

Francis X. Diebold

## University of Pennsylvania

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Last updated December 22, 2020

### Education

Ph.D., Economics, University of Pennsylvania, School of Arts and Sciences, 1986  
B.S. Economics, University of Pennsylvania, Wharton School, 1981

### Current Appointments (University of Pennsylvania)

Paul F. Miller, Jr. and E. Warren Shafer Miller Professor of Social Sciences  
School of Arts and Sciences, 2008-present  
Professor of Economics, School of Arts and Sciences, 2008-present  
Professor of Finance, Wharton School, 2000-present  
Professor of Statistics, Wharton School, 1996-present

### Current Research Institute Appointments

National Bureau of Economic Research, Cambridge, Mass., Research Associate, 1999-present  
(Economic Fluctuations and Growth; Asset Pricing; International Finance and Macro)  
Penn Institute for Economic Research, University of Pennsylvania, Fellow, 2000-present  
Federal Reserve Bank of Philadelphia, Real-Time Data Research Center, Fellow and Board Member,  
2008-present  
Warren Center for Network and Data Sciences, University of Pennsylvania, Inaugural Affiliate, 2013-  
present  
Center for Financial Studies, Frankfurt, Fellow, 2003-present

### Past Appointments

#### University of Pennsylvania

Co-Director, Wharton Financial Institutions Center, 2007-2013  
Professor of Economics, 1996-2008 (various chairs, 1999-2008)  
Associate Professor of Economics (with tenure), 1992-1996  
Assistant Professor of Economics, 1989-1992

**Elsewhere**

Executive Director, Morgan Stanley Investment Management, 2007-2008  
(on leave from University of Pennsylvania)

Economist, Board of Governors of the Federal Reserve System, Washington, DC, 1986-1989

**Visiting Appointments**

New York University, Stern School of Business, Department of Finance, 1998-2000

Cambridge University, Trinity College and Faculty of Economics and Politics, Summer 1998

Princeton University, Department of Economics, Fall 1997

Johns Hopkins University, Department of Economics, Fall 1995

University of Chicago, Graduate School of Business, Department of Finance, Summer 1993

London School of Economics, Financial Markets Group, Spring 1992

**Honors**

Richard Stone Prize in Applied Econometrics, 2020

Federal Reserve Bank of Dallas conference, "The Econometrics of Macroeconomic and Financial Data", 2021. (Associated festschrift to appear as a special issue of *Journal of Econometrics*.)

Fellow, *Econometric Reviews*, since 2018

Founding Fellow, International Association for Applied Econometrics, since 2015

Charter Fellow, Society for Economic Measurement, since 2014

Fellow, *Journal of Econometrics*, since 2014

President, Society for Financial Econometrics, 2011-2013

Inaugural Fellow, Society for Financial Econometrics, since 2012

Honorary Fellow, International Institute of Forecasters, since 2012

Fellow, American Statistical Association, since 2004

Alexander von Humboldt Award, Germany, 2004

Fellow, John Simon Guggenheim Foundation, 2003-2004

"Comparing Predictive Accuracy," (*Journal of Business and Economic Statistics*, 13, 253-265, 1995, with R.S. Mariano) reprinted in E. Ghysels and A. Hall, eds., Special Twentieth Anniversary Commemorative Issue of *Journal of Business and Economic Statistics*, 20, 134-144, 2002, containing the ten most influential papers published in the journal's first twenty years.

"Club Six" Teaching Distinction, New York University, 1999

Fellow, Econometric Society, since 1998

Kravis Award for Outstanding Teaching, University of Pennsylvania, 1994, 1998

Fellow, Alfred P. Sloan Foundation, 1992-1993

## Major Lectures

IAAE Annual Lecture, International Association for Applied Econometrics meeting, Rotterdam, 2021  
Granger Lecture, University of Nottingham, 2019  
*Journal of Business and Economic Statistics* Annual Lecture, Philadelphia ASSA Meetings, 2014  
Presidential Address, Society for Financial Econometrics, Singapore Management University, 2013  
*Journal of Applied Econometrics* Annual Lecture, Toulouse School of Economics, 2012  
Distinguished Scholar Lecture, CREATES, University of Aarhus, Denmark, 2012  
Tinbergen Lectures, Erasmus University Rotterdam, 2010  
(Published as *Yield Curve Modeling and Forecasting*, Princeton University Press, 2013)  
W.A. Mackintosh Lecture, Queen's University, Kingston, Ontario, 2010  
CASE Lecture, Humboldt University, Berlin, 2010  
Hermann Otto Hirschfeld Lectures, Humboldt University, Berlin, 2005  
Lawrence R. Klein Lecture, Project LINK Annual Meeting, Mexico City, 2005  
Marshak Lecture, Econometric Society, Melbourne, 2004  
Purvis Lecture, Canadian Economic Association, Montreal, 2001  
Plenary Lecture, European Meeting of the Econometric Society, Santiago de Compostela, Spain, 1999

## Books

*Financial and Macroeconomic Connectedness: A Network Approach to Measurement and Monitoring*, Oxford University Press, 2015. With K. Yilmaz.

*Yield Curve Modeling and Forecasting: The Dynamic Nelson-Siegel Approach*. Princeton University Press (*The Tinbergen Lectures*), 2013. With G. Rudebusch.

*Business Cycles: Durations, Dynamics and Forecasting*. Princeton University Press, 1999. With G. Rudebusch. (Chapter 1 reprinted as "Five Questions About Business Cycles," *Economic Review*, Federal Reserve Bank of San Francisco, 1-15, 2001.)

*Elements of Forecasting*. Cincinnati: South-Western, 1998. Second edition, 2001. Third edition, 2004. Fourth edition, 2007. (Also Spanish, Indian, and Chinese editions.)

*Empirical Modeling of Exchange Rate Dynamics*. Springer-Verlag, 1988.

## Edited Volumes

*Financial Risk Measurement and Management (International Library of Critical Writings in Economics, Volume 267)*, Edward Elgar Publishing Ltd., 2012.

*The Known, the Unknown and the Unknowable in Financial Risk Management*. Princeton University Press, 2010, with N. Doherty and R. Herring. (Winner of Kulp-Wright Award, American Risk and Insurance Association.)

*Risk Management for Central Bank Foreign Reserves*. Frankfurt: European Central Bank, 2004, with C. Bernadell, P. Cardon, J. Coche and S. Manganelli.

## Edited Journal Issues

*Predictive Modeling, Volatility, and Risk Management in Financial Markets: In Memory of Peter F. Christoffersen*, special journal issue in two parts. Part I, *Journal of Financial Econometrics*, 18, 471-652, 2020. Part II, *Journal of Financial Econometrics*, 2021, in press. With R. Garcia and K. Jacobs.

*Big Data in Dynamic Predictive Econometric Modeling*, special issue of *Journal of Econometrics*, 212, 1-358, 2019. With E. Ghysels, P. Mykland and L. Zhang.

*The Econometrics of Macroeconomics, Finance and the Interface*, special issue of *Journal of Econometrics*, 131, 1-612, 2006. With R. Engle, C. Favero, G. Gallo and F. Schorfheide.

*New Directions in Financial Risk Management*, special issue of *Journal of Financial Econometrics*, 3, 1-168, 2005. With R. Garcia, S. Mittnik and E. Renault.

*Regulatory Capital and Operational Risk Management*, special issue of *Journal of Risk Finance*, 4, 2002, 25-56. With J. Drzik, R. Herring and A. Kuritzkes.

*Symposium on Forecasting Performance*, special issue of *IMF Staff Papers*, 49, 1-64, 2002.

*Forecasting and Empirical Methods in Finance and Macroeconomics*, special issue of *Journal of Econometrics*, 105, 2001, 1-308. With K. West.

*Forecasting and Empirical Methods in Macroeconomics and Finance*, special issue of *Review of Economics and Statistics*, 81, 1999, 553-673. With J. Stock and K. West.

*Forecasting and Empirical Methods in Macroeconomics and Finance*, special issue of *International Economic Review*, 39, 1998, 811-1144. With K. West.

*Econometric Forecasting*, special issue of *Journal of Applied Econometrics*, 11, 453-594, 1996. With M. Watson.

## Articles

"'Big Data' and its Origins," *Significance*, 18, 2021, in press. arXiv:2008.05835.

"Real-Time Real Economic Activity Entering the Pandemic Recession," *Covid Economics*, 62, 1-19, 2020.

"Probability Assessments of an Ice-Free Arctic: Comparing Statistical and Climate Model Projections," *Journal of Econometrics*, 2021, in press. With G. Rudebusch.

"Optimal Combination of Arctic Sea Ice Extent Measures: A Dynamic Factor Modeling Approach," *International Journal of Forecasting*, in press, 2021. With P. Goulet Coulombe, M. Goebel, G. Rudebusch, and B. Zhang.

Introduction to *Predictive Modeling, Volatility, and Risk Management in Financial Markets: In Memory of Peter F. Christoffersen*, special journal issue in two parts. Part I, *Journal of Financial Econometrics*, 18, 471-652, 2020. Part II, *Journal of Financial Econometrics*, 19, 2021, in press. With R. Garcia and K. Jacobs.

"Machine Learning for Regularized Survey Forecast Combination: Partially-Egalitarian Lasso and its Derivatives," *International Journal of Forecasting*, 35, 1679-1691, 2019. With M. Shin.

Introduction to *Big Data in Dynamic Predictive Econometric Modeling*, special issue of *Journal of Econometrics*, 212, 1-3, 2019. With E. Ghysels, P. Mykland and L. Zhang.

"On the Comparison of Interval Forecasts," *Journal of Time Series Analysis*, 39, 953-965, 2018. With R. Askanasi, F. Schorfheide and M. Shin.

"Commodity Connectedness," in E. Mendoza, D. Saravia and E. Pasten (eds.), *Monetary Policy and Global Spillovers: Mechanisms, Effects and Policy Measures*. Santiago: Bank of Chile Central Banking Series, Volume 25, 97-136, 2018. With L. Liu and K. Yilmaz.

"Estimating Global Bank Network Connectedness," *Journal of Applied Econometrics*, 33, 1-15, 2018. With M. Demirer, L. Liu, and K. Yilmaz. (Winner of 2020 Richard Stone Prize in Applied Econometrics for best paper in a two-year interval.)

"Real-Time Forecast Evaluation of DSGE Models with Stochastic Volatility," *Journal of Econometrics*, 201, 322-332, 2017. With F. Schorfheide and M. Shin.

"Assessing Point Forecast Accuracy by Stochastic Error Distance," *Econometric Reviews* (Special Issue in Honor of E. Maasoumi; P.C.B. Phillips and A. Ullah, eds.), 36, 588-598, 2017. With M. Shin.

"Consistent Scoring Functions, Choquet Representations, and Forecast Rankings: Comment on Ehm, Gneiting, Jordan and Krüger," *Journal of the Royal Statistical Society, Series B*, 2016, 544.

"Improving GDP Measurement: A Measurement-Error Perspective," *Journal of Econometrics*, 191, 384-397, 2016. With S.B. Aruoba, J. Nalewaik, F. Schorfheide and D. Song.

"Trans-Atlantic Equity Volatility Connectedness: U.S. and European Financial Institutions, 2004-2014," *Journal of Financial Econometrics*, 14, 81-127, 2016. With K. Yilmaz.

"Measuring the Dynamics of Global Business Cycle Connectedness," in S.J. Koopman and N. Shephard (eds.), *Unobserved Components and Time Series Econometrics: Essays in Honor of Andrew C. Harvey*, Oxford University Press, 2015, 45-89. With K. Yilmaz.

"Assessing Point Forecast Accuracy by Stochastic Loss Distance," *Economics Letters*, 130, 37-38, 2015. With M. Shin.

Diebold, F.X. (2015), "Comparing Predictive Accuracy, Twenty Years Later: A Personal Perspective on the Use and Abuse of Diebold-Mariano Tests" (with discussion), *Journal of Business and Economic Statistics*, 33, 1-24.

"On the Network Topology of Variance Decompositions: Measuring the Connectedness of Financial Firms," *Journal of Econometrics*, 182, 119-134, 2014. With K. Yilmaz. (Dennis J. Aigner Award for Applied Econometrics, Honorable Mention, 2016.)

"Financial Risk Measurement for Financial Risk Management," in G. Constantinedes, M. Harris and R. Stulz (eds.), *Handbook of the Economics of Finance*, Volume 2, Part B, Elsevier, 1127-1220, 2013. With T. Andersen, T. Bollerslev and P. Christoffersen.

"On the Correlation Structure of Microstructure Noise: A Financial Economic Approach," *Review of Economic Studies*, 80, 1304-1337, 2013. With G. Strasser.

"A Markov-Switching Multi-Fractal Inter-Trade Duration Model, with Application to U.S. Equities," *Journal of Econometrics*, 177, 2013, 320-342. With F. Chen and F. Schorfheide.

"Improving GDP Measurement: A Forecast Combination Perspective," in X. Chen and N. Swanson (eds.), *Recent Advances and Future Directions in Causality, Prediction and Specification Analysis: Essays in Honor of Halbert L. White Jr.*, Springer, 1- 26, 2012. With B. Aruoba, J. Nalewaik, F. Schorfheide and D. Song.

"Better to Give than to Receive: Predictive Directional Measurement of Volatility Spillovers" (with discussion), *International Journal of Forecasting*, 28, 57-66, 2012. With K. Yilmaz. (Awarded best paper in a two-year interval, 2015.)

"The Affine Arbitrage-Free Class of Nelson-Siegel Term Structure Models," *Journal of Econometrics*, 164, 4-20, 2011. With J. Christensen and G. Rudebusch.

"Globalization, the Business Cycle and Macroeconomic Monitoring" (with discussion), in R. Clarida and F. Giavazzi (eds.), *NBER International Seminar on Macroeconomics*. Chicago: University of Chicago Press, 2011, 245-302. With B. Aruoba, A. Kose and M. Terrones.

"Equity Market Spillovers in the Americas," in R. Alfaro (ed.) *Financial Stability, Monetary Policy, and Central Banking*. Santiago: Bank of Chile Central Banking Series, Volume 15, 199-214, 2011. With K. Yilmaz. (Spanish translation published as: "Efectos Errame en Los Mercados de Valores del Continente Americano," *Revista Economía Chilena*, 12, 55-65, 2009.)

"Real-Time Macroeconomic Monitoring: Real Activity, Inflation and Interactions," *American Economic Review*, 100, 20-24, 2010. With B. Aruoba.

"Parametric and Nonparametric Volatility Measurement," in L.P. Hansen and Y. Ait-Sahalia (eds.), *Handbook of Financial Econometrics*. Amsterdam: North-Holland, 2010, 67-138. With T.G. Andersen and T. Bollerslev.

"Macroeconomic Volatility and Stock Market Volatility, Worldwide," in T. Bollerslev, J. Russell and M. Watson (eds.), *Volatility and Time Series Econometrics: Essays in Honor of Robert F. Engle*. Oxford University Press, 2010, 97-116. With K. Yilmaz.

"An Arbitrage-Free Generalized Nelson-Siegel Term Structure Model," *Econometrics Journal*, 12, 33-64, 2009. With J. Christensen and G.D. Rudebusch.

"Real-Time Measurement of Business Conditions," *Journal of Business and Economic Statistics*, 27, 417-427, 2009. With S.B. Aruoba and C. Scotti.

"Measuring Financial Asset Return and Volatility Spillovers, With Application to Global Equity Markets," *Economic Journal*, 119, 158-171, 2009. With K. Yilmaz.

"Stock Returns and Expected Business Conditions: Half a Century of Direct Evidence," *Journal of Business and Economic Statistics*, 27, 266-278, 2009. With S. Campbell.

"Global Yield Curve Dynamics and Interactions: A Generalized Nelson-Siegel Approach," *Journal of Econometrics*, 146, 351-363, 2008. With C. Li and V. Yue.

"Roughing It Up: Including Jump Components in the Measurement, Modeling and Forecasting of Return Volatility," *Review of Economics and Statistics*, 89, 701-720, 2007. With T. Andersen and T. Bollerslev.

(Reprinted T.G. Andersen and T. Bollerslev, eds., *Volatility*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2018.)

"Real-Time Price Discovery in Stock, Bond and Foreign Exchange Markets," *Journal of International Economics*, 73, 251-277, 2007. With T. Andersen, T. Bollerslev and C. Vega.

"Financial Asset Returns, Direction-of-Change Forecasting and Volatility Dynamics," *Management Science*, 52, 1273-1287, 2006. With P. Christoffersen.

"The Macroeconomy and the Yield Curve: A Dynamic Latent Factor Approach," *Journal of Econometrics*, 131, 309-338, 2006. With G. Rudebusch and B. Aruoba.

"Realized Beta: Persistence and Predictability," in T. Fomby and D. Terrell (eds.) *Advances in Econometrics: Econometric Analysis of Economic and Financial Time Series*, Volume B, 2006, 1-40. With T. Andersen, T. Bollerslev and G. Wu.

"Volatility and Correlation Forecasting," in G. Elliott, C.W.J. Granger and Allan Timmermann (eds.), *Handbook of Economic Forecasting*. Amsterdam: North-Holland, 2006, 778-878. With T. Andersen, T. Bollerslev and P. Christoffersen.

"Forecasting the Term Structure of Government Bond Yields," *Journal of Econometrics*, 130, 337-364, 2006. With C. Li.

"Practical Volatility and Correlation Modeling for Financial Market Risk Management," in M. Carey and R. Stulz (eds.), *Risks of Financial Institutions*, University of Chicago Press for NBER, 2006, 513-548. With T. Andersen, T. Bollerslev and P. Christoffersen.

"A No-Arbitrage Approach to Range-Based Estimation of Return Covariances and Correlations," *Journal of Business*, 79, 61-74, 2006. With M. Brandt.

"Weather Forecasting for Weather Derivatives," *Journal of the American Statistical Association*, 100, 6-16, 2005 (lead article for the year). With S. Campbell.

"A Framework for Exploring the Macroeconomic Determinants of Systematic Risk," *American Economic Review*, 95, 398-404, 2005. With T. Andersen, T. Bollerslev and J. Wu.

"Modeling Bond Yields in Finance and Macroeconomics," *American Economic Review*, 95, 415-420, 2005. With M. Piazzesi and G. Rudebusch.

"The Nobel Memorial Prize for Robert F. Engle," *Scandinavian Journal of Economics*, 106, 165-185, 2004.

"Modeling and Forecasting Realized Volatility," *Econometrica*, 71, 579-626, 2003. With T. Andersen, T. Bollerslev and P. Labys.

(Reprinted T.G. Andersen and T. Bollerslev, eds., *Volatility*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2018.)

"Micro Effects of Macro Announcements: Real-Time Price Discovery in Foreign Exchange," *American Economic Review*, 93, 38-62, 2003. With T.G. Andersen, T. Bollerslev and C. Vega.

(Reprinted T.G. Andersen and T. Bollerslev, eds., *Volatility*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2018.)

"The ET Interview: Professor Robert F. Engle," *Econometric Theory*, 19, 1159-1193, 2003.

"'Big Data' Dynamic Factor Models for Macroeconomic Measurement and Forecasting," in M. Dewatripont, L.P. Hansen and S. Turnovsky (eds.), *Advances in Economics and Econometrics: Theory and Applications, Eighth World Congress of the Econometric Society*. Cambridge University Press, 2003, 115-122.

"Range-Based Estimation of Stochastic Volatility Models," *Journal of Finance*, 57, 1047-1092, 2002 (lead article). With S. Alizadeh and M.W. Brandt.

"Ratings Migration and the Business Cycle, with Application to Credit Portfolio Stress Testing," *Journal of Banking and Finance*, 26, 445-474, 2002. With A. Bangia, A. Kronimus, C. Schagen and T. Schuermann.

(Reprinted in expanded form in S. Figlewski and R.M. Levich, eds., as "Modeling Liquidity Risk, With Implications for Traditional Market Risk Measurement and Management," *Risk Management: The State of the Art*, Kluwer Academic Publishers, 2002.)

"Measuring Predictability: Theory and Macroeconomic Applications," *Journal of Applied Econometrics*, 16, 657-669, 2001. With L. Kilian.

"Long Memory and Regime Switching," *Journal of Econometrics*, 105, 131-159, 2001. With A. Inoue.

"The Distribution of Realized Stock Return Volatility," *Journal of Financial Economics*, 61, 43-76, 2001. With T. Andersen, T. Bollerslev and H. Ebers.

"The Distribution of Realized Exchange Rate Volatility," *Journal of the American Statistical Association*, 96, 42-55, 2001. With T. Andersen, T. Bollerslev and P. Labys.

(Reprinted T.G. Andersen and T. Bollerslev, eds., *Volatility*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2018.)

(Reprinted in N. Shephard, ed., *Stochastic Volatility: Selected Readings*, Oxford University Press, 2005.)

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

"Unit Root Tests are Useful for Selecting Forecasting Models," *Journal of Business and Economic Statistics*, 18, 265-273, 2000. With L. Kilian.

"Great Realizations," *Risk*, 13, 105-108, March 2000. With T. Andersen, T. Bollerslev and P. Labys. (Abridged version of "Understanding, Optimizing, Using and Forecasting Realized Volatility and Correlation," Working Paper FIN-99-061, Department of Finance, Stern School of Business, New York University.)

(Reprinted in J. Danielsson, ed., *The Value-at-Risk Reference*, Risk Publications, 2008.)

"How Relevant is Volatility Forecasting for Financial Risk Management?," *Review of Economics and Statistics*, 82, 12-23, 2000. With P. Christoffersen.

"Exact Maximum Likelihood Estimation of Observation-Driven Econometric Models," in R.S. Mariano, M. Weeks and T. Schuermann (eds.), *Simulation-Based Inference in Econometrics: Methods and Applications*, 2000, 205-217. Cambridge University Press. With T. Schuermann.

"Multivariate Density Forecast Evaluation and Calibration in Financial Risk Management: High-Frequency Returns on Foreign Exchange," *Review of Economics and Statistics*, 81, 661-673, 1999. With J. Hahn and A. Tay.

(Reprinted in T.C. Mills, ed., *Forecasting Financial Markets*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2002.)

"Evaluating Density Forecasts of Inflation: The Survey of Professional Forecasters," in R. Engle and H. White (eds.), *Cointegration, Causality and Forecasting: A Festschrift in Honor of Clive W.J. Granger*, 76-90, 1999. Oxford University Press. With A. Tay and K. Wallis.

"Dynamic Equilibrium Economies: A Framework for Comparing Models and Data," *Review of Economic Studies*, 65, 433-452, 1998. With L. Ohanian and J. Berkowitz.

"Pitfalls and Opportunities in the Use of Extreme Value Theory in Risk Management," in A.-P. N. Refenes, A.N. Burgess and J.D. Moody (eds.), *Decision Technologies for Computational Finance*, 3-12. Amsterdam: Kluwer Academic Publishers, 1998. With T. Schuermann and J. Stroughair.

(Reprinted in *Journal of Risk Finance*, 1 (Winter 2000), 30-36.)

(Reprinted in P. Embrechts, ed., *Extremes and Integrated Risk Management*, Risk Publications, 2000.)

"Evaluating Density Forecasts, With Applications to Financial Risk Management," *International Economic Review*, 39, 863-883, 1998. With T. Gunther and A. Tay.



"Cointegration and Long-Horizon Forecasting," *Journal of Business and Economic Statistics*, 16, 450-458, 1998. With P. Christoffersen.

"The Past, Present and Future of Macroeconomic Forecasting," *Journal of Economic Perspectives*, 12, 175-192, 1998.

"Bootstrapping Multivariate Spectra," *Review of Economics and Statistics*, 80, 664-666, 1998. With J. Berkowitz.

"Scale Models," *Risk*, 11, 104-107, 1998. With T. Schuermann, A. Hickman and A. Inoue. (Revised and abridged version of "Converting 1-Day Volatility to h-Day Volatility: Scaling by  $\sqrt{h}$  is Worse than You Think," Wharton Financial Institutions Center, Working Paper 97-34.)

(Reprinted in M. Broadie and P. Glasserman, eds., *Hedging with Trees: Advances in Pricing and Risk Managing Derivatives*, 233-237, Risk Publications, 1998.)

(Reprinted in B. Warwick, ed., *The Handbook of Risk*, John Wiley and Sons, 2003.)

"Horizon Problems and Extreme Events in Financial Risk Management," *Economic Policy Review*, Federal Reserve Bank of New York, October 1998, 109-118. With P. Christoffersen and T. Schuermann.

(Reprinted in R. Rieves and B. Warwick, eds., *Handbook of Risk Management*, John Wiley and Sons, 2003.)

(Reprinted in *ICFAI Journal of Financial Risk Management*, 3, 7-18, 2004.)

"Why are Estimates of Agricultural Supply Response so Variable?," *Journal of Econometrics*, 76, 357-373, 1997. With R. Lamb.

"Optimal Prediction Under Asymmetric Loss," *Econometric Theory*, 13, 808-817, 1997. With P. Christoffersen.

"Job Stability in the United States," *Journal of Labor Economics*, 15, 206-233, 1997. With D. Neumark and D. Polsky.

"Bounded Rationality and Strategic Complementarity in a Macroeconomic Model: Policy Effects, Persistence and Multipliers," *Economic Journal*, 107, 1358-1375, 1997. With A. Bomfim.

"Forecast Evaluation and Combination," in G.S. Maddala and C.R. Rao (eds.), *Handbook of Statistics*, 241-268, 1996. Amsterdam: North-Holland. With J. Lopez.

"Measuring Business Cycles: A Modern Perspective," *Review of Economics and Statistics*, 78, 67-77, 1996. With G.D. Rudebusch.

(Reprinted in T.C. Mills, ed., *Long-Term Trends and Business Cycles*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2002.)

"Fractional Integration and Interval Prediction," *Economics Letters*, 50, 305-313, 1996. With P. Lindner.

"Testing Structural Stability With Endogenous Break Point: A Size Comparison of Analytic and Bootstrap Procedures," *Journal of Econometrics*, 70, 221-241, 1996. With C. Chen.

"The Uncertain Unit Root in Real GNP: Comment," *American Economic Review*, 86, 1291-1298, 1996. With A. Senhadji.

"Further Results on Forecasting and Model Selection Under Asymmetric Loss," *Journal of Applied Econometrics*, 11, 561-572, 1996. With P. Christoffersen.

"Comparing Predictive Accuracy," *Journal of Business and Economic Statistics*, 13, 253-265, 1995. With R.S. Mariano.

(Reprinted in T.C. Mills, ed., *Economic Forecasting*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 1998.)

(Reprinted in E. Ghysels and A. Hall, eds., Special Twentieth Anniversary Commemorative Issue of *Journal of Business and Economic Statistics*, 20, 134-144, 2002.)

"Modeling Volatility Dynamics," in K. Hoover (ed.), *Macroeconometrics: Developments, Tensions and Prospects*, 427-472, Springer. With J. Lopez.

"Regime Switching with Time-Varying Transition Probabilities," in C. Hargreaves (ed.), *Nonstationary Time Series Analysis and Cointegration*. (*Advanced Texts in Econometrics*, C.W.J. Granger and G. Mizon, eds.), 283-302, 1994. Oxford University Press. With J.-H. Lee and G. Weinbach.

"Maximum Likelihood Estimation of Fractionally Integrated Noise with Unknown Mean," *Journal of Econometrics*, 62, 301-316, 1994. With Y.-W. Cheung.

"Cointegration and Exchange Rate Dynamics," *Journal of Finance*, 49, 727-735, 1994. With J. Gardeazabal and K. Yilmaz.

"Further Evidence on Business Cycle Duration Dependence" (with discussion), in J.H. Stock and M.W. Watson (eds.), *Business Cycles, Indicators and Forecasting*, 255-284, 1993. University of Chicago Press for NBER. With G.D. Rudebusch and D.E. Sichel.

"Are Long Expansions Followed by Short Contractions?," *Business Review*, Federal Reserve Bank of Philadelphia, July-August, 3-11, 1993.

"Have Postwar Economic Fluctuations Been Stabilized?," *American Economic Review*, 82, 993-1005, 1992. With G. Rudebusch.

"Real Exchange Rates Under the Gold Standard," *Journal of Political Economy*, 99, 1252-1271, 1991. With S. Husted and M. Rush.

(Reprinted in L. Sarno and M.P. Taylor, eds., *New Developments in Exchange Rate Economics*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2002.)

"Forecasting Output with the Composite Leading Index: A Real-Time Analysis," *Journal of the American Statistical Association*, 86, 603-610, 1991. With G. Rudebusch.

(Reprinted in T.C. Mills, ed., *Economic Forecasting*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 1998.)

"Turning point Prediction with the Composite Leading Index: An Ex Ante Analysis," in *Leading Economic Indicators: New Approaches and Forecasting Records* (Kajal Lahiri and Geoffrey H. Moore, eds.), 231-256, 1991. Cambridge: Cambridge University Press. With G. Rudebusch.

"A Note on Bayesian Forecast Combination Procedures," in P. Hackl and A. Westlund (eds.), *Economic Structural Change*, 225-232, 1991.

"On the Power of Dickey-Fuller Tests Against Fractional Alternatives," *Economics Letters*, 35, 155-160, 1991. With G. Rudebusch.

"Is Consumption too Smooth? Long Memory and the Deaton Paradox," *Review of Economics and Statistics*, 73, 1-9, 1991 (lead article). With G. Rudebusch.

"The Use of Prior Information in Forecast Combination," *International Journal of Forecasting*, 6, 503-508, 1990. With P. Pauly.

"Nonparametric Exchange Rate Prediction?," *Journal of International Economics*, 28, 315-332, 1990. With J. Nason.

(Reprinted in T.C. Mills, ed., *Forecasting Financial Markets*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2002.)

(Reprinted in R. Batchelor and P. Dua, eds., *Financial Forecasting*, part of the *International Library of Critical Writings in Financial Economics*, Edward Elgar Publishing, 2003.)

"A Nonparametric Investigation of Duration Dependence in the American Business Cycle," *Journal of Political Economy*, 98, 596-616, 1990. With G. Rudebusch.

(Reprinted in T.C. Mills, ed., *Long-Term Trends and Business Cycles*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2002.)

"Unit Roots in Economic Time Series: A Selective Survey," in T. Fomby and G. Rhodes (eds), *Co-Integration, Spurious Regressions, and Unit Roots*, (*Advances in Econometrics, Volume 8*), 3-69, 1990. With M. Nerlove.

"Post-Deregulation Bank-Deposit-Rate Pricing: The Multivariate Dynamics," *Journal of Business and Economic Statistics*, 8, 281-291, 1990. With S. Sharpe.

"Forecast Combination and Encompassing: Reconciling two Divergent Literatures," *International Journal of Forecasting*, 5, 589-592, 1989.

"Long Memory and Persistence in Aggregate Output," *Journal of Monetary Economics*, 24, 189-209, 1989. With G. Rudebusch.

"Scoring the Leading Indicators," *Journal of Business*, 62, 369-392, 1989. With G. Rudebusch.

"The Dynamics of Exchange Rate Volatility: A Multivariate Latent-Factor ARCH Model," *Journal of Applied Econometrics*, 4, 1-22, 1989. With M. Nerlove.

(Reprinted T.G. Andersen and T. Bollerslev, eds., *Volatility*, part of the *International Library of Critical Writings in Economics*, Edward Elgar Publishing, 2018.)

(Reprinted in N. Shephard, ed., *Stochastic Volatility: Selected Readings*, Oxford University Press, 2005.)

"Random Walks vs. Fractional Integration: Power Comparisons of Scalar and Joint Tests of the Variance-Time Function," in Baldev Raj (ed.), *Advances in Econometrics and Modeling*, 29-45, 1989. *Advanced Studies in Theoretical and Applied Econometrics, Volume 15*. Boston: Kluwer Academic Publishers.

"Endogenous Risk in a Portfolio-Balance Rational-Expectations Model of the Deutschmark-Dollar Rate," *European Economic Review*, 32, 27-53, 1988. With P. Pauly.

"Has the EMS Reduced Member-Country Exchange Rate Volatility?," *Empirical Economics*, 13, 81-102, 1988. With P. Pauly.

"Testing for Bubbles, Reflecting Barriers and Other Anomalies," *Journal of Economic Dynamics and Control*, 12, 63-70, 1988.

"Serial Correlation and the Combination of Forecasts," *Journal of Business and Economic Statistics*, 6, 105-112, 1988.

"Structural Change and the Combination of Forecasts," *Journal of Forecasting*, 6, 21-40, 1987. With P. Pauly.

"Testing for Serial Correlation in the Presence of ARCH," *Proceedings of the American Statistical Association, Business and Economic Statistics Section*, 1986, 323-328. Washington, DC: American Statistical Association, 1987.

"Modeling the Persistence of Conditional Variances: A Comment," *Econometric Reviews*, 5, 51-56, 1986.

"The Exact Initial Covariance Matrix of the State Vector of a General MA(q) Process," *Economics Letters*, 22, 27-31, 1986.

"Exact Maximum-Likelihood Estimation of Autoregressive Models via the Kalman Filter," *Economics Letters*, 22, 197-201, 1986.

### Working Papers

"On the Aggregation of Probability Assessments: Regularized Mixtures of Predictive Densities for Eurozone Inflation and Real Interest Rates," arXiv:2012.11649, Department of Economics, University of Pennsylvania, 2020. With M. Shin and B. Zhang.

"On the Evolution of U.S. Temperature Dynamics," arXiv:1907.06303, Department of Economics, University of Pennsylvania, 2019. With G. Rudebusch.

### Work in Progress

"On the Efficacy of Reduced-Form Statistical Projections in a Structural Climate-Model Environments". With G. Rudebusch.

"Climate Models Underestimate the Effect of Greenhouse Gases on Arctic Sea Ice". With G. Rudebusch.

"On the Timing of an Ice-Free Arctic: Improved Estimates Blending Extent, Thickness, and Volume". With G. Rudebusch.

"On the Aggregation of Probability Assessments: Regularized Mixtures of Predictive Densities". With M. Shin.

"On the Wisdom of Crowds (of Economists)". With M. Shin.

"Measuring Heat Discomfort, Day and Night". With G. Rudebusch.

"A Network Approach to Summarizing and Visualizing the High-Dimensional Climatological Temperature Record".

"Real-Time Prediction of Arctic Sea-Ice Extent, with Economic Implications".

"Behavioral Biases in Subjective Probability Assessments". With M. Shin and A. Akovalli.

### Ph.D. Dissertation Supervision (\* Denotes Main Advisor or Co-Main Advisor)

\* Philippe Goulet Coulombe (in progress) (Went to \*\*\*. Other committee members Frank Schorfheide (Co-Main Advisor), Karun Adusumilli.)

\* Boyuan Zhang (in progress) (Went to \*\*\*. Other committee members Frank Schorfheide (Co-Main Advisor), \*\*\*)

Mamiko Yamashita (2020, Toulouse School of Economics, France), "Essays On Financial Risk Management And Fat Tails". Other committee members Nour Meddahi (Main Advisor), Raffaella Giacomini, Christian Gourieroux, Jihyun Kim, and Andrew Patton.

Ian Hunt (2020, EDHEC, France), "Essays in Financial Econometrics".

\* Paul Sangrey (2019), "Uncertainty and Learning in Dynamic Financial Econometrics". (Went to Amazon. Other committee members Frank Schorfheide (Co-Main Advisor), Amir Yaron, Xu Cheng.)

\* Ross Askanasi (2017), "Applied Dynamic Factor Modeling in Finance". (Went to Cornerstone Research. Other committee members Xu Cheng, Frank DiTraglia.)

\* Jacob Warren (2017), "Essays in Nonlinear Econometrics". (Went to Stevens Capital Management. Other committee members Frank Schorfheide (Co-Main Advisor), Xu Cheng.)

\* Laura Liu (2017), "Point and Density Forecasts in Panel Data Models." (Went to Board of Governors of the Federal Reserve System. Other committee members Frank Schorfheide (Co-Main Advisor), Xu Cheng.)

Katja Gisler (2016, University of St. Gallen Ph.D.), "Essays on the Economic Relevance of Volatility Spillovers." (Other committee members Matthias Fengler (St. Gallen), Francesco Audrino (St. Gallen), Daniel Buncic (St. Gallen).)

Molin Zhong (2015), "Essays on Bayesian Macroeconometrics." (Went to Board of Governors of the Federal Reserve System. Other committee members Jesus Fernandez-Villaverde, Frank Schorfheide.)

\* Minchul Shin (2015), "Bayesian GMM." (Went to University of Illinois. Other committee members Frank Schorfheide (Co-Main Advisor), Xu Cheng, Frank DiTraglia.)

\* Lorenzo Braccini (2015), "Essays in Dynamic Duration and Count Modeling." (Went to Bank of Italy. Other committee members Xu Cheng, Frank Schorfheide.)

\* Dongho Song (2014), "Essays on Risk Measurement and Modeling in Macroeconomics and Finance." (Went to Boston College. Other committee members Frank Schorfheide (Co-Main Advisor), Ivan Shaliastovich, Amir Yaron.)

Mark Bognanni (2013), "Essays in Empirical Macroeconomics." (Went to Federal Reserve Bank of Cleveland. Other committee members Frank Schorfheide, Jesus Fernandez-Villaverde.)

Han Chen (2013) "Essays on Unconventional Monetary Policy." (Went to Board of Governors of the Federal Reserve System. Other committee members Frank Schorfheide, Harold Cole.)

\* Fei Chen (2011), "Multifractal Duration Modeling." (Went to Huazhong University of Science and Technology (HUST), China. Other committee members Frank Schorfheide, Kevin Song.)

Dalibor Stevanovic (2011, University of Montreal Ph.D.), "Factor Models, VARMA Processes and Parameter Instability with Applications in Macroeconomics." (Went to European University Institute and University of Quebec. Other committee members Jean-Marie Dufour (McGill), Jean Boivin (Bank of Canada), Benoît Perron (Montreal), Francisco Ruge-Murcia (Montreal).)

Edward Herbst (2011), "Essays on Bayesian Macroeconometrics." (Went to Board of Governors of the Federal Reserve System. Other committee members Frank Schorfheide, Jesus Fernandez-Villaverde.)

Asyl Bakinova (2011, University of Lugano Ph.D.), "Futures Volatility in the Crude Oil Market." (Other committee members Giovanni Barone-Adessi (Lugano) and Patrick Gagliardini (Lugano).)

\* Leonardo Melosi (2010), "Essays on the Macroeconomics of Incomplete Information." (Went to London Business School. Other committee members Frank Schorfheide (Co-Main Advisor), Jesus Fernandez-Villaverde, Dirk Krueger.)

Edith Liu (2010), "On International Finance and Risk Sharing." (Went to Cornell University. Other committee members Karen Lewis and Craig MacKinlay.)

Christina Fuentes-Albero (2010), "Essays on Financial Frictions, Propagation of Shocks and Macroeconomic Volatility." (Went to Rutgers University. Other committee members Frank Schorfheide, Jesus Fernandez-Villaverde and Urban Jermann.)

Max Kryshko (2010), "Essays in Estimation of Dynamic Stochastic General Equilibrium Models." (Went to IMF. Other committee members Frank Schorfheide and Jesus Fernandez-Villaverde.)

\* Jian Hua (2010), "Essays in Financial Econometrics." (Went to Baruch College, City University of New York. Other committee members Aureo De Paula, David Musto.)

\* Georg Strasser (2008), "Essays in Applied Econometrics." (Went to Boston College. Other committee members Urban Jerman, Karen Lewis, Frank Schorfheide.)

Taeyoung Doh (2007), "Three essays on the estimation of dynamic macroeconomic models." (Went to Federal Reserve Bank of Kansas City. Other committee members F. Schorfheide, A. Yaron.)

Sungbae An (2006), "Essays on Bayesian Estimation of Dynamic Economies." (Went to Singapore Management University. Other committee members Frank Schorfheide, Jesus Fernandez-Villaverde.)

\* Vivian Yue (2005), "Essays on Sovereign Default and Emerging Countries." (Went to New York University. Other committee members Urban Jerman, Dirk Krueger, Martin Uribe.)

\* Chiara Scotti (2005), "A Multivariate Bayesian Analysis of Policy Rates: Fed and ECB Timing and Level Decisions." (Went to Board of Governors of the Federal Reserve System. Other committee members Jesus Fernandez-Villaverde, Frank Schorfheide.)

\* Jin (Ginger) Wu (2005), "Essays on Financial Economics and Econometrics." (Went to University of Georgia. Other committee members Gregory Kordas, Craig MacKinlay, Frank Schorfheide, Yihong Xia.)

\* Yansong (Bill) Lu (2005), "Modeling and Forecasting Daily Stock Return Volatility with Intra-day Price Fluctuation Information." (Went to Lehman Brothers. Other committee members Yuichi Kitamura, Frank Schorfheide.)

\* Lei Ji (2005), "Essays in Financial Economics and Econometrics." (Went to Lehman Brothers. Other committee members Gregory Kordas, Frank Schorfheide, Yihong Xia.)

\* Aruoba, Boragan (2004), "Data Uncertainty: Empirical Evidence, General Equilibrium Implications and Hedging Strategies." (Went to University of Maryland. Other committee members Jesus Fernandez-Villaverde, Dirk Krueger, Frank Schorfheide.)

\* Campbell, Sean (2002), "Regime Switching in Economics." (Went to Brown University. Other committee members Yuichi Kitamura, Roberto Mariano and Frank Schorfheide. Winner of the Hayes prize, awarded biennially for the best graduate student research contribution in a two-year interval.)

\* Vega, Clara (2002), "Public Information, Private Information and Microstructure Theory." (Went to University of Rochester. Other committee members Simone Gervais, Frank Schorfheide.)

\* Li, Canlin (2002), "Essays in Financial Economics and Econometrics." (Went to University of California, Riverside. Other committee members Michael Brandt, Frank Schorfheide.)

\* Labys, Paul (2001), "Essays on Microstructure and the Use of Information in Limit Order Markets." (Went to Charles River Associates. Other committee members Ken Kavajecz, Patrik Sandas, Frank Schorfheide.)

\* Cheng, Yingmei (2001), "Essays in Financial Economics and Applied Econometrics." (Went to Florida State University. Other committee members Gary Gorton, Craig MacKinlay, Petra Todd.)

Jones, Christopher (1999), "Bayesian Investigation of Continuous Time Finance Models." (Went to University of Rochester. Other committee members Craig MacKinlay, Krishna Ramaswamy, Robert Stambaugh.)

Zhang, Jing (1998), "Model Selection and Some Extensions of Markov Switching Models." (Went to Moody's KMV.)

\* Alizadeh, Sassan (1998), "Essays in Financial Econometrics." (Went to Bear Sterns. Other committee members Michael Brandt, Sanford Grossman.)

\* Inoue, Atsushi (1998), "Three Essays in Time Series Econometrics." (Went to North Carolina State University. Other committee members Valentina Corradi, Jinyong Hahn. Winner of Carey Prize for best dissertation.)

\* Altissimo, Filippo (1997), "Essays in Macroeconometrics." (Went to Bank of Italy. Other committee members Albert Ando, Valentina Corradi.)

\* Shapiro, Natalie (1997), "Civil and Political Liberties Over Space and Time: A Markov Model of Transition Dynamics." (Went to Massachusetts Financial Services. Other committee members Valentina Corradi, Roberto Mariano.)

\* Tay, Anthony (1997), "Density Forecast Evaluation: Theory and Applications." (Went to National University of Singapore. Other committee members Valentina Corradi, Jinyong Hahn.)

\* Kilian, Lutz (1996), "Small Sample Confidence Intervals for Impulse Response Estimates." (Went to University of Michigan. Other committee members Lee Ohanian, Robert Stine.)

\* Berkowitz, Jeremy (1996), "Estimating and Evaluating Economic Models Via Spectral Analysis." (Went to Board of Governors of the Federal Reserve System. Other committee members Valentina Corradi, Lee Ohanian.)

\* Christoffersen, Peter (1996), "Essays on Forecasting in Economics." (Went to McGill University. Other committee members Albert Ando, Roberto Mariano.)

\* Giorgianni, Lorenzo (1996), "On Expectations and Risk Premia in Foreign Exchange Markets: Evidence from Survey Data." (Went to International Monetary Fund. Other committee members Albert Ando, Richard Marston.)

\* Binder, Michael (1995), "Essays in Empirical Macroeconomics." (Went to University of Maryland. Other committee members Lee Ohanian, Victor Rios-Rull.)

Gong, Faxiong (1995), "Essays on Several Contemporary Issues in Econometrics and Financial Economics." (Went to Federal Reserve Bank of New York. Other committee members Roberto Mariano and Joseph Gyourko.)

\* Chauvet, Marcelle (1995), "An Econometric Characterization of Business Cycle Dynamics with Factor Structure and Regime Switching." (Went to University of California, Riverside. Other Committee members Roberto Mariano, Lee Ohanian.)

\* Lopez, Jose (1995), "Evaluating Forecasts of Exchange Rate Volatility." (Went to Federal Reserve Bank of New York. Other committee members Roberto Mariano, Lee Ohanian.)

Hodges, Scott (1994), "Business Cycles in Historical Perspective." (Other committee members Daniel Raff and Christopher Hanes.)

\* Senhadji, Abdelhak (1994), "Adjustment of a Small Open Economy to External Shocks." (Went to Washington University in St. Louis. Other committee members Jere Berhman, Wilfred Ethier, Lee Ohanian.)

\* Mor, Nachiket (1994), "Essays on Nonlinearity in Exchange Rates." (Went to Corporation of India Limited (ICICI). Other committee members Sanford Grossman, Karen Lewis.)

\* Weinbach, Gretchen (1993), "Regime Switching with Time-Varying Transition Probabilities: Methodological Issues and Application to Exchange Rates." (Went to Board of Governors of the Federal Reserve System. Other committee members Alan Auerbach, Fumio Hayashi.)

\* Chen, Celia (1993), "Tests for Structural Change With Endogenous Break Point and Their Finite Sample Properties." (Went to Regional Financial Associates, Philadelphia, now MoodysEconomy.com. Other committee members Fumio Hayashi, Roberto Mariano.)

Schuermann, Til (1993), "Simulation-Based Econometrics." (Went to Bell Labs. Other committee members Marc Nerlove, Roberto Mariano.)

Fornari, Ilaria (1993), "Quasi-Rational and Fully-Rational Expectations: An Application to Modeling U.S. Beef Cattle Supply." (Went to JP Morgan. Other committee members Roberto Mariano and Marc Nerlove.)

Ansoategui, Carmen (1993), "Stock Market and Real Activity Cointegration Analysis: Application to U.S. and Japan Markets." (Went to E.S.A.D.E. Business School, Barcelona, Spain. Other committee members Roberto Mariano and Craig MacKinlay.)

Bomfim, Antulio (1992, University of Maryland), "Strategic Complementarities and Business Cycles: Essays in Dynamic Macroeconomics." (Went to Board of Governors of the Federal Reserve System. Other committee members John Haltiwanger, Allan Drazen, Martin Bailey, Martin Loeb, Michael Haliassos.)

Golub, John (1992), "The Equity Premium: Sensitivity to Consumption Misspecification and a Non-Expected Utility Resolution." (Went to Federal Reserve Bank of Kansas City. Other committee members Andrew Abel, Franklin Allen, Richard Kihlstrom.)

Bradley, Ralph (1992), "A Nonparametric Investigation Into the Health Care Crisis." (Went to Bureau of Labor Statistics. Other committee members Roberto Mariano and Peter Pauly.)

Tanizaki, Hisashi (1991), "Nonlinear Filters: Estimation and Applications." (Went to Kobe University, Japan. Other committee members Roberto Mariano and Marc Nerlove.)

Lee, Joon-Haeng (1991), "Nonstationary Markov-Switching Models of Exchange Rates." (Went to Korean Securities Research Institute, Seoul, Korea. Other committee members Roberto Mariano and Sandy Grossman.)

Gardeazabal, Javier (1991), "The Monetary Model of Exchange Rate Determination in the Light of Cointegration." (Went to University of the Basque Country, Spain, Department of Economics. Other committee members Roberto Mariano and Marc Nerlove.)



Regulez, Marta (1991), "Prediction With Cointegrated Systems: Theory and Applications." (Went to University of the Basque Country, Spain, Department of Economics. Other committee members Marc Nerlove and Roberto Mariano.)

\* Lindner, Peter (1991), "Interest Rates, Inflation and Risk: An Empirical Investigation." (Went to Lehman Brothers. Other committee members Roberto Mariano, Robert Stambaugh.)

Shen, Qi (1991), "Essays on Transaction Costs and their Impact on Financial Decisions." (Went to University of Michigan, Graduate School of Business.)

Lee, Jai-Seong (1990), "Transition of Economic Regime and Shift in Production Function: Estimation and Testing of Alternative Production Function Models on Nine Subsectors of Korean Industries, 1971-1987."

Willson, Douglas (1990, "Essays in Macroeconometrics and Financial Econometrics." (Went to Concordia University. Other committee members Roberto Mariano and Marc Nerlove.)

Belessakos, Elias D. (1990), "Exchange Rate Target Zones and the European Monetary System." (Went to Baruch College, City University of New York.)

Boldin, Michael (1990), "Business Cycles and Stock Market Volatility: Theory and Evidence of Animal Spirits." (Went to Federal Reserve Bank of New York. Other committee members F. Gerard Adams and Costas Azariadis.)

Cheung, Yin-Wong (1990), "Long Memory in Foreign Exchange Rates and Sampling Properties of Some Statistical Procedures Related to Long Memory Series." (Went to University of California, Santa Cruz. Other committee members Roberto Mariano and Marc Nerlove.)

Arvin-Rad, Hassan (1990), "Two Essays in Econometric Theory." (Went to Florida State University. Other committee members Roberto Mariano and Peter Pauly.)

Feyzioglu, Tarhan (1989), "Analysis of Nonlinear, Nonnormal Economic Time Series and Applications." (Went to Georgetown University. Other committee members Roberto Mariano and Marc Nerlove.)

Hassett, Kevin (1989), "Essays in Applied Econometrics." (Went to Columbia University. Other committee members Albert Ando and Alan Auerbach.)

### **Post-Doc and Visiting Pre-Doc Supervision**

Maximilian Gobel (2019-2021) (University of Lisbon)

Jorge Hansen (2018) (Aarhus University)

Umut Akovali (2017-2018) (Koc University, Istanbul)

Daniel Borup (2017) (Aarhus University)

Sergey Nasekin (2016) (Humboldt University, Berlin)

Maria Grith (2015-2016) (Humboldt University, Berlin)

Ronald Indergand (2015-2016) (University of Bern)

Katja Gisler (2015-2016) (University of St. Gallen)

Chu Kin (Roy) Chan (2014-2015) (City University of Hong Kong)

Diego Fresoli (2012) (Universidad Carlos III de Madrid)

Dalibor Stevonovic (2011) (University of Montreal)

Asyl Bakanova (2011) (from University of Lugano)

Bernd Schlusche (2008) (University of Bonn)  
 Emanuel Moench (2007) (Humboldt University Berlin)  
 Peter Lildolt (2001) (Aarhus University)

**Recent Undergraduate and Master's Mentoring  
 (Weekly Reading/Research Group, Thesis Supervision, etc.)**

Tony Liu (2021)  
 Preston Ching (2020, accepted to graduate programs at Harvard, Stanford)  
 Akshay Malhotra (2020) (Went to Stanford University Ph.D. program)  
 Samantha Wu-Georges (2020)  
 David Wigglesworth (2019, winner of university-wide Rose Research Prize)  
 Daniel Onorato (2018, went to Harvard Economics pre-doc research assistantship)  
 JoonYup Park (2018, went to Duke Economics Ph.D. program)  
 Sarah Whinton (2017, went to Jordan on Fulbright Research Fellowship)  
 Theodore Caputi (2017, went to MIT Economics Ph.D. program)  
 Hong Ken Teoh (2017, went to Columbia Economics Ph.D. program)  
 Modibo Camara (2016, went to Northwestern Economics Ph.D. program)  
 Bas Bergmans (2016, went to Amazon UK)  
 Han Tian (2016, went to AQR Capital Management)  
 Juan Ignacio Perez-Gea (2016, went to BCG Consulting, Miami)  
 Max Miller (2015, went to Wharton School Finance Ph.D. program)

**Recent and Forthcoming Presentations**

2021 (scheduled):

Penn Wharton School Conference in Honor of Ed George, December (Virtual)  
 Rotterdam, International Association for Applied Econometrics, Annual Meeting, Keynote Address  
 University of California, Santa Barbara, Seminar  
 Federal Reserve Bank of Dallas Conference, Advances in Econometrics  
 Federal Reserve Bank of Dallas Conference, The Econometrics of Macroeconomic and Financial Data  
 University of California, Santa Cruz, Seminar

2020:

EC2 Annual Conference (CREST/ESSEC), High-Dimensional Modeling in Time Series, Keynote Address, December (Virtual, "Paris")  
 International Association for Applied Econometrics, Seminar, December (Virtual)  
 Applied Machine Learning, Economics, and Data Science (AMLEDS), Seminar, December 2020 (Virtual)  
 Penn/Wharton Statistics Seminar, December (Virtual, "Philadelphia")  
 Amazon Seminar, November (Virtual, "Seattle")  
 Oxford University, Climate Econometrics Seminar, November (Virtual)

Morgan Stanley 8th Annual Quant Conference, Keynote Address, November (Virtual, "New York")  
 Penn School of Arts and Sciences, Board of Overseers, "Democracy on the Ballot" (Panel on the 2020 election), October (Virtual, "Philadelphia")  
 Federal Reserve Bank of Philadelphia Conference on Real-Time Data Analysis, Methods, and Applications in Macroeconomics and Finance, October (Virtual, "Philadelphia")  
 Penn 60-Second Lecture, September (Virtual, "Philadelphia")  
 Penn Wharton Energy Economics and Finance Seminar, Kleinman Center for Energy Policy, September (Virtual, "Philadelphia")  
 Universidad de Costa Rica, Escuela de Economía, Centennial Conference Honoring the Legacy of Lawrence R. Klein, September (Virtual, "Costa Rica")  
 Korea-America Economic Association Seminar, August (Virtual)  
 Society for Financial Econometrics, Past Presidents' Panel Discussion, August (Virtual).  
 European Geophysical Union Annual Meeting, May (Virtual, "Vienna")  
 San Diego, ASSA Annual Meeting, January

2019:

San Francisco, American Geophysical Union Annual Meeting  
 Federal Reserve Bank of San Francisco Conference, The Economics of Climate Change  
 Durham, NC, Duke University Conference in Honor of George Tauchen  
 Cambridge, Mass., NBER International Finance and Macroeconomics Meeting  
 University of Chicago (Stevanovich Center for Financial Mathematics) Conference Big Data and Machine Learning in Econometrics, Finance, and Statistics  
 Cambridge, Mass., NBER Summer Institute  
 Zurich, Bank for International Settlements Annual Meeting  
 University of Nottingham, Granger Lecture  
 Nuffield College, Oxford, England, visiting scholar and seminar  
 Seattle, University of Washington, Seminar  
 Chicago, NBER Asset Pricing Meeting  
 Bethesda, MD, NBER CRIW Meeting, Discussant  
 Federal Reserve Bank of San Francisco, visiting scholar  
 Atlanta, GA, ASSA Meetings

2018:

Houston, TX, Rice University  
 Philadelphia, PA, FRB Philadelphia Conference on Real-Time Data Analysis, Methods, and Applications  
 San Diego, CA, UCSD Conference in Honor of Tim Bollerslev  
 Boston, Mass., NBER Summer Institute  
 York, UK, University of York, Center for Applied Macro-Finance Asset Pricing Conference, Keynote Lecture

Frankfurt, Germany, European Central Bank Conference on Economic Forecasting with Large Datasets, Keynote Lecture

Vienna, Austria, Technical University of Vienna

Chicago, IL, Chicago / Penn Conference on New Aspects of Statistics, Financial Econometrics, and Data Science

Amelia Island, GA, Federal Reserve Bank of Atlanta Financial Markets Conference

Philadelphia, PA, PIER Workshop on Quantitative Tools for Macroeconomic Policy Analysis

Los Angeles, CA, USC

Washington, DC, Johns Hopkins University

Washington, DC, International Monetary Fund

Philadelphia, PA, ASSA meeting

### Editorial Boards

*Journal of Financial Econometrics*, 2000-present (advisory board)

*International Journal of Central Banking*, 2005-present (associate editor)

*Journal of Applied Econometrics*, 1991-1997 (associate editor), 2011-2014 (co-editor)

*Journal of Business and Economic Statistics*, 1993-2003 (associate editor)

*Econometrica*, 1994-1997 (associate editor)

*Review of Economics and Statistics*, 1993-2002 (associate editor)

*International Economic Review*, 1993-2000 (co-editor)

### Scientific Meetings Organized

Chicago/Penn/UNC Conference Series on Econometrics and Statistics, 2015-present

Big Data and Machine Learning in Economics, Finance, and Statistics, University of Chicago, 2019.

New Aspects of Statistics, Financial Econometrics, and Data Science, University of Chicago, 2018.

Big Data in Predictive Dynamic Econometric Modeling, University of Pennsylvania, 2017

Econometrics of High-Dimensional Risk Networks, University of Chicago, 2015

Conference in Honor of Marc Nerlove, Washington, DC 2015

Conference in Memory of Lawrence R. Klein, University of Pennsylvania, 2014

Society for Financial Econometrics, Annual Conference, Program Committee, 2010-2013

Society for Financial Econometrics, Ad Hoc Conferences, Program Committee, 2010-2013

Wharton Financial Institutions Center, Annual Financial Risk Roundtable, Founder and Organizer, 1998-2012

Penn-Cambridge-Tinbergen Annual Conference on The Economics of Finance, Co-Founder and Organizer, 2009-2013

American Finance Association, Annual Meeting, Program Committee, 2010

Econometric Society, North American Summer Meeting, Program Committee, 2009

Econometric Society, Ninth World Congress, Program Committee, 2005

American Economic Association, Annual Meeting, Program Committee, 2004  
PIER-IGIER Conference on Macro- and Financial Econometrics, Milan, Co-Chairman, 2003  
National Science Foundation / National Bureau of Economic Research Time Series Conference, Chairman of the Organizing Committee and local host, 2002  
Econometric Society, North American Winter Meeting, Program Committee, 2003  
National Science Foundation / National Bureau of Economic Research Forecasting Seminar, Chairman, 1995-2001  
National Bureau of Economic Research, Working Group on Empirical Methods in Macroeconomics and Finance, Co-Chairman, 1992-2001  
Econometric Society, North American Winter Meeting, Program Committee, 1999  
Econometric Society, North American Summer Meeting, Program Committee, 1993

### **Additional Scientific Leadership**

Executive Council, Society for Financial Econometrics, 2011- present  
Advisory Board, CSDA Annals of Computational and Financial Econometrics, 2014-present  
Advisory Board, CAFIN, University of California, Santa Cruz, 2013-present  
Advisory Board, Center For Applied Financial Economics, University of Southern California, 2012-present  
Advisory Board, Center for Applied Statistics and Economics (CASE), Humboldt University Berlin, 2010-present  
Advisory Board, Real Time Data Research Center, Federal Reserve Bank of Philadelphia, 2009-present  
Advisory Board, Jacobs Levy Center for Quantitative Financial Research, University of Pennsylvania, 2014-2018  
Founding Member, International Association of Applied Econometrics, 2011  
Founding Council, Society for Financial Econometrics, 2007  
National Science Foundation Economics Panel, 1998-2000  
American Statistical Association, Program Chair, Business and Economic Statistics Section, 1991

### **Selected Service**

Business Conditions Indicators Advisory Panel, The Conference Board, 2003-2015  
Chairman, Model Validation Council, U.S. Federal Reserve System, 2012-2013  
Co-Director, Wharton Financial Institutions Center, 2007-2013  
Founding member, Oliver Wyman Institute, 1996-2012  
Executive Director, Morgan Stanley Investment Management, 2007-2008  
Boards of Directors, various Carey Property Associates real estate investment trusts, 2002-2004

### **Selected Grants Received**

National Science Foundation (seven multi-year grants since 1990), Sloan Foundation, Guggenheim Foundation, Pew Foundation

**Miscellaneous**

Citation leader. (60K+ Google Scholar citations, numerous "highly-cited researcher" designations, etc.)

Blog: *No Hesitations*, <http://fxdiebold.blogspot.com/>, 2013-present. More than 1,700,000 pageviews.

Freely-available e-texts and related materials (continuously evolving):  
(<http://www.ssc.upenn.edu/~fdiebold/Textbooks.html>)

*Econometric Data Science: A Predictive Modeling Approach* (undergraduate)

*Forecasting* (undergraduate, graduate)

*Time-Series Econometrics* (graduate)

Aruoba-Diebold-Scoti Business Conditions Index, Federal Reserve Bank of Philadelphia, 2008-present,  
<https://www.philadelphiafed.org/research-and-data/real-time-center/business-conditions-index>

Diebold et al. GDPplus, Federal Reserve Bank of Philadelphia, 2013-present,  
<https://www.philadelphiafed.org/research-and-data/real-time-center/gdpplus>