CURRICULUM VITAE March 2014

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Personal Information

Marital status: Married; three children.
Citizenship: Denmark; U.S. Permanent Resident.

Education

Ph. D. in Economics, **Yale University,** New Haven, 1992.
Master's Degree, Science, Economics and Mathematics (Cand Scient Oecon).
University of Aarhus, Denmark, 1985.

Academic Positions:

2000-present: *Nathan S. and Mary P. Sharp Distinguished Professor of Finance*, Department of Finance, Kellogg School of Management, Northwestern University.

2013-present: Fellow of the ***Society for Financial Econometrics, SoFiE***.

2008-present: Fellow of the ***Econometric Society***.

2008-present: Research Affiliate of ***The Volatility Institute,*** Stern School of Business, New York University.

2008-present: Faculty Fellow, ***Zell Center for Risk Research***; Kellogg School of Management.

2007-present: International Fellow, *Center for Research in Econometric Analysis of Economic Time Series (**CREATES**)*; Aarhus, Denmark.

2006-present: Director, ***International Business & Markets Program and Research Center***; Kellogg School of Management.

2000-present: Research Associate, *National Bureau of Economic Research (**NBER**)*; Cambridge, MA.

1997-2000: Associate Professor, Department of Finance, Kellogg School of Management, Northwestern University.

1991-1997: Assistant Professor, Department of Finance, Kellogg School of Management, Northwestern University.

Fields of Interest:

Return Volatility Modeling, Financial Econometrics; Asset Pricing, Time Series Econometrics, International Finance

Fellowships, Honors and Awards:

Rigmor and Carl Holst-Knudsen Science Prize 2013, University of Aarhus, Denmark.
Fellow of the *Econometric Society*, 2008-present
Fellow of the *Society for Financial Econometrics*, 2011-present
Certificate of Appreciation for Editorship, Journal of Business & Economic Statistics,
American Statistical Association, 2006.
National Science Foundation Research Grants, 1998-2005; 2006-2008
Morgan Stanley Market Microstructure Research Grant, 2003.
BSI Gamma Foundation Grant, 2002-2003, for "The Evolving Effects of
Macroeconomic News on Global Stock, Bond and Foreign Exchange Markets."
Best Paper Award, *Multinational Finance Journal,* 2000.
Institute for Quantitative Research in Finance (Q-Group) Fellowship, 1996;
Merrill-Lynch Research Fellowship, 1993; 1995;
Research Fellowship, Kellogg, Northwestern University, 1991-92, 1994
NATO Science Fellowship, 1990
Alfred P. Sloan Dissertation Fellowship, 1989

Editor-in-Chief: *Journal of Business & Economic Statistics* (January 2004 – December 2006)
Co-Editor: *Journal of Financial Econometrics* (2009 – present)

Editorial Boards:

Springer Series in Operations Research and Financial Engineering (Advisory Board; June 2006-)
Review of Financial Studies (July 2002 – July 2005)
Journal of Financial Econometrics (April 2001 – June 2009)
Econometric Theory (January 2002 – December 2003)
Journal of Finance (March 2000 – October 2003)
Journal of Empirical Finance (May 1998 - November 2001)
Journal of Business & Economic Statistics (March 1998 – December 2003)
Management Science (December 1997 - December 2000)

Program Committee:

Society for Financial Econometrics, Geneva, Switzerland, June 2009; Chicago, June 2011;
Oxford, U.K., June 2012; Singapore, June 2013.
Econometric Society Meeting, Montréal, Canada, 1998; New Orleans, 2008.
European Finance Association Meeting, Fontainebleau, France, 1998; Helsinki, Finland, 1999;
Copenhagen, Denmark, 2012; Cambridge, U.K., 2013.
Western Finance Association Meeting, Sun Valley, 2000; Tucson, 2001; Park City, 2002;
Cabo Real, Mexico, 2003; Vancouver, Canada, 2004;
American Finance Association Meeting, Washington, D.C., 2003.

Teaching:

International Finance, International Financial Decisions (MBA level)
Empirical Finance, Advanced Derivatives, High-Frequency Asset Pricing (Ph.D. level)

Consulting:

Federal Reserve Board of Governors and regional Federal Reserve Banks
European Central Banks
Chicago-based Financial Market Trading Companies
International Academic Institution
Hedge Funds (including *John Street Capital*, London, U.K.)

Articles and Books:

"A Robust Neighborhood Truncation Approach to Estimation of Integrated Quarticity," with Dobrislav Dobrev and Ernst Schaumburg; ***Econometric Theory*** 30, 3-59, 2014.

"VPIN and the Flash Crash," with Oleg Bondarenko; ***Journal of Financial Markets*** 17, 1-46, 2014.

"Reflecting on the VPIN Dispute," with Oleg Bondarenko; ***Journal of Financial Markets*** 17, 53-64, 2014.

"Financial Risk Measurement for Financial Risk Management," with Tim Bollerslev, Peter Christoffersen and Francis X. Diebold; G.Constantinides, M. Harris and R. Stulz (eds.): ***Handbook of the Economics of Finance***; Elsevier, North Holland; Chapter 17, pp. 1127-1220, 2013.

"Robust Volatility Estimation using Nearest-Neighbor Truncation," with Dobrislav Dobrev and Ernst Schaumburg; ***Journal of Econometrics*** 169, 75-93, 2012.

"Realized Volatility Forecasting and Market Microstructure Noise," with Tim Bollerslev and Nour Meddahi; ***Journal of Econometrics*** 160, 220-234, 2011.

"A Reduced Form Framework for Modeling Volatility of Speculative Prices Based on Realized Variation Measures," with Tim Bollerslev and Xin Huang; ***Journal of Econometrics***, 160, 176-189; 2011.

"Do Bonds Span Volatility Risk in the U.S. Treasury Market? A Specification Test for Affine Term Structure Models," with Luca Benzoni; ***Journal of Finance*** 65, 603-653, 2010.

"Continuous-Time Models, Realized Volatilities and Testable Distributional Implications for Daily Stock Returns," with Tim Bollerslev, Per Frederiksen and Morten Nielsen; ***Journal of Applied Econometrics***.25, 233-261, 2010.

"Parametric and Nonparametric Measurements of Volatility," with Tim Bollerslev and Francis X. Diebold; Y. Ait-Sahalia and L.P. Hansen (eds.): ***Handbook of Financial Econometrics****,* Volume 1 – Tools and Techniques; North Holland; pp. 67-137, 2010.

"Stochastic Volatility," with Luca Benzoni; in Bob Meyers (ed.): ***Complex Systems in Finance and Econometrics****,* Springer Verlag, pp 694-726, 2009.

Handbook of Financial Time Series, Co-Editor with Richard A. Davis, Jens-Peter Kreiss and Thomas Mikosch; Springer Verlag, 2009.

"Introduction," with R.A. Davis, J.-P. Kreiss and T. Mikosch; in T.G. Andersen, R.A. Davis, J.-P. Kreiss and T. Mikosch (eds.): ***Handbook of Financial Time Series****,* Springer Verlag, 2009, pp 1-13.

"Stochastic Volatility: Origins and Overview," with Neil Shephard; in T.G. Andersen, R.A. Davis, J.-P. Kreiss and T. Mikosch (eds.): ***Handbook of Financial Time Series****,* Springer Verlag, 2009, pp 233-254.

"Realized Volatility," with Luca Benzoni; in Torben G. Andersen, Richard Davis, Jens-Peter Kreiss and Thomas Mikosch (eds.): ***Handbook of Financial Time Series****,* Springer Verlag, 2009, pp 555-575.

"Stochastic Volatility," with Luca Benzoni; **forthcoming** in Bob Meyers (ed.) and Bruce Mizrach (section ed.): ***Encyclopedia of Complexity and Systems Science****,* Springer Verlag, 2009, Part 19, pp 8783-8815.

"Realized Volatility and Multipower Variation," with Viktor Todorov; **forthcoming** in Rama Cont (ed.) and Ole Barndorff-Nielsen and Eric Renault (section eds.): ***Encyclopedia of Quantitative Finance****,* Wiley.

"Construction and Interpretation of Model-Free Implied Volatility," with Oleg Bondarenko; in Israel Nelken (ed.): ***Volatility as an Asset Class****,* pp. 141-181; Risk Books, London, 2007.

“Volatility Modeling,” in Brian Everitt and Ed Melnick (eds.): ***Encyclopedia of Quantitative Risk Assessment***; Volume 4, Wiley; September 2008.

“Realized Volatility,” in Steven Durlauf and Lawrence Blume (eds.): ***New Palgrave, 2nd Edition,*** New Palgrave-MacMillan; June 2008.

“Real-Time Price Discovery in Global Stock, Bond and Foreign Exchange Markets,” with Tim Bollerslev, Francis X. Diebold and Clara Vega. ***Journal of International Economics*** 73, 251-277, 2007.

”Roughing It Up: Including Jump Components in Measuring, Modeling, and Forecasting of Asset Return Volatility,” with Tim Bollerslev, Francis X. Diebold; ***Review of Economics and Statistics*** 89, 701-720; 2007.

“No-Arbitrage Semi-Martingale Restrictions for Continuous-Time Volatility Models subject to Leverage Effects, Jumps and i.i.d. Noise: Theory and Testable Distributional Assumptions,” with Tim Bollerslev and Dobrislav Dobrev; ***Journal of Econometrics***; 138; 125-180, 2007.

“Comment on “Realized Variance and Market Microstructure Noise,” by Peter R. Hansen and Asger Lunde,” with Tim Bollerslev, Per H. Frederiksen and Morten Ø. Nielsen; ***Journal of Business and Economic Statistics*** 24; 173-179, 2006.

“Volatility and Correlation Forecasting,” with Tim Bollerslev, Peter Christoffersen and Francis X. Diebold; Graham Elliott, Clive W. J. Granger and Allan Timmermann (eds.): ***Handbook of Economic Forecasting,*** Chapter 15, pp. 777-878; North Holland, 2006.

“Practical Volatility and Correlation Modeling for Financial Market Risk Management,” with Tim Bollerslev, Peter Christoffersen and Francis X. Diebold; in M. Carey and R.M. Stulz (eds.): ***The Risks of Financial Institutions,*** pp. 512-548 (with discussion), *NBER*, University of Chicago Press, 2006.

“A Framework for Exploring the Macroeconomic Determinants of Systematic Risk,” with Tim Bollerslev, Francis X. Diebold, and Jin (Ginger) Wu, ***American Economic Review*** 95, 398-404, 2005.

"Realized Beta: Persistence and Predictability," with Tim Bollerslev, Francis X. Diebold and Jin Wu; in Thomas Fomby (ed.): ***Advances in Econometrics: Econometric Analysis of Economic and Financial Time Series***, Volume B, pp. 1-40, 2005.

”Correcting the Errors: On Volatility Forecast Evaluation Using High-Frequency Data and Realized Volatilities,” with Tim Bollerslev and Nour Meddahi; ***Econometrica*** 73, 279-296, 2005.

“Analytical Evaluation of Volatility Forecasts,” with Tim Bollerslev and Nour Meddahi; ***International Economic Review*** 45, 1079-1110, 2004.

“Modeling and Forecasting Realized Volatility,” with Tim Bollerslev, Francis X. Diebold and Paul Labys; ***Econometrica** 71,* 579-625, 2003.

“Micro Effects of Macro Announcements: Real-Time Price Discovery in Foreign Exchange,” with Tim Bollerslev, Francis X. Diebold and Clara Vega; ***American Economic Review** 93,* 38-62, 2003.

"An Empirical Investigation of Continuous-Time Models for Equity Returns," with Luca Benzoni and Jesper Lund; ***Journal of Finance*** 57, 1239-1284, 2002.

"The Distribution of Realized Stock Return Volatility," with T. Bollerslev, F.X. Diebold and H. Ebens; ***Journal of Financial Economics*** 61, 43-76, 2001.

"Variance-Ratio Statistics and High-Frequency Data," with Tim Bollerslev and Ashish Das; ***Journal of Finance*** 56, 305-327, 2001.

"The Distribution of Realized Exchange Rate Volatility," with T. Bollerslev, F.X. Diebold and P. Labys; ***Journal of American Statistical Association*** 96, 42-55, 2001. Reprinted 2005 in *Stochastic Volatility: Selected Readings,* Ch. 15, 451-479; editor, Neil Shephard; Advanced Texts in Economics, Series Editors: M. Arellano, G. Imbens, G.E. Mizon, A. Pagan and M. Watson; Oxford University Press, Oxford, U.K.

"Exchange Rate Returns Standardized by Realized Volatility are (Nearly) Gaussian," with T. Bollerslev, F.X. Diebold and P. Labys; ***Multinational Finance Journal*** 4, 159-179, 2000.

"Great Realisations," with T. Bollerslev, F.X. Diebold and P. Labys; ***Risk Magazine*** 18, 105-108, March 2000.

"Intraday and Interday Volatility in the Japanese Stock Market," with Tim Bollerslev and Jun Cai; ***Journal of International Financial Markets, Institutions & Money*** 10, 107-130, 2000.

"Some Reflections on Analysis of High Frequency Data," ***Journal of Business & Economic Statistics*** 18, 146-153, 2000.

"Forecasting Financial Market Volatility: Sampling Frequency vis-a-vis Forecast Horizon", with Tim Bollerslev and Steve Lange; ***Journal of Empirical Finance*** 6, 457-477, 1999.

"Efficient Method of Moments Estimation of a Stochastic Volatility Model: A Monte Carlo Study," with Hyung-Jin Chung and Bent E. Sørensen; ***Journal of Econometrics*** 91, 61-87, 1999.

"Answering the Skeptics: Yes, Standard Volatility Models Do Provide Accurate Forecasts," with Tim Bollerslev; ***International Economic Review*** 39, 885-905, 1998. Reprinted 2002 in *Forecasting Financial Markets,* ed: T.C. Mills; International Library of Critical Writings in Economics, Series Editor: Mark Blaug; Edward Elgar Ltd, Cheltenham Glos, U.K.

"Towards a Unified Framework for High and Low Frequency Return Volatility Modeling," with Tim Bollerslev; ***Statistica Neerlandica*** 52, 273-302, 1998.

"Deutsche Mark-Dollar Volatility: Intraday Activity Patterns, Macroeconomic Announcements, and Longer Run Dependencies," with Tim Bollerslev; ***Journal of Finance*** 53, 219-265, 1998. Reprinted 2005 in *Foreign Exchange Markets,* Ch. 6, 133-179; Ed: R.J. Sweeney; International Library of Critical Writings in Financial Economics, Series Editor: R. Roll; Edward Elgar Ltd, Cheltenham Glos, U.K.

"ARCH and GARCH Models," with Tim Bollerslev; *Encyclopedia of Statistical Sciences, Update Volume 2*, Eds.: S. Kotz, C.B. Read, and D.L. Banks; New York: Wiley & Sons, pp. 6-16, 1998.

"Heterogeneous Information Arrivals and Return Volatility Dynamics: Uncovering the Long-Run in High Frequency Returns," with Tim Bollerslev; ***Journal of Finance*** 52, 975-1005, 1997.

"Estimating Continuous Time Stochastic Volatility Models of the Short Term Interest Rate," with Jesper Lund; ***Journal of Econometrics*** 77, 343-377, 1997.

"GMM and QML Asymptotic Standard Deviations in Stochastic Volatility Models: Comments on Ruiz (1994)," with Bent Sørensen; ***Journal of Econometrics*** 76, 397-403, 1997.

"Intraday Periodicity and Volatility Persistence in Financial Markets," with Tim Bollerslev; ***Journal of Empirical Finance*** 4, 115-158, 1997. Reprinted 2005 in *Foreign Exchange Markets,* Chapter 5, 89-132; edited by Richard J. Sweeney; International Library of Critical Writings in Financial Economics, Series Editor: Richard Roll; Edward Elgar Publishing Ltd, Cheltenham Glos, United Kingdom.

"GMM Estimation of a Stochastic Volatility Model: A Monte Carlo Study," with Bent Sørensen; ***Journal of Business & Economic Statistics*** 14, 328-352, 1996.

"Return Volatility and Trading Volume: An Information Flow Interpretation of Stochastic Volatility," ***Journal of Finance*** 51, 169-204, 1996.

"Stochastic Autoregressive Volatility: A Framework for Volatility Modeling," ***Mathematical Finance*** 4, 75-102, 1994. Reprinted 2005 in *Stochastic Volatility: Selected Readings,* Chapter 7, 177-208; edited by Neil Shephard; Advanced Texts in Economics, Series Editors: Manuel Arellano, Guido Imbens, Grayham E. Mizon, Adrian Pagan and Mark Watson; Oxford University Press, Oxford, United Kingdom.

Summaries, Book Reviews and Comments:

"Realized Volatility, Asset Pricing, and Risk Management," with T. Bollerslev; ***NBER Reporter,*** pp. 7-10; Fall 2006.

"Comment" (P.R. Hansen &A. Lunde: *Realized Variance and Market Microstructure Noise*), with T. Bollerslev, P.H. Frederiksen & M.Ø. Nielsen; ***Journal of Business & Economic Statistics*** 24, 173-179, 2006.

"Discussion" (of Ole E. Barndorff-Nielsen and Neil Shephard: "Power and Bipower Variation with Stochastic Volatility and Jumps"), ***Journal of Financial Econometrics*** 2, 37-48, 2004.

"Comments on Benjamin H. Cohen and Eli M. Remolona: Information flows during the Asian crisis: Evidence from closed-end funds," ***BIS Papers*** 2 (*Market Liquidity: Proceedings from BIS Workshop)*, 73-75, 2001.

"Book Review: Simulation-Based Econometric Methods," (Gouriéroux, C. and A. Monfort, Oxford University Press); ***Econometric Theory*** 16, 131-138, 2000.

"Book Review: The Econometrics of Financial Markets," (Campbell, J.Y., A.W. Lo and A.C. MacKinlay, Princeton University Press); ***Econometric Theory*** 14, 671-685, 1998.

"Comment," (Jacquier, E., N.G. Polson & P.E. Rossi: Bayesian Analysis of Stochastic Volatility Models), ***Journal of Business and Economic Statistics*** 12, 389-392, 1994.

"Comments on Li, H., I. Mathur, T.V. Schwarz & A.C. Szakmary: Dynamic Efficiency in the Treasury Bill and Eurodollar Futures Market and Implications for the TED Spread," ***Review of Futures Markets*** 13, 301-305, 1994.

Working Papers and Book Projects:

"The Risk Premia Embedded in Option Panels," with Nicola Fusari and Viktor Todorov; Kellogg School of Management; Northwestern University; under revision for second round submission, *Journal of Finance.*

"Parametric Inference and Dynamic State Recovery from Option Panels," with Nicola Fusari and Viktor Todorov; Under Second Round Review, *Econometrica.*

"The Fine Structure of Equity-Index Option Dynamics," with Oleg Bondarenko, Viktor Todorov and George Tauchen; Kellogg School of Management; Northwestern University; under review at *Journal of Econometrics.*

"Uncovering Novel Features of Equity-Index Return Dynamics via Corridor Implied Volatility," with Oleg Bondarenko and Maria Gonzalez-Perez; Revise-and-Resubmit; *Review of Financial Studies*;

"Assessing Measures of Toxic Order Flow and Early Warning Signals for Market Turbulence," with Oleg Bondarenko; under second round review; *Review of Finance*.

"A Corridor Fix for High-Frequency VIX: Developing Coherent Implied Volatility Measures," with Oleg Bondarenko and Maria Gonzalez-Perez; Working Paper under Revision.

"Dissection the Pricing of Equity-Index Volatility," with Oleg Bondarenko; Working Paper under Revision, Kellogg School, Northwestern University.

"Duration-Based Volatility Estimation," with Dobrislav Dobrev and Ernst Schaumburg; Working Paper, Department of Finance, Kellogg School, Northwestern University.

Financial Market Volatility: From ARCH and GARCH to Stochastic and Realized Volatility and Correlation, with Tim Bollerslev; Book in Progress, Zeuthen Lecture Series, MIT Press, Cambridge, MA.

Volatility and Correlation – Practical Methods for Financial Applications, with Tim Bollerslev, Peter Christoffersen and Francis X. Diebold; Book in Progress, Princeton University Press, Princeton, New Jersey.

"On the Informational Efficiency of Option-Implied and Time Series Forecasts of Realized Volatility," with Rasmus T. Varneskov; Working Paper, Kellogg School, Northwestern University.

Ad hoc Refereeing:

American Economic Review
Applied Mathematical Finance
Applied Stochastic Models in Business and Industry
Bulletin of Economic Research
Cambridge University Press
Computational Statistics and Data Analysis
Econometric Reviews
Econometric Theory
Econometrica
Economic Modelling
Economics Letters
Empirical Economics
Energy – The International Journal
European Economic Review
European Finance Review
Finance Research Letters
Financial Review
Hong Kong, University Grants Committee
International Economic Review
Journal of the American Statistical Association
Journal of Applied Econometrics
Journal of Applied Economics
Journal of Banking and Finance
Journal of Business
Journal of Business & Economic Statistics
Journal of Econometrics
Journal of Economic Dynamics and Control
Journal of Economic Geography
Journal of Empirical Finance
Journal of Finance
Journal of Financial and Quantitative Analysis
Journal of Financial Economics
Journal of Financial Engineering
Journal of Financial Markets
Journal of International Economics

Journal of International Money and Finance
Journal of Monetary Economics
Journal of Money, Credit and Banking
Journal of Political Economy
Journal of Risk
Journal of the Royal Statistical Society
Macroeconomic Dynamics
Management Science
Mathematical Finance
National Science Foundation, Grant Proposals
National Tax Journal
Oxford Bulletin of Economics and Statistics
Pacific Basin Finance Journal
Pakistan Journal of Statistics
Princeton University Press
Prentice-Hall
Quantitative Finance
Quarterly Review of Economics and Finance
Review of Economic Studies
Review of Economics and Statistics
Review of Finance
Review of Financial Studies
Review of Futures Markets
Review of International Economics
Royal Society of New Zealand, Marsden Fund
Southern Economic Journal