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CHICAGO BOOTH
The University of Chicago Booth School of Business

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ACADEMIC POSITIONS HELD:

- University of Chicago, Booth School of Business
  2005-present Professor of Econometrics and Statistics
  2000-2005 Associate Professor of Econometrics and Statistics
  1996-2000 Assistant Professor of Econometrics and Statistics

- NYU, Stern School Business
  2005-2006 Morgan Stanley Visiting Researcher, Finance Department

EDUCATION:

- Ph.D., Economics, University of California, San Diego, 1996
- B.A., Economics, University of California, San Diego, 1991
- B.S., Mathematics, Scientific Programming, University of California, San Diego, 1991

RESEARCH INTERESTS:

Financial Econometrics, Time Series, Applied Econometrics
Empirical Market Microstructure, analysis of high frequency financial data

PUBLICATIONS

"Measuring and Modeling Execution Cost and Risk" forthcoming, *Journal of Portfolio Management* (with Robert Engle and Robert Ferstenberg)

"Market Microstructure Noise, Integrated Variance Estimators, and the Accuracy of Asymptotic Approximations," 2011, *Journal of Econometrics* (with Federico Bandi)

"Empirical Market Microstructure," 2010, *Encyclopedia of Quantitative Finance, eds. Rama Cont.*

"Volatility and Time Series Forecasting: Essays in Honor of Robert Engle" 2010 Oxford University Press (with Tim Bollerslev and Mark Watson).

"Analysis of High Frequency and Transaction Data," 2010, *Handbook of Financial Econometrics* North Holland eds. Yacine Ait-Sahalia and Lars Hansen (with R. F. Engle).

"A New Model for Limit Order Book Dynamics," 2010, "Volatility and Time Series Forecasting: Essays in Honor of Robert Engle" eds Tim Bollerslev, Jeffrey Russell and Mark Watson. (with Taejin Kim)

"Determinants of Bid and Ask Quotes and Implications for the Cost of Trading" 2008, *Journal of Empirical Finance* (with Ruey Tsay and Michael Zhang)

"Realized Volatility Forecasting and Option Pricing," 2008, *Journal of Econometrics* (with Federico Bandi and Chen Yang)

"Microstructure Noise, Realized Volatility, and Optimal Sampling", 2008 (Lead article), *Review of Economic Studies*, (with Federico Bandi)

"True or Spurious Long Memory? A New Test", 2008, *Journal of Business and Economic Statistics*, (with Arek Ohanissian and Ruey Tsay)

"Using High-Frequency Data in Dynamic Portfolio Choice", 2008, *Econometric Reviews* (with Federico Bandi and Julia Zhu)

"Volatility," 2008, *Handbook of Financial Engineering* eds. John R. Birge and Vadim Linetsky (with Federico Bandi).

"Comment on 'An Unbiased Measure of Realized Volatility'" by Peter Hansen and Asger Lunde, 2006, *Journal of Business and Economic Statistics* (with Federico Bandi).

"Separating Microstructure Noise from Volatility," 2006, *Journal of Financial Economics* (with Federico Bandi)

"A Discrete-State Continuous-Time Model of Financial Transaction Prices and Times: The ACM-ACD Model," 2005, *Journal of Business Economics and Statistics* (with R.F. Engle)

"The Kurtosis of GARCH and Stochastic Volatility Models," 2003, *Journal of Econometrics* (with Xuezheng Bai and George Tiao)

"The Magnet Effect of Price Limits: Evidence from High Frequency Data on the Taiwan Stock Exchange," February 2003, *Journal of Empirical Finance*, (with David Cho, Ruey Tsay, and George Tiao).

"A Nonlinear Autoregressive Conditional Duration Model with Applications to Financial Transactions Data," July 2001, *Journal of Econometrics,* (with Ruey Tsay and Michael Zhang).

"Autoregressive Conditional Duration: A New Model for Irregularly Spaced Transaction Data," September 1998, *Econometrica*, (with R.F. Engle).

"Forecasting the Frequency of Quoted Price Changes in the Foreign Exchange Market Using the Autoregressive Conditional Duration Model," June 1997, *Journal of Empirical Finance,* (with R.F. Engle). Reprinted in <u>Financial Forecasting</u> Edited by R. Batchelor and P. Dua. Part of The International Library of Critical Writings in Financial Economics Series edited by Richard Roll.

SUBMITTED PAPERS:

"Forecasting Realized Volatility in the Presence of Time-Varying Noise" 2011 (with Federico Bandi and Chen Yang)

"The Econometrics of Realized Effective Spreads" 2011 (with Federico Bandi and Lei Lian)

"The Price Level Puzzle" 2011 (with Federico Bandi and Omid Sabbaghi) This paper was awarded the *Standard & Poor's best paper award in Investments: Asset Pricing* at the Midwest Finance Association Annual Meetings

"Market Frictions, Market Volatility, and the Cross-Section of Stock Returns" 2010, (with Federico Bandi and Claudia Moise).

PROFESSIONAL ACTIVITIES

- Member of Organizing Committee for Society for Financial Econometrics Conference , Chicago, June 2011
- Conference Organizer for Volatility and Time Series Econometrics Conference, San Diego, June 2009
- NASDAQ Economic Advisory Board, 2006-2009
- Associate Editor, *Journal of Business and Economic Statistics,* 2004-present
- Associate Editor, *Journal of Financial Econometrics,* 2001-present
- Guest Editor, *Journal of Financial Econometrics* special issue on high frequency data 2004
- Conference Organizer of the Analysis of High-Frequency Financial Data and Market Microstructure Conference, Taipei, Taiwan December 2003
- Conference Organizer of the NBER/NSF Time Series Conference, Chicago, September 1998 and September 2003.

HONORS AND AWARDS:

- Morgan Stanley Equity Microstructure Grant 2003-2004, 2007-2008
- Initiative on Global Financial Markets Grant 2007-2008
- Alfred P. Sloan Doctoral Dissertation Fellowship, 1995-1996
- University of California, San Diego, Econometric Analysis Fellowship, 1994-1995
- University of California, San Diego, Academic Excellence Award, 1993-1995

RELATED EXPERIENCE:

- Consultant for financial institutions.
- Research Economist, Regional Economic Research, January 1989-February 1992.

CONFERENCE PRESENTATIONS

- Financial Econometrics Conference May 2010, Toulouse School of Economics, “Forecasting Realized Volatility in the Presence of Time-Varying Noise”
- Conference on Financial Econometrics, June 2009, Denmark, “On the Econometrics of Realized Effective Spreads”
- Morgan Stanley Conference on Execution, 2008, “The Dynamic Price Impact of an Order”.
- Conference on Liquidity Risk, December 2008, London, UK. “Realized Volatility Forecasting in the Presence of Time-Varying Noise”
- Conference on High Frequency Data in Bond Markets, May 2007, Cambridge, UK. “Realized Volatility Forecasting and Option Pricing”
- Atlanta Federal Reserve Conference on Financial Econometrics April 2006, Atlanta, GA, “Measuring and Modeling Execution Cost and Risk”
- North American Econometric Society Meetings, January 2006, Boston, MA, “Full Information Transaction Costs”
- Financial Econometrics Conference, May 2005, Montreal Canada, Discussant for "Tracing the Source of Long Memory in Volatility" by Deo and Hurvich
- Morgan Stanley Equity Microstructure Conference, May 2005, Miami FL, “Full Information Transaction Costs”
- American Finance Association Annual Meetings, January 2005, Philadelphia PA, “Separating Microstructure Noise From Volatility”
- NYU Conference on Innovations in Financial Econometrics, October 2004, New York, NY, “Full Information Transaction Costs”
- NBER/NSF Time Series Conference, September 2004, Dallas TX, “Full-Information Transaction Costs”
- Conference on High-Frequency Data Analysis, Singapore, May 7-8, 2004 “Full-Information Transaction Costs”
- Analysis of High-Frequency Financial Data and Market Microstructure Conference, December 2003, Taipei, Taiwan “Realized Volatility, Microstructure Noise, and Optimal Sampling”
- Analysis of High-Frequency Financial Data and Market Microstructure Conference, December 2003, Taipei, Taiwan “Measuring and Explaining the Cross-Sectional Variation in Effective Spreads”
- Realized Volatility Conference, November 2003, Montreal. “Realized Volatility, Microstructure Noise, and Optimal Sampling”

- Joint Statistical Meetings, August 2003, San Francisco. "Using Temporal Aggregation to Distinguish Between True and Spurious Long Memory"
- Econometric Society Meetings January 2003. Discussant for "Stochastic Volatility Models with Transaction Time Risk" by Renault and Werker.
- Econometric Society Latin American Meetings (special invited paper), July 2002
- Joint Statistical Meetings (special invited paper), New York, August 2002 "Effects of Non-Normality and Dependence on Variance Estimates Using High Frequency Data"
- Econometric Society Meetings January 2002. Discussant for "Modeling and Forecasting Realized Volatility" by Andersen, Bollerslev, Diebold, and Labys.
- Academia Sinica December 2001, "The Econometrics of High Frequency Data"
- Princeton University Handbook of Financial Econometrics Conference November 2001 "The Econometrics of High Frequency Data"
- Conference on High Frequency Data in Finance Denmark August 2001"Information Determinants of Bid and Ask Quotes: Implications for market liquidity and volatility"
- Financial Econometrics Conference, University of Waterloo, March 2001, "Beyond Merton's Utopia: Effects of Non-Normality and Dependence on Variance Estimates Using High Frequency Data"
- 9th Conference on the Theories and Practices of Securities and Financial Markets, Kaohsiung, Taiwan, December 2000 "Beyond Merton's Utopia: Effects of Non-Normality and Dependence on Variance Estimates Using High Frequency Data"
- NBER Forecasting and Empirical Methods in Macro and Finance, Boston, July 2000.
"Beyond Merton's Utopia: Effects of Non-Normality and Dependence on Variance Estimates Using High Frequency Data"
- NBER Market Microstructure Meetings, Boston, December 1999
Discussant for "Trading Fast and Slow: Security Market Events in Real Time" by Joel Hasbrouck
- NBER/NSF Time Series Conference, Taiwan, August 1999.
"Beyond Merton's Utopia: Effects of Non-Normality and Dependence on Variance Estimates Using High Frequency Data"
- North American Econometric Society Winter Meetings, New York, January 1999.
"Econometric Analysis of Multivariate High Frequency Data"
- Symposium on Microstructure and High Frequency Data, Paris France, December 1998.
"Econometric Analysis of Irregularly-Spaced, Discrete-Valued, Financial Transaction Data Using a New Autoregressive Conditional Multinomial Model"
- Econometrics and Financial Time Series, Cambridge UK, October 1998. "Econometric Analysis of Irregularly-Spaced, Discrete-Valued, Financial Transaction Data Using a New Autoregressive Conditional Multinomial Model"
- NBER/NSF Time Series Conference, Chicago, September 1998.
"Econometric Analysis of Multivariate Transactions Data"
- High Frequency Data in Finance II, Zurich Switzerland, April 1998.
"Econometric Analysis of Irregularly-Spaced, Discrete-Valued, Financial Transaction Data Using a New Autoregressive Conditional Multinomial Model"
- Econometric Society North American Meetings, Chicago, January 1998.
Discussant for "Answering the Critics, ARCH Models Do Provide Good Volatility Forecasts", by Torbin Andersen and Tim Bollerslev
- Econometric Society North American Meetings, Chicago, January 1998.
Discussant for "Long-Term Dependence in Trading" by Eric Ghysels and Joanna.Jasiak.
- American Statistical Association, Chicago Chapter Invited Speaker, Chicago, September 1997
"Microscopic Views of Time Series"

- Time Series Analysis of High Frequency Financial Data, San Diego, April 1997.
  "Econometric Analysis of Discrete Valued, Irregularly Spaced Financial Transactions Data Using a New Autoregressive Conditional Multinomial"
- NSF Symposium on Duration Models, University of California, Berkeley, August 1995.
  "Autoregressive Conditional Duration with Various Applications to Financial Transactions Data"
- Western Finance Association Meetings, Aspen Co., June 1995.
  "Autoregressive Conditional Duration with Various Applications to Financial Transactions Data"
- High Frequency Data in Finance Conference (Olsen & Associates), Zurich, Switzerland, March 1995.
  "A New Class of Duration Models for High Frequency Transactions Data"
- Multivariate and Financial Econometrics Conference, University of California, San Diego, 1994.
  "Forecasting Transaction Rates: The Autoregressive Conditional Duration"
- NYSE, UCLA, USC Joint Conference on Liquidity, University of California, Los Angles, 1994.
  "Forecasting Transaction Rates: The Autoregressive Conditional Duration"