

ROBERT F. ENGLE CURRICULUM VITAE

NOBEL PRIZE FOR ECONOMICS 2003

January 28, 2008

BRIEF BIOGRAPHY

Robert Engle, the Michael Armellino Professor of Finance at New York University Stern School of Business, was awarded the 2003 Nobel Prize in Economics for his research on the concept of autoregressive conditional heteroskedasticity (ARCH). He developed this method for statistical modeling of time-varying volatility and demonstrated that these techniques accurately capture the properties of many time series. Professor Engle shared the prize with Clive W. J. Granger of the University of California at San Diego.

Professor Engle is an expert in time series analysis with a long-standing interest in the analysis of financial markets. His ARCH model and its generalizations have become indispensable tools not only for researchers, but also for analysts of financial markets, who use them in asset pricing and in evaluating portfolio risk. His research has also produced such innovative statistical methods as cointegration, common features, autoregressive conditional duration (ACD), CAViaR and now dynamic conditional correlation (DCC) models.

Before joining NYU Stern in 2000, Professor Engle was Chancellor's Associates Professor and Economics Department Chair at the University of California, San Diego, and Associate Professor of Economics at the Massachusetts Institute of Technology.

He received his bachelor of science in physics from Williams College and his master of science in physics and doctor of philosophy in economics from Cornell University. Born in Syracuse, NY, he grew up in Media, Pennsylvania, spent 25 years in San Diego, and now lives in New York.

BUSINESS ADDRESS

New York University
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EDUCATION

Ph.D., Economics, Cornell University, 1969
M.S., Physics, Cornell University, 1966
B.S., Williams College, 1964, with
Highest Honors in Physics

ACADEMIC POSITIONS

Michael Armellino Professor in the Management of Financial Services, NYU Stern School of Business, 2000-
 Professor, Department of Finance, Stern School of Business, New York University, 1999.
 Emeritus Professor and Distinguished Research Professor, University of California, San Diego, 2003
 Chair, University of California, San Diego, 1990 - 1994.
 Chancellors' Associates Chair in Economics, 1993 -
 Professor, University of California, San Diego, 1977
 Associate Professor, University of California, San Diego, 1975-1977.
 Associate Professor, Massachusetts Institute of Technology, 1975.
 Assistant Professor, Massachusetts Institute of Technology, 1969-1974.

HONORS and AWARDS

Member, World Economic Forum, 2007
 Member, National Academy of Sciences, 2006
 Fellow of the Institute for Quantitative Research in Finance, 2006
 Doctorate Honoris Causis, HEC, Paris, France, 2005
 Doctorate Honoris Causis, Université de Savoie, France, 2005
 Nobel Prize for Economics, 2003
 Doctorate Honoris Causis, University of Southern Switzerland, 2003
 Fellow, American Finance Association, 2004
 Fellow, American Academy of Arts and Sciences, 1995
 Fellow, American Statistical Association, 2000
 Fellow, the Econometric Society, 1981

HONORARY LECTURES

- Pareto Lecture, Annual Meeting of ASSET, Istanbul, 1995
- Frank Paish Lecture, Annual Meeting of the Royal Economic Society, Swansea 1996
- Fisher Schultz Lecture, European Meeting of the Econometric Society, Istanbul 1996
- A.W. Phillips Lecture, Australasian Meetings of the Econometric Society, Melbourne, 1997
- Lecture Series, Academica Sinica, Taiwan, 2000
- Journal of Applied Econometrics Lecture Series, Cambridge, England, 2001.
- Lecture Series, Finnish Statistical Association Meeting, Vassa, Finland, 2001
- Conference Honoree and Keynote Address, "International Conference on Modeling and Forecasting Financial Volatility", Perth, Australia, 2001
- Fields Lecture, University of Toronto, 2001
- Nobel Lecture, Stockholm, 2003
- Econometric Institute/Princeton University Press lecture series at Erasmus University, 2003.
- Joint lunch of the AEA/AFA Annual Meeting, Philadelphia, 2004
- "Cutting Edge Innovations and Derivatives", *Credit Suisse First Boston First Annual Meeting*, March 2005

- Lecture: "A Simple GARCH Approach to Default Correlations", *International Association of Financial Engineers*. New York, NY: March 2, 2005
- Lecture on "Downside Risk: Implications for Financial Management", *the Czech National Bank, Czech Economic Society and CERGE-EI*. March 17, 2005.
- Public Lecture: Budapest Collegiums, "Downside Risk: Implications for Financial Management", *European Cultural Foundation*. March 23, 2005.
- Presentation on "Testing and Valuing Dynamic Correlations for Asset Allocation", *Research Conference for Corporate Associates*. Stern School of Business – NYU. April 2005
- "Dean's Roundtable Luncheon", *Stern Executive Board*, Stern School of Business - NYU. April 5th, 2005
- Lecture: *Citigroup Conference*, April 6th, 2005
- Federal Reserve System's Fourth Annual Community Affairs Research: *Federal Reserve Bank of New York*, April 8th, 2005
- "Statistics Day", *University of Maryland Conference on Statistics*. April 15th, 2005
- "Stern Scholar in the Parlor", Hosted by Leonard Stern, Stern School of Business. April 20th, 2005
- Paper presentation on Microstructure, *National Bureau of Economic*. Cambridge, MA – May 6, 2005.
- Keynote Speaker, *Morgan Stanley Equity Market Microstructure Research Conference*. May 12th-13th, 2005
- Induction Ceremony Key Note Speaker, *Penncrest High school*, May 18th, 2005
- *Financial Econometrics Conference*, University of Montreal, May 19th, 2005
- Lecture on "Frontiers in Time Series Analysis", *Journal of Applied Econometrics Annual Conference*, Sardinia, Italy. May 29-31, 2005.
- Lecture: *Changing Structures in International and Financial Market ant the Effects on Financial Decision Making*, Venice, Italy. June 2nd and 3rd, 2005.
- "MBS and Credit Derivatives – The Recent Development", *13th annual PBFAE Conference* - Rutgers University, New Brunswick. June 10, 2006.
- Chair Speaker, *Econometrics Society World Congress*, London, England. August 2005.
- Key Note Speaker, *International Conference on Finance*, University of Copenhagen, Denmark. September 2005
- "Downside Risk – Econometric Models and Financial Implications", *ASTIN – AFIR Conference*, Zurich, Switzerland. September 2005
- Opening Address: "The Spline GARCH Model for Unconditional Volatility and its Global Macroeconomic Causes", *Statistical and Applied Mathematical Sciences Institute Conference*. Duke University, North Carolina. September 2005
- *Stern Honors Society Lecture*, Stern School of Business – New York University. November 3, 2005.
- Hedge Fund Lecture Principal Speaker on "Measuring Downside Risk": *IXIS - NYU Banking Conference Series on Hedge Funds*. September 2005.
- Keynote Speaker: "Underlying Dynamics of Credit Correlations", *Risk Magazine Quant Congress*, New York, NY. November 8, 2005.
- "A Brief History of Time", *Economics Roundtable for University of California, San Diego*. August 2005.
- Public Lectures at *Chongqing University, Wuhan University, Huanzang University, National Taiwan University, TABF Inauguration, NBER Trio Conference, Tokyo University*. December 2005
- Keynote speaker "Allied Social Science Associations Annual Convention, KUU Conference, *American Economic Association*. Boston, MA. January 6-8, 2006.
- Host, *Monday Quantitative Finance & Econometrics Seminars*: Stern School of Business – NYU. On-going
- Lecture and Workshop on "Execution Risk", *University of Toronto*. Feb. 17-19, 2006.
- Will Mann Richardson Lectureship, *Austin College*. March 3-5, 2006.
- Speaker: "Financial Volatility – Causes, Consequences, and Global Patterns", *Midwest Economics Association, Chicago*. March 24-25, 2006.

- Speaker: "Downside Risk and its Implications for Financial Management", *Q-Group Conference – Institute for Quantitative Research in Finance, West Palm Beach, Florida*. March 31-April 3, 2006.
- Edmund R. Mechalik Distinguished Lecture in the Mathematical Sciences, "Global Volatility: It's Measurement, Interpretation, and Causes", *University of Pittsburgh*. April 7-9, 2006.
- Bloomberg TV Interview, "Downside Risk". May 31, 2006
- Lecture on "Execution Risk", Paris Microstructure. June 6, 2006
- Lecture, Hautes Etudes Commerciales, Université de Lausanne. June 8, 2006
- Speaker, INSEAD - Paris, France. June 9, 2006
- Speaker, International Symposium on Forecasting – Santander, Spain. June 12, 2006
- Lecture on "Global Financial Volatility", Lindau Foundation – Germany. Aug. 16, 2006
- Lecture, University of Florence. Sept. 15, 2006
- Lecture on "Measuring and Modeling Execution Cost and Risk", Time Series Conference – Montreal, Quebec. Sept. 29, 2006
- "History of Finance" Internet Interview for American Finance Association. Oct. 2006
- Keynote speech, Ukrainian National University – Kiev, Ukraine. Oct. 13, 2006
- Lecture, Econometrics Conference – Yale University, New Haven, Connecticut. Dec. 2, 2006
- Panel Presenter, World Economic Forum – Davos, Switzerland. January 2007
- Lecture on "Execution Risk", Morgan Stanley Conference – London School of Economics, London. Jan. 30, 2007
- Lecture on "Anticipating Correlations", Manchester Business School – Manchester, UK. Jan. 31, 2007
- Speaker, "Global Financial Volatility", Swiss National Bank – Zurich. Feb. 2, 2007
- Speaker, "Global Financial Volatility", European Central Bank – Frankfurt. Feb. 5, 2007
- Public Lecture at University of Technology Sydney, Australia. April 12, 2007
- Speaker, Inaugural Rady School Finance Conference. May 2007
- Lecture on "Global Financial Volatility" Chancellor's Distinguished Lecture Series at University of California-Riverside. May 2007
- Speaker, "Volatility, Downside Risk, Portfolio Models, and VAR" - Distinguished Lecture Series at KAIST Graduate School of Finance-Seoul, South Korea
- Keynote Speaker for the Conference 2007 International Symposium on Financial Engineering and Risk Management (FERM2007), Beijing 11-12 June 2007
- Invited talk "DECO: Dynamic Equicorrelation Models for Large Correlation Matrices" at the 2007 European meeting of the Econometric Society at Budapest, Hungary. August 2007
- Keynote Speaker, Journal of Investment Management Conference Series - Boston, MA. September 2007
- Lecture, "Vector Multiplicative Error Models: Representation and Inference" Princeton Conference on Likelihood Methods – Princeton, NJ. October 2007
- Keynote Address and Official Opening Remarks for the FMA 2007 Annual Meeting - Orlando, FLA. October 17, 2007
- Keynote Speaker at the Multivariate Volatility Models Conference in Faro, Portugal. October 26, 2007
- Master Lecture at Foundation Rafael Del Pino – Madrid, Spain. October 29, 2007
- Public Lecture at Universidad Carlos III in Madrid, Spain. October 30, 2007
- Panel Discussant on VolatilityTOPIC: The Fed's role & the impact of financial turmoil on the real economy with Tom Cooley and Mickey Levy, Chief Economist of Bank of America. November 2007
- Interview for Street.com, November 2007
- Keynote speaker at ISEO European Colloquia and Pioneer Investment in Vienna
- Lecture on "High Dimension Dynamic Correlations" at HIS joint with OeNB in Vienna, December 2007
- Speaker/Participant at Nobels Colloquia in Trieste, December 2007

BUSINESS AFFILIATIONS

Director, Volatility Institute

Director, Society for Financial Econometrics (SoFiE)

Principle, *Robert F. Engle, Econometric Services*

A personal consulting company specializing in the application of econometric methods to financial and other business needs. Current work focuses on liquidity and trading in financial markets, risk measurement and management, derivatives pricing and hedging and a variety of volatility and correlation related research tasks.

In addition, presents many lectures every year to financial practitioners around the world on topics of current interest.

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Director and Founder of the Center for Financial Econometrics at New York University. The center runs a seminar series, Quantitative Finance and Econometrics (QFE) sponsored by Morgan Stanley, a series of lunch research meetings, a public web site under the Salomon Center and a venue for visitors, post-docs and reaserch fellows.

Chairman of the Academic Advisory Board of Morgan Stanley's Equity Microstructure Grants.

This board administers an academic grant program giving approximately 10 grants per year to faculty and students studying market microstructure. The winning grants are invited to present their work at a conference in the following year that is run by the AAB.

NBER, Faculty Research Associate

MEDIA

Video and Television

BBC Nobel Laureates 2003
Swedish Television Nobel Ceremony 2003
BBC Nobel Minds, 2003
CNBC October, 2003
Kudlow and Cramer, November 2003
CNBC Power Lunch, 2004
BBC Asia, 2004
Nobel e-museum, 2003
Bloomberg Radio and Bloomberg TV 2006

Bloomberg TV 2006
 "History of Finance" Internet series, American Finance Association, 2006
 BBC Radio and BBC TV 2007
 World Economic Forum, Davos Switzerland, 2007
 Financial Times "Global Financial Volatility" Online Series Lecture, 2007
 Street.com, 2007
 TV Globo: Brazil 2008

RESEARCH PUBLICATIONS

Overview:

Engle has published well over 100 academic research papers, four books and many other scholarly works. These are mostly in the broad area of time series econometrics with the most important applications to financial markets. However over the years there are influential papers analyzing macro economics, energy markets, urban economies, emerging markets as well as the main financial asset classes: equities, currencies, fixed income and derivatives. Two of his papers have reached milestones in citations: the paper introducing the *ARCH* model in 1982 and the paper coauthored with Clive Granger introducing *Cointegration* in 1986. These two papers were honored in "Citation Classics" as two of the most cited of all papers in economics. They were also the two papers forming the basis for the 2003 Nobel Prize.

Several other papers have achieved widespread recognition and have been reprinted widely. The most heavily cited papers are listed below.

12 FREQUENTLY CITED PAPERS

1. "Autoregressive Conditional Heteroskedasticity With Estimates of the Variance of U.K. Inflation," *Econometrica* 50 (1982): 987-1008.
2. "Co-integration and Error Correction: Representation, Estimation and Testing," (with C.W.J. Granger), *Econometrica* 55 (1987): 251-276.
3. "Estimation of Time Varying Risk Premia in the Term Structure: the ARCH-M Model," (with David Lilien and Russell Robins), *Econometrica* 55 (1987): 391-407.
4. "Asset Pricing with a Factor ARCH Covariance Structure: Empirical Estimates for Treasury Bills," (with V. Ng, and M. Rothschild) *Journal of Econometrics* 45 (1990): 213-237.
5. "ARCH Models," (with D. Nelson and T. Bollerslev) in *Handbook of Econometrics, Volume IV*, ed. R. Engle and D. McFadden (Amsterdam: North Holland, 1994), 2959-3038
6. "Forecasting and Testing in Co-integrated Systems," (with Sam Yoo), *Journal of Econometrics* 35 (1987): 143-159.
7. "Semi-parametric estimates of the relation between weather and electricity demand," (with C.W.J. Granger, J. Rice and A. Weiss), *Journal of American*

- Statistical Association* 81 (1986): 310-320.
8. "Exogeneity," (with David F. Hendry and Jean-Francois Richard), *Econometrica* 51 (1983): 277-304.
 9. "Testing for Common Features," (with S. Kozicki), *Journal of Business and Economic Statistics* 11 (1993): 369 - 380.
 10. "Autoregressive Conditional Duration: A New Model for Irregularly Spaced Transaction Data," *Econometrica* (1998) 66: 1127-1162.
 11. "The Econometrics of Ultra High Frequency Data," *Econometrica* (2000) 68: 1-22.
 12. "Dynamic Conditional Correlation - A Simple Class of Multivariate GARCH Models," *Journal of Business and Economic Statistics*, ", (July 2002), V20N3

EXPOSITORY PAPERS

1. "The ET Interview: Robert F. Engle," (interviewed by Francis X. Diebold), *Econometric Theory* (January 2003) v19 n6
2. "Robert F. Engle III, autobiography (2004) Les Prix Nobel 2003, Nobel Foundation, pp. 309-325
3. "Risk and Volatility: Econometric Models and Financial Practice," Nobel Lecture, (2004) *American Economic Review*, V94M3 pp 405-420
4. "Grappling with GARCH," (with Joseph Mezrich), *RISK* (1995): 112-117
5. "GARCH for Groups," (with Joseph Mezrich), *RISK* (1996): 36-40
6. "GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics", *Journal of Economic Perspectives* (Fall 2001), V15N4
7. "What Good is a Volatility Model?" (with Andrew Patton), *Quantitative Finance*, (March 2001) V1N2 pp 237-245
8. "Financial Econometrics – A New Discipline with New Methods," *Journal of Econometrics* (Jan. 2001), V100 pp53-56

RECENT PAPERS

1. "Time-Varying Arrival Rates of Informed and Uninformed Trades" with David Easley, Maureen O'Hara, Liuren Wu. *Journal of Financial Econometrics*, Forthcoming 2008
2. "Priced Risk and Asymmetric Volatility in the Cross Section of Skewness," with Abhishek Mishra.
3. "The Underlying Dynamics of Credit Correlations" (with Arthur Berd and Artem Voronov), *Journal of Credit Risk* (2007), Vol. 3, N2: 27-62
4. "Execution Risk", (with Robert Ferstenberg) *Journal of Portfolio Management*, Winter (2007), V33, I2, pp.34-45

5. "Measuring and Modeling Execution Cost and Risk" (with Jeffrey Russell and Robert Ferstenberg) Working paper, pp.1-54 (2007)
6. "Are Exchange Traded Funds Fairly Priced?" (with Debojyoti Sarkar) Institutional Investor, Fifth Anniversary Issue, (2006)
7. "High Frequency Multiplicative Component GARCH," (with Magdalena E. Sokalska and Ananda Chanda), (August 2005), Working Paper No. SC-CFE-05-05
8. "The Spline-GARCH Model for Unconditional Volatility and its Global Macroeconomic Causes," (with J. Gonzalo Rangel), (November 2004). Working Paper No. SC-CFE-04-05, forthcoming *Review of Financial Studies*
9. "Vector Multiplicative Error Models: Representation and Inference" (With Fabrizio Cipollini, and Giampiero M. Gallo) Working Paper No. 0331
10. "A GARCH Option Pricing Model with Filtered Historical Simulation", (with Giovanni Barone-Adesi and Loriano Mancini), *forthcoming Review of Financial Studies*

PAPERS IN PROCESS

- a "Investigating ICAPM with Dynamic Conditional Correlations" (with Bali, Turan),(2007) manuscript
- b "High Dimension Dynamic Correlations," Prepared for a Festschrift for David Hendry, Oxford University, (2007)
- c "When Is Noise Not Noise – A Microstructure Estimate of Realized Volatility" (with Zheng Sun) (2007)
- d "Fitting and Testing Vast Dimensional Time-Varying Covariance Models," (with Kevin Sheppard and Neil Sheppard). (2007)
- e "Measuring and Modeling Execution Cost and Risk," (with Jeffrey Russell). (2007)
- f "Vector Multiplicative Error Models: Representation and Inference," (with Fabrizio Cipollini and Giampiero M. Gallo)
- g "Priced Risk and Asymmetric Volatility in the Cross-Section of Skewness," (with Abhishek Mistry). (2007)
- h "High Frequency Multiplicative Component GARCH," (with Magdalena E. Sokalska and Ananda Chanda)
- i "Forecasting Variance of Variance: The Square-root, the Affine and the CEV GARCH Models," with

Isao Ishida - under revision

- j "Theoretical Properties of Dynamic Conditional Correlation Multivariate GARCH" (with Kevin Sheppard), (2005)
- k "Evaluating the Specification of Covariance Models for Large Portfolios (with Kevin Sheppard), (2005).
- l "Time-Varying Betas and Asymmetric Effects of News: Empirical Analysis of Blue Chip Stocks," (with Young-Hye Cho).-under revision
- m "Modeling the Impacts of Market Activity on Bid-Ask Spreads in the Option Market," (with Young-Hye Cho). under revision
- n "Macroeconomic Announcements and Volatility of Treasury Futures," (with Li Li).-under revision
- o "Conditional Volatility of Exchange Rates Under a Target Zone (with Yin-Feng Gau). -under revision

BOOKS

Long Run Economic Relations: Readings in Cointegration, (eds. R. Engle and C.W.J. Granger) Oxford, Oxford University Press, 1991

Handbook of Econometrics, Volume IV, (ed. with Dan McFadden), Amsterdam: North Holland, 1994

ARCH: Selected Readings, Oxford University Press, 1995

Cointegration, Causality, and Forecasting: A Festschrift in Honor of Clive W. J. Granger, (ed. with Halbert White) Oxford University Press, 1999

Econometric Analysis of Financial and Economic Time Series, "Good Ideas" (Dedicated to R. Engle and C.W.J. Granger, Vol. 20, Parts A/B) Elsevier, Ltd, 2006

Anticipating Correlations. Princeton University Press 2008

COMPLETE CHRONOLOGICAL LIST OF PUBLICATIONS

1. "Effects of aggregation over time on dynamic characteristics of an economic model," (with T.C. Liu) in Burt G. Hickman, ed., *Econometric Models of Cyclical Behavior, Studies in Income and Wealth*, v. 2, no. 36, National Bureau of Economic Research, New York, 1972.
2. "An Econometric Simulation Model of Intra-Metropolitan Housing Location: Housing, Business, Transportation and Local Government," (with Franklin M. Fisher, John R. Harris and Jerome Rothenberg) *The American Economic Review* 62 (1972): 87-97.

3. "Issues in the Specification of an Econometric Model of Metropolitan Growth," *Journal of Urban Economics* 1 (1974): 250-267.
4. "Specification of the Disturbance for Efficient Estimation," *Econometrica* 42 (1974): 135-146.
5. "Band Spectrum Regression," *International Economic Review* 15 (1973): 1-11.
6. "A Disequilibrium Model of Regional Investment," *Journal of Regional Science* 14 (1974): 367-376.
7. "De Facto Discrimination in Residential Assessments: Boston," *National Tax Journal* 28 (1975): 445-451.
8. "An Asset Price Model of Aggregate Investment," (with Duncan Foley), *International Economic Review* 16 (1975): 625-647.
9. "Equilibrium in Regional Investment: A Reply," *Journal of Regional Science* 15 (1975): 235-238.
10. "Some Finite Sample Properties of Spectral Estimators of a Linear Regression," (with Roy Gardner), *Econometrica* 44 (1976): 149-165.
11. "Interpreting Spectral Analysis in Terms of Time Domain Models," *Annals of Economic and Social Measurement* 5 (1976): 89-109.
12. "Simultaneous Estimation of the Supply and Demand for Household Location in a Multizoned Metropolitan Area," (with Katharine Bradbury, Owen Irvine, and Jerome Rothenberg), in *Residential Location and Housing Markets* (Gregory K. Ingram, ed.), (Ballinger 1977): 51-86.
13. "Policy Pills for a Metropolitan Economy," *Papers and Proceedings of the Regional Science Association* 35 (1976): 191-205.
14. "Constraints Often Overlooked in Analysis of Simultaneous Equation Models: Comment," *Econometrica* 44 (1976): 617-819.
15. "Estimating structural models of seasonality," in *Seasonal Analysis Of Economic Time Series*, ed. A. Zellner (U.S. Department of Commerce, Bureau of Census, 1978).
16. "Hypothesis Testing in Spectral Regression; The Lagrange Multiplier Test as a Regression Diagnostic," in *Evaluation of Econometric Models*, ed. Jan Kmenta and James Ramsey, (Academic Press, 1980).
17. "Testing Price Equations for Stability Across Frequency Bands," *Econometrica* 46 (1978): 869-881.
18. "Long Term Residential Load Forecasting," (with C.W.J. Granger, Allan Andersen, and Ramu Ramanathan) in *Forecasting and Modeling Time of Day and Seasonal Electricity Demands* (Electric Power Research Institute, Aspen, Colorado, 1977).
19. "Residential Load Curves and Time-Of-Day Pricing: An Econometric Analysis," (with C.W.J. Granger, Ramu Ramanathan, and Allan Andersen), *Journal of Econometrics* 9 (1979): 13-32.
20. "Review of `The Econometrics of Panel Data'," ed. Pascal Mazodier, *Economic Journal* 89 (1979): 999-1001.

21. "An Exploratory Policy Oriented Econometric Model of a Metropolitan Area: Boston," in *Essays in Quantitative Economics and Development in Memory of T.C. Liu*, ed. L.R. Klein, M. Nerlove, S.C. Tsiang (Academic Press, 1980).
22. "The Regional Response to Factor Supplies: Estimates for the Boston SMSA," in *Interregional Movements and Regional Growth; Coupe Papers on Public Economics*, ed. William Wheaton (Urban Institute, 1979).
23. "Some problems in the estimation of daily load shapes and peaks," (with C.W.J. Granger, Allen Mitchem, Ramu Ramanathan), in *Modeling and Analysis of Electricity Demand by Time-of-Day*, EPRI, EA-1304, December 1979.
24. *Regional Load Curve Models, Volumes 2, 4*, (with Granger and Ramanathan), EPRI EA-1672, Final Report of RP-1008.
25. "Exact Maximum Likelihood Methods for Dynamic Regressions and Band Spectrum Regressions," *International Economic Review* 21 (1980):391-407.
26. "Testing some propositions about Proposition 13," (with Richard Attiyeh), *National Tax Journal* 32 (979): 131-146.
27. "A Time Domain Approach to Dynamic Factor Analysis and Mimic Models," (with Mark Watson), *Les Cahiers de Seminaire d'Econometrie* No. 22, 1980.
28. "Estimation of the Price Elasticity of Demand Facing Metropolitan Producers," *Journal of Urban Economics* 6 (1979): 42-64.
29. "A One-Factor Multivariate Time Series Model of Metropolitan Wage Rates," (with Mark Watson), *Journal of the American Statistical Association* 76 (1981): 774-781.
30. "Autoregressive Conditional Heteroskedasticity With Estimates of the Variance of U.K. Inflation," *Econometrica* 50 (1982): 987-1008.
31. "Wald, Likelihood Ratio and Lagrange Multiplier Tests in Econometrics," in *Handbook of Econometrics, vol II*, ed. Griliches and Intrilligator (Amsterdam: North Holland, 1984), 775-826.
32. "Multiperiod forecast error variances of inflation estimated from ARCH models," (with Dennis Kraft), in *Applied Time Series Analysis of Economic Data*, ed. A. Zellner (Washington, D.C.: Bureau of the Census, 1983), 293-302.
33. "A Note on Robust Methods for ARIMA Models," in *Applied Time Series Analysis of Economic Data*, ed. A. Zellner (Washington, D.C.: Bureau of the Census, 1981), pp. 176-177.
34. "A Microeconomic Analysis of Vacant Housing Units," (with R. Marshall), in *The Urban Economy and Housing*, ed. Grieson (Lexington, 1983), 105-123.
35. "Applications of spectral analysis in econometrics," (with C.W.J. Granger), *The Handbook of Statistics, Vol. III, Time Series and the Frequency Domain*, ed. Krishniah and Brillinger (Amsterdam: North Holland, 1983), 93-109.
36. "Exogeneity," (with David F. Hendry and Jean-Francois Richard), *Econometrica* 51 (1983): 277-304.

37. "Alternative Algorithms for the Estimation of Dynamic Factor, MIMIC, and Varying Coefficient Regression Models," (with Mark Watson), *Journal of Econometrics* 23 (1983): 385-400.
38. "A General Approach to Lagrange Multiplier Model Diagnostics," *Journal of Econometrics* 20 (1982): 83-104.
39. "Estimates of the Variance of U.S. Inflation Based on the ARCH Model," *Journal of Money, Credit and Banking* 15 (1983): 286-301.
40. "A comment on 'The Econometric Analysis of Economic Time Series,'" *International Statistical Review* (2005) 51: 149-150.
41. "Two-step modeling for short term forecasting," (with Ramu Ramanathan, C.W.J. Granger) in *Studies in the Development and Implementation of Forecasting and State Estimation Procedures in the Electric Power Industry*, ed. D.W. Bunn and E.D. Farmer (New York: Wiley and Sons, 1983): 131-158
42. "Short-Term Forecasting of Electricity Sales: A Comparison of New Methodologies," (with Granger, Brown, Joiner, Stern and Wolin), in *Forecasting in an Era of Technological Change: Proceeding of Fifth Forecasting Symposium*, EPRI EA-4031, 1985, pp. 19-1 to 19-18.
43. "Combining Competing Forecasts of Inflation Based on a Multivariate ARCH Model," (with Dennis Kraft and C.W.J. Granger), *Journal of Economic Dynamics and Control* 8 (1984): 151-165.
44. "A Dymimic Model of Housing Price Determination," (with Mark Watson and David Lilien), *Journal of Econometrics*, 28 (1985): 307-326.
45. "Wholesale and Retail Prices: Bivariate Modeling with Forecastable Variances," (with C.W.J. Granger and Russell Robins), in *Model Reliability*, ed. David Belsley and Edwin Kuh, (Cambridge, MA: MIT Press, 1986), 1-17.
46. "Weather Normalization of Electricity Sales," (with Granger, Ramanathan, Train and Ignelzi), EPRI, 1983.
47. "Forecasting Electricity Sales Over the Short Term: A Comparison of New Methodologies," EPRI, 1986, (with Robert Goodrich): Report No. EM - 4772
48. "Discussion of 'Diagnostic Tests as Residual Analysis' by Pagan and Hall," *Econometric Reviews* 2 (1983): 223-228.
49. "Econometric Forecasting - A Brief Survey of Current and Future Techniques," (C.W. J. Granger), in *Forecasting in the Social and Natural Sciences*, ed. K.C. Land and S.H. Schneider, (Reidel Publishing Co., 1987), 117-140.
50. "The Billing Cycle and Weather Variables in Models of Electricity Sales," (with Kenneth Train, Patrice Ignelzi, Clive Granger, Ramu Ramanathan), *Energy* 9 (1984): 1041-1047.
51. "Model Selection for Forecasting," (with S. Brown), *Journal of Computation in Statistics*, (1985): 20
52. "Small-Sample Properties of ARCH Estimators and Tests," (with David Hendry and David Trumble), *Canadian Journal of Economics* 18 (1985): 66-93.
53. "Testing for Coefficient Stability with a Stationary AR(1) Alternative," (with Mark Watson), *Review of*

Economics and Statistics 67 (1985): 341-346.

54. "Semi-parametric estimates of the relation between weather and electricity demand," (with C.W.J. Granger, J. Rice and A. Weiss), *Journal of American Statistical Association* 81 (1986): 310-320.
55. "Transportation Costs and the Rent Gradient," (with N. Edward Coulson), *Journal of Urban Economics* 21 (1987): 287-297.
56. "The Kalman Filter: Applications to Forecasting and Rational Expectations Models," (with Mark Watson), Invited Paper to the World Congress of the Econometric Society, Cambridge, 1985, in *Advances in Econometrics Fifth World Congress, Volume I*, ed. Truman Bewley), pp. 245-283.
57. "Estimation of Time Varying Risk Premia in the Term Structure: the ARCH-M Model," (with David Lilien and Russell Robins), *Econometrica* 55 (1987): 391-407.
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