information and Timing in Repeated Partnership," *Econometrica* 59(6), November 1991 (with P. Milgrom and D. Pearce).
- "On the Theory of Infinitely Repeated Games with Discounting," *Econometrica* 56(2), March 1988.

YACINE AÏT-SAHALIA is the Otto A. Hack '03 Professor of Finance and Economics and the director of the Bendheim Center for Finance. He was previously a professor at the University of Chicago's Graduate School of Business. He was named an outstanding faculty member by *BusinessWeek's 1997 Guide to the Best Business Schools* and is the recipient of the 1997 Michael Brennan Award, the 2001 FAME Award, and the 2003 Aigner Award. He received fellowships from the Sloan and Guggenheim Foundations. He is a fellow of the Econometric Society, the American Statistical Association, and the Institute of Mathematical Statistics, and a research associate for the National Bureau of Economic Research. He currently serves as a co-editor of the Journal of Econometrics. He edited the Handbook of Financial Econometrics with Lars P. Hansen. He received his Ph.D. in economics from the Massachusetts Institute of Technology in 1993 and his undergraduate degree from France's École Polytechnique.

REPRESENTATIVE PUBLICATIONS
- "Testing Whether Jumps Have Finite or Infinite Activity," with Jean Jacod, *Annals of Statistics*, 2011, 39 1689-1719 .
- "Ultra High Frequency Volatility Estimation with Dependent Microstructure Noise," with Per A. Mykland and Lan Zhang, *Journal of Econometrics*, 2011, 160, 160-175.
- "High Frequency Covariance Estimates with Noisy and Asynchronous Financial Data," with Jianqing Fan and Dacheng Xiu, *Journal of the American Statistical Association*, 2010, 105, 1504-1517.

- "Nonparametric Tests of the Markov Hypothesis in Continuous-Time Models," with Jianqing Fan and Jiancheng Jiang, *Annals of Statistics*, 2010, 38, 3129-3163.
- "Is Brownian Motion Necessary to Model High Frequency Data?," with J. Jacod, *Annals of Statistics*, 2010, 38.

ALAN BLINDER is the Gordon S. Rentschler Memorial Professor of Economics. He also founded the Griswold Center for Economic Policy Studies at Princeton in 1990. He is former vice chairman of the Board of Governors of the Federal Reserve System (1994–96) and before that was a member of President Clinton's original Council of Economic Advisers (1993–94). He also served briefly as deputy assistant director of the Congressional Budget Office in 1975. He is the vice chairman of Promontory Interfinancial Network, a director of the Council on Foreign Relations, and a member of the Economic Club of New York. Blinder was elected to the American Philosophical Society and the American Academy of Arts and Sciences. He is the author or coauthor 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: Introduction to Macroeconomics
- WWS 524: Domestic Macroeconomics: The Political Economy of Central Banking

REPRESENTATIVE PUBLICATIONS
- After the Music Stopped: The Financial Crisis, The Response, and What's Ahead, Penguin Press, 2013.
- "Financial Crises and Central Bank Independence," Business Economics, July 2013 (forthcoming).
- "The Supply Shock Explanation of the Great Stagflation Revisited," forthcoming in M. Bordo and A. Orphanides (eds.), The Great Inflation, University of Chicago Press for NBER, 2013 (with Jeremy Rudd).
- "It's Broke, Let's Fix It: Rethinking Financial Regulation," International Journal of Central Banking, December 2010, pp. 277-330
- "Revisiting Monetary Policy in a Low Inflation and Low Utilization Environment," *Journal of Money, Credit and Banking*, Supplement to Vol. 44, No. 1, (February 2012), pp. 141-146.

MARKUS BRUNNERMEIER is the Edwards S. Sanford Professor at Princeton University. He is a faculty member of the Department of Economics and affiliated with Princeton's Bendheim Center for Finance and the International Economics Section. He is the founding director of Princeton's Julis Rabinowitz Center for Public Policy and Finance. He is also a research associate at CEPR, NBER, and CESifo. He is member of the Advisory Scientific Committee of the ESRB, the research advisory council of the Bundesbank, and an advisory group of the IMF. He is an academic consultant to New York Fed and a founding member of the Euro-nomics group. Brunnermeier was awarded his Ph.D. by the London School of Economics (LSE), where he was affiliated with its Financial Markets Group. His research focuses on financial markets and the macroeconomy with special emphasis on bubbles, liquidity, financial stability

and implications for financial regulation and monetary policy. To explore these topics, his models incorporate frictions as well as behavioral elements. He is a Sloan Research Fellow, Fellow of the Econometric Society and the recipient of the Bernácer Prize granted for outstanding contributions in the fields of macroeconomics and finance. He recently received a Guggenheim Fellowship for studying the impact of financial frictions on the macroeconomy.

GRADUATE STUDENTS ADVISED
- Wei, Cui "Partially Irreversible Investment with Financing Constraints"

REPRESENTATIVE PUBLICATIONS
- "A Macroeconomic Model with a Financial Sector", *American Economic Review*, (forthcoming), with Yuliy Sannikov
- "The Maturity Rat Race," *Journal of Finance*, 2013, with Martin Oehmke
- "Bubbles, Financial Crises and Systemic Risk," 2013, *Handbook of the Economics of Finance*, with Martin Oehmke,
- Leadership, Coordination and Corporate Culture, *Review of Economic Studies*, (forthcoming), with Patrick Bolton and Laura Veldkamp.
- "Risk Topography," *NBER Macroeconomics Annual* 2011, (forthcoming)
- "Deciphering the 2007–08 Liquidity and Credit Crunch," *Journal of Economic Perspectives*, 2009 23 (1).

RENÉ CARMONA is the Paul M. Wythes '55 Professor of Engineering and Finance. As director of graduate studies of the Bendheim Center for Finance, he is responsible for the Master in Finance program. He joined Princeton in 1995. He was granted the "Aggregation" of mathematics (federal degree) in 1969, and a "These d'Etat" in probability from the University of Marseille in 1977. He was elected fellow of the Institute of Mathematical Statistics in 1984, and of the Society for Industrial and Applied Mathematics (SIAM) in 2009. He is also a member of the Bachelier Finance Society. Among his many editorial responsibilities, he was the co-founder and editor in chief of Electronic Journal in Probability, Communications in Probability and SIAM Journal on Financial Mathematics. He works on mathematical models for the commodity markets, especially the energy and emissions markets, and computational methods for quantitative finance.

COURSES TAUGHT
- ORF505/FIN505: Regression & Applied Time Series
- ORF542: Stochastic Control and Stochastic Differential Games
- ORF557, 558: Stochastic Analysis Seminar

UNDERGRADUATE STUDENTS ADVISED (sample)
- Kyle O'Donovan, "The New Asian Option: Using Temperature and Rainfall to Predict and Hedge the Uncertainty in Chinese Tea Harvests"
- Patrick Ohlendorf, "Reconsidering Public University Debt Management in Light of the 2008 Financial Crisis: A Stochastic Optimization Approach"
- Michael Weinberg, "Optimal Investment Under Asymmetric Compensation Contracts in a Discrete-Time Framework"
- Philip Oasis, "High Frequency Markets Analysis from Order Flows and Interactions"

GRADUATE STUDENTS ADVISED
- Tianhui Li, "Dynamic Programming and Trade Execution"

REPRESENTATIVE PUBLICATIONS
- Interest Rate Models: An Infinite Dimensional Stochastic Analysis Perspective, Springer Verlag, 2006.
- Indifference Pricing (editor), Princeton University Press, 2008.
- Statistical Analysis of Financial Data in R, Springer Verlag, 2013 (to appear)
- "Market Design for Emissions Markets Trading Schemes" (with M. Fehr, J. Hinz & A. Porchet)
- "The Clean Development Mechanism and CER Price Formation in the Carbon Emissions Markets" (with M. Fehr)
- "Singular Forward-Backward Stochastic Differential Equations and Emissions Derivatives" (with F. Delarue, G.E. Espinoza & N. Touzi)
- "Predatory Trading: a Game on Volatility and Liquidity" (with J. Yang)
- "Tangent Models as a Mathematical Framework for Dynamic Calibration" (with S. Nadtochyi)
- "Probabilistic Analysis of Mean Field Games" (with F. Delarue)
- "High Frequency Market Making" (with K. Webster)

PATRICK CHERIDITO is an associate professor of operations research and financial engineering. His research interests lie in probability theory and its applications to finance and insurance. Recently, he has been working on stochastic models for interest rates, dynamic risk measurement, risk allocation problems and backward stochastic differential equations.

COURSES TAUGHT
- ORF 526: Probability Theory
- ORF 570: Convex Analysis

UNDERGRADUATE STUDENTS ADVISED
- Charles Fox, "A Few Experiments in Portfolio Management"

RECENT PUBLICATIONS
- "Existence, Minimality and Approximation of Solutions to BSDEs with Convex Drivers" *Stochastic Processes and Their Applications*, 122, 2012.
- "Pricing and Hedging in Affine Models with Possibility of Default" SIAM *Journal of Financial Mathematics*, 3(1), 2012.
- "Processes of Class Sigma, Last Passage Times and Drawdowns," SIAM *Journal of Financial Mathematics* 3(1). 2012.
- "Ordered Contribution Allocations: Theoretical Properties and Applications" *The Journal of Risk*, 14(1), 2011.
- "Optimal Consumption and Investment in Incomplete Markets with General Constraints," *Stochastics and Dynamics* 11(2),2011, p. 283-299 (with Y. Hu)
- "Composition of Time-consistent Dynamic Monetary Risk Measures in Discrete Time," *International Journal of Theoretical and Applied Finance*, 14, 2011 (with M. Kupper).

GREGORY CHOW is a professor of economics, emeritus, and the Class of 1913 Professor of Political Economy, Emeritus. He was manager of economic research at the I.B.M. Thomas J. Watson Research Center from 1962–70, and director of the Econometric Research Program at Princeton from 1970–97. The program was renamed the Gregory C. Chow Econometric Research Program in 2001. 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. Chow's contributions to economics cover three main areas: econometrics, including the often used "Chow test" for parameter stability, the estimation of simultaneous stochastic equations, and criteria for model selection; dynamic economics, including spectral methods and optimal control methods for the analysis of econometric models and dynamic optimization under uncertainty to be solved by the method of Lagrange multipliers (in lieu of dynamic programming); and the Chinese economy, an institutional, theoretical, and quantitative approach to its study. He received his Ph.D. from the University of Chicago. He writes a column in three major newspapers in China and one in Taiwan. He is editor of the Routledge Handbook of the Chinese Economy and independent director of the Taiwan Semiconductors Manufacturing Company.

COURSES TAUGHT
- ECP379/EAS346: The Chinese Economy
- ORF 571: Economic Analysis of Environmental Problems

REPRESENTATIVE PUBLICATIONS
- "China as a Leader of the World Economy," *World Scientific*, 2012, Chinese edition, World Scientific 2012
- "Co-movements of Shanghai and New York Stock Prices by Time-varying Regressions," *Journal of Comparative Economics*, 2011.
- "A Simple Model of the Chinese Macroeconomy," *Economics Letters* 106, 2010.
- "Interpreting China's Economy" *World Scientific*, 2010; (Chinese edition) Citic Press, 2010.
- China's Economic Transformation. Oxford: Blackwell Publishers, second edition, 2007.
- Knowing China. Singapore: World Scientific Publishing Co., 2004.
- Dynamic Economics: Optimization by the Lagrange Method. Oxford: Oxford University Press, 1997.

ERHAN ÇINLAR is the Norman J. Sollenberger Professor of Engineering in the Department of Operations Research and Financial Engineering. He came to Princeton as a visiting professor of statistics in 1979–80. He is a fellow of the Institute of Mathematical Statistics, a fellow of INFORMS, an elected member of the International Statistical Institute, and the recipient of the Science Prize of TUBITAK. He has served as editor or associate editor of more than 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. He received the President's Award for Distinguished Teaching during the June 2010 Princeton Commencement ceremonies. He received the Lifetime Achievement Award for Excellence in Teaching for the Engineering School Student Council in 2011.

COURSES TAUGHT
- ORF 309: Probability and Stochastic Systems
- ORF 551/APC 521: Probability Theory

REPRESENTATIVE PUBLICATIONS
- "Lyapunov Exponents of Poissson Shot-noise Velocity Fields," *Stochastic Processes and Their Applications* 94, 2001 (with M. Caglar).
- "Spectral Expansion of the Occupation Measure for Birth and Death on a Flow," *Stochastic Processes and Their Applications*, 74, 1998 (with J. Kao).
- "Dispersion of Particle Systems in Brownian Flows," *Advances in Applied Probability 28*, 1996 (with C. Zirbel).
- "Probability and Stochastics. Springer, 2011, Graduate Texts in Mathematics vol.261.
- "Real and Convex Analysis. Springer, 2013, Undergraduate Texts in Mathematics (with Robert Vanderbei).
- "Introduction to Stochastic Processes. Dover, 2013.

JIANQING FAN is the Frederick L. Moore '18 Professor of Finance, and he joined the Department of Operations Research and Financial Engineering in 2003 and chaired the department since 2012. His research interests are financial econometrics, asset pricing, risk management, statistical learning, nonparametric modeling, and computational biology. As a specialist in statistics and financial econometrics, Fan received the 2000 Presidents' Award from the Committee of Presidents of Statistical Societies, recognizing the most outstanding statistician under age 40; the 2007 Morningside Gold Medal of Applied Mathematics, given triennially to an outstanding applied mathematical scientist of Chinese descent under age 45; the Guggenheim Fellowship in 2009; Academician of Academia Sinica in 2012. He was the president of the Institute of Mathematical Statistics, an international professional and scholarly society. He is an elected fellow of the American Association for the Advancement of Science, the American Statistical Association, and the Institute of Mathematical Statistics. He has coauthored two highly regarded books. He delivered a talk at the 2006 Madrid International Congress for Mathematicians, a high honor in mathematical sciences. He serves as the co-editor of the Journal of Econometrics, and Econometrics Journal and an associate editor of Econometrica, and Journal of the American Statistical Association. He has served as the co-editor (in-chief) of the Annals of Statistics (2004–06), and an editor of the Journal of Multivariate Analysis (1998–2000) and Probability Theory and Related Fields (2003–05). He earned his Ph.D. from the University of California–Berkeley. He has served as the director of graduate studies of both Ph.D. program of ORFE and Master in Finance in BCF.

COURSES TAUGHT
- ORF 504/FIN 504: Financial Econometrics

UNDERGRADUATE STUDENTS ADVISED
- Michael W. Markiewicz, Exploring the Development and Use of a Multinomial Logit Model to Improve Betting Returns at Saratoga Race Course
- Qizhao Weng, False Discoveries in Exchange-Traded Fund Performances: Identifying ETFs that outperform the Market

GRADUATE STUDENTS ADVISED
- Weijie Gu, "Estimating False Discovery Proportion under Covariance Dependence"
- Xin Tong, "Learning with Asymmetry, High Dimension, and Social Networks"
- Ahmet Emre Barut, ``Variable selection and prediction in high dimensional problems"

POSTDOCTORAL FELLOWS SUPERVISED
- Runlong Tang, "High-dimensional Statistical Learning and Inference"
- Yunbei Ma, "High-dimensional Statistical Learning and Inference"
- Lingzhou Xue, "Big Data"
- Zhao Chen, "Statistical Learning"

REPRESENTATIVE RECENT PUBLICATIONS
- "Testing and Detecting Jumps Based on a Discretely Observed Process," *Journal of Econometrics*, 2011 164, 331-344 (with Y. Fan).
- High Dimensional Covariance Matrix Estimation in Approximate Factor Models," *The Annals of Statistics* 39, 3320-3356 (with Y. Liano and M. Mincheva).
- "Sparse High-dimensional Models in Economics," *Annual Review of Economics* 2011 3, 291-317 (with J. Lv and L. Qi).
- "High Frequency Covariance Estimates with Noisy and Asynchronous Financial Data," *Journal of American Statistical Association* 105, 2010 (with Y. Aït-Sahalia and D. Xiu)
- "Nonparametric Tests of the Markov Hypothesis in Continuous-time Models," *The Annals of Statistics* 38, 3129-3163, 2010 (with Y. Aït-Sahalia and J. Jiang).
- "Option Pricing with Model-guided Nanparametric Methods," J*ournal of American Statistical Association* 104, 2009 (with L. Mancini).
- "Nonparametric Transition-based Tests for Diffusions," *Journal of American Statistical Association* 104, 1102-1116, 2009 (with Y. Aït-Sahalia and H. Peng).
- Nonlinear Time Series: Nonparametric and Parametric Methods, Springer Verlag, New York. 2003 (with Q. Yao).

MIKHAIL GOLOSOV is a professor of economics at Princeton University. Dr. Golosov has also held positions at Yale University and the Massachusetts Institute of Technology. He is the associate editor of Econometrica and Journal of Public Economics. Dr. Golosov was awarded the Sloan Research Fellowship in 2008 as well as the National Science Foundation CAREER Grant. His research covers topics in macro economics, public finance and political economy.

COURSES TAUGHT
- ECO341: Public Finance
- ECO523: Public Finance

REPRESENTATIVE RECENT PUBLICATIONS
- "A Dynamic Theory of Resource Wars" (with D. Acemoglu, A. Tsyvinski and P. Yared), *Quarterly Journal of Economics*, (2012)
- "Dynamic Mirrlees Taxation under Political Economy Constraints" (with D. Acemoglu and A. Tsyvinski), *Review of Economic Studies*, (2010)
- "A Theory of Liquidity and Regulation of Financial Intermediation" (with E. Farhi and A. Tsyvinski), *Review of Economic Studies*, (2009)

VALENTIN HADDAD joined the faculty at the Department of Economics at Princeton University in 2012 and teaches courses in finance for the undergraduate and the Ph.D. programs. He received his B.S. in applied mathematics and economics from École Polytechnique in 2008 and his Ph.D. in finance and economics from the University of Chicago in 2012. His research covers topics such as: the role of concentrated ownership for aggregate asset pricing dynamics; the impact of macroeconomic conditions for buyout activity.

COURSES TAUGHT
- ECO342: Money and Banking

UNDERGRADUATE STUDENTS ADVISED
- Anders Trung: "A Tale of Two Markets: Understanding the 2008 Shorting Ban Caroline Wang: "Not All News is Created Equal: An Analysis of Investor Attention and Stock Reactions"

REPRESENTATIVE PUBLICATIONS
- Concentrated Ownership and Equilibrium Asset Prices
- Buyout Activity: the Impact of Aggregate Discount Rates (with Erik Loualiche and Matthew Plosser)
- When Ignorance is Bliss (with Marianne Andries)

HARRISON HONG is the John Scully '66 Professor of Economics and Finance. He teaches courses in finance in the undergraduate, master's, and Ph.D. programs. Before joining Princeton in 2002, he was on the faculty of the Graduate School of Business at Stanford University, most recently as an associate professor of finance. He received his B.A. in economics and statistics with highest distinction from the University of California– Berkeley in 1992 and his Ph.D. in economics from the Massachusetts Institute of Technology in 1997. His research has covered such topics as: behavioral finance and stock market efficiency; asset pricing and trading under market imperfections; social interaction and investor behavior; security analyst incentives and forecast biases; organizational form and mutual fund performance; and destabilizing arbitrage, socially responsible investing, and commodities pricing. His work has received numerous awards and grants. He is on the editorial boards of the Journal of Finance and the Journal of International Central Banking. He was awarded the 2009 Fischer Black Prize by the American Finance Association, given bi-annually to the best financial economist under the age of 40.

COURSES TAUGHT:
- ECO 362 Financial Investments

- Advisors and Asset Prices: A Model of the Origins of Bubbles," *Journal of Financial Economics*, forthcoming (with J. Scheinkman and W. Xiong).
- "Simple Forecasts and Paradigm Shifts," *Journal of Finance* 62, 2007 (with J. Stein and J. Yu).
- Disagreement and the Stock Market," *Journal of Economic Perspectives* 21, 2007 (with Stein).
- "Do Industries Lead Stock Markets?" *Journal of Financial Economics*, February 2007 (with W. Torous and R. Valkanov).
- "Asset Float and Speculative Bubbles," *Journal of Finance*, June 2006 (with J. Scheinkman and W. Xiong).

HAROLD JAMES, who holds a joint appointment as a professor of international affairs in the Woodrow Wilson School and a professor in the history department, studies economic and financial history and modern German history. He was educated at the University of Cambridge (Ph.D., 1982) and was a fellow of Peterhouse for eight years before coming to Princeton in 1986. In 2004, he was awarded the Helmut Schmidt Prize for Economic History, and in 2005, the Ludwig Erhard Prize for writing about economics. He is chair of the editorial board of World Politics.

COURSES TAUGHT
- WWS 340/HIS 466: The History of Financial Crises
- HIS 366: Germany Since 1806
- HIS 554: Germany in 19th and 20th Centuries

REPRESENTATIVE PUBLICATIONS
- *Making The European Monetary Union*, Cambridge: Harvard University Press, 2012
- *The Creation and Destruction of Value: The Globalization Cycle*, Cambridge: Harvard University Press, 2009 (also Japanese and Polish editions)
- *The Roman Predicament: How the Rules of International Order Create the Politics of Empire*. Princeton: Princeton University Press, 2006.
- Family Capitalism: Wendels, Haniels, and Falcks. Cambridge: Harvard University Press, (also available in German: Munich, Verlag C. H. Beck), 2006.
- Europe Reborn: A History 1914–2000. London: Longman/Pearson Education, 2003.
- *The Deutsche Bank and the Nazi Economic War against the Jews*. Cambridge: Cambridge University Press, 2001.
- *The End of Globalization: Lessons from the Great Depression*. Cambridge: Harvard University Press (also available in Chinese, German, Greek, Japanese, Korean, and Spanish translations), 2001.

JAKUB JUREK is an Assistant Professor at the Department of Economics at Princeton University, and a research fellow at the National Bureau of Economic Research. He joined the Bendheim Center for Finance in 2008, and teaches courses on fixed income and financial economics. His research focuses on theoretical and empirical asset pricing, with applications to liquidity, credit risk and portfolio management. Jakub's recent work develops option-based methods for the valuation of collateralized debt

obligations (CDOs) and the dynamics of repo market financing terms. His research has been published in refereed journals such as the Journal of Finance, American Economic Review and the Review of Finance. Jakub holds an undergraduate degree in Applied Mathematics and a Ph.D. in Business Economics, both from Harvard University. Prior to entering graduate school, he was an analyst at the quantitative equity strategy groups at Goldman Sachs and AQR Capital Management. He has also served as a consultant to Grantham, Mayo, van Otterloo, LLC, a Boston-based investment management company, and the Harvard Management Company.

COURSES TAUGHT
- ECO 466/FIN 521 Fixed Income: Models and Applications
- ECO 467/FIN 567 Institutional Finance
- ECO 525/FIN 595 Financial Economics I

REPRESENTATIVE PUBLICATIONS
- "The Economics of Structured Finance," *Journal of Economic Perspectives* 23(1) (with J. Coval and E. Stafford).
- "Economic Catastrophe Bonds," *American Economic Review* 99(3) (with J. Coval and E. Stafford).
- "The Price of Immediacy," *Journal of Finance* 63(3), June 2008 (with G. Chacko and E. Stafford).

WORKING PAPERS
- "The Cost of Capital for Alternative Investments," April 2012 (with E. Stafford)
- "Crashes and Collateralized Lending," April 2011 (with E. Stafford)

DANIEL KAHNEMAN is a senior scholar at the Woodrow Wilson School of Public and International Affairs. He is also professor of psychology and public affairs, emeritus, at the Woodrow Wilson School, the Eugene Higgins Professor of Psychology Emeritus at Princeton, and a fellow of the Center for Rationality at the Hebrew University in Jerusalem. Kahneman has held the position of professor of psychology at the Hebrew University in Jerusalem (1970–78), the University of British Columbia (1978–86), and the University of California–Berkeley (1986–94). He is a member of the National Academy of Science, the Philosophical Society, and the American Academy of Arts and Sciences, and a fellow of the American Psychological Association, the American Psychological Society, the Society of Experimental Psychologists, and the Econometric Society. He has been the recipient of many awards, among them the Nobel Prize in Economic Sciences (2002); the Lifetime Contribution Award of the American Psychological Association (2007) and the Grawemeyer Prize (2002), both jointly with Amos Tversky; the Warren Medal of the Society of Experimental Psychologists (1995); the Distinguished Scientific Contribution Award of the American Psychological Association (1982); and the Hilgard Award for Career Contributions to General Psychology (1995). Kahneman holds honorary degrees from numerous universities.

REPRESENTATIVE PUBLICATIONS
- "Frames and Brains: Elicitation and Control of Response Tendencies," *Trends in Cognitive Sciences* 11, 2007 (with S. Frederick).
- "Why Hawks Win," Foreign Policy 158, 2007 (with J. Renshon).

- "Developments in the Measurement of Subjective Well-being," *Journal of Economic Perspectives* 20, 2006 (with A. Krueger).
- Anomalies: Utility Maximization and Experienced Utility," *Journal of Economic Perspectives* 20, 2006 (with R. Thaler)
- Choices, Values, and Frames. New York: Cambridge University Press and the Russell Sage Foundation, summer 2000 (with A. Tversky).

NOBUHIRO KIYOTAKI is the Harold H. Helm '20 Professor of Economics and Banking. He received his Ph.D. at Harvard University. He has published widely in macroeconomics and monetary economics, including "Monopolistic Competition and the Effects of Aggregate Demand," with Olivier Blanchard in 1987, "On Money as a Medium of Exchange," with Randall Wright in 1989, and "Credit Cycles," with John Moore in 1997. Kiyotaki also serves as an academic consultant for the Federal Reserve Bank of New York. Among professional honors, Kiyotaki received in 2010 the Stephen A. Ross Prize in Financial Economics and in 1999 the EEA Yrjo Jahnsson Award together with John Moore. He is a Fellow of the Econometric Society and a Fellow of the British Academy.

COURSE TAUGHT
- ECO 522: Advanced Macroeconomics
- ECO 301: Macroeconomics

GRADUATE STUDENTS ADVISED
- Mathieu Tachereau-Dumouchel "Three Essays on Macroeconomics of Labor Market" completed January 2012, now assistant professor at Wharton.
- Edouard Schaal "Three Essays on Macroeconomics of Labor Market" completed May 2011, now assistant professor at NYU.

PAUL R. KRUGMAN is a professor of economics and international affairs. He is the author or editor of dozens of books and several hundred articles, primarily about international trade and international finance. He is also internationally 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. In 2008, Krugman received the Nobel Prize in Economic Sciences. 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. He received his Ph.D. from the Massachusetts Institute of Technology. He holds a joint appointment with the economics department and the Woodrow Wilson School of Public and International Affairs.

COURSE TAUGHT
- WWS 472: Special Topics in Public Affairs – The Economics of the Welfare State

REPRESENTATIVE PUBLICATIONS
- *The Conscience of a Liberal*, 2007.
- *Macroeconomics*, 2005 (with R. Wells).
- *Principles of Economics*, 2004 (with R. Wells).
- *Currency Crises* (ed.), University of Chicago Press, 2000.

BURTON MALKIEL has been the Chemical Bank Chairman's Professor of Economics at Princeton since 1988. He entered emeritus status in 2011. His research interests center on financial markets, asset pricing, and investment strategies. He is a regular op-ed writer for The Wall Street Journal. He also serves on the boards of several financial and non-financial corporations. He has been awarded an Honorary Doctor of Humane Letters from the University of Hartford (1971), Phi Beta Kappa, and the Harvard Business School Alumni Achievement Award for 1984. He has served as the president of the American Finance Association. He received his Ph.D. from Princeton.

COURSES TAUGHT
- ECO 362: Financial Investments

UNDERGRADUATE STUDENTS ADVISED
- Joshua Rosner, "The Build America Bond Programs: An Empirical Analysis of Issuer Borrowing Costs and the Muni-Puzzle"
- Sean (Xueyang) Li, "A New Way to Invest: Style Timing Using Dynamic Rank Weighting"
- Alaap Parikh, "Asset Pricing in the Indian Stock Market: Tests of the Size and Value Effects"

GRADUATE STUDENT ADVISED
- Nicholas Racculia "Returns from Investing in Venture Capital"

REPRESENTATIVE PUBLICATIONS
- "Asset Management Fees and the Growth of Finance" *Journal of Economic Perspectives* 27:2, 2013.
- *A Random Walk Down Wall Street*, New York: *W.W. Norton & Co. 10th edition, paper*, January 2012.
- "The Value Effect and the Market for Chinese Stocks," *Emerging Market Review* 10, 2009.
- The Elements of Investing, New York: Wiley, January 2013 (with C. Ellis).
- "Have Individual Stocks Become More Volatile? *Journal of Finance*, February 2001 (with J. Campbell, M Lettau, and Y. Xu) [First Prize paper for the Smith Breeden Prizes for 2002].

ATIF MIAN holds a bachelors degree in Mathematics and Ph.D. in Economics from MIT. Prior to joining Princeton in 2012 he taught at the University of Chicago Booth School of business and U.C. Berkeley. His research studies links between financial markets and the macro economy. Professor Mian's work emphasizes the role played by political, governance, and organizational constraints in shaping the effectiveness and scope of financial markets. His more recent work centers on understanding the origins of the global financial crisis, the political economy of government intervention in financial markets, and the link between asset prices, household borrowing, and consumption. Professor Mian's work has appeared in top Economics and Finance journals, including *American Economic Review, Quarterly Journal of Economics, Journal of Finance, Review of Financial Studies* and *Journal of Financial Economics.* Professor Mian's work has also been profiled by leading media outlets such as *The Economist* and *The Wall Street Journal.*

REPRESENTATIVE PUBLICATIONS
- "The Effects of Fiscal Stimulus: Evidence from the 2009 'Cash for Clunkers' Program" (with Amir Sufi), *Quarterly Journal of Economics*
- "The Political Economy of Subprime Mortgage Expansion" (with Amir Sufi and Francesco Trebbi), *Quarterly Journal of Political Science*
- "House Prices, Home Equity-Based Borrowing, and the U.S. Household Leverage Crisis" (with Amir Sufi), *American Economic Review,* Vol 101, August 2011
- "Rent Seeking and Corruption in Financial Markets" (with Asim Ijaz Khwaja), *Annual Review of Economics,* Vol 3, 2011

STEPHEN MORRIS is the Alexander Stewart 1886 Professor of Economics, and his work ranges from game theory to applied (microeconomic) theory to topics in financial economics. He joined Princeton in 2005. He taught at the University of Pennsylvania from 1991 to 1998, first as an assistant and then as an associate professor. He joined the Yale University faculty as a professor of economics in 1998. Morris received his Ph.D. in economics from Yale in 1991.

COURSES TAUGHT
- ECO 317: The Economics of Uncertainty
- ECO 502: Microeconomic Theory II

UNDERGRADUATE STUDENTS ADVISED
- Dan Elkind (2013): "Relative Return Paranoia: Mutual Fund Managerial Incentives and the Implied Volatility Skew"
- Josue Figueroa (2013): "Over-Experimentation in Contracts for Experimenting Agents"

GRADUATE STUDENT ADVISED
- Ming Yang, "Essays in Strategic Information Acquisition"
- Takuo Sugaya, "Essays on Repeated Games With Private Monitoring"
- Eduardo Grillo, "Essays in Strategic Communication"

REPRESENTATIVE PUBLICATIONS
- "Contagious Adverse Selection," *American Economic Journal: Macroeconomics*, 2012 (with H. Shin)
- "Financial Regulation in a System Context," *Brookings Papers on Economic Activity,* 2009 (with H. Shin).
- "Risk and Wealth in a Model of Self-fulfilling Currency Crises," *Journal of Monetary Economics* 54, 2007 (with B. Guimaeres).
- "Beauty Contests and Bubbles," *Review of Financial Studies* 19, 2006 (with F. Allen and H. Shin)
- "Central Bank Transparency and the Signal Value of Prices," *Brookings Papers on Economic Activity* 2, 2005 (with H.S. Shin)

ULRICH MÜLLER is an associate professor in the Department of Economics. He received his Ph.D. in economics from the University of St. Gallen, Switzerland. His main research interest is time series econometrics. His recent work focuses on Bayesian inference, low frequency variability, and the development of econometric tools that are robust to correlations of largely unknown form.

REPRESENTATIVE PUBLICATIONS
- Measuring Prior Sensitivity and Prior Informativeness in Large Bayesian Models, *Journal of Monetary Economics* 59 (2012), 581 – 597.
- "Efficient Tests under a Weak Convergence Assumption," *Econometrica* 79 (2011), 395-435.
- "Efficient Estimation of the Parameter Path in Unstable Time Series Models,) *Review of Economic Studies* 77 (2010), 1508-1539. Supplement. (Joint with Philippe Emmanuel Petalas).
- "t-statistic Based Correlation and Heterogeneity Robust Inference," *Journal of Business & Economic Statistics* 28 (2010), 453 – 468. (Joint with Rustam Ibrgimov.)
- "Testing Models of Low Frequency Variability," *Econometrica* 76 (2008), 979-1016. (Joint with Mark Watson).

JOHN MULVEY is a professor of operations research and financial engineering. His research interests center on designing financial planning systems, primarily for pension plans, hedge funds, and wealthy individuals; developing optimal hedge fund strategies; combining financial optimization and stochastic models; stochastic optimization algorithms; and decentralized risk management. He was a finalist for the Edelman Prize for the Towers Perrin-Tillinghast investment system in 1999. He received his Ph.D. in management from the University of California–Los Angeles.

COURSES TAUGHT
- ORF 534: Quantitative Investment Management
- ORF 311: Optimization under Uncertainty
- ORF 307: Optimization

UNDERGRADUATE STUDENTS ADVISED
- Ji Hyun Kim, "New Opportunities in Currency Carry Trade"
- Ling-Chen Eric Hsu, "Liquidity and Investment Styples in the Commodity Futures Market"
- Ryan Chiu, "Alternative Investing: The Search for Profitable Trading Strategies in the U.S. Commodity Markets"

GRADUATE STUDENTS ADVISED
- Lorenzo Reus, "Discovering Regimes in Currencies Tactics, and Related Issues for Private Equity Investors"
- Max Goer, "A Study of Volatility and the VIX Index in Equity Markets"
- Changle Lin, "The Impact of Regulations on Risk Management and Asset Allocation for Defined Benefit Pension Plans"

- "Advantages of long-short commodity funds for long-term investors," *Investments and Pensions Europe*, Autumn 2012, 3-5.
- "Werkzeuge fur Absolute-Return-Strategien," *Organon*, 2, December 2012, 1-23.
- "Long-Short versus Long-Only Commodity Funds," *Quantitative Finance*, December 2012, 1779-1785.
- "Dynamic Asset Allocation for Varied Financial Markets under Regime Switching Framework," *European Journal of Operations Research*, January 2013, (with W. Kim, and F. Fabozzi).
- "Longevity Risk Management for Individual Investors," in Applications in Finance, Energy, Planning, and Logistics, (ed. W. Ziemba), 2012, (with W. Kim, K. Simsek, and M.J. Kim).
- "The Role of Managed Futures and Commodity Funds: Protecting Wealth during Turbulent Periods," *Journal of Indexes*, Summer 2012.

BIRGIT RUDLOFF is an assistant professor of operations research and financial engineering. Her research interests include hedging, price bounds and risk measurement in markets with transaction costs, hedging in incomplete markets with convex risk measures, portfolio optimization with risk constraints, mathematical finance, risk management, and convex analysis. She received her Ph.D. in mathematical finance from Martin-Luther University Halle-Wittenberg (Germany) in 2006 and visited the research institute IMPA in Rio de Janeiro and the technical university in Vienna before coming to Princeton in 2006.

COURSES TAUGHT
- ORF 435/535: Financial Risk Management
- ORF 533: Convex Analysis for Mathematical Finance
- ORF 515: Asset Pricing II: Stochastic Calculus and Advanced Derivatives.

REPRESENTATIVE PUBLICATIONS
- "Multi-portfolio time consistency for set-valued convex and coherent risk measures." Submitted for publication (with Z. Feinstein)
- A Benson type algorithm for linear vector optimization and applications. Submitted for publication (with A. Hamel, A. Löhne) On the economic interpretation of time consistent risk averse dynamic stochastic programming problems. Submitted for publication (with A. Street, D. Valladao)
- "An Algorithm for Calculating the Set of Superhedging Portfolios in Markets with Transaction Costs," submitted for publication 2012 (with A. Loehne).
- "Set-valued Risk Measures for Conical Market Models," 2011, *Mathematics and Financial Economics* 5 (1), 1-28 (with A. Hamel, F. Heyde).
- "Time consistency of dynamic risk measures in markets with transaction costs." Forthcoming in *Quantitative Finance*, (2013). (with Z. Feinstein)
- Testing Composite Hypotheses via Convex Duality. *Bernoulli* 16 (4), 1224-1239, 2010, (with I. Karatzas).
- "Coherent Hedging in Incomplete Markets," *Quantitative Finance* 9 (2), 2009.

YULIY SANNIKOV is a Professor of economics whose research interests include economic theory, corporate finance and macroeconomics with financial frictions. Yuliy Sannikov got his B.A. from Princeton and a Ph.D. from Stanford GSB. Yuliy was an invited panel speaker at several meetings of the Econometric Society, including North American Meetings in 2006, Latin American in 2008, East Asian in 2009, and the World Congress in 2010. He is a Sloan Fellow in 2009-2011, and he was also invited to give the annual Schultz lecture at the University of Chicago Economics Department in 2008. He participated in the Review of Economic Studies tour as one of the top six Economics Ph.D. graduates in the U.S. in 2004, and he got three gold medals at International Mathematical Olympiads in 1996, 1995, and 1994. Besides Princeton, Yuliy Sannikov has taught at MIT, NYU, Harvard, Stanford and UC Berkeley.

REPRESENTATIVE PUBLICATIONS
- "Optimal Security Design and Dynamic Capital Structure in a Continuous-time Agency Model," with Peter DeMarzo, *Journal of Finance*, 2006, Vol. 61, No. 6, pp. 2681-2724
- Games with Imperfectly Observable Actions in Continuous time," Econometrica, 2007, Vol. 75, No. 5, pp. 1285-1330.
- "Impossibility of Collusion under Imperfect Monitoring with Flexible Production," with Andy Skrzypacz, *American Economic Review*, 2007, Vol. 97, No. 5, pp. 1794-1823.
- "A Continuous-time Version of the Principal-agent Problem," *Review of Economic Studies*, 2008, Vol. 75, No. 3, pp. 957-984.
- "The Role of Information in Repeated Games with Frequent Actions, with Andy Skrzypacz, *Econometrica*, 2010, Vol. 78, No. 3, pp. 847-882.
- "Reputation in Continuous-time Games," with Eduardo Faingold, *Econometrica*, 2011, Vol. 79, No. 3, 773-876.

JOSÉ A. 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 research associate of the National Bureau of Economic Research, a member of the National Academy of Sciences, a fellow of the American Academy of Arts and Sciences and of the Econometric Society, a corresponding member of the Brazilian Academy of Sciences, and a "docteur honoris causa" of the University of Paris-Dauphine. He was named a fellow of the John Simon Guggenheim Memorial Foundation in 2007. From 1973 to 1998, Scheinkman taught at the University of Chicago, where he was from 1995 to 1998 the chair of the economics department, and beginning in 1997 the Alvin H. Baum Distinguished Service Professor of Economics. From 1987–88, he was vice president of the Financial Strategies Group at Goldman, Sachs & Co. He has been a visiting professor at College de France, Princeton University, University of Paris-Dauphine, E.H.E.S.S. (France), Instituto de Matemática Pura e Aplicada, and E.P.G.E. (Brazil). During 2002, he held a Blaise Pascal Research Chair (France). His current research interests are the determinants of the size of the financial industry, asset-price bubbles, and developing tools for empirical studies of asset markets.

- ECO 502 Microeconomic Theory II
- ECO 525/FIN 595: Financial Economics
- ECO 493/FIN 593: Financial Crises

UNDERGRADUATE STUDENTS ADVISED
- Daria Kolotiy, "A Tale of Three Peoples: Hispanic, Black and White-Owned Business Startup Capital, Exports and E-commerce"

REPRESENTATIVE PUBLICATIONS
- "Shadow Finance" (with P. Bolton and Tano Santos) in *Rethinking the Financial Crisis*, A. Blinder, A. Lo and R. Solow (eds.), 2012.
- "Recursive Utility in a Markov Environment with Stochastic Growth" (with Lars Hansen) *Proceedings of the National Academy of Sciences*, 109:30, 2012.
- "Pricing Growth-Rate Risk," (with Lars Hansen) Finance and Stochastics 16:1, 2012.
- "The Informal Sector: An Equilibrium Model and Some Empirical Evidence from Brazil" (with Aureo de Paula) *Review of Income and Wealth* 57:s1, 2011.
- "Risk Price Dynamics," (with J. Borovicka, L. Hansen and M. Hendricks) *Journal of Financial Econometrics* 9:1, winter 2011.
- "Outside and Inside Liquidity,"(with P. Bolton and T. Santos) *Quarterly Journal of Economics* 126:1, 2011.
- "Value Added Taxes, Chain Effects and Informality," *American Economic Journal: Macroeconomics*, 2010 (with A. de Paula).
- "Market and Public Liquidity," *American Economic Review Papers and Proceeding*, 2009, (with With P. Bolton and T. Santos)
- "Long Run Risks: An Operator Approach," *Econometrica*, 2009 (with L. Hansen).

HYUN SONG SHIN is the Hughes-Rogers Professor of Economics at Princeton University. His recent research has covered international finance, especially on global liquidity and its consequences. His broader research interests are in financial economics, especially in issues related to disclosures, financial regulation, crises, and financial stability, issues on which he has advised central banks and policy institutions. He is a fellow of the Econometric Society and the British Academy. He received his Ph.D. from the University of Oxford in 1988. He was on leave during the academic year 2009–10, serving as an adviser to President Lee Myung-bak of South Korea.

COURSES TAUGHT
- FIN 591/ECO 491: Cases in Financial Risk Management
- FIN 596/ECO 526: Financial Economics II

UNDERGRADUATE STUDENT ADVISED
- Daniel Lewis, "When Can Central Banks Credibly Provide Forward Guidance?"
- Peiwen Xu, "Resale Housing Price Determinants: A Case Study of Canada"
- Edward Zheng, "Hedge Fund Replication: An Investor Friendly and Non-Linear Approach"

REPRESENTATIVE PUBLICATIONS
- Risk and Liquidity, Clarendon Lectures in Finance, 2009, Oxford University Press
- "Marking to Market: Panacea or Pandora's Box?" *Journal of Accounting Research* 46, 2008 (with G. Plantin and H. Sapra).
- "Beauty Contests and Iterated Expectations in Asset Markets," *Review of Financial Studies* 19, 2006 (with F. Allen and S. Morris).
- "Disclosure Risk and Price Drift," *Journal of Accounting Research* 44, 2006.
- "Disclosures and Asset Return," *Econometrica* 71, 2003.
- "Social Value of Public Information," *American Economic Review*, 52, 2002 (with Morris).

CHRISTOPHER SIMS is the John F. Sherrerd '52 University Professor of Economics. He received his Ph.D. from Harvard University in 1968. He taught in the economics department of the University of Minnesota from 1969 to 1990, then moved to Yale University 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 served as president and as co-editor of Econometrica. He became president elect of the American Economic Association in 2011 and serves as president during 2012. He was with Thomas Sargent, the co-recipient of the 2011 Nobel Prize in Economics. He has intermittently served as an 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.

COURSES TAUGHT
- ECO 342: Money and Banking I
- ECO513: Advanced Econometrics: Time Series Models
- ECO 521: Macroeconomic Theory I
- ECO 522: Advanced Macroeconomic Theory II

REPRESENTATIVE PUBLICATIONS
- "Were There Regime Switches in U.S. Monetary Policy?" *American Economic Review* 96(1), March 2006.
- "Implications of Rational Inattention," *Journal of Monetary Economics* 50(3), April 2003.
- "The Role of Models and Probabilities in the Monetary Policy Process," *Brookings Papers on Economic Activity* 2, 2002.
- "The Precarious Fiscal Foundations of EMU," *De Economist* 147(4), 1999.
- "Error Bands for Impulse Responses," *Econometrica* 67(5), 1999 (with T. Zha).

RONNIE SIRCAR is a professor of operations research and financial engineering. He received his doctorate from Stanford University, and taught for three years at the University of Michigan in the Department of Mathematics before coming to Princeton. He has received continuing National Science Foundation research grants since 1998. He was a recipient of the E-Council Excellence in Teaching Award for his teaching in 2002, 2005, and 2006 and the Howard B. Wentz Jr. Junior Faculty Award in 2003. His research interests center on financial mathematics, stochastic volatility models, credit risk, asymptotic and computational methods, portfolio

optimization and stochastic control problems, stochastic differential games and energy and commodities markets.

COURSES TAUGHT
- ORF335/ECO364: Financial Math Seminar

UNDERGRADUATE STUDENTS ADVISED
- Paulius Paulauskas, "Forex Market Response: Analysis of Natural Disasters and Their Impact on the Foreign Exchange Market"

GRADUATE STUDENTS ADVISED
- Edmond Choi, "An Estimation of the Systemic Risks in the Multi-Name Credit and Equity Markets

REPRESENTATIVE PUBLICATIONS
- "Oligopoly Games under Asymmetric Costs and an Application to Energy Production," with A. Ledvina, *Mathematics and Financial Economics* 6(4), 2012, pages 261-293.
- "Exploration and Exhaustibility in Dynamic Cournot Games," with M. Ludkovski, *European Journal on Applied Mathematics* (23)3, 2012, pp 343-372.
- *Multiscale Stochastic Volatility for Equity, Interest-Rate and Credit Derivatives* with J.-P. Fouque, G. Papanicolaou and K. Solna, Cambridge University Press, September 2011.
- "A Model for Hedging Load and Price Risk in the Texas Electricity Market," with M. Coulon and W. Powell, August 2012, submitted.
- "Implied Volatility of Leveraged ETF Options," with T. Leung, October 2012 submitted.
- *"Games with Exhaustible Resources," SIAM J.,* Applied Mathematics 70(7), 2010, pages 2556-2581 (with C. Harris and S. Howison).

DAVID SRAER joined the faculty at the Department of Economics at Princeton University in 2009 and teaches courses in corporate finance for the master's and the Ph.D. programs. He received his B.S. in applied mathematics and economics from École Polytechnique in 2001 and his Ph.D. in economics from the Toulouse School of Economics in 2007. His research has been published in leading journals in economics and finance such as the American Economic Review, Review of Economic Studies, *The Journal of Finance*, and the *Journal of Financial Economics*. It has covered topics such as: the role of collateral value on firms' investment decisions; the importance of family ownership for corporate behavior; the impact of retail investing on idiosyncratic volatility; and the role of dissent in organizations. Sraer is an associate editor for the *Journal of the European Economic Association* and has served as ad hoc referee for leading journals in both economics and finance.

COURSES TAUGHT
- FIN 502: Corporate Finance and Financial Accounting
- ECO 526/FIN 596: Corporate Finance

UNDERGRADUATE STUDENTS ADVISED
- Jared Bauman, "Analyst Irrationality and the Impact of Implicit Beliefs on Consensus Earnings Forecasts"
- Monica Chow, "The Core Issue: The Impact of Bank Liability Structure on Mortgage Lending in the Early 21st Century Financial Crisis"
- Sean P. Cotter, "State Fiscal Crises in the Aftermath of the Great Recession: The Effects of Changes in State Corporate Income Tax Rates on Entrepreneurship and Investment"

REPRESENTATIVE PUBLICATIONS
- "Performance and Behavior of Family Firms: Evidence from the French Stock Market," *Journal of the European Economic Association* 5(4), June 2007 (with D. Thesmar).
- "Optimal Dissent in Organizations," *The Review of Economic Studies* 76, 2009 (with A. Landier and D. Thesmar).
- "Individual Investors and Volatility," *The Journal of Finance*, forthcoming (with T. Foucault and D. Thesmar)
- "Growth LBOs," *The Journal of Financial Economics*, forthcoming (with Q. Boucly and D. Thesmar).
- "The Collateral Channel: How Firms React to Real Estate Shocks." *The American Economic Review*, forthcoming (with T. Chaney and D. Thesmar).
- "Quiet Bubbles" *The Journal of Financial Economics*, forthcoming (with H. Hong).

KENNETH STEIGLITZ, the Eugene Higgins Professor of Computer Science, received his doctorate in 1963 from New York University and has been teaching at Princeton ever since. He is a fellow of the Institute of Electrical and Electronics Engineers (1981), a fellow of the Association for Computing Machinery (1997), and a recipient of the Technical Achievement Award of the Signal Processing Society (1981), the Signal Processing Society Award (1986), the IEEE Centennial Medal (1984), the School of Engineering Distinguished Teacher Award (1997), and the IEEE Third Millennium Medal (2000). His current research interests are in agent-based modeling of markets, auctions, and computing using soliton collisions. Kenneth Steiglitz has transferred to emeritus status and continues to work on emergent behavior in agent-based macroeconomic models.

COURSES TAUGHT
- COS 126/EGR 126: General Computer Science

REPRESENTATIVE PUBLICATIONS
- "Soliton-guided Phase Shifter and Beam Splitter," *Phys. Rev.* A 81, March 2010.
- "Proton Trapping and Transfer with Solitons," *Phys. Rev.* A 79, 021802R, February 2009 (with D. Rand).
- Snipers, Shills, and Sharks: EBay and Human Behavior, Princeton University Press, 2007.
- "Making Beam Splitters with Dark Soliton Collisions," *Phys. Rev.* A, 82, 043831, October 2010
- "The Spite Motive and Equilibrium Behavior in Auctions," Contributions to *Economic Analysis & Policy*, 2(1), 2003 (with J. Morgan and G. Reis).

ROBERT VANDERBEI has been a professor in the Department of Operations Research and Financial Engineering since its creation in 1999 and was the chair from 2005-2012. His research interests focus on algorithms for nonlinear optimization and their application to problems arising in engineering and science. Application areas of interest focus mainly on inverse Fourier transform optimization problems and action minimization problems with a special interest in applying these techniques to the design of NASA's terrestrial planet finder space telescope. He is an associate editor for both *Optimization in Engineering* and *Mathematical Programming*. He is a member of the Mathematical Optimization Society, SPIE, and the American Astrophysical Society. He is a Fellow of the Society for Industrial and Applied Mathematics and he is a Fellow of the Institute for Operations Research and Management Science. He received his Ph.D. in applied mathematics from Cornell University in 1981.

COURSES TAUGHT
- ORF 522: Linear Optimization
- ORF 307: Optimization

UNDERGRADUATE STUDENTS ADVISED
- Iris Chang, "Face Detection, Tracking Methods, and Image Processing: A MATLAB Approach"
- Sarah Germain, "Analyzing and Presenting Modern Temperature Trends"
- Christina Kaelin, "The Linear Simplex Method: Investigation of Cycling and Application to Markov Decision Processes"

REPRESENTATIVE PUBLICATIONS
- "Interior-point Methods for Nonconvex Nonlinear Programming: Jamming and Numerical Testing," *Mathematical Programming* 2003 (with H. Benson and D. Shanno).
- "Two-mirror Apodization for High-contrast Imaging," *Astrophysical Journal* 599, 2003 (with W. Traub).

ERIK VANMARCKE is a professor of civil and environmental engineering. He received his doctorate from the Massachusetts Institute of Technology in 1970 and joined the faculty, remaining there until 1985. At MIT, he was the Gilbert W. Winslow Career Development Professor and served as director of the Civil Engineering Systems Methodology Group. He has held visiting appointments at Harvard University, Technical University of Delft (the Netherlands), and University of Leuven (Belgium), his undergraduate alma mater, and was the Shimizu Corporation Visiting Professor at Stanford University. He presently holds the Kwang-Hua Chair Visiting Professorship at Tongji University in Shanghai, China. His principal expertise is in risk assessment and applied systems science. He authored *Random Fields: Analysis and Synthesis*, originally published by MIT Press; the second (revised and expanded) was published in 2010 by World Scientific Company. He won several research prizes of the American Society of Civil Engineers and chaired its Council on Disaster Risk Management. He 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: Risk Assessment and Management
- CEE 558: Random Fields and Random Media

REPRESENTATIVE PUBLICATIONS
- "Physically Based Assessment of Hurricane Surge Threat under Climate Change", *Nature Climate Change*, Vol. 2, 462-467 (2012) (with N. Lin, K. Emanuel & M. Oppenheimer).
- "Risk Assessment of Hurricane Storm Surge for New York City," J. Geophys. Res., 115, D18121, doi: 10.1029/2009JD013630, 2010. (with N. Lin, K. Emanuel & J.A. Smith)
- "Quantitative Risk Analysis of Damage to Structures during Windstorms: Some Multi-scale and System Reliability Effects," Keynote Lecture, Proc. Intern'l Symposium on Reliability Engineering and Risk Management, Shanghai, China; To be Published in *Structure and Infrastructure Engineering*, 2013. (with N. Lin & S.C. Yau)
- *Random Fields: Analysis and Synthesis, 2nd* (revised and expanded) edition, World Scientific Publishing Company, 2010.
- *Random Fields: Analysis and Synthesis, 2nd* (revised and expanded) edition, World Scientific Publishing Company, 2010.

MARK WATSON is the Howard Harrison and Gabrielle Snyder Beck Professor of Economics and Public Affairs in the Department of Economics 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 received the Galbraith Award for Graduate Teaching in 1986 and the McGraw Center Graduate Mentoring Award in 2008. 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
- ECO 518: Econometric Theory II
- ECO 531: Time Series
- WWS507B: Quantitative Analysis (Basic)

REPRESENTATIVE PUBLICATIONS
- "Sectoral vs. Aggregate Shocks: A Structural Factor Analysis of Industrial Production" *Journal of Political Economy*, February 2011, Vol. 119, No. 1, p p1-38 (with Andrew Foerster and Pierre-Danieal Sarte).
- "Relative Goods' Prices, Pure Inflation, and the Phillips Correlation," *American Economic Journal: Macroeconomics*, July 2010 2(3), pp 128-157 (with Ricardo Reis).
- "Heteroskedasticity-robust Standard Errors for Fixed Effect Panel Data Regression," *Econometrica*, January 2008, Vol. 76, No. 1, pp 155–174 (with J. Stock).
- Testing Models of Low-frequency Variability (with Ulrich Müller), *Econometrica* 76(5), September 2008.

WEI XIONG is a professor of economics in the Department of Economics. His research interests center on capital market imperfections. His earlier papers cover speculative bubbles induced by heterogeneous beliefs and short-sales constraints, effects of stock price bubbles on managerial incentives and firm investment, asset market contagion, limited investor attention, non-standard investor preferences, asset pricing with heterogeneous beliefs and rollover risk and dynamic coordination problems between creditors. He is currently researching financialization of commodities markets, belief distortions in the recent financial crisis, and China's financial markets. He received his Ph.D. from Duke University in 2001. He is a research associate of the National Bureau of Economic Research and was the finance editor of *Management Science*.

COURSES TAUGHT
- FIN 522/ECO 465: Futures, Options, and Financial Derivatives
- FIN 595/ECO 525: Financial Economics I
- FIN 593/ECO 493: Financial Crises
- FIN S500: Math Camp for MIF Students

UNDERGRADUATE STUDENTS ADVISED
- Ryan Shyu, "Investment and Intermediation in High Frequency Markets"
- Henry Mancuso, "Detecting False Financial Statements for Chinese Companies Listed in the United States"
- Juliet Michele Tempest, "A Counterfactual Test of Mature Investors' Asset & Debt Market Participation: China vs the U.S."

GRADUATE STUDENTS ADVISED
- Yi Li, "Essays on Fund Management Industry"
- Weicheng Lian, "Essays on Housing Prices"

REPRESENTATIVE PUBLICATIONS
- "Index Investment and Financialization of Commodities," *Financial Analysts Journal*, 2012 (with K. Tang).
- "Rollover Risk and Credit Risk," *Journal of Finance*, 2012 (with Z. He).
- "Dynamic Debt Runs," *Review of Financial Studies*, 2012 (with Z. He).
- "Realization Utility," *Journal of Financial Economics*, 2012 (with N. Barberis).
- "The Chinese Warrants Bubble," *American Economic Review*, 2011 (with J. Yu).

VISITING FACULTY

During the academic year 2012-13, the Bendheim Center for Finance welcomed the following visiting faculty:

DARIO VILLANI was a guest lecturer at Princeton during the spring semester. He was a member of our first graduating class of Princeton Master in Finance students in 2002, and he holds a PhD in Theoretical Physics with highest honors from University of Salerno. He is currently a Portfolio Manager at BlueCrest Capital Management, LLC, where he joined from Deutsche Bank as a Managing Director of Global Credit Trading. Prior to joining Deutsche Bank in 2008, he was a Managing Director of the Global Strategic Risk Group at Merrill Lynch. In this role, he headed proprietary trading for structured credit, ABS and CMBS. From 2004 to 2006, he was Vice President of the Proprietary Positioning Business at JPMorgan Chase. Previously, Mr. Villani worked at Hess Energy Trading Company as a Commodities Trader. He has authored over 25 articles in finance, physics and statistics. .

COURSE TAUGHT
- ORF 574/FIN 574: Special Topics in Investment Science: Trading and Risk Management

---

JEAN-CHRISTOPHE DE SWAAN has been teaching at Princeton since the Spring of 2009 as a Lecturer. He teaches a joint undergraduate and graduate course, The Rise of Asian Capital Markets, and a Freshman seminar, Ethics in Financial Markets. He also teaches at the University of Cambridge and has taught at Yale University, Cheung Kong Business School and Renmin University in Beijing. He is also a Principal at Cornwall Capital, a multi-strategy hedge fund based in New York. Prior to that, he was a special adviser on China at a global macro hedge fund, a Principal at an Asia-dedicated hedge fund, and a consultant at McKinsey & Company. He received his B.A. from Yale University, an MPhil in International Relations from the University of Cambridge, and a Masters in Public Policy from Harvard University's Kennedy School of Government. He is a Member of the Council on Foreign Relations. He is a faculty advisor in Rockefeller College (Princeton University) and an Associate Fellow of Ezra Stiles College (Yale University).

COURSES TAUGHT
- FRS139: Ethics in Financial Markets
- ECO 492/FIN 592: The Rise of Asian Capital Markets

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. Sexton graduated from Princeton 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 1995, he became an active advisory director of Morgan Stanley. Also in 1995, he became an adjunct professor at Columbia University's Graduate School of

Business, teaching two courses in the subject of corporate finance. In 2000, he became a visiting lecturer at Princeton. Sexton is a member of the board of directors of Morgan Stanley, and he is a director of Investor AB, a publicly traded company based in Stockholm, Sweden, and of one other privately held company.

COURSE TAUGHT
- ECO 464/FIN 519: Corporate Restructuring

STAFF

WENDELL COLLINS is the director of corporate relations for the Bendheim Center for Finance. Before joining the center in 2007, she worked in Princeton's Office of Development and Office of the Dean for Research. Before joining the University, Collins spent 11 years at Merrill Lynch in marketing, training, and business development, as well as serving in various management roles at Dow Jones and the Associated Press. Her responsibilities with the center include i) managing the Corporate Affiliates Program, which seeks support for the 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 center, and iv) promoting and organizing special events involving alumni and advisory council members. She received her undergraduate degree in journalism and political science from the University of North Carolina–Chapel Hill.

ELLEN DIPIPPO was the Academic Administrator for the Bendheim Center for Finance. Before joining Princeton in 2008, Ellen held several administrative positions in both the private and academic sector, including the Economics Graduate Administrator at Harvard University and Economic Recruiter at the Brattle Group in Washington, DC. She earned her Bachelor of Music in Education from Youngstown State University, Ohio. BCF said good bye to Ellen in May of 2013 as she accepted a promotion to work in the Research Integrity and Assurance Department.

KAREN NEUKIRCHEN is the Center Administrator for the Bendheim Center for Finance. She joined the Princeton Economics Department in 1986 and has been with Bendheim Center since 2000. She was previously employed by Mobil Oil Corporation, Hazeltine Corporation, and FMC. She graduated from Rider University in 2006 with a degree in Business Administration.

JESSICA H. B. O'LEARY is the Center Manager for the Bendheim Center for Finance. In that role she oversees the day to day functions of the Bendheim Center for Finance including its facility in the Old Dial Lodge. She has worked at Princeton since 1998, including three years in Molecular Biology and nine years in Mechanical & Aerospace Engineering as the Graduate Program Administrator. She is a graduate of Rider University with a BA in business management.

PH.D. STUDENTS
Graduating 2012-2013

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. Five Ph.D. students graduated in 2013.

Edmond Choi, ORF, dissertation title: "An Examination of the Systematic Risks in the Multi-name Credit and Equity Markets," will be a Senior Quantitative Analyst at TD Securities.

Wei Cui, ECO, dissertation title: "Partially Irreversible Investment with Financing Constraints," will be an assistant professor at University College London (economics department).

Tianhui Li, ORF, dissertation title: "Dynamic Programming and Trade Execution," will be a data scientist at Foursquare.

Yi Li, ECO, "Reputation, Volatility, and Performance Persistence of Private Equity," will be an Economist at the Federal Reserve Board.

Weicheng Lian, ECO, dissertation title: "Essays on Housing Cycles," will be an Economist for the International Monetary Fund.

SEMINARS AND CONFERENCES

2012-2013

CIVITAS FOUNDATION FINANCE SEMINARS

Each week, Bendheim Center for Finance organizes a seminar in which academic experts are invited to present their latest research to the faculty and graduate students of the center. The seminar usually meets on Wednesdays, 2:50–4 p.m., in the Bendheim Center for Finance classroom.

FALL 2012

Sept. 18
Andrew Patton, Duke University,
"Modelling Dependence in High Dimensions with Factor Copulas" (with Dong Hwan Oh)

Sept. 26
Bryan Kelly, University of Chicago, Booth School of Business,
"Too-Systemic-To-Fail: What Option Markets Imply About Sector-wide Government Guarantees"

Oct. 3
Dong Lou, London School of Economics,
"Industry Window Dressing"

Oct. 10
Zhenyu Gao, Princeton University Ph.D.,
"Industry Window Dressing" with Huaizhi Chen, Lauren Cohen and Dong Lou.

Oct. 17
Yi Li, Princeton University Ph.D.,
"Reputation, Volatility and Performance Persistence of Private Equity"

Nov. 7
Motohiro Yogo, Federal Bank of Minneapolis,
"The Cost of Financial Friction for Life Insurers"

Nov. 14
Albert Menkveld, VU University Amsterdam,
"Middlemen in Limit-Order Markets"

Nov. 28
Roger Myerson, University of Chicago,
"A Model of Moral Hazard Credit Cycles"

Dec. 5
Manuel Adelino, Duke University, Fuqua School of Business,
"House Prices, Collateral, and Self-Employment" with Antoinette Schoar and Felipe Severino.

Dec. 12
Amit Seru, Chicago University, Booth School of Business,
"Inconsistent Regulators: Evidence from Banking"

SPRING 2013

Feb. 13
Christopher Malloy, Harvard Business School,
"Casting Conference Calls"

Feb. 20
Ian Martin, Graduate School of Business, Stanford *University,*
"Simple Variance Swaps"

Feb. 27
Markus Brunnermeier, Princeton University,
"The I-theory of Money"

Mar. 6
Marcin Kacperczyk, Stern School of Business, New York University,
"How Safe are Money Market Funds?"

Mar. 13
Lorenz Kueng, Kellogg School of Management, Northwestern University,
"Tax News"

Mar. 27
Tarek Alexander Hassan, Booth School of Business, University of Chicago,
"The Social Cost of Near-Rational Investment" with Thomas Mertens

Apr. 3
Arvind Krishnamurthy, Kellogg School of Management, Northwestern University,
"A Macroeconomic Framework for Quantifying Systemic Risk"

Apr. 17
Robin Greenwood, Harvard Business School,
"Waves in Ship Prices and Investment"

Apr. 24
Terrance Odean, Haas School of Business, University of California, Berkeley,
"Bubbling with Excitement: An Experiment"

May 1
Ralph S. Koijen, Booth School of Business, University of Chicago,
"Health and Mortality Delta: Assessing the Welfare Cost of Household Insurance Choice" with Stijn Van Nieuwerburgh and Motohiro Yogo

FINANCE PH.D. STUDENT WORKSHOPS

Each week, the Bendheim Center for Finance organizes a seminar for its Ph.D. students and faculty in which preliminary research ideas are presented internally. The seminar usually meets on Tuesdays, 12:30–1:30 p.m., in the Bendheim Center for Finance library.

FALL 2012

September 18
Matthew Barron
"The Trading Profits of High Frequency Traders," with Jonathan Brogaard and Andrei Kirilenko

September 25
Peter Van Tassel
"A High Frequency Test of the ICAPM"

October 2
Weicheng Lian
"A Quantitative Model of House Quantities and House Prices"

October 9
Michael Sockin
"Feedback Effects of Commodity Future Prices," with Wei Xiong

October 16
Wei Cui
"Delayed Capital Reallocation"

October 23
Ji Huang
"Unregulated Financing"

November 6
Jeong Ho (John) Kim
"Ambiguity Aversion and Risk Sharing"

November 13
Zhenyu Gao
"Home Investors and Housing Price Dynamics"

November 20
Hans Gersbach
"Delayed Capital Reallocation"

November 27
Maria Grith
"An Axiomatic and Data Driven View on the EPK Paradox"

December 4
Delwin Olivan
"Default and the Financial Sector"

Ji Huang
"Unregulated Financing II: Imperfect Risk Sharing"

December 11
Olivier Darmouni
"Optimal Intervention in a Market-Based Financial System"

SPRING 2013

February 12
Francois Geerolf (Harvard University)
"House Prices Drive Current Accounts: Evidence from Property Tax Shocks"

February 26
Haoshu Tian
"The Effect of Temporary Short-Selling Ban".

March 26
Philip Yan
"Momentum Crash and Short Covering"

April 23
Jakub Kastl
"Liquidity Auctions, Fixed Rate Tenders, Bailouts & Systemic Risk in the EURO Zone" with Nuno Cassola and Ali Hortacsu

May 7
Ji Huang
"Unregulated Financing I: Pro-Cyclical Implicit Guarantees"

May 14
Nemanja Antic
"Robust Contracts in Security Design"

2012 PRINCETON LECTURES IN FINANCE

Each year, the Bendheim Center invites a leading figure in the field of finance to deliver a set of lectures at Princeton on a topic of major significance to researchers and professionals. The published lectures will appear as a Princeton University Press book. The lectures are open to the public and held in the BCF classroom.

Robert F. Engle of New York University gave the 2012 Princeton Lectures in Finance on October 24–26 on the topic of "Volatility and Systemic Risk."

Lecture 1:
 "The economics of global financial volatility"

Lecture 2:
"Long run risk: Modelling commodity prices"

Lecture 3:
"Systemic risk: Measurement and regulation"

SYMPOSIUM ON CHINA'S FINANCIAL MARKETS

The conference took place on July 7, 2012 at Peking University

Session 1: Chinese Financial Markets and Economic Development
Banking Structure, Labor Intensity, and Industrial Growth: Evidence from China
Justin Y. Lin
Xifang Sun
Harry X. Wu
Discussant: Qiao Liu

Should We Fear an Adverse Collateral Channel Effect on Investment in China?
Yongheng Deng
Joseph Gyourko
Jing Wu
Discussant: Jie Gan

Political Motivation, Overinvestment and Firm Performance
Qiao Liu
Wei Luo
Nianhang Xu
Discussant: Ning Zhu

Session 2: Chinese Investor Behavior and Market Dynamics
Speculation Spillover
Jane Liu
Zheng Zhang
Longkai Zhao

PRINCETON INITIATIVE: MACRO, MONEY AND FINANCE

September 7-9, 2012, Princeton University
Taylor Auditorium, Frick Chemistry Laboratory

Friday, September 7

Liquidity Concepts: Amplification, Persistence and Asymmetry
Markus Brunnermeier

Heterogeneous Agent Models with Financial Frictions: A Continuous Time Approach
Yuliy Sannikov

Financial Frictions: Empirical Facts
David Sraer

Saturday, September 8

Demand for Liquid Assets
Markus Brunnermeier

The I Theory of Money
Markus Brunnermeier

Productivity Losses from Financial Frictions
Ben Moll

Rollover Risk, Credit Risk, and Debt Runs
Wei Xiong

Bubbles and Imbalances
Markus Brunnermeier

Sunday, September 9

The Fiscal Theory of the Price Level
Chris Sims

International Macro: Capital Flows and Asset Prices
Nobuhiro Kiyotaki

Global Liquidity
Hyun Shin

EIGHTH CAMBRIDGE-PRINCETON CONFERENCE

This conference, the eighth in the series, brought together faculty from Princeton's Bendheim Center for Finance and the Cambridge Endowment for Research in Finance, thanks to generous support from William H. Janeway '65.

The conference took place on September 14-15, 2012, at Robinson College, Cambridge.

Friday September 14

Session Chair: Yacine Aït-Sahalia
Xuan Tam, "Bankruptcy and Delinquency in a Model of Unsecured Debt"
Discussant: Sergey Zhuk

Sergey Zhuk, "Speculative Bubbles and Real Investment"
Discussant: Bill Janeway

Session Chair: Andrew Harvey
Jeremy Large, "Accounting for the Epps Effect: Realized Covariation, Cointegration and Common Factors"
Discussant: Mark Salmon

Kanak Patel, "Real Estate Development and Infrastructure Investment Under Asymmetric Information and Functional Dependence"
Discussant: Jeremy Large

Saturday September 15

Session Chair: D'Maris Coffman
Filippos Papakonstantinou, "A Direct and Full-Information Estimation of the Distribution of Skill in the Mutual Fund Industry"
Discussant: Michael Dempster

Amir Amel-Zadeh, "Optimal Capital Structure and Growth Options in Mergers and Acquisitions"
Discussant: Filippos Papakonstantinou

Session Chair: Jeremy Large
Angie Andrikogiannopoulou, "State Dependent Risk Preferences: Evidence from Online Sports Gambling"
Discussant: Chris Rogers

Oliver Linton, "Semiparametric Panel Data Models with Application to the Effect of Fragmentation on Market Quality"
Discussant: Angie Andrikogiannopoulou

Session Chair: Michael Dempster
Valentin Haddad, "Concentrated Ownership and Equilibrium Asset Prices"
Discussant: Bart Lambrecht

Andrew Harvey, "The Dynamic Location/Scale Model: With Applications to Intraday Data"
Discussant: Yacine Aït-Sahalia

Session Chair: John Eatwell
Pawel Zaczkowski, "Firms, Banks and Household"
Discussant: Valentin Haddad

Yacine Aït-Sahalia, "The Term Structure of Variance Swaps, Risk Premia and the Expectation Hypothesis"
Discussants: Oliver Linton

MEASURING RISK CONFERENCE

September 21-22, 2012, Princeton University
Bendheim Center for Finance

Friday, September 21

Bilateral Exposures and Systemic Solvency Risk
Christian Gouriéroux (with J.C. Heam and A. Monfort)

Sovereign, Bank and Insurance Credit Spreads: Connectedness and System Networks
Monica Billo

Transparency versus Privacy in Systemic Risk
Andrew Lo

Measuring General Market Risk
Eckhard Platen

The Long and the Short of the Risk
René Garcia

Saturday, September 22

Volatility Occupation Times
Jia Li

A Structural Model of Dynamic Market Timing
Marcel Rindisbacher (with Jerome Detemple)

On Implied Volatility for Options-Some Reasons to Smile and More to Correct
Song Xi Chen

An Extended Pareto Law for Operational Risk Losses
Victor Chernozhukov

The Bigger They Come, The Harder They Fall
Jialin Yu

Price Modeling Across Time Scales and Mutually Exciting Point Processes: Microstructure Noise and Price Impact
Marc Hoffman

Extreme Risk and Fractal Regularity in Finance
Laurent Calvet (with A. Fisher)

A Tale of Two Option Markets: State-Price Densities Implied from S&P 500 and VIX Option Prices
Dacheng Xiu (with Zhaogang Song)

Risk, Return and Ross Recovery
Peter Carr

An Economic Analysis of the Volatility Risk Premium
Michael Imerman

A CONFERENCE IN HONOR OF CHRISTOPHER A. SIMS

This conference was held in honor of Christopher A. Sims, 2011 Nobel Laureate, for his lifelong achievements in economics and his 70th birthday. The program for the conference covered a variety of subjects on which Professor Sims has had a profound influence, ranging from econometrics to macroeconomic policies. The conference was co-sponsored by Princeton University, The University of Chicago and The Federal Reserve Bank of Atlanta.

October 19-20, 2012, Princeton University
Bendheim Center for Finance

Friday, October 19

Session 1: Continuous time, Yacine Ait Sahalia and George Tauchen

Session 2: Time series, Harald Uhlig and John Geweke

Session 3: Rational inattention, Laura Veldecamp and Bartosz Makowiak

Saturday, October 20

Session 4: Estimation of DSGE models, Giorgio Primiceri and Frank Schorfheide

Session 5: Practice in monetary policy, Frank Smets and Tao Zha

Panel discussion: Fiscal/monetary policy
Moderator: Jesus Fernandez-Villaverde
    Larry Christiano
    Marty Eichenbaum
    Thomas Sargent
    Michael Woodford

SECOND ANNUAL JULIS-RABINOWITZ CENTER CONFERENCE

This conference took place on Thursday, February 28 and Friday, March 1, 2013 on the Princeton University campus. It combined economic and historical analysis to shed light on how to overcome the slow recovery. The conference was open to the public.

"Understanding the Economic Slump: Balance Sheets and Policy Uncertainty"

Thursday, February 28

Lessons from the Great Depression
Chair: Atif Mian

Michael Bordo
"Deep Recessions, Fast Recoveries and Financial Crises:
Evidence from the American Record"

Gary Gorton
"The Flight from Maturity"

Alan Taylor
"When Credit Bites Back"

Policy Uncertainty
Chair: Brandice Canes-Wrone

Nicholas Bloom
"Measuring Economic Policy Uncertainty"

Casey B. Mulligan
"Uncertainty, Redistribution, and the Labor Market"

Pietro Verones
"Political Uncertainty and Risk Premia"

Keynote Speech – Anne Krueger, "Sovereign Debt Crisis and Sovereign Debt Restructuring"

Friday, March 1

Financial Innnovation
Chair: Ashoka Mody

Sebastian Di Tella
"Uncertainty Shocks and Balance Sheet Recessions"

Edward Kung
"A Structural Model of Continuous Workout Mortgages"

Alp Simsek
"Speculation and Risk Sharing with New Financial Assets"

Policy Responses - Panel
Chair: Hyun Song Shin

Giovanni Dell'Ariccia
"A Banking Union for the Euro"

Linda Goldberg
"International Dollar Use, Global Finance and Central Bank Response"

Jean-Pierre Landau
"Problems with the Helicopter"

Loretta J. Mester
"Federal Reserve Policy During and After the Crisis"

EDHEC-Princeton Institutional Money Management Conference

April 3, 2013
Princeton Club of New York

From Asset Allocation to Risk Allocation
Lionel Martellini

Speculative Betas
Harrison Hong

Constructing a Portfolio of Dynamic Tactics: Improving Diversification and Tail Risk Protection
John Mulvey

Non-parametric Hedge Fund Modeling and Implications for Hedge Fund Performance Evaluation and Asset Allocation Decisions
René Garcia

Pricing and Hedging Currency Risk
Jakub Jurek

Giants at the Gate: Investment Returns and Diseconomies of Scale in Private Equity
Florencio Lopez de Silanes

THIRD PRINCETON UNIVERSITY CARNEGIE MELLON HIGH FREQUENCY AND QUANTITATIVE TRADING CONFERENCE

This conference was organized by Princeton University and Carnegie Mellon Graduate Students from Operations Research and Financial Engineering, Economics, Mathematics and Computer Science on April 13, 2013 at the Friend Center.

Keynote Speakers

Matt Andresen
co-CEO, Headlands Technologies LLC

Raj Mahajan
CEO, Allston Trading LLC

Speakers and Panelists

Dr. Shakil Ahmed
Global Head of Market Making
Citi
Founder, Princeton Alpha

Irene Aldridge
Managing Partner and Quantitative Portfolio Manager, Able Alpha Trading, LTD
Industry Professor, New York University

Trevor Barran
Principal, Eagle Stone Advisors

David Berk
Partner, Developer Auction

Benjamin Blander
Co-Founder, Blander Technologies

Frederic Boyer
Global Head: Convertible Arbitrage, Citadel

Karol Y Borejsza
FID Quant Strats Rates, Credit Suisse

Paul Edelman
Managing Director, Edelman & Associates

Evan Gary
Founder, Quantitative Systems

Ryan Gould
MD Automated Trading, Citigroup

Eric Greiner
Quantitative Prime Services, Barclays

George J Houlihan
CEO and Founder, Caherciveen Partners

Brennan Hughes
Partner, Axiom Group

Andrei Kirilenko
Professor, Former chief economist of the CFTC,
MIT

Dr. Anlong Li
Head of Allston's Quantitative Volatility Group,
Allston Trading LLC

Dr. Mike Lipkin
Professor,
The Fu Foundation School of Engineering and Applied Science, Columbia University

Mani Mahjouri
CIO, Tradeworx

Dr. John M. Mulvey
Professor, Bendheim Center for Finance,
Princeton

Daniel Nehren
Head of Linear Quantitative Research, JP Morgan

Dan Penley
Director of Algorithmic Trading & Execution,
Spot Trading

David Pettey
Associate Director, SIG

Giovanni Pillitteri
Global Head: FX Electronic Market Making,
Morgan Stanley

Dr. James Thomas
Head of Research, Headlands Technologies LLC

SECOND PRINCETON-LAUSANNE WORKSHOP ON QUANTITATIVE FINANCE

The Princeton-Lausanne Workshops are part of a collaboration between researchers in Quantitative Finance & Economics from Princeton University, Ecole Polytechnique Fédérale de Lausanne (EPFL) and the University of Lausanne (UNIL). This 2nd event of a series of workshops is hosted by the Bendheim Center for Finance and the Department of Operations Research and Financial Engineering (ORFE) at Princeton.

May 3-4, 2013
Princeton University, Sherrerd Hall and Bendheim Center for Finance

Friday, May 3

Moral Hazard and Long Run Incentives
Yuliy Sannikov

Cash Holdings and Competition
Francesca Zucchi

Liquidity Risk in Credit Default Swap Markets
Anders Trolle

Maximal Long-term Growth Rate in Market with
Transaction Costs and Stochastic Volatility
Maxim Bichuch

Leverage Effect Puzzle
Jianqing Fan

Polynomial Term Structure Models
Martin Larsson

Insider Trading, Stochastic Liquidity and
Equilibrium Prices
Pierre Collin-Dufresne

Structural Relationships on a Limit Order Book
Kevin Webster

Saturday, May 4

Feedback Effects of Commodity Futures Prices
Wei Xiong (with Michael Sockin)

Equilibrium Commodity Trading
Remy Praz

Option-Implied Currency Risk Premia
Jakub Jurek (with Zhikai Xu)

Pricing Variance Swaps on Time-Changed
Markov Processes
Matt Lorig

CERTIFICATE IN FINANCE

Undergraduate

In 1999, the Bendheim Center for Finance started offering an Undergraduate Certificate in Finance (UCF) to Princeton undergraduates. 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. Students then apply at the end of their sophomore year.
- 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, or for non-ECO or ORF majors only, a separate, shorter piece of independent work if there is no possibility of finance content in their senior thesis or junior paper.

Now in its 16th year, the Undergraduate Certificate in Finance continues to do extremely well. We currently have 118 students in the Class of 2014 and enrolled 85 juniors from the Class of 2015. This will bring our total number of undergraduate students in the program (juniors and seniors) to 203 for the coming academic year. This number is subject to change, as we often have students who apply and are admitted mid-year. 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 2013

Total number of certificates awarded: 74 (21 to women or 28 percent)

Major	Number of Students
Art	1
Chemical and Biological Engineering	1
Chemistry	1
Computer Science	2
Economics	35
Electrical Engineering	3
Mathematics	2
Mechanical and Aeronautical Engineering	2
Molecular Biology	1
Near Easter Studies	1
Operations Research and Financial Engineering	14
Philosophy	2
Physics	1
Politics	2
Psychology	1
Woodrow Wilson School	4

CLASS OF 2014

Total expected number of certificates to be awarded: 118 (32 to women, or 37 percent)

Major	Number of Students
Astrophysics	1
Chemical and Biological Engineering	5
Chemistry	2
Classics	1
Computer Science	15
Economics	43
Electrical Engineering	1
Mathematics	4
Mechanical and Aerospace Engineering	1
Operations Research and Financial Engineering	29
Philosophy	2
Physics	2
Politics	1
Psychology	3
Woodrow Wilson School	8

CLASS OF 2015

Total expected number of certificates to be awarded: 85 (to 31 women, or 36 percent)

Major	Number of Students
Art	1
Chemical and Biological Engineering	1
Chemistry	1
Classics	2
Comparative Literature	1
Computer Science	3
Economics	37
Electrical Engineering	3
Geosciences	1
History	1
Mathematics	4
Operations Research and Financial Engineering	24
Woodrow Wilson School	7

DEPARTMENTAL PRIZES

Undergraduate Certificate in Finance (UCF) students continue to receive a high proportion of the prizes awarded by their respective departments. This year, UCF students received a combination of departmental prizes and honors; 6 UCF seniors received departmental prizes (two receiving two prizes); 7 UCF students were elected to Phi Beta Kappa Society; 19 UCF students were elected to membership in Society of Sigma Xi; and 32 UCF students received academic honors (6 cum laude, 9 magna cum laude, and 17 summa cum laude). Twenty-two of our UCF students earned certificates in proficiency from 6 other departments or programs, 15 students earning one additional certificate, 5 earning 2 additional certificates and 2 earning three additional certificates.

6 UCF STUDENTS RECEIVED 7 DEPARTMENTAL PRIZES AND HONORS

Samuel Tang (ECO), *Birch Family Prize (Bendheim Center for Finance)*
Xiang Ding (ECO), *Daniel I. Rubinfeld '67 Prize in Empirical Economics (Economics)*
Jio Park (ECO), *Wolf Balleisen Memorial Prize (Economics)*
Brenden Joseph O'Leary (MAE), *Calvin Dodd MacCracken Senior Thesis Project Award (School of Engineering and Applied Science)*

And *John Marshal II Memorial Award (Mechanical and Aerospace Engineering)*
Philip Andrew Oasis (ORF), *Ahmet S. Cakmak Prize (Operations Research and Financial Engineering)*
Ling-Chen Eric Hsu (ORF), *Dr. Frank S. Castellana Prize in Operations Research and Financial Engineering (Operations Research and Financial Engineering)*

7 UCF STUDENTS WERE ELECTED TO PHI BETA KAPPA SOCIETY

Ling-Chen Eric Hsu (ORF)
Yongju Jason Jung (ECO)
Samantha Wen Li Lam (ECO)
Jio Park (ECO)

Christopher Karl Scherer (ECO)
Chengyue Sun (CBE)
Maple Zhang (ECO)

19 UCF STUDENTS WERE ELECTED TO MEMBERSHIP IN SOCIETY OF SIGMA XI

Jin Hyun Cheong (PSY)
Woo-Hyung Cho (ORF)
Shreyasi Ghosh (ORF)
Ling-Chen Eric Hsu (ORF)
Angela Ruowen Jiang (ORF)
Ji Hyun Kim (ORF)
Chester Kwak (COS)
Michael Walter Markiewicz (ORF)
Julia Alexandra Neagu (PHY)

Philip Andrew Oasis (ORF)
Brendan Joseph O'Leary (MAE)
Kanika Pasricha (ELE)
Chengyue Sun (CBE)
Xinyue Tian (ORF)
Yanbo Xu (ORF)
Wonpyo Yun (MOL)
Jaison John Zachariah (ORF)

6 UCF STUDENTS WERE ELECTED TO MEMBERSHIP IN TAU BETA PI NATIONAL ENGINEERING HONOR SOCIETY

Sling-Chen Eric Hsu (ORF)
Angela Ruowen Jian (ORF)
Philip Andrew Oasis (ORF)

Kanika Pasricha (ELE)
Chengyue Sun (CBE)
Haotian Zheng (ORF)

6 UCF SENIORS RECEIVED THE SHAPIRO PRIZE FOR ACADEMIC EXCELLENCE 2012-2013

Eric Chen (MAT)
Luke Cheng (ORF)
Alexander Judge (CBE)

John McNamara (ECO)
Brendon Vetter (ECO)
Qiuyi Zhang (MAT)

SENIOR THESES AND INDEPENDENT PROJECTS OF THE CLASS OF 2013

This table shows the senior thesis and independent project titles from the UCF Class of 2013.

Nicholas Adkins	ECO	Using Difference in Difference Estimators to Determine the Effect of Pension Reform on Private Savings in Italy
Poshak Agrawal	ECO	A Study of the Property Market in China and its Relationship with the Macroeconomy
Jared Bauman	ECO	Analyst Irrationality and the Impact of Implicit Beliefs on Consensus Earnings Forecasts
Dana Butnariu	COS	Literature Review and Data Analysis Extension of the Holidiay Effect on Stock Returns
Zeit Cai	MAE	iSoccer: the gamification of soccer
Luqi Chen	ECO	Performance and Valuation Bias in Private Equity
Yuhan Chen	MAT	The Turn-of-the Month-Effect at the Indonesian Stock Exchange
Jin Hyun Cheung	PSY	Mental Accounting on Whether to Accept Bargains Based on Amount, Percentage, and Time
Woo-Hyung Cho	ORF	Stochastic Volatility Models for Pricing Vix Options Consistent with VIX and SPX Implied Volatilities: A Simulation Approach
Sean Cotter	ECO	State Fiscal Crises in the Aftermath of the Great Recession: The Effects of Changes in State Corporate Income Tax Rates on Entrepreneurship and Investment
Pritha Dasgupta	ECO	The Effects of the Sarbanes-Oxley Act of 2002 on Acquisition Due Diligence
Alesia Dechkovskaia	CHM	The Symmetry of Returns' Distribution between the Market and Telecommunication Companies Traded in NYSE
Xiang Ding	ECO	Credit and Uncertainty Shocks in the Labor Market
Dan Elkind	ECO	Relative Return Paranoia: Mutual Fund Managerial Incentives and the Implied Volatility Skew
Evan Frost	PHI	When To Give: Options Theory, Return on Investment, and Optimal Charitable Giving
Shreyasi Ghosh	ORF	The Future of Solar: An Analysis of New Jersey's Market for Solar Renewable Energy Credits (SRECs)
Danny Guo	PHI	Using Machine Learning to Test the Validity of the Efficient Market Hypothesis in the Foreign Exchange Market
Eric Hagstrom	NES	Islamic Finance: Overzealous Islamist Interpretations of God's Law
Jonathan Hezghia	ECO	The Moral Hazard of Unemployment Benefits: Examining the Effect of Unemployment Insurance Policies on Job Search Intensity
Ling-Chen Eric Hsu	ORF	Liquidity and Investment Styles in the Commodity Futures Market
Antonia Hyman	WWS	Please Rain on My Parade: Rainfall Shocks and Coping Mechanisms for Rural Ethiopian Farmers
Dilek Izek	ECO	Quantifying Sovereign Risk in Turkey with the Contingent Claims Approach
Christopher Jeng	ECO	The Effect of Market Volatility on the Capital Asset Pricing Model (CAPM) Beta
Angela Jiang	ORF	A Queueing Theory Approach to Modeling Toll Plaza Delay with Applications for Commute User Cost Optimization

Yongju Jung	ECO	An Empirical Analysis of Corporate Default Risk During the Financial Crisis of 2007-2009
Jacob Kim	ECO	Was it Global and Has it Been Settled? The Impact of the Global Research Analyst Settlement and Other Early 2000s Sell-side Analyst Reforms
Ji Hyun Kim	ORF	New Opportunities in Currency Carry Trade
Daria Kolotiy	ECO	A Tale of Three Peoples: Hispanic-, Black- and White-Owned Business Startup Capital, Exports and E-commerce
Chester Kwak	COS	Mobile Payments Integration: Solving Problems for Kenyan Micro, Small and Medium Enterprises
Samantha Lam	ECO	Constructing and Trading Sparse Mean-Reverting Portfolios
Christopher Lando	ECO	An Analysis of the Drivers of Acquisition Premiums and Success: A Reinvestigation of CEO Hubris
Anne Lee	ECO	Which Advisors and How Many to Hire: An Investigation on the Relationship Between Acquirer and Target Mergers and Acquistions (M&A) Investment Banking Advisor Choices and Announcement Returns
Brett Leibowitz	ORF	Fishing Within the Limits: A Sustainable Fishing Model
Helen Lu	ECO	The Impact of Securitization on the Credit Risk Taking Behavior of U.S. Bank Holding Companies
Nicolas Lulli	POL	El Ladrillo: An Explanation of Chile's Golden Decade
Michael Markiewicz	ORF	Exploring the Development and Use of A Multinomial Logit Model to Improve Betting Returns at Saratoga Race Course
Caitlin Miller	ECO	Understanding the Household Saving Rate: A Demographic Analysis of the Intertemporal Consumption Decision
Kevin Mu	ECO	The Impact of State Mortgage Foreclosure Policies and Income Forecast Error on Foreclosure Rates During the U.S. Subprime Mortgage Crisis
Connor Murphy	ECO	The Growth Effects of Public Debt Reduction: Do Interest Rates Determine Efficacy?
Iulia Neagu	PHY	Networks, Economics and Computing
Philip Oasis	ORF	High Frequency Markets Analysis from Order Flows and Interactions
Brendan O'Leary	MAE	Bursting the Student Loan Debt "Bubble"
Jio Park	ECO	Consolidation in the Health Care Industry: An Empirical Study of the Impact of Hospital Mergers on Quality of Care in California
Kanika Pasricha	ELE	The computational hardness of pricing compound securities
Peter Perdue	ECO	University Endowment Management: An Empirical Analysis of Endowment Risks, Asset Allocations and Debt Ratios
Nicholas Piacente	AAC	Between Zeitgeist and Tradition: The Deutsche Bank Collection and Contemporary African Art
Aditya Rajagopalan	ECO	Speculative Initial Public Offerings: A Disagreement Approach to the IPO Puzzle
Anthony Sacco	POL	When I'm Sixty-Seven: Public Opinion on Social Security Reform and A Proposal to Restore Long-Run Solvency
Saumitra Sahi	ECO	Monetary Policy Independence in the EU
Christopher Scherer	ECO	Executive Stock Options and Corporate Restructurings: The Differential Risk-Taking Incentives of Vega and Delta
William Schleier	WWS	Commercialized Microfinance: Regulatory Structures and Institutional Approaches

David Shuster	ECO	An Event Study Examination of the Effect of Natural Catastrophe on United States Property and Casualty Insurance Companies
Chengyue Sun	CBE	Optimization of Novel Hybrid Coal, Biomass, and Natural Gas Energy Process Under Input, Output and Electricity Price Uncertainty
Samuel Tang	ECO	Corporate Diversification: A Catering Theory Approach
Juliet Tempest	ECO	A Counterfactual Test of Mature Investors' Asset & Debt market Participation: China Vs. the US
Xinyue (Hanna) Tian	ORF	Analysis of Leveraged ETF Compounding Difference
Andres Tung	ECO	A Tale of Two Markets: Understanding the 2008 Shorting Ban
Eric Walpert	ECO	Emerging from Facebook's Shadow: A Look at Trends in Social Media Venture Capital Funding from 2011-2012
Erick Walsh	ECO	Financial Dollarization and Financial (In)Stability: Evidence from Latin America
Timothy Wenzlau	ORF	Nested Newsvendor Optimal Commitment Policies in Day-Ahead and Hour-Ahead Electric Capacity Forward Markets
Yichen Wu	MAT	Modeling Investor Attention for Price and Earnings Momentum
Danke Derek Wu	WWS	Chinese Outward Foreign Direct Investment—Trajectory, Motivations, and Implications for the United States
Peiwen Xu	ECO	Resale Housing Price Determinants: A Case Study of Canada 2000-2009
Yangbo Xu	ORF	Modeling Spikes, Heavy-Tails, and Volatility Clustering in Electricity by Applying a Stochastic Time-Change to the Ornstein-Uhlenbeck Process
Wonpyo Yun	MOL	PrEP-ping for HIV Transmission: Pre-exposure Prophylaxis as a Potential Cost-Effective Method at the Individual Level
Jaison Zachariah	ORF	Are We There Yet? A Proposal for an Autonomous Taxi System in New Jersey and a Preliminary Foundation for Empty Vehicle Routing
Maple Zhang	ECO	On Predicting the Relative Effects of Supply, Demand, and Money Shocks on Real Exchange Rate Fluctuations
Brian Zhang	ECO	The Accuracy and Efficiency of Prediction Markets in the US Presidential Elections
Charles Zhang	ELE	Treasury Auctions and its Value in the Market
Edward Zheng	ECO	Hedge Fund Replications: An Investor Friendly and Non-Linear Approach
Haotian Zheng	ORF	Replicating Electricity Spot Prices Through Inverse Optimization of Supply Shocks
Mengou Zhu	WWS	Effects of School Closure on Public School Financing
Kevin Zigadlo	ORF	"Raising Capital in the New Age of Venture Finance" A Model and Analysis of Crowdfunding

MASTER IN FINANCE

The distinctive feature of our Master in Finance program is its strong emphasis on financial economics in addition to financial engineering and computational methods. Graduates of our program 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, portfolios, and the financial decisions of firms. 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 prepares students for a wide spectrum of careers in the financial industry, ranging from quantitative trading strategies, risk management, and financial engineering, to quantitative asset management and macroeconomic and financial forecasting. The program does not require prior work experience, although it can be a plus. The Bendheim Center for Finance provides extensive career assistance to students, including help with internships and job placement, through its own staff. Our placement record has been excellent.

The curriculum is designed to be completed in four terms. Admission letters will specify the expected program length. Individual meetings between students admitted into the program and the director of graduate studies will determine, on the basis of courses previously completed at Princeton or another institution, which courses need to be taken. This format allows exceptionally well-prepared students to complete the program in as little as one academic year. The program is designed to be completed on a full-time basis. Classes are taught during the day, and full-time students take four or five courses per term. Given the logistics, the only possibility for part-time enrollment would be for students who already work in the Princeton area and who would be able to attend class during the day. Part-time students are expected to take a minimum of two classes per term, and a maximum of four years (eight terms) to finish the program. All students are subject to an annual review of academic 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 (a) the prerequisite skills in mathematics, economics, and probability and statistics necessary for the study of finance at a sophisticated level and (b) 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. Finally, the required summer internship is meant to provide additional practical experience in addressing real-world finance issues.

ADMISSION REQUIREMENTS

The Master in Finance program is designed both for students with training in mathematical or quantitative fields such as physics or engineering who want to make finance their main field of application, and for students with an economics or business background who want to acquire the quantitative skills essential for 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, which are pervasive in modern finance. An intensive two-week refresher course covering the relevant probability, statistics, and mathematics topics, as required for the core courses, is offered prior to the beginning of classes in the fall. In addition, we organize in September for every incoming class a three-day "boot camp" with industry professionals where various career options are reviewed and help is provided (including resume writing, one-on-one videotaped interview sessions, interviewing techniques, etc.).

Applicants must take either the GRE or the GMAT. Applicants whose native language is not English and who have not received their undergraduate education in the United States must take the TOEFL (Test of English as a Foreign Language) or the IELTS (International English Language Testing System) exam. Applicants whose native language is not English but who have received their undergraduate education in an English-speaking country do not have to submit these scores. Non-native English speakers who graduate with an undergraduate degree from an institution whose language of instruction is English but not in an English-language country must submit scores from either of these tests. All requirements are based on undergraduate education regardless of any graduate education. The Graduate School does not offer waivers of this requirement.

STATISTICS ON THE ADMISSION PROCESS

ADMISSION

	Applications	Offers	Acceptances
January '04	200	19	9
January '05	296	31	19
January '06	418	47	27
January '07	425	49	32
January '08	660	40	30
January '09	591	24	19
January '10	601	31	25
January '11	729	36	29
January '12	815	48	43
January '13	694	32	26

APPLICANT PROFILE : GENDER AND AGE

	Female	Male	Median Age
January '04	29%	71%	24
January '05	26%	74%	26
January '06	29%	71%	25
January '07	31%	69%	23
January '08	31%	69%	24
January '09	36%	64%	24
January '10	39%	61%	24
January '11	38%	62%	25
January 12	38%	62%	24
January '13	37%	63%	23

HIGHEST DEGREE BEFORE APPLYING TO PRINCETON'S M.FIN .

	Bachelor	Master	Ph.D.
January '04	85%	14%	1%
January '05	60%	35%	5%
January '06	66%	30%	4%
January '07	68%	28%	4%
January '08	72%	26%	2%
January '09	75%	23%	2%
January '10	8%	20%	2%
January '11	78%	20%	2%
January '12	83%	15%	2%
January '13	87%	12%	2%

APPLICANT PROFILE : GRE SCORES MEAN (MEDIAN)

		Analytical	Quantitative	Verbal
January '04	Applicants	714 (810)	776 (790)	554 (560)
September '04	Entering Class	768 (780)	786 (800)	609 (620)
January '05	Applicants	705 (745)	781 (800)	547 (580)
September '05	Entering Class	765 (765)	789 (800)	642 (640)
January '06	Applicants	4.47 (4.5) (new test)	781 (800)	568 (580)
September '06	Entering Class	5.1 (5) (new test)	786.5 (800)	6 47.5 (655)
January '07	Applicants	4.44 (4.5)	786.77 (800)	563.75 (570)
September '07	Entering Class	4.75 (5)	795.39 (800)	600.38 (630)
January '08	Applicants	4.18 (4)	786.43 (800)	553.09 (560)
September '08	Entering Class	4.67 (5)	788.43 (800)	573.75 (570)
January '09	Applicants	4.17 (4)	787.19 (800)	566.05 (580)
September '09	Entering Class	4.58 (4.5)	795.74 (800)	606.32 (610)
January '10	Applicants	4.01 (4)	788.34 (800)	566.63 (570)
September '10	Entering Class	4.42 (4.5)	798.95 (800)	597 (590)
January '11	Applicants	3.84 (4) 7	91 (800)	580
September '11	Entering Class	4.48 (4.5)	796.8 (800)	632
January '12	Applicants (new scale)	3.79 (40%)	165.3 (93%)	161.2 (83%)
September '12	Entering Class (new scale)	4.6 (71%)	165.3 (93%)	161.1 (81%)
January '13	Applicants		166.2 (95%)	157.5 (75%)
September '13	Entering Class		166.3 (94%)	159.4 (77%)

PROGRAM REQUIREMENTS

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

- At least five of the elective courses must be at the level 500 or higher.
- At least five of the elective courses must be taken from List 1 below.
- 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 for Finance-affiliated faculty member on a topic relevant to finance, and by enrolling in the appropriate courses (FIN 560/561), 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 program provide students with analytical fundamentals of modern finance, both theoretical and empirical. Core courses for students entering the program are:

- Financial Economics—ECO 362 (fall) and FIN 502 (spring)
- Asset Pricing—FIN 501/ORF 514 (fall) and ORF 515/FIN 503 (spring)
- Statistics and Econometrics—ORF 505/FIN 505 (fall) and ORF 504/FIN 504 (spring)

ELECTIVE COURSES

In addition to core courses, which provide a broad survey of topics and techniques of modern finance, the program offers 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 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
FIN 522: Options, Futures, and Financial Derivatives
FIN 523: Forecasting and Time Series Analysis
FIN 560: Master's Project I
FIN 561: Master's Project II
FIN 567: Institutional Finance, Trading, and Markets
FIN 568: Behavioral Finance
FIN 570: Valuation and Security Analysis
FIN 590: Financial Accounting

FIN 591: Cases in Financial Risk Management
FIN 592: The Rise of Asian Capital Markets
FIN 593: Financial Crises
ECO 414: Introduction to Economic Dynamics
ECO 525/FIN 595: Financial Economics I
ECO 526/FIN 596: Financial Economics II
ECO 575/FIN 575: Topics in Financial Economics
ORF 527: Stochastic Calculus and Finance
ORF 530: Statistical Analysis of Large Financial Datasets
ORF 531/FIN 531: Computational Finance in C++
ORF 534/FIN 534: Financial Engineering
ORF 535/FIN 535: Financial Risk Management
ORF 538: Analytical and Computational Methods of Financial Engineering
ORF 555: Fixed Income Models
ORF 569: Special Topics in Statistics and Operations Research
ORF 574: Special Topics in Investment Science

APC 350:   Introduction to Differential Equations
APC 503:   Analytical Techniques in Differential
           Equations
APC 518/ORF 518: Applied Stochastic Analysis
           and Methods
CEE 513:   Introduction to Finite-element Methods
CEE 532:   Advanced Finite-element Methods
CEE 548:   Risk Assessment and Management
CHE 508:   Numerical Methods for Engineers
CHE 530:   Systems Engineering
COS 318:   Operating Systems
COS 323:   Computing for the Physical and Social
           Sciences
COS 333:   Advanced Programming Techniques
COS 423:   Theory of Algorithms
COS 424:   Interacting with Data
COS 425:   Database Systems
COS 432:   Information Security
COS 436:   Human-computer Interface Technology
COS 444/ECO 444: Electronic Auctions
COS 461:   Computer Networks
ECO 418:   Strategy and Information
ECO 501:   Microeconomic Theory I
ECO 502:   Microeconomic Theory II
ECO 503:   Macroeconomic Theory I
ECO 504:   Macroeconomic Theory II
ECO 511:   Advanced Economic Theory I
ECO 512:   Advanced Economic Theory II
ECO 513:   Advanced Econometrics: Time Series
           Models
ECO 517:   Econometric Theory I
ECO 518:   Econometric Theory II
ECO 519:   Advanced Econometrics: Nonlinear
           Models
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:   Industrial Organization and Public
           Policy

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 591:   High-tech Entrepreneurship
MAE 503:   Basic Numerical Methods for Ordinary
           and Partial Differential Equations
MAT 301/MAE 305: Mathematics in Engineering
           I (ODE, PDE)
MAT 302/MAE 306: Mathematics in
           Engineering II
MAT 305:   Mathematical Programming
MAT 591 & MAT 592: Applied Partial Differential
           Equations
MAT 594/APC 584 Wavelets: Applications of
           Wavelets in Mathematics and Other
           Fields
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 524:   Statistical Theory and Methods
ORF 526:   Probability Theory
ORF 533:   Convex Analysis for Mathematical
           Finance
ORF 542:   Stochastic Control and Stochastic
           Differential Games
ORF 547:   Dynamic Programming
ORF 548:   Large-scale Optimization
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 often 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

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, and it 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 dynamic programming and stochastic control, financial economics, optimization under uncertainty, probability, and stochastic calculus and computational finance. 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 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

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 analysis of earnings revisions, "attribute" screening, 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, major asset managers, commercial banks, life insurance companies, securities firms, 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 macroeconomic models.

FINANCIAL TECHNOLOGIES

Computer-based technologies, such as algorithms, efficient trading systems, large databases, multimedia and Web interfaces, parallel processing, and the security of computer networks, are becoming increasingly important in finance. The continued development of e-commerce, the growth of electronic trading, and the renewed emphasis on risk management in all firms are creating a new competitive environment in which 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 are 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 financial data feeds, personal computers, and workstations) 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 are taught in a series of workshops and in a course on computational finance in C++.

SELECT COURSE DESCRIPTIONS

ECO 362: Financial Investments
This course surveys the field of investments with special emphasis on the valuation of financial assets. Issues studied include how portfolios of assets should be formed, how to measure and control risk, how to evaluate investment performance, and how to test alternative investment strategies and asset pricing models.

FIN 501: Asset Pricing I: Pricing Models and Derivatives
This course provides an introduction to the modern theory of asset pricing. Topics include: no arbitrage, Arrow-Debreu prices and equivalent martingale measures, security structure and market completeness, mean-variance analysis, Beta-pricing, CAPM, and introduction to derivative pricing.

FIN 502: Corporate Finance and Financial Accounting
This course 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, long-term productive assets, bonds and other liabilities, stockholders equity, and the statement of changes in financial position. The course provides students with the skills necessary to become informed users of financial statements. Problem sets emphasize an ability to interpret and analyze financial statement disclosures.

FIN 515: Portfolio Theory and Asset Management
This course covers a number of advanced topics related to asset management and asset pricing, including 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 518: International Financial Markets
This course studies the assets and institutions of international financial markets. A key difference between these markets and others is the role of exchange rates relating the value of two or more national currencies. The course studies the market-making institutions, the market conventions, and market practices. It also studies the interrelationships between different assets and their pricing, trading, and use by corporations.

FIN 519: Corporate Restructuring, Mergers, and Acquisitions
This course examines 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 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 modeling: Black model, Heath-Jarrow-Morton; (iv) applications of arbitrage free models to pricing of interest rate contracts; (v) credit risk; and (vi) mortgage-backed securities.

FIN 522: 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 the trading strategies associated with financial derivatives for different purposes and potential problems 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.

FIN 560/561: Master's Project I and II
Under the direction of a Bendheim Center for Finance-affiliated faculty member, students carry out a master's project and write a report.

FIN 567: Institutional Finance, Trading, and Markets

This course studies financial institutions and focuses on the stability of the financial system. It covers important theoretical concepts and recent developments in financial intermediation, asset pricing under asymmetric information, behavioral finance and market microstructure. Topics include market efficiency, asset price bubbles, herding, liquidity crisis, risk management, market design, and financial regulation.

FIN 568: Behavioral Finance

This course will present models that are psychologically more realistic than the standard "rational actor" model. About 30 percent of the course will be devoted to economics, 70 percent to finance. Applications to economics will include decision theory, happiness, fairness, and neuroeconomics. Applications to finance will include theory and evidence on investor psychology, predictability of the stock market and other markets, limits to arbitrage, bubbles and crashes, experimental finance, and behavioral corporate finance.

FIN 570: Valuation and Security Analysis

This is a specialized corporate finance course. The objective is to teach valuation methods. The course uses accounting and finance concepts for valuing firms and covers the necessary corporate finance concepts with an equal mix of theory and application. Topics include financial statement analysis, capital budgeting methods, estimating cash flows, estimating various costs of capital, valuation of projects, valuation of companies and security valuation, LBOs, mergers and acquisitions, valuing a drug licensing opportunity, the initial public offering valuation, and valuation of strategic and real options.

FIN 590: Financial Accounting

A survey of the concepts and techniques that non-managers use to hold the managers of organized human activity—chiefly corporations—accountable for the resources entrusted to them. Alerts students to the judgments and assumptions that regulators and managers make in that process, even when the managers wish to report honestly. Explores the methods that the managers of resources can (and often do) use to lie about their actual performance. While this course aims to make you a sophisticated user, not producer, of financial statements, you must master some record keeping procedures and vocabulary in order to be the boss, not the servant.

FIN 591: Cases in Financial Risk Management

This course examines the concept of risk and its mitigation, and how the ideas can be applied in the practice of risk management for financial and non-financial companies. The basic toolkit draws on economics, probability theory, and statistics, and they are integrated with more advanced concepts drawn from portfolio choice, derivative securities, and dynamic hedging. The overall aim of the course is to demonstrate how the main concepts have practical applications.

FIN 592: The Rise of Asian Capital Markets

This course explores the increasing weight of Asia in global equity financial markets and its implications, and frames the discussion in the macroeconomic context of the globalization of financial markets and the evolution of the global monetary system. The course puts particular emphasis on concepts of economic development, market efficiency, and corporate governance. Discussions combine analysis of historical trends and recent data and events with insights from practical experience in Asian equity markets. The course also explicitly considers the policy decisions faced by the U.S. and Chinese governments relative to existing global imbalances.

FIN 593: Financial Crises

This course uses economic theory and empirical evidence to study the causes of financial crises and the effectiveness of policy responses to them. Particular attention is given to some of the major economic and financial crises of the past century and to the crisis that began in August 2007.

ECO 525/FIN 595: Financial Economics I

This course covers asset pricing in competitive markets in which 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.

ECO 526/FIN 596: Financial Economics II

This course studies 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.

ECO 575/FIN 575: Topics in Financial Economics
This course is intended for Ph.D. students who have already completed the yearlong Ph.D. sequence in finance (ECO 525 and 526) and who intend to write their dissertation in finance. Topics vary by year, focusing on recent developments in the field.

ORF 504/FIN 504: Financial Econometrics
This course covers econometric and statistical methods as applied to finance. Topics include measurement issues in finance, predictability of asset returns and volatilities, value at risk and extremal events, linear factor pricing and portfolio problems, intertemporal models of the stochastic discount factor and generalized method of moments, vector autoregressive and maximum likelihood methods in finance, risk neutral valuation in discrete time, estimation methods for continuous-time models, volatility smiles and alternatives to Black-Scholes, and nonparametric statistical methods for option pricing.

ORF 505/FIN 505: Modern Regression and Time Series
This course examines linear and mixed effect models, nonlinear regression, nonparametric regression and classification, time series analysis, stationarity and classical linear models (AR, MA, ARMA), nonlinear and nonstationary time-series models, state space systems, and hidden Markov models and filtering.

ORF 515/FIN 503: Asset Pricing II: Stochastic Calculus and Advanced Derivatives
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 derivatives modeling, pricing, and hedging. Topics include Brownian motion, martingales, and diffusions and their uses in stochastic volatility; volatility smiles; risk management; interest-rate models; and derivatives, swaps, credit risk, and real options.

ORF 531/FIN 531: Computational Finance in C++
The intent of this course is to introduce the student to the technical and algorithmic aspects of a wide spectrum of computer applications currently used in the financial industry, and to prepare the student for the development of new applications. The student will be introduced to C++, the weekly homework will involve writing C++ code, and the final project will also involve programming in the same environment.

ORF 534/FIN 534: Financial Engineering
This course surveys central topics in the area of financial engineering and multi-period financial planning systems. It covers pricing methodologies integrated with financial planning systems and linking asset and liability strategies to maximize surplus wealth over time. We model the organization as a multi-stage stochastic program with decision strategies.

ORF 535/FIN 535: 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.

ORF 538: Analytical and Computational Methods for Financial Engineering
This course introduces analytical and computational methods that are common in financial engineering problems. It is aimed at Ph.D. students and advanced M.A. students who have studied stochastic calculus. The focus is on uses of partial differential equations: their appearance in pricing financial derivatives, connection with Markov processes, and occurrence as Hamilton-Jacobi-Bellman equations in stochastic control problems, and analytical, asymptotic, and numerical techniques for their solution.

ORF 555/FIN 555: Fixed Income Models
This course is an 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 Heath-Jarrow-Morton methodology and related consistency problems, LIBOR market models, affine term structure models, and risk of default.

MASTER IN FINANCE PLACEMENT

Our program has continued to enjoy excellent success with 100 percent of our 2013 graduates being placed in finance industry jobs or internships and 100 percent internship placement. The candidates for the Master in Finance receive support and assistance with their postgraduate career planning from a coordinated program of resources, including Princeton's Office of Career Services and the Bendheim Center for Finance's director of corporate relations. They also benefit from support from our Corporate Affiliates Program and Advisory Council.

OUR GRADUATES WILL BE PURSUING THEIR CAREERS AT:

Analytic Investors, Los Angeles
AQR, Greenwich, CT
Barclays Market Risk, New York
Barclays Sales & Trading, London
BNP Paribas Fixed Income Trading, New York
Bridgewater Associates, Westport, CT
Citi Markets & Quant Analysis, New York
CITIC, Beijing
Constellation Energy, Baltimore, MD
Credit Suisse Derivatives Structuring, Sao Paolo, Brazil
Credit Suisse Sales & Trading London
Federal Reserve Bank of New York
Goldman Sachs Securities, London

Government of Singapore Investment Corporation Pte Ltd.
Gray Whale Capital, Santa Barbara, CA
Guanying Investment Management Co., Ltd., China
JPMorgan Commodities, New York
JPMorgan FX Strategy, New York
Morgan Stanley Funds Services, New York
Ministry of National Development, Singapore
Morgan Stanley Sales & Trading, New York
Nomura Research, New York
Susquehanna International Group, PA
Synthesis Capital Management, Seoul
Trillium Trading, New York

OUR FIRST-YEAR STUDENTS HAVE OBTAINED SUMMER INTERNSHIPS AT:

BNY Mellon Derivatives Trading, New York
Barclays Market Risk, New York
Barclays POINT, New York
Barclays Quant Analytics, London
Canepa US, New York
CIBC Oppenheimer, New York
Citadel Investments Group, Chicago (2)
Citi Sales & Trading Hong Kong
Credit Suisse Sales & Trading, New York
Federated Investors Investment Management Global Equity, New York
Finch Investment Group, Florida
Goldman Sachs Investment Banking, London
Goldman Sachs Securities, New York

Goldman Sachs Securities, Hong Kong (2)
HSBC Sales & Trading, New York
ITG, New York
J.P. Morgan Asset Management Multi-Asset Group, New York
Macquarie Sales & Trading, New York
Morgan Stanley Investment Banking, Hong Kong
Morgan Stanley Investment Banking, Mexico City
QuantEdge, Singapore
Spot Trading, Chicago
Stone Toro, Princeton
TransMarket Group LLC, Chicago
Two Sigma, New York

MFIN MATH CAMP/BOOT CAMP

For the eighth year, the Bendheim Center for Finance conducted a two-week "math camp" program, August 27–September 7, taught by Matt Lorig. The purpose of the math camp is to enrich the finance mathematics background of the incoming students so that they are ready for the mathematical rigors of the program.

Following math camp, we continued our three-day "boot camp" program, which was developed for the incoming students prior to the beginning of classes in September. The camp focuses on a refresher of various finance topics, the types of careers for which the Master in Finance degree prepares students, and some useful information on interviewing and networking skills. Boot camp presenters included the Bendheim Center for Finance faculty, Master in Finance alumni, and speakers from the financial services industry. This program was well received by the incoming students, particularly those who would have to begin interviewing for permanent jobs less than six weeks after starting the program. In 2012, the program's agenda was as follows:

SATURDAY, SEPTEMBER 8

Introductions and Career Development Overview, Employment Etiquette, Interviewing 101, and Networking Best Practices—Wendell Collins
Perspectives from a Global Career—Peter Lighte, JPMorgan, Vice Chairman, Global Corporate Bank, China

Panel Discussion among Recent Graduates on Careers in Finance and Job Search Best Practices— Duygu Gozeler, Deutsche Bank, Theo Kim, Princeton University Investment Company; Adam Lichtenstein, Kepos Capital; Nestor Macias, Credit Suisse; Chad Shampine, Morgan Stanley; and Dennis Walsh, Goldman Sachs Asset Management.
Mock Interviews with Roundtable Participants.

MONDAY, SEPTEMBER 10

Quantitative Finance—Professor Frank Fabozzi
Morgan Stanley Strats Group—Pankaj Khandelwal
Careers in High Frequency Trading—Paul Edelman, Edelman & Associates
Princeton University Investment Company—Andy Golden, President
Kohlberg Kravis Roberts & Co.—John Massad, Director, and Antoine Chiche, Principal

TUESDAY, SEPTEMBER 11

Citi Markets Quantitative Analysis— L. Sankar, Managing Director, Securities Trading
Economics and Finance Library—Todd Hines
Goldman Sachs IBD Strats—Gaye Erkan, Managing Director
Career Services Resources—Amy L. Pszczolkowski and Julie Shurts
Hedging in the Insurance Arena—Todd Solash, AXA Equitable
Eladian Partners—Peter Kent, Managing Partner, and Brenden Eng, Trader
Adam Lutz, DC Energy
Andy Hubbard, MD, Credit Suisse
Risk Management and Asset Management—Kian Esteghamat, Partner, Canepa Management
Citadel—Jamey Thompson, Head, Quantitative Credit

MFIN WEEKLY LUNCH AND LEARN SPEAKER SERIES

In addition to boot camp, a number of guest speakers from a variety of areas of finance visited the Bendheim Center in 2012/2013 to address Master in Finance, undergraduate, and PhD students.

Speakers at the BCF for Fall 2012 included:
Robert Khoury '90, World Wide Financial Industry Recruiting
Antoine Chiche *06, KKR
Lewis Alexander, Senior US Economist, Nomura Securities
Carl Riccadonna '01, Senior US Economist, Deutsche Bank
Kristerfor Mastronardi '99, Goldman Sachs Asset Management
Mani Mahjouri—Chief Strategist/Chief Investment Officer, Tradeworx
Ignacio Navarro, Deutsche Bank Analytics
Harold Kim PhD '93, Citi HK
Bill Janeway '65, Warburg Pincus and Cambridge

Speakers in the Spring of 2013 included:
Ellen Zentner, Senior Economist, Nomura Research
Michael E. Novogratz '87, Principal and a Member of the Board of Directors, Fortress Investment Group LLC and Co-Chief Investment Officer, Fortress Macro Fund and the Drawbridge Global Macro Fund
John C. (Jack) Bogle '51, Founder of The Vanguard Group, Inc., President of the Bogle Financial Markets Research Center, and a member of the Bendheim Center for Finance Advisory Council.
Arminio Fraga *85, Chairman and Chief Investment Officer, Gavea Investmentos—Madison Medal Lecture
Brian Foran '01, Autonomous Research
Theo Kim *06, Princo
Dr. Peter Orszag '91, Vice Chairman, Corporate and Investment Banking at Citigroup Inc., former Director of the Office of Management and Budget in the first Obama administration.
Women in Finance workshop featuring panel discussion by Heidi G. Miller '74, Amy Emanuel '90, Nicole Thie '06, Lillian Schulz *10, and Amy Chivetta '12
Neil Chriss, Founder, Chief Investment Officer and CEO at Hutchin Hill Capital, LP
Dr. William H. Janeway '65, Senior Advisor, Warburg Pincus
Gerry Parsky '64, Chairman of Aurora Capital

ADVISORY COUNCIL AND SUPPORTERS

ADVISORY COUNCIL

The Advisory Council for the Bendheim Center for Finance is made up of a group of distinguished leaders in the financial industry. The council meets on campus once a year. In 2013, the meeting took place on May 2-3. We continued our format of including a dinner the night before the morning meeting to enable the council members to exchange ideas in a more informal setting.

COUNCIL MEMBERS

Hamid Biglari
Former Vice Chairman
Citicorp

John C. Bogle
President
Bogle Financial Markets Research Center
Vanguard

Richard H. Bott
Vice Chairman (retired)
Morgan Stanley Investment Banking Division

John L. Cecil
Chairman and Chief Executive Officer
Eagle Knolls Capital

Howard E. Cox Jr.
General Partner
Greylock Management Corporation

David A. DeNunzio
Vice Chairman, Mergers and Acquisitions
Crédit Suisse

Jeremy Diamond
Managing Director
Annaly Capital Management, Inc.

J. Michael Evans
Vice Chairman
Goldman, Sachs & Co.

Arminio Fraga
Founder, Chairman and Chief Investment Officer
Gavea Investmentos

John K. Hepburn
Advisory Vice Chairman
Morgan Stanley & Co.

Kenneth Hersh
Chief Executive Officer
NGP Energy Capital Management

William H. Heyman
Vice Chairman and Chief Investment Officer
The Travelers Companies, Inc.

Alfred F. Hurley Jr.
Consultant
Emigrant Bank

William H. Janeway
Senior Adviser
Warburg Pincus

Hugh E. McGee III
Chief Executive
Barclays Americas

Heidi G. Miller
Former President, International
JPMorgan Chase

Jeffrey M. Peek (Chair)
Vice Chairman, Investment Banking
Barclays

Lynn Bendheim Thoman
Co-president
Leon Lowenstein Foundation

CORPORATE AFFILIATES PROGRAM

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

2012/2013 AFFILIATES

AXA Equitable
Barclays
Citadel Investments Group
Citigroup
Crédit Suisse
DC Energy

Deutsche Bank
Edelman & Associates
Goldman Sachs
Prediction Company (A Millennium
Platform Company)

Benefits of Corporate Affiliation

- Annual Report of the Bendheim Center for Finance

- Opportunity to advertise internships and employment opportunities to both Undergraduate Certificate in Finance and Master in Finance students

- Opportunity to use the Bendheim Center for Finance facilities to host recruiting events

- Access to the Bendheim Center for Finance director of corporate relations as a resource for recruiting

- Recognition in the publicly disseminated materials of the Bendheim Center for Finance, including the center's reports and website, which both list corporate affiliates, as well as a hyperlink to each member's website

- Access to research authored by the center's affiliated faculty within the academic year

- Access to Bendheim Center for Finance faculty for internal or client presentations or for sponsored research

- Opportunity to work with the center's 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 Bendheim Center for Finance-sponsored conferences

- Invitation and two reserved seats for all public events hosted by the center

GIFT OPPORTUNITIES

Early in 1998, a $10 million gift from the Leon 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 Bendheim Center for Finance 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.

ACADEMIC PERSONNEL

Endowed Professorships (five committed, two additional needed)
To support the appointment of a distinguished senior faculty member
$4,000,000

Endowed Visiting Professorship (one needed)
To support a distinguished senior visitor who provides expertise in a particular area of study
$2,000,000

Postdoctoral Fellows (one needed)
$1,500,000

Junior Faculty Fellow (one committed, one additional needed)
$1,500,000

FELLOWSHIPS

Graduate Fellowships (three committed, seven additional needed)
To support a new generation of scholars concentrating in finance
$250,000

SUPPORT OF FINANCIAL RESEARCH AND TEACHING

Research and Course Development Funds
Endowed funds to support research and course development
$50,000 minimum

PHYSICAL SPACE

Director's Office
$100,000

Graduate Student Suite
$100,000

ACKNOWLEDGEMENTS 2012-13

Princeton University gratefully acknowledges those whose generosity continues to make the Bendheim Center for Finance possible.

INDIVIDUAL SPONSORS

Gerhard R. Andlinger '52
Kwesi Adofo-Mensah '03
Chester Baylis Jr. '29 (D)
Robert M. Baylis '60
Robert Bendheim '37 (D)
Hamid Biglari *87
David H. Blair '67
Charles Brodbeck '71
Janice Calloway (In Remembrance of Robert Bendheim '37)
David Carlin '60
Howard E. Cox Jr. '64
David A. DeNunzio '78
Kathleen T. DeRose '83
Robert G. Dettmer (In Remembrance of Robert Bendheim '37)
Jay Diamond '86 and
Alexandra Lebenthal '86
The Family of Carl H. Donner '20
J. Michael Evans '80
Edward B. Goodnow '47
Mr. and Mrs. Randall A. Hack '69
Walter Haydock '75
John K. Hepburn '72
Robert R. Hermann Jr. '75
Kenneth Hersh '85

William H. Heyman '70
Alfred F. Hurley Jr. '76
Stanley G. Ivins W34
William H. Janeway '65
Richard Korhammer '88
Oliver M. Langenberg '35
Susan Payne Madole '76
Burton G. Malkiel
Edward E. Matthews '53
John Mayer '62
Reuben M. Morriss III '58 (D)
Sharmin Mossavar-Rahmani '80
Robert B. Payne Jr. '74
Robert B. Payne Sr. '45
Jeffrey M. Peek '69
John G. Quigley
Jonathan F. Schachter PhD '94
Charles Sheedy (In Remembrance of Robert Bendheim '37)
John H. Scully '66
Lynn Bendheim Thoman '77
Dario Villani *02
Evan A. Wyly '84
Mr. and Mrs. Paul M. Wythes '55
William T. Young Jr. '70

GROUPS/ORGANIZATIONS

The Civitas Foundation
The Leon Lowenstein Foundation
Princeton Class of 1950
The Starr Foundation
Fayez Sarofim Co. (In Remembrance of Robert Bendheim '37)

In the Nation's Service and in the Service of All Nations