The
Bendheim
Center *for*
FINANCE

2014
ANNUAL REPORT

CONTENTS

Faculty and Staff

2013-2014

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 BCF from 1998 to July of 2014. 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, the latest being *After the Music Stopped,* which *The New York Times* named one of the five best nonfiction books of 2013. He 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
- "The Supply Shock Explanation of the Great Stagflation Revisited," 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 and the new director of the Bendheim Center for Finance since July 2014. 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
- "Redistributive Monetary Policy," Jackson Hole Symposium 2012
- "A Macroeconomic Model with a Financial Sector," American Economic Review, 2014, 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, 2013, with Patrick Bolton and Laura Veldkamp.
- "Risk Topography," NBER Macroeconomics Annual 2011, 2012
- "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
- ORF 505/FIN 505: Regression & Applied Time Series
- ORF 542: Stochastic Control and Stochastic Differential Games
- ORF 557, 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
- Phillips M. Cao, "Bid and Ask Prices in Options Markets with Transaction Costs"
- Daniel Xiochen Wang, "Analytical Approaches to Calculating Value-at-Risk of a Quadratic Approximation of a Stock and Options Portfolio"
- Ray Wang, "Modeling Systemic Risk Using Networks"

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 and the Class of 1913 Professor of Political Economy, Emeritus. He taught a MIT, Cornell, Harvard and Columbia universities and was manager of economic research at the I.B.M. Thomas J. Watson Research Center from 1962–70 before serving as 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. His 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. He received his Ph.D. from the University of Chicago. He writes a column in three major newspapers in China, one in Hong Kong and one in Taiwan. He is editor of the Routledge Handbook of the Chinese Economy and independent director of the Taiwan Semiconductors Manufacturing Company.

REPRESENTATIVE PUBLICATIONS
- *China's Economic and Social Problems*, World Scientific, 2014, Chinese edition, World Scientific 2014.
- *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 Emeritus. 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.

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, who joined the Department of Operations Research and Financial Engineering in 2003 and has chaired the department since 2012. His research interests include 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; and Guys Medal in Silver of Royal Statistical Society in 2013. 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 serves as the co-editor of the Journal of Econometrics and associate editor Journal of the American Statistical Association. He has served as the co-editor (in-chief) of the Annals of Statistics (2004–06), an editor of the Journal of Multivariate Analysis (1998–2000), Probability Theory and Related Fields (2003–05), and Econometrics Journal (2007-2012), and associate editor of Econometrica (2010–2013), and Journal of Financial Econometrics (2009–2012). He earned his Ph.D. from the University of California–Berkeley. He 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
- ORF 245: Fundamentals of Engineering Statistics
- ORF 524: Statistical Theory and Methods

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"
- Edgar Dobriban, "Regularity Properties of Random Matrices and Applications"
- Natalie H. Shoup, "Sustainable Energy Economics: Optimizing the Integration of Renewables in Guatemala"

GRADUATE STUDENTS ADVISED
- Xin Tong, "Learning with Asymmetry, High Dimension, and Social Networks"
- Ahmet Emre Barut, "Variable selection and prediction in high dimensional problems"
- Jelela Bradic, "Sparse estimation and oracle properties of regularized regression with non-polynomial dimensional covariates"
- Yang Feng, "High-dimensional Learning and Nonparametric Modeling"

POSTDOCTORAL FELLOWS SUPERVISED
- Runlong Tang, "High-dimensional Statistical Learning and Inference"
- Lingzhou Xue, "Big Data"
- Yuan Lian, "High-dimensional Econometrics"
- Michael Innerman, "Finance"

REPRESENTATIVE RECENT PUBLICATIONS
- "The leverage effect puzzle: disentangling sources of bias in high frequency inference," *Journal of Financial Economics* 109, 224-249, 2013 (with Ait-Sahalia and Li).
- "Large Covariance Estimation by Thresholding Principal Orthogonal Complements" (with discussion), *Journal of Royal Statistical Society* B , 75, 603-680, 2013.
- "Vast volatility matrix estimation using high frequency data for portfolio selection," *Journal of American Statistical Association*, 107, 412-428, 2012 (with Li and Yu)
- "Testing and Detecting Jumps Based on a Discretely Observed Process," *Journal of Econometrics*, 164, 331-344, 2011 (with Y. Fan).
- "Sparse High-dimensional Models in Economics," *Annual Review of Economics*, 3, 291-317, 2011 (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," *Journal of American Statistical Association* 104, 2009 (with L. Mancini).

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
- ECO 341: Public Finance
- ECO 523: 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
- ECO 342: 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

REPRESENTATIVE PUBLICATIONS
- 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

REPRESENTATIVE PUBLICATIONS
- "Crash-Neutral Currency Carry Trades," *Journal of Financial Economics*, forthcoming.
- "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) (with G. Chacko and E. Stafford).

WORKING PAPERS
- "The Risk of Safe Assets," May 2013 (with E. Stafford)
- "Option-Implied Currency Risk Premia", November 2013 (with Z. Xu)
- "The Cost of Capital for Alternative Investments," March 2014 (with E. Stafford)

PhD STUDENTS ADVISED:
- Zhikai XU (ORFE); currently at AQR Capital Management.

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.

COURSES TAUGHT
- ECO 521: Advanced Macroeconomics
- ECO 504: Macroeconomic Theory
- ECO 315: Topics in Macroeconomics

STUDENTS ADVISED
- Wei Cui, Weicheng Lian, Thomas Carter, Qingqing Cao, Christian Moser

REPRESENTATIVE PUBLICATIONS

- "Credit Cycles" with John Moore (1997) *Journal of Political Economy*
- "Financial Crises, Bank Risk Exposure and Government Financial Policy" with Mark Gertler (2012) *Journal of Monetary Economics*

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.

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.

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.* 11th edition, January 2015.
- "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 Bachelor's 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*.

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

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 a professor in the Department of Economics. He received his Ph.D. in economics from the University of St. Gallen, Switzerland. His research interest is in 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
- Risk of Bayesian Inference in Misspecified Models, and the Sandwich Covariance Matrix, *Econometrica* 81 (2013), 1805 - 1849.
- 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.
- "t-statistic Based Correlation and Heterogeneity Robust Inference," *Journal of Business & Economic Statistics* 28 (2010), 453 – 468. (Joint with Rustam Ibragimov).

- "Testing Models of Low Frequency Variability," *Econometrica* 76 (2008), 979-1016. (Joint with Mark Watson).

COURSES RECENTLY TAUGHT
- ECO202: "Statistics and Data Analysis for Economics"
- ECO513: "Advanced Econometrics: Time Series Models"
- ECO518: "Econometric Theory II"

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 family offices; 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

UNDERGRADUATE STUDENTS ADVISED (sample)
- Jane Leong, "Detecting surprises and correlation breakdowns for investment gains" (junior paper)
- Prakhar Agarwal, "Analyzing risk parity investment: a look at historical performance and future potential" (senior thesis)
- Ryan Peng, "Hedge fund replication: from a linear model to a Markovian model" (senior thesis)
- Julian He, "Can alternative dogs of the Dow beat hedge funds?" (senior thesis)

GRADUATE STUDENTS ADVISED
- Max Goer, "Developing a synthetic diversification approach based on randomization"
- Changle Lin, "An enterprise risk management system for sovereign wealth funds and family offices"
- Jian Ye, "Implementing limited loss strategies with VIX futures and options on futures"

REPRESENTATIVE PUBLICATIONS
- "A rule based commodity index," *Journal of Investment Management*, summer 2014
- "Taking advantage of rebalancing gains by randomization and synthetic diversification of investment tactics," under review *Quantitative Finance* (2014).
- "Dynamic Asset Allocation for Varied Financial Markets under Regime Switching Framework," *European Journal of Operations Research*, January 2013, (with W. Kim, and F. Fabozzi).
- "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.
- "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. Sannikov received his B.A. from Princeton and a Ph.D. from Stanford GSB. He 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 received three gold medals at International Mathematical Olympiads in 1996, 1995, and 1994. Besides Princeton, 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 Studie*s, 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.

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 STUDENTS 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
- ECO 513: 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
- ORF 335/ECO 364: Introduction to Financial Mathematics
- ORF 538: PDE Methods in Financial Mathematics

GRADUATE STUDENTS ADVISED
- Patrick Chan (PACM, PhD), "Mean Field Games and Financialization of Commodities Markets"
- Yidong Dong (ORFE, PhD), "Optimal Investment with Market-Dependent Risk Aversion
- Holly Goodman (M.Fin), "Electricity production in the US from different sources of fuel'"

- Laurent Dupras-Boileau (M. Fin), "Implied Volatility Skews"

REPRESENTATIVE PUBLICATIONS
- "Bertrand & Cournot Mean Field Games," with P. Chan, 2014, submitted.
- "Optimal Investment with Transaction Costs & Stochastic Volatility," with M. Bichuch, 2014, submitted.
- *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, 2012, to appear in Energy Economics.
- "Implied Volatility of Leveraged ETF Options", with T. Leung, October 2012 submitted.

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 Optimization in Engineering, Optimization Methods and Software and Mathematical Programming. He is a member of numerous professional societies and is a Fellow of three of them: the American Mathematical Society (AMS), the Society for Industrial and Applied Mathematics (SIAM) and the Institute for Operations Research and Management Science (INFORMS). He received his Ph.D. in applied mathematics from Cornell University in 1981.

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

- Jamie Iannone (Executive at Wal-Mart, Barnes & Nobel, eBay)
- Gordon Scharf (Associate, Intellectual Ventures)
- Robert Moore (CEO, RJMetrics)

REPRESENTATIVE PUBLICATIONS
- "Discrete-Time Pricing and Optimal Exercise of American Perpetual Warrants in the Geometric Random Walk Model," *Applied Mathematics and Optimization* 2013 (with M.C. Pinar and E.F. Bozkaya).
- "Fast Fourier Optimization," Mathematical Programming Computation 2012

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.

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 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.

REPRESENTATIVE PUBLICATIONS
- "Disentangling the Channels of the 2007-2009 Recession" (with James Stock), *Brookings Papers on Economic Activity*, Spring 2012, 81-135.
- Low-Frequency Robust Cointegration Testing (with Ulrich Müller), *Journal of Econometrics*, 177 (2013), pp 66-81.
- "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).

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 2013-14, the Bendheim Center for Finance welcomed the following visiting faculty:

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
- FRS 139: Ethics in Financial Markets
- ECO 492/FIN 592: Asian Capital Markets

MICHAEL GORDY is a Senior Economist at the Federal Reserve Board in Washington, DC. He has previously held a visiting appointment at the Indian School of Business, and serves as an associate editor of the Journal of Banking & Finance, International Journal of Central Banking, and Journal of Credit Risk. Michael is a recipient of Risk's 2004 Quant of the Year and GARP's 2003 Financial Risk Manager of the Year awards. Most of his research pertains to modeling credit risk at the single-name and portfolio levels, to the computation and estimation of such models, and to regulatory applications such as minimum capital requirements. Michael received his Ph.D. in economics from MIT in 1994.

COURSES TAUGHT
- ECO 465/FIN 522: Options & Futures
- ECO 493/FIN 593: Financial Crisis

WILLIAM H. JANEWAY was a guest lecturer at Princeton during the spring semester and is a Senior Advisor and Managing Director of Warburg Pincus. He joined Warburg Pincus in 1988 and was responsible for building the information technology investment practice. Previously, he was executive vice president and director at Eberstadt Fleming. Dr. Janeway is a director of Magnet Systems, Nuance Communications, O'Reilly Media, and a member of the Board of Managers of Roubini Global Economics. He is a Visiting Lecturer in Economics at Cambridge University and Princeton University. Dr. Janeway is Chairman of the Board of Trustees of Cambridge in America, University of Cambridge and a Member of the Board of Managers of the Cambridge Endowment for Research in Finance (CERF). He is a member of the board of directors of the Social Science Research Council and the board

of governors of the Institute for New Economic Thinking and of the Advisory Boards of the Princeton Bendheim Center for Finance and the MIT-Sloan Finance Group. He is the author of *Doing Capitalism in the Innovation Economy: Markets Speculation and the State*, published by Cambridge University Press in November 2012. Dr. Janeway received his doctorate in economics from Cambridge University where he was a Marshall Scholar. He was valedictorian of the class of 1965 at Princeton University.

COURSE TAUGHT
- ECO 493/FIN 593: Financial Crisis

AUGUSTIN LANDIER was a guest lecturer at Princeton during the Fall semester. He is a Professor at at the Toulouse School of Economics and a member of the French Economic Council of Sustainable Development. He received his PhD in Economics from Massachusetts Institute of Technology in 2002. His research interests cover such topics as banking deregulation; monetary policy, behavioral economics; and asset pricing. His work has been published in journals such as *The Economic Journal, The Journal of Finance* and *Economic Policy*.

COURSES TAUGHT
- ECO 468/FIN 568: Behavioral Finance

ASANI SARKAR was a visiting lecturer in the Department of Economics and taught courses in finance in the undergraduate and master programs. He is also a Vice President with the Federal Reserve Bank of New York. He has been a visiting assistant professor of finance at Columbia University and was on the faculty of the School of Business at the University of Illinois–Urbana/Champaign. He received his Ph.D. in economics from the University of Pennsylvania in 1990. His research has covered such topics as: limits to arbitrage, evaluations of the Fed's liquidity programs during the crisis, market liquidity and funding liquidity globally, stock co-movements around index additions, and macro announcement effects. His work has been published in numerous journals such as the *Journal of Finance* and the *Review of Financial Studies.*

COURSES TAUGHT
- ECO 462/FIN 515: 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.

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.

MELANIE HEANEY-SCOTT is the Academic Administrator for the Bendheim Center for Finance. Before joining BCF in 2013, Mel was a Graduate Admission Specialist in the Graduate School for 9 years. Prior to moving to the states with her husband from Manchester England she held several administrative positions. In her role as Academic Administrator, Mel oversees the day to day functions of the Undergraduate Certificate Program and the Master in Finance Program.

Ph.D. Students

GRADUATING 2013-14

Ph.D. students in the Bendheim Center for Finance are admitted through the Department of Economics, the Department of Operations Research and Financial Engineering, or the Program in Applied and Computational Mathematics. Three Ph.D. students graduated in 2014.

Zhenyu Gao, ECO, dissertation title: "Essay on Real Estate," will be an Assistant Professor at Chinese University of Hong Kong.

Jiangmin Xu, ECO, dissertation title: "Essays on Trading and Financial Econometrics," will be an assistant professor at Guanghua School of Management, Peking University.

Philip Yan, ECO, dissertation title: "The Effects of Short Sales and Leverage Constraints on Market Efficiency," will be a Research Associate at Goldman Sachs, Quantitative Investment Strategies Group.

Seminars and Conferences

2013-14

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 2013

Sept. 18
Erik Loualiche, MIT, Sloan School of Management
"Asset Pricing with Entry and Imperfect Competition"

Sept. 25
Toni Whited, Rochester
"Endogenous Financial Constraints, Taxes and Leverage"

Oct. 2
Emmanuel Farhi, Harvard
"A Model of Safe Asset Mechanism (SAM): Safety Traps and Economic Policy"

Oct. 9
Dimitris Papanikolaou, Northwestern, Kellogg School of Management
"Innovation Cycles"

Oct. 16
Charles Jones, Columbia School of Business
"A solution to the Palm—3Com spin-off puzzles" (joint with Martin Cherkes and Chester Spatt)

Oct. 23
Jiangmin Xu
"Optimal Strategies of High Frequency Traders"

Nov. 13
Jakub Jurek, Princeton
"Option-Implied Currency Risk Premia" (joint with Zhikai Xu)

Nov. 20
Anna Cieslak, Northwestern University, Kellogg
"Expected Returns in Treasury Bonds" (joint with Pavel Povala)

Dec. 4
Itamar Drechsler, NYU, Stern School of Business
"A Model of Monetary Policy and Risk Premia" (joint with Alexi Savov and Philipp Schnabl)

Dec. 12
Konstantin Milbradt, Northwestern, Kellogg School of Management
"Maturity Rationing and Collective Short-termism" (with Martin Oehmke)

SPRING 2014

Feb. 12
Itay Goldstein, University of Pennsylvania, Wharton
"Diversity and Complementarities in Trading and Information Acquisition" with Liyan Yang

Feb. 19
Robert Hall, Stanford University, joint with Macroeconomics
"High Discounts and High Unemployment"

Feb. 26
Andrew Ang, Columbia University
"Estimating Private Equity Returns from Limited Partner Cash Flows" with Bingxu Chen, William Goetzmann and Ludovic Phalippou

Mar . 5
Adriano Rampini, Duke University "Household Risk Management" with S. Viswanathan

Mar. 12
Amir Yaron, University of Pennsylvania, Wharton
"Good and Bad Uncertainty," with Gill Segal and Ivan Shaliastovich

Mar. 26
Alexi Savov, New York University
"The Macroeconomics of Shadow Banking" with Alan Moreira

Apr. 9
Gabriel Zucman, London School of Economics, visiting U.C.-Berkeley
"The Distribution of US Wealth, Capital Income and Returns since 1913"

Apr. 16
Maureen O'Hara, Cornell University
"Relative Tick Size and the Trading Environment"

Apr. 23
Adi Sunderam, Harvard University
"Fiscal Risk and the Portfolio of Government Programs"

Apr. 30
Jose Luis Peydro, Pompeu Fabra
"Macroprudential Policy, Countercyclical Bank Capital Buffers and Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments"

May 7
Jean-Noel Barrott, Massachusetts Institute of Technology
"Trade Credit and Industry Dynamics: Evidence from trucking firms"

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 2013

September 24
Ji Huang
"Banking and Shadow Banking"

October 1
Joonas Haemaelaeinen
"Optimal Investment Portfolios with Predictable Return Signs"

October 15
Philip Yan
"Short Covering in Momentum Crashes"

October 22
Vicky Liu
"Trade Credit and Firm Level Risk Sharing"

November 12
Zhenyu Gao
"Housing Boom and Bust with Elastic Supplies"

November 19
Philip Yan
Crowded Trades, Short Covering, and Momentum Crashes"

November 26
Michael Sockin
"Optimal Capital Structure and Security Valuation with Stochastic Volatility"

December 3
Gabriele La Spada
"Fund Tournaments with Heterogeneous Costs of Default"

December 10
Felix Matthys
"Yield Curve and Equilibrium Exchange Rate under Uncertainty about Government and Monetary Policy" (with Markus Leippold)

SPRING 2014

February 4
Alan Xiaochen Feng
"Bank Competition: Risk Taking and Their Consequences: Evidence from the U.S. Mortgage and Labor Markets"

February 11
Olivier Darmouni
"Policy Experimentation in Banking Crises"

February 18
Matt Baron
"The Causes and Consequences of Credit Expansion: Evidence from Stock Prices"

February 25
Zongbo Huang
"Haircut and Risk Sharing over the Cycle"

March 11
Alexander Rodnyansky
"Corporate Governance and the Real Effects of Corporate Cash Holdings"

March 25
Ying Jiang
"Informed Trading and Firm's External Financing"

April 1
Carlos Campani
"Approximate Analytical Solutions for Consumption and Portfolio Decisions under Recursive Utility and Finite Horizon"

April 8
Xiaoyang Sean Dong
"Technological and Market Liquidity Spirals"

April 15
Michael Sockin
"Learning about the Neighborhood: A Model of Housing Cycles?"

April 22
Peter Van Tassel
"Deal Failure Risk"

April 29
Matthieu Gomez
"How Do Firm-Level Shocks Impact Aggregate Fluctuations?"

2013 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.

Nobel Prize winner Robert Shiller of Yale University gave the 2013 Princeton Lectures in Finance on October 8-10, 2013, on the topic of "Neoclassical Finance and Reality..

Lecture 1:
Tuesday, October 8,
"The Relative Strengths of Neoclassical and Behavioral Finance for Understanding Bubbles and Systemic Crises"

Lecture 2:
Wednesday, October 9,
"Why Don't Sound Financial Innovations Get Adopted"

Lecture 3:
Thursday, October 10,
"Phishing for phools: The Economics of Manipulation and Deception"
(work in progress with George Akerlof)

SYMPOSIUM ON CHINA'S FINANCIAL MARKETS

The conference took place on July 6, 2013, Peking University

Session 1: Corporate Governance

Shell Games: Have U.S. Capital Markets been harmed by Chinese companies entering via Reverse Mergers?
Charles M. C. Lee, Stanford University
Kevin K. Li, University of Toronto
Ran Zhang, Peking University
DISCUSSANT: Long Chen, Cheung Kong Graduate School of Business

Reputation Concerns of Independent Directors: Evidence from Individual Director Voting
Wei Jiang, Columbia Business School
Hualin Wan, Shanghai Lixin University of Commerce
Shan Zhao, Grenoble Ecole de Management
DISCUSSANT: Qiao Liu, Peking University

The Effect of Mandatory CSR Disclosure on Information Asymmetry: Evidence from a Quasi-natural Experiment in China
Mingyi Hung, Hong Kong University of Science and Technology
Jing Shi, Australian National University
Yongxiang Wang, University of Southern California
DISCUSSANT: Roger Loh, Singapore Management University

Session 2: Stock Market Trading and Asset Pricing

Informed Trading and Expected Returns
James Choi, Yale University
Li Jin, Oxford University and Peking University
Hongjun Yan, Yale University
DISCUSSANT: Jialin Yu, Hong Kong University of Science and Technology

Does Diversity Lead to Diverse Opinions? Evidence from Languages and Stock Markets
Yen-Cheng Chang, Shanghai Advanced Institute of Finance
Harrison Hong, Princeton University
Larissa Tiedens, Stanford University
Bin Zhao, Shanghai Advanced Institute of Finance
DISCUSSANT: John Wei, Hong Kong University of Science and Technology

Word-of-mouth Communication, Observational learning, and Stock Market Participation
Yu-Jane Liu, Peking University
Juanjuan Meng, Peking University
Wei You, University of California at San Diego
Longkai Zhao, Peking University
DISCUSSANT: Harrison Hong, Princeton University

Session 3: Investor Psychology and Trade Execution

The Effect of Regret
Fei Wu, Shanghai Advanced Institute of Finance
Prachi Deuskar, University of Illinois
Deng Pan, Fudan University
Scott Weisbenner, University of Illinois and NBER
DISCUSSANT: Jianfeng Yu, University of Minnesota

Do Behavioral Biases Affect Order Aggressiveness?
Jiangze Bian, University of International Business and Economics
Kalok Chan, The Hong Kong University of Science and Technology
Donghui Shi, Shanghai Stock Exchange
Hao Zhou, Tsinghua University
DISCUSSANT: Liyan Yang, University of Toronto

PRINCETON INITIATIVE: MACRO, MONEY AND FINANCE

September 6-8, 2013, Princeton University,
Taylor Auditorium, Frick Chemistry Laboratory

Friday, September 6, 2013

Liquidity Concepts: Amplification, Persistence and Asymmetry
Markus Brunnermeier

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

Heterogeneous Agent Models with Financial Frictions: Computational Steps
Yuliy Sannikov

Financial Frictions: Empirical Facts
David Sraer

Saturday, September 7, 2013

Demand for Liquid Assets
Markus Brunnermeier

The I Theory of Money
Markus Brunnermeier

Productivity Losses from Financial Frictions
Ben Moll

Bubbles and Imbalances
Markus Brunnermeier

A Welfare Criterion for Models with Distorted Beliefs
Wei Xiong

Sunday, September 8, 2013

The Fiscal Theory of the Price Level
Chris Sims

Banking, Liquidity and Bank Runs
Nobuhiro Kiyotaki

Empirical Macro and Finance
Atif Mian

NINTH CAMBRIDGE-PRINCETON CONFERENCE

This conference, the ninth 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 13-14, 2013, at Bendheim Center for Finance, Princeton University.

Friday September 13, 2013

SESSION CHAIR: Hyun Shin
Markus Brunnermeier, *"The I Theory of Money"*
Pedro Saffi, "Deleveraging Risk"

SESSION CHAIR: Sanjeev Goyal
Valentin Haddad, *"Buyout Activity: Impact of Aggregate Discount Rates"*
Bart Lambrecht, *"The Dynamics of Investment, Payout and Debt"*

Saturday September 14, 2013

SESSION CHAIR: Hyun Shin
David Sraer, *"Can Unemployment Insurance Spur Entrepreneurial Activity? Evidence from France"*
(with Johan Hombert, Antoinette Schoar & David Thesmar)
Sanjeev Goyal, *"Trading in Networks: Theory and Experiment"*

SESSION CHAIR: Bart Lambrecht
Chris Rogers, *"Estimate Nothing"*
John Mulvey, *"A Commodity Tracking Index: Enhancing Performance for Long-Term Investors"*

SESSION CHAIR: Chris Rogers
Eva Steiner, *"Leverage, Growth Opportunities, Earnings Growth Volatility and Expected Stock Returns"*
Wei Xiong, *"Wall Street and the Housing Bubble"*

SESSION CHAIR: Hyun Shin
Peter Szilagyi, *"Swift Message Flow and Systemic Risk"*
Patrick Cheridito, *"Measuring and Allocating Systemic Risk"*

Princeton – UChicago Fall 2013 Quant Trading Conference

November 8, 2013, Illinois Institute of Technology's Stuart School of Business

KEYNOTE SPEAKERS

David Pettey, Associate Director, Susquehanna International Group

Peng Zhao, Co-Head of Quantitative Strategies, Citadel

SPEAKERS AND PANELISTS

Doug Adams, CEO, TransMarket Group

Rajib Ranjan Borah, Director & co-founder, iRageCapital Advisory Pvt Ltd, QuantInsti Quantitative Learning Pvt Ltd

Jim Cone, Senior Trading Team Leader, Sun Trading LLC

Larry Connors, CEO, The Connors Group

Armando Gonzalez, President & CEO, RavenPack

Ilya Gorelick, CEO, Deltix

Troy Kane, COO, Eagle Seven Trading

Andrew Killion, CEO, Akuna Capital

Sebastiaan Koeling, CEO for Optiver US, Optiver

Grace Lo, Director of Risk and Portfolio Management & Member of the Investment Committee, Campbell and Company

Rob Lopez, High-Frequency Trader, KCG

Elliott Lorenz, High Frequency Trader, Caherciveen Partners

Carl Mahler, Director of Algorithmic Trading, Gelber Group

Raj Mahajan, CEO, Allston Trading

Enrico Malverti, Senior Quantitative Analyst, MC Capital Ltd

Scott Martindale, Senior Vice President, Sabrient Systems

Marat Molyboga, Chief Risk Officer, Efficient Capital Management

Daniel Nehren, Managing Director, J.P. Morgan

Mukul Pal, Founder, Orpheus CAPITALS

José Pardo-Kronemann, Partner & Vice President, Pardo Capital Limited

Daniel Penley, Director of Algorithmic Trading & Execution, Spot Trading

Rajeev Ranjan, Policy Specialist & Financial Markets Senior Analyst, Federal Reserve Bank of Chicago

Ashwin Rao, Founder & CEO, ZLemma.com

D. Keith Ross, Jr., CEO, PDQ ATS

Uriel Scott, Independent Trader

Todd Simkin, Associate Director, Susquehanna International Group

Derek Wang, CEO, Bell Curve Capital LP

Francis Wenzel, CEO & co-founder, TickSmith Corp.

Zachary Ziliak, Owner, Ziliak Law, LLC

THIRD ANNUAL JULIS-RABINOWITZ CENTER FOR PUBLIC POLICY & FINANCE CONFERENCE

February 20, 2014

The conference took place on the Princeton Campus and brought together academics, researchers and policy makers to discuss the connections between Consumption and Finance.

Program

Welcome
Atif Mian, Princeton University

Consumption and Credit
Chris Carroll, Consumer Financial Protection Bureau
"Credit and Saving in the Long Run and Over the Business Cycle"
Amir Sufi, Chicago Booth School of Business
"Cash on Hand" and Consumption: Evidence from Mortgage Refinancing"
CHAIR: Angus S. Deaton, Princeton University

Consumption and Non-standard Preferences
Adair Morse, Berkeley Haas School of Business
"Trickle-Down Consumption"
David Laibson, Harvard University
"Self-Control and Liquidity: How to Design a Commitment Contract"
CHAIR: Mark Aguilar, Princeton University

Keynote Address
Robert E. Hall, Hoover Senior Fellow and Professor of Economics, Stanford University
"Consumption Smoothing and Intertemporal Substitution vs. the Household Financial Squeeze in the Great Recession"
INTRODUCTION: Markus Brunnermeier, Princeton University

Wealth and Saving Behavior
Raj Chetty, Harvard University
"Active vs. Passive Decisions and Crowd-Out in Retirement Savings Accounts: Evidence from Denmark"
Jonathan Zinman, Dartmouth College
"Follow the Money: Methods for Identifying Consumption and Investment Responses to a Liquidity Shock"
CHAIR: Roland Benabou, Princeton University

Consumer Finance
Annamaria Lusardi, George Washington University
"Debt and Debt Management Among Older Adults"
Gregor Matvos, Chicago Booth School of Business
"Advertising Expensive Mortgages"
Johannes Stroebel, NYU Stern School of Business
"Very Long-Run Discount Rates"
CHAIR: Nobu Kiyotaki, Princeton University

PRINCETON-QUT-SMU CONFERENCE

This conference brought together Princeton's Bendheim Center for Finance and the Queensland University and SMU faculty.

The conference took place on October 17-18, 2013, at Bendheim Center for Finance, Princeton University.

Friday October 17, 2013

SESSION CHAIR: Stan Hurn
Yin Liao, QUT
"Modeling and forecasting realized volatility: getting the most out of the jump component"
Yong Li, SMU
"A Bayesian Chi-Squared test for Hypothesis Testing in Economics and Finance"
Xiaohu Wang, SMU
"Double asymptotics for stationary and explosive continuous time models"

SESSION CHAIR: Anthony Hall
Genevieve Gauthier, Montreal
"Recovery rates and contagion in a hybrid credit risk model"
Susan Thorp, UTS
"Endogenous crisis dating and contagion using smooth transition structural GARCH"
Stan Hurn, QUT
"Volatility transmission in global financial markets"

Saturday October 18, 2013

SESSION CHAIR: Joon Park
Jun Yu, SMU
"Testing for Multiple Bubbles"
Jiti Gao, Monash
"Nonlinear Cointegration and Estimation of Stock Return Predictive Function"
Jianqing Fan, Princeton
"Large Panel Test of Factor Pricing Models"

SESSION CHAIR: Jianqing Fan
Joon Park, Indiana
"Mean reversion and unit root in diffusion"
Yoosoon Chang, Indiana
"Regime switching model with autoregressive endogenous latent factor"
Junye Li, ESSEC
"Variance Components, Term Structures of Variance Risk Premia, and Expected Asset Returns"

SESSION CHAIR: Jun Yu
Anthony Hall, UTS
"Resiliency of the Limit Order Book"
Yacine Ait-Sahalia, Princeton
"High Frequency Traders Taking Advantage of Speed"
Jiangmin Xu, Princeton
"Optimal Trading of the New Market Maker in a Limit Order Book"

Fourth Princeton Quant Trading Conference

Saturday, April 12, 2014 Friend Center, Princeton University

SPEAKERS:

Irene Aldridge, Head of Quantitative Research, ABLE Alpha

Raj Mahajan, CEO, Allston Trading

Marcos Lopez de Prado, Senior Managing Director, Guggenheim Partners

John Arabadjis, Head of Investor Behavior Research, State Street Associates

Chris Clearfield, Head of Quantitative Research, System Logic

Jim Cone, Senior Trading Team Leader FX & Fixed Income , Sun Trading LLC

Stefanos Damianakis, Chief of Staff, Edgestream LLC

David Frohardt-Lane, Senior Trader, 3red group

Alexander Greyserman, Chief Scientist, ISAM

Michael Jansen, Managing Director, Morgan Stanley

AJ Lindeman, Fixed Income Product Manager, Bloomberg

Edith Mandel, Head of Quantitative Fixed-Income Mid-Frequency Trading, KCG

Fang Wu, Senior Quantitative Researcher, Citadel

Jarrod Yuster, Co-Founder and CEO, Pico Financial Technologies

Shakil Ahmed, Founder, Princeton Alpha

Paul Edelman, Founder, Managing Director, Edelman & Associates

Eric Greiener, Executive Director, Quantitative Investor Solutions, JP Morgan

Dongsheng Lu, Head of Quantitative Research, The Bank of New York Mellon

Guy Miller, Deputy General Counsel, Jane Street

Nanda Kishore Moravapalle, Quantitative Analyst, Citadel

Shawn Sloves, CEO, Co-founder, Fundamental Interactions

Certificate in Finance

UNDERGRADUATE

CERTIFICATE IN FINANCE

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 17th year, the Undergraduate Certificate in Finance (UCF) continues to do extremely well, attracting record numbers of students. We enrolled 119 juniors from the Class of 2015 and currently have 90 students enrolled for the Class of 2016. This brings our total number of undergraduate students in the program (juniors and seniors) to 209 this year. We instituted grade requirements starting with the Class of 2008 in order to admit a smaller, more manageable number of students into the program. We awarded 83 Undergraduate Certificates in Finance at graduation this year.

BRENDEN VETTER was the recipient of the Birch Family Prize, which was presented at our Class Day ceremonies. This prize was established in 2004 by William D. Birch Jr. '64 and William Marco Birch '92. This is the fifth year we were able to present it to a graduating senior with the highest grade point average in course work related to the Undergraduate Certificate in Finance.

The Kathleen Traynor '83 Senior Research Prize was awarded for the second time to the graduating female senior with the highest GPA in UCF course work, **YANRAN LU.**

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 16 departments, in decreasing order of numbers of students in the UCF: Mathematics, Woodrow Wilson School, Computer Science, Chemical and Biological Engineering, Physics, Electrical Engineering, Chemistry, Philosophy, Psychology, Molecular Biology, Art, Classics, Geosciences and History.

CLASS OF 2014

Total expected number of certificates to be awarded: 83 (24 to women, or 28 percent)

Major	Number of Students
Astrophysics	1
Chemical and Biological Engineering	5
Chemical and Environmental Engineering	1
Comparative Literature	1
Computer Science	6
Economics	36
Mathematics	1
Operations Research and Financial Engineering	24
Politics	1
Psychology	2
Woodrow Wilson School	5

CLASS OF 2015

Total expected number of certificates to be awarded: 107 (to 40 women, or 37 percent)

Major	Number of Students
Art	1
Chemical and Biological Engineering	2
Classics	3
Computer Science	6
Economics	46
Electrical Engineering	4
Geosciences	1
History	1
Mathematics	4
Operations Research and Financial Engineering	31
Woodrow Wilson School	8

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); 8 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

Birch Family Prize (Bendheim Center for Finance)—Brendon Vetter (ECO)

Burton Malkiel*67 Senior Thesis Prize (Economics)—John McNamara IV (ECO) Elizabeth Pitts (ECO),

Halbert White '72 Prize in Economics —John McNamara IV (ECO)

Ahmet S. Cakmak Prize (Operations Research and Financial Engineering)—Tanakrit Rungrojchiaporn (ORF)
Sigma XI Book award for Outstanding Research—Chad Michael Horner (ORF)

8 UCF STUDENTS WERE ELECTED TO PHI BETA KAPPA SOCIETY

Nicolo Cottarelli (ECO)
Alexander Judge (CBE)
John Joseph McNamara (ECO)
Elizabeth Pitts (ECO)

Tanakrit Rungrochaiporn (ORF)
David Seyferth (ECO)
Michael She (ORF)
Brendon Lowell Vetter (ECO)

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

Prakhar Agarwal (ORF)
Daniel P. Chen (ORF)
Chad Michael Horner (ORF)
Margaret Elizabeth Jonas (PSY)
Alexander Judge (CBE)
Jonathan Andrew Lack (COS)
Xiao Tian Elaine Liew (COS)
Alice Lynn Lin (ORF)
Bozhena Liskco (CBE)
Jieming Liu (ORF)

Yanran Lu (ECO)
Ryan Peng (ORF)
Tanakrit Rungrochaiporn (ORF)
Anand Kamlesh Shash (COS)
Michael She (ORF)
Leonardo Stedle (ORF)
Zhuu Judy Sun (ORF)
Allyce Terell (ECO)
Lucias Wang (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)

7 UCF SENIORS RECEIVED THE SHAPIRO PRIZE FOR ACADEMIC EXCELLENCE

Kubrat Danailov (MAT)
David Durst (COS)
Kyle Douglas (ORF)
Yuen Ying Fung (ECO)

Neil Hannam (CLA)
Alexander Sappington (ECO)
Tayyab Shah (CHE)

SENIOR THESES AND INDEPENDENT PROJECTS OF THE CLASS OF 2014

This table shows the senior thesis and independent project titles from the UCF Class of 2014.

Frederick Addy	AST	A Behavioral Analysis of American Market Responses to the Greek Credit Crisis
Prakhar Agarwal	ORF	Analyzine Risk Parity Investment: A Look at Historical Performance and Future Potential
Collin Berger	WWS	The Maestro's Baton: How Federal Reserve Chairs Influence Policy
Kurt Buchbinder	ECO	Picking Picassos: Differentiating Artists by Gini Ratio as a Measure of Brand and Innovative Style
Daniel Chern	ORF	Analyzing Transformer Replacement Policies: A Simulation Approach to Reducing Failure Risk
Sungmin Cho	ECO	Value of Conglomerate Business Structure in Liquidity Crisis: Evidence from Korea during Asian financial Crisis
Andrew Choi	ORF	Copacetic: An Optimization Platform for Software Defined Networks
Nicolo Cottarelli	ECO	Personal CEO Characteristics and Firm Capital Structures
Ani Deshmukh	ECO	Analyzing Acquirer Returns in the Software-as-a-Service Sector
Shawn Du	ECO	The Effects of the Euro on Financial Flows Using Gravity Equation Estimations
Christine Feng	ORF	Exploring The Influence of Technology M&A Through Patents, R&D Spending, and Market Valuation
James Feng	ORF	A Vector Autoregression Analysis if Quantitative Easing's Housing Sector Implants in the United States
Lisa Fierstein	ORF	Measuring Risk: Using The Markowitz Model, Conditional Value at Risk, and Risk Parity for Asset Allocation In Medium-Duration Investments
Nicholas Gilligan	ECO	Understanding Bitcoin: Cryptography, Monetary Theory, and Valuation
Rafael Grillo Avila, Jr.	POL	Democracy & Sustainable Energy Transitions: The Role of Iberal Democratic Factors in Renewable Energy Policy & Technology Adoption
Tiansheng (Eric) Guo	ECO	Play - Money Poker
Elizabeth Harkins	CEE	Testing Relative Purchasing Power Parity in sub Saharan Africa
Jon Ralph Harris III	ECO	The Housing Market "Contagion Effect": Evidence for Time-Varying Volatility and Misperceptions of Risk Effects Between the U.S. Housing and Stock Markets Around the 2007-2009 Financial Crisis
Julian He	ORF	Can Alternative Dogs of the Dow Beat Hedge Funds
Julian Helguero-Kelley	ECO	The Game of Domes: Analyzing the Effect of Corporate Purchases of Stadium Naming Rights on Firm Stock Prices
Chad Horner	ORF	Predicting the Impact of American Airlines-US Airways Merger on Domestic Airfares
Sarina Huang	ECO	Small Firms Effect and Crisis: Empirical Analysis of the Size Effect in Equity Returns from 1995-2012
Rachita Jain	ECO	Fundamental Effects in the United States Housing Market

David Jensen	MAT	An Examination of The Computational Viability of A Weighted-Sum Execution Method in Short-Horizon Trading
Sunny Jeon	WWS	Peril in Europe's Periphery: A Comparison of the Banking Crises in Ireland, Iceland and Cyprus
Margaret Jonas	PSY	A study on scarcity: How not having enough time affects cognitive abilities
Alex Judge	CBE	Development of a Nanoparticle-Gel Microparticle Drug Delivery Vehicle for Lung Cancer Treatment
Vijit Kapoor	ECO	Hedge Fund Activism: An Empirical Analysis of its Impact on Shareholder Value
Daniel Katz	ORF	Examining the Volatility Risk Premium in the Crude Oil Market through Volatility Swaps and Skew
Dillon Kelly	ECO	Put A Stock In It: Analyzing the Impact of FOMC Announcements on he Equity Market In Various Environments
Yoon Kim	ECO	The Effect of Safe Asset Shortages on U.S. Financial Assets: an Empirical Analysis
Elan Kugelmass	ECO	Machine Learning Classification In Economics: Applications For The Business Cycle and Monetary Policy
Jonathan Lack	COS	Public Sentiment Analysis to Predict Movements in the Stock Market
Lucy Lee	COM	Yum! Brands: Sweet and Not Too Sour
Danny Lei	ECO	Determinants of Public Company Survival Duration After A Sponsor-Backed IPO: A Survival Analysis
Xi Leng	COS	Sentiment Analysis of Financial News
Grace Li	WWS	FDI Follows the Flag: State Influence Over Foreign Firms in China
Xiao Tian (Elaine) Liew	COS	The Case for Dynamic Spectrum Allocation in the 2015 Federal Communications Commission (FCC) spectrum auction
Alice Lin	ORF	A Different Approach to Modelling Changes in Stock Prices
Bozhena Lisko	CBE	Where Does Geopolitical Risk Manifest?: The Effect of the Ukrainian Crisis on Financial Assets
Jingjie Liu	ECO	Re-Evaluating Corporate Greening: An Empirical Analysis of Environmental Publicity and Corporate Financial Performance
Diana Liu	ORF	Optimal Yield Commodity Indices in Context of The Open Interest Term Structure
Jieming Liu	ORF	A Follow-Up Study on the Volume-Volatility Relationship in the U.S. Municipal Bond Market
Yanran Lu	ORF	Monte Carlo Simulation in Valuing Parisian and Parasian Barrier Options
Kevin Ma	ECO	An Event Study Analysis of the Effects of Quantitative Easing on Long-Term Asset Yields
Tanoy Mandal	ECO	Contracting for Defense: An analysis of Defense Acquisition Contracts and Cost Overruns
John McGee	ECO	Fracking In the United States: An Applied Microeconomic Approach To the Shale Gas Revolution
David McKenna	COS	Analyzing Sentiment in the News, and Its Effects on Economics Sectors
John McNamara IV	ECO	Corporate Real Assets and Employment Decisions
Frank Musella	ECO	The Impact of High-Frequency Trading Regulatory Regimes on European Market Quality

Kristian Parapanov	ECO	The Pricing of Systematic Risks in Corporate Stock and Bond Markets
Ryan Peng	ORF	Hedge Fund Replication: From Linear Model to Markovian Model
Jared Peterson	ECO	Monte Carlo Simulations of Contagion in the US Banking System: A Network Approach to Systemic Risk
Elizabeth Pitts	ECO	The Timing of Intra-Industry Information Transfers, 1995-2012: A Signal Extraction Approach
Kashyap Rajagopal	WWS	Emerging Markets: A Cure for Big Pharma's Ails
Hannah Rajeshwar	ORF	Analyzing Localized Commodity Returns in the Context of Terrorists Attacks: A Two Phase Approach
Brandon Rhodes	ORF	An Analysis of Economically Efficient Insurance Schemes for Automated Vehicles
Tanakrit Rungrojchaiporn	ORF	Long Term Financial Planning for Sovereign Wealth Funds and Family Offices: A Multistage Stochastic Programming Approach
Alexander Rush	ECO	A Revised Mergers and Acquisitions Landscape: A Unified Theory Across Transaction Types
Paul Schepel	ORF	Psychological Arbitrage: An Analysis of the Dynamics of Apple's Stock Prices in Neighborhoods of Round Numbers
David Seyferth	ECO	The Crisis Aftermath: Understanding Variability in Housing Recovery at the Metropolitan Level
Anand Shah	COS	Greek Fiscal Policy and The Euro
Dhruv Shah	ORF	Traders Without Borders: A Comparative Study of the Efficiency of Trend-Prediction Trading Strategies Between Indian and U.S. Markets and its Implications on Market Efficiency
Michael She	ORF	Quantification of Central Counterparty Risk: A Clearing Member's Perspective
Ezra Spiro	WWS	Playing Our Cards Wrong: Behavioral and Competitive Challenges in U.S. Payments Markets
Leonardo Stedile	COS	Analysis of Risk in Chess
John Joseph Strabo, Jr.	ECO	Disasters, Man-Made and Natural: The Effects of Oil Spills and Hurricanes in The Gulf of Mexico on Clean Energy Stock Prices
Zhuyi (Judy) Sun	ORF	Casual Price Discrimination: An Analysis of the Healthcare Costs Associated with Motor Vehicle and Transportation Collisions
Aleksandra Szczuka	CBE	A Look at Investing in Hydraulic Fracturing and Shale Gas
Allyse Terrell	CBE	Analysis of Stock Prediction Using Online Learning Methods
Ashutosh Thakur	ECO	Bargaining Micro-Foundations of Decentralized Markets, Competition, and Reputation
Ketevan Tsereteli	ECO	Libor Manipulation: Structural Breaks in Interest Rates and the Impact on Select U.S. School Districts
Bruno Velloso	ECO	Real Exchange Rate Fluctuations In Emerging Markets: The Role of Money, Demand, and Supply Shocks
Brendon Vetter	ECO	Examining Japan's Saving Rate through Credit Constraints
Lucia Wang	ORF	A Comparison of Modelling Techniques for Time-Varying Beta in Asia-Pacific Real Estate Investment Trusts
Stephen Wang	ORF	Neural Networks in FX Derivatives Trading: Analyzing Artificial Intelligence Techniques to Price GBP/USD Options
Ziyang (Sunny) Xu	ECO	Understanding The Impact of Federal Reserve Announcements in Emerging Markets

Michael York	ECO	An Investigation on the Income and Employment Effects of the North Dakota Oil and Gas Boom
Younjoo Yu	ECO	Corporate Governance and Stock Return: Before, During, and After 2007-2008 Financial Crisis
Frank Zhao	ECO	Credit Rating Reversals in Scrutinized Products and Corporate Bonds
Paul Zima	PSY	The Efficiency and Formation of Strategic Corporate Alliances: A Game Theory approach
Haotian Zheng	ORF	Replicating Electricity Spot Prices Through Inverse Optimization of Supply Shocks

Master in Finance

MASTER IN FINANCE

The 13th class of the Center's Master in Finance (MFin) program graduated in June 2014 with 32 students.

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.

ADMISSIONS

The number of MFin applications for 2014-15 decreased from 694 in January 2013 to 603 in January 2014. 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 123 of the applicants and made 30 offers of admission (32 last year). Our selectivity rate continues to be very high, with our program admitting only 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 30 offers, we received 25 acceptances, compared to 26 out of 32 last year. Our yield this year was 87%, 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 25 students.

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
January '14	603	30	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
January '14	38%	62%	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	7%	20%	2%
January '11	78%	20%	2%
January '12	83%	15%	2%
January '13	86%	12%	2%
January '14	85%	15%	5%

		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%)
January '14	Applicants		167.2 (95%)	156.5
September '14	entering Class		167.2 (95%)	159.0

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:

FALL SEMESTER
FIN 501/ORF 514: Asset Pricing I: Pricing Models and Derivatives
FIN 505/ORF 505: Modern Regression and Applied Time Series

SPRING SEMESTER
FIN 502: Corporate Finance and Financial Accounting
FIN 503/ORF 515: Asset Pricing II: Stochastic Calculus and Advanced Derivatives
FIN 504/ORF 504: Financial Econometrics

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 574:	Special Topics in Investment Science: Trading and Risk Management
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 525:	Asset Pricing
ECO 526/FIN 526:	Corporate Finance
ECO 527/FIN 527:	Financial Modelling
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 574/FIN 574:	Special Topics in Investment Science: Trading and Risk Management
WWS 505:	Financial Management in the Corporate and Public Sectors
WWS 594n:	Financial Regulation, Crises and Macro Policy

APC 350:	Introduction to Partial 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
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 391/MAE 305:	Mathematics in Engineering I (ODE, PDE)
MAT 392/MAE 306:	Mathematics in Engineering II (PDE, complex variables)
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
WWS 519B/PSY 528B:	Negotiation, Persuasion and Social Influence: Theory and Practice
WWS 523:	Legal & Regulatory Policy Toward Markets
WWS 524:	Advanced Macroeconomics: Domestic Policy Issues
WWS 544:	International Macroeconomics
WWS 582C:	Topics in Applied Economics: Growth, International Finance & Crisis
WWS 582F:	Topics in Applied Economics: Financial Markets and Public Policy

TRACKS

Elective courses can be chosen according to 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 in a small group on actual financial engineering problems.

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), binomialtree 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 2014 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:

Analysis Group, Boston
Barclays Market Risk, NYC
Bloomberg, NYC
BNP Paribas, NYC
Citadel Investment Group, NYC
Citadel Investment Group, Chicago
Citi Global Markets, Hong Kong
Citi Global Markets, Singapore
Credit Suisse Asset Management, Trading Strategies, NYC
Dun & Bradstreet, NJ
Goldman Sachs Asset Management, QIS, NYC
Goldman Sachs Investment Banking, London

Goldman Sachs Securities, NYC
Goldman Sachs Securities, Hong Kong
Government of Singapore
HSBC Global Markets Trading & Structuring Division, NYC
ITG, NYC
JP Morgan Global Multi-Asset Group, Quant Research Team, NYC
Morgan Stanley Investment Banking, Hong Kong
Morgan Stanley Investment Banking, Mexico City
QuantEdge, Singapore
Tudor Investments, NYC
TransMarket Group, Chicago

OUR FIRST-YEAR STUDENTS HAVE OBTAINED SUMMER INTERNSHIPS AT:

AIG, NYC
Arrowstreet Capital, Boston
BlackRock RQA, NYC
BNP Paribas Fixed Income Trading, NYC
Credit Suisse Investment Banking, NYC
Credit Suisse Sales & Trading, Hong Kong
Sandpointe LLC, West Palm Beach, FL
Goldman Sachs Credit Risk, Hong Kong
Goldman Sachs Investment Banking, Beijing
Goldman Sachs Securities, Hong Kong

Goldman Sachs Securities, NYC
JP Morgan Sales & Trading, NYC
Kiski Alpha Partners, NYC
Nomura Research, NYC
Oppenheimer Funds, NYC
State Street Associates, Boston
Transmarket Group, Chicago
UBS Sales & Trading, NYC
World Bank Treasury, Washington, DC

MFIN MATH CAMP/BOOT CAMP

For the ninth year, the Bendheim Center for Finance conducted a two-week "math camp" program, August 26–September 6, 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 2014, 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

Career Perspectives—Thomas John, BlackRock Scientific Active Equities.

Panel Discussion among recent graduates on Careers in Finance and Job Search Best Practices—Lilian Schulz, BTG Pactual; Theo Kim, Princeton University Investment Company; Adam Lutz, DC Energy; Nestor Macias, Credit Suisse; Nicolas Cojocaru-Durand, Citadel; Chad Shampine, Morgan Stanley; and Dennis Walsh, Goldman Sachs Asset Management.

Mock Interviews with Roundtable Participants.

MONDAY, SEPTEMBER 9

Quantitative Finance—Professor Frank Fabozzi

Barclays Enterprise Risk Management IBD—Nikola Miljkovic, MD, Sujay Kumar Davuluri, VP

Morgan Stanley Strats Group—Jean Boyer

Career Services Resources—Amy L. Pszczolkowski and Grace Williamson

Careers in High Frequency Trading—Paul Edelman, Edelman & Associates

TUESDAY, SEPTEMBER 10

Perspectives from a Global Career—Peter Lighte, JPMorgan, Vice Chairman, Global Corporate Bank, China

Citi Markets Quantitative Analysis—L. Sankar, Managing Director, Securities Trading Economics and Finance Library—Todd Hines

Goldman Sachs IBD Strats—Gaye Erkan, Managing Director

Princeton University Investment Company—Andy Golden, President

Kohlberg Kravis Roberts & Co.—John Massad, Director

Credit Suisse—Amar Sujanani

Citadel—James Yeh, Senior Managing Director

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 2013/2014 to address Master in Finance, undergraduate, and PhD students.

Speakers at the BCF for Fall 2013 included:
Norman Champ '85, SEC, Director of Investment Management Division
Antoine Chiche *06, KKR, Principal
Barbara Byrne h76, Vice Chairman, Barclays
Anshu Jain, Co-CEO, Deutsche Bank
Ben Blander, Founder, Blander Technologies
Carl Chastenay *99, Senior Risk Officer, IFC/World Bank
Lew Alexander, Nomura US Chief Economist
John Cunniff *88, TIAA-CREF
Jeremy Diamond '86, former MD, Annaly Capital

Speakers in the Spring of 2014 included:
Mary Schapiro, Former Chair, SEC
Ben Bernanke, former chairman, Board of the Federal Reserve
Andrew Schofield, Deutsche Bank Analytics
Qian Liu and Avery Moon, Wealthfront
Rick Grove '79, Rutter Associates
Glen Swindle '85, Scoville Risk Partners

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 2014, the meeting took place on May 8-9. 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

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Former Vice Chairman
Citicorp

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President
Bogle Financial Markets Research Center

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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.

2013/2014 AFFILIATES

Barclays
Citadel
Citigroup
Crédit Suisse
Deutsche Bank
Edelman & Associates

Goldman Sachs
Prediction Company (A Millennium Platform Company)
Sandpointe LLC
Stevens Capital Management

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 2013-14

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

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

The Bendheim Center *for* FINANCE