Time Series Analysis (Econ 2142)
Harvard University, Fall 2013
James D. Hamilton

Principal text:

TSA: James D. Hamilton, *Time Series Analysis*, Princeton University Press, 1994.

Course web page:

http://isites.harvard.edu/icb/icb.do?keyword=k96901

Office hours:

Professor Hamilton: Littauer Center 124, Tuesdays 10:15-11:15 (jhamilton@ucsd.edu)

Fernando Yu: Cubicle 30 (basement of Littauer Center), Thursdays 10-11 (yu8@fas.harvard.edu)

Grades:

30% in-class midterm scheduled for Thursday Oct 10
30% empirical exercise due Tuesday Nov 26
40% final exam scheduled for Thursday Dec 12, 8:30-11:30 a.m.

Tentative daily outline

Tu Sep 3: Difference equations and lag operators

TSA, Chapters 1 and 2

Th Sep 5: ARMA processes and forecasting

TSA, Chapters 3 and 4

Tu Sep 10: Estimation

TSA, Chapters 5 and 8

David N. DeJong and Charles H. Whiteman (1996), "Estimating Moving Average Parameters: Classical Pileups and Bayesian Posteriors," *Journal of Business & Economic Statistics* 11, pp, 311-317

Th Sep 12: Spectral analysis 1

TSA, Sections 6.1-6.2

Tu Sep 17: Spectral analysis 2

TSA, Sections 6.3-6.4

Timothy Cogley and James M. Nason (1995), "Effects of the Hodrick-Prescott filter on trend and difference stationary time series: Implications for business cycle research, *Journal of Economic Dynamics and Control* 19, pp. 253-278

Marianne Baxter and Robert G. King (1999), "Measuring Business Cycles: Approximate Band-Pass Filters for Economic Time Series," *Review of Economics and Statistics* 81, pp. 575-593

Wouter J. den Haan (2000), "The comovement between output and prices," *Journal of Monetary Economics* 46, pp. 3-30

Th Sep 19: Vector time series

TSA, Chapter 10

Donald W. K. Andrews (1991), "Heteroskedasticity and Autocorrelation Consistent Covariance Matrix Estimation," *Econometrica* 59, pp. 817-858

Wouter J. Den Haan, and Andrew Levin (1997), "A Practioner's Guide to Robust Covariance Matrix Estimation," *Handbook of Statistics*, Volume 15, Chapter 12, pp. 291-341

Nicholas M. Kiefer, Timothy J. Vogelsang, and Helle Bunzel (2000), "Simple Robust Testing of Regression Hypotheses," *Econometrica* 68, pp. 695-704

Nicholas M. Kiefer and Timothy J. Vogelsang (2002), "Heteroskedasticity-Autocorrelation Robust Standard Errors Using the Bartlett Kernel Without Truncation," *Econometrica* 70, pp. 2093-2096

Yixiao Sun and Min Seong Kim (2012), "Simple and Powerful GMM Over-identification Tests with Accurate Size," *Journal of Econometrics* 166, pp. 267-281

Yixiao Sun (2012), "Let's Fix It: Fixed-b Asymptotics versus Small-b Asymptotics in Heteroskedasticity and Autocorrelation Robust Inference," working paper, UCSD

Tu Sep 24: Atheoretical vector autoregressions

TSA, Sections 11.1-11.5

Th Sep 26: Structural vector autoregressions 1

TSA, Section 11.6

Tu Oct 1: Linear state-space models 1

TSA, Sections 13.1-13.7

Mark W. Watson and Robert F. Engle (1983), "Alternative Algorithms for the Estimation of Dynamic Factor, MIMIC and Varying Coefficient Regression Models," *Journal of Econometrics* 23, pp. 385-400

Th Oct 3: Linear state-space models 2

TSA, Section 13.8

Maximo Camacho and Gabriel Perez-Quiros (2010), "Introducing the Euro-Sting: Short Term Indicator of Euro Area Growth," *Journal of Applied Econometrics* 25(4), pp. 663–694

S. Boragan Aruoba, Jesus Fernandez-Villaverde, and Juan F. Rubio-Ramırez (2006), "Comparing Solution Methods for Dynamic Equilibrium Economies," *Journal of Economic Dynamics and Control* 30, pp. 2477–2508

Paul Klein (2000), "Using the Generalized Schur Form to Solve a Multivariate Linear Rational Expectations Model," *Journal of Economic Dynamics and Control* 24, pp. 1405-1423

Frank Smets and Raf Wouters (2003), "An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area," *Journal of the European Economic Association* 1, pp. 1123-1175

Ivana Komunjer and Serena Ng (2011), "Dynamic Identification of DSGE Models," *Econometrica* 79(6), pp. 1995-2032

Tu Oct 8: Forecasting evaluation and model comparison

Helmut Lütkepohl (2005), *New Introduction to Multiple Time Series Analysis*, Chapter 4

Rob J. Hyndman, Anne B. Koehler, Ralph D. Snyder and Simone Grose (2002), "A state space framework for automatic forecasting using exponential smoothing methods," *International Journal of Forecasting* 18(3), pp. 439-454

Rob J Hyndman and George Athanasopoulos (2013), *Forecasting: Principles and Practice*, Chapter 7 (online text available at http://otexts.com/fpp/)

Kenneth D. West (2006), "Forecasting Evaluation", in *Handbook of Economic Forecasting*, Volume 1, edited by Graham Elliott, C.W.J. Granger, and Allan Timmermann, Amsterdam: Elsevier

Raffaella Giacomini and Halbert J. White (2006), "Tests of Conditional Predictive Ability," *Econometrica* 74(6), pp. 1545-1578

Francis X. Diebold and Roberto S. Mariano (1995), "Comparing Predictive Accuracy," *Journal of Business and Economic Statistics* 13, pp. 253-263

Kenneth D. West (1996), "Asymptotic Inference about Predictive Ability," *Econometrica* 64, pp. 1067-1084

Michael W. McCracken (2007), "Asymptotics for Out of Sample Tests of Granger Causality," *Journal of Econometrics* 140, pp. 719–752

Todd E. Clark and Kenneth D. West (2007), "Approximately Normal Tests for Equal Predictive Accuracy in Nested Models," *Journal of Econometrics* 138, pp. 291–311

Th Oct 10: Midterm exam

Tu Oct 15: Introduction to nonstationary time series

TSA, Chapters 15 and 16

Th Oct 17: Functional Central Limit Theorem and unit-root processes

TSA, Chapter 17

James H. Stock (1994), "Unit roots, structural breaks and trends," in *Handbook of Econometrics*, Volume 4, pp. 2739-2841

Graham Elliott, Thomas J. Rothenberg, and James H. Stock (1996), "Efficient tests for an autoregressive unit root," *Econometrica* 64, pp. 813-836

Tu Oct 22: Nonstationary vector processes

TSA, Chapter 18

Th Oct 24: Cointegration and spurious regression

TSA, Chapter 19

Tu Oct 29: FIML estimation of cointegrated systems

TSA, Chapter 20

Th Oct 31: Dynamic models for large-dimensional vector systems

James H. Stock, and Mark W. Watson (2010), "Dynamic Factor Models," *Oxford Handbook of Economic Forecasting*, Michael P. Clements and David F. Hendry (eds), Oxford University Press

Jushan Bai, and Serena Ng (2002), "Determining the number of factors in approximate factor models", *Econometrica* 70, pp. 191-221

Seung C. Ahn, and Alex R. Hornstein (2013), "Eigenvalue Ratio Test for the Number of Factors," *Econometrica* 81, pp. 1203-1227

James H. Stock, and Mark W. Watson (2002), "Forecasting Using Principal Components from a Large Number of Predictors," *Journal of the American Statistical Association* 97, pp. 1167–1179

Dominico Giannone, Lucrexzia Reichlin, and David Small (2008), "Nowcasting: the real-time informational content of macroeconomic data," *Journal of Monetary Economics* 55, pp. 665-676

Ben S. Bernanke, Jean Boivin and Piotr. Eliasz (2005), "Measuring the effects of monetary policy: a factor-augmented vector autoregressive (FAVAR) approach", *Quarterly Journal of Economics* 120, pp. 387–422

Jing Cynthia Wu and Fan DoraXia (2013), "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound," http://econweb.ucsd.edu/~faxia/pdfs/JMP.pdf

Tu Nov 5: Structural vector autoregressions 2

Olivier J. Blanchard and Danny Quah (1989), "Dynamic Effects of Aggregate Demand and Supply disturbances," *American Economic Review* 79, pp. 655-672

Jon Faust, Eric T. Swanson, and Jonathan H. Wright (2004), "Identifying VARs Based on High-Frequency Futures Data." *Journal of Monetary Economics* 51, pp. 1107-31

James H. Stock and Mark W. Watson (2012), "Disentangling the Channels of the 2007–09 Recession," *Brookings Papers on Economic Activity* Spring 2012, pp. 81-130

Mark Gertler and Peter Karadi (2013), "Monetary Policy Surprises, Credit Costs, and Economic Activity," http://conference.nber.org/confer/2013/FCMPf13/GertlerKaradi2013Oct3draftd.pdf

Ricardo Rigobon and Brian Sack (2004), "The impact of Monetary Policy on Asset Prices," *Journal of Monetary Economics* 51, pp. 1553-1575

Wright, Jonathan (2012), "What does Monetary Policy do to Long-term Interest Rates at the Zero Lower Bound?", *Economic Journal* 122, pp.F447-F466

Juan Rubio-Ramírez, Daniel F. Waggoner, and Tao Zha (2010), "Structural vector autoregressions: theory of identification and algorithms for inference," *Review of Economic Studies* 77, pp. 665-696

Christiane Baumeister and James D. Hamilton (2013), "Sign Restrictions, Structural Vector Autoregressions, and Useful Prior Information," http://dss.ucsd.edu/~jhamilto/bh1.pdf

Th Nov 7: Markov-switching processes 1

TSA, Chapter 22

Marcelle Chauvet and James D. Hamilton (2006), "Dating Business Cycle Turning Points," in *Nonlinear Analysis of Business Cycles*, edited by Dick van Dijk , Costas Milas, and Philip Rothman

Tu Nov 12: Markov-switching processes 2

Aaron Smith, Prasad A. Naikb, and Chih-Ling Tsaib (2006), "Markov-switching model selection using Kullback–Leibler divergence," *Journal of Econometrics* 134, pp. 553–577

Marine Carrasco, Liang Hu, and Werner Ploberger (2013), "Optimal Test for Markov Switching Parameters", working paper, University of Montreal

Th Nov 14: Structural breaks

Franklin M. Fisher (1970), "Tests of Equality Between Sets of Coefficients in Two Linear Regressions: An Expository Note," *Econometrica* 38, pp. 361-366

Donald W. K. Andrews (1993), "Tests for Parameter Instability and Structural Change with Unknown Change Point", *Econometrica* 61, pp. 821-856; Errata, *Econometrica* (2003), 71, pp. 395-397

Donald W. K. Andrews and Werner Ploberger (1994), "Optimal Tests When a Nuisance Parameter is Present Only under the Alternative," *Econometrica* 62, pp. 1383-1414

Jushan Bai and Pierre Perron (1998), "Testing for and Estimation of Multiple Structural Changes," *Econometrica* 66(1), pp. 47-78

Jushan Bai and Pierr Perron (2003), "Computation and Analysis of Multiple Structural Change Models," *Journal of Applied Econometrics* 18:1-22

Tu Nov 19: Nonlinear state-space models 1

James D. Hamilton (2005), "What's Real About the Business Cycle?", *Federal Reserve Bank of St. Louis Review*, July/August, 87(4), pp. 435-52

James D. Hamilton (1994), "State-space models," in *Handbook of Econometrics*, Vol. 4, pp. 3039-3080, edited by Robert F. Engle and Daniel L. McFadden, Amsterdam: North-Holland

John Geweke (1989), "Bayesian inference in econometric models using Monte Carlo integration," *Econometrica* 57, pp. 1317-1139

Drew Creal (2012), "A Survey of Sequential Monte Carlo Methods for Economics and Finance," *Econometric Reviews* 31(3), pp. 245-296

Thomas Flury and Neil Shephard (2011), "Bayesian Inference Based Only on Simulated Likelihood: Particle Filter Analysis of Dynamic Economic Models," *Econometric Theory* 27, pp. 933-956

Th Nov 21: Nonlinear state-space models 2

Jesús Fernández-Villaverde and Juan F. Rubio-Ramírez (2007), "Estimating Macroeconomic Models: A Likelihood Approach," *Review of Economic Studies* 74(4), pp. 1059-1087

Tu Nov 26: Time-varying second moments 1

TSA, Chapter 21

James D. Hamilton (2010), "Macroeconomics and ARCH," in *Festschrift in Honor of Robert F. Engle*, pp. 79-96, edited by Tim Bollerslev, Jeffry R. Russell and Mark Watson (http://dss.ucsd.edu/~jhamilto/JHamilton_Engle.pdf)

Tu Dec 3: Time-varying second moments 2

Sangjoon Kim, Neil Shepherd, and Siddhartha Chib (1998), "Stochastic Volatility: Likelihood Inference and Comparison with ARCH Models," *Review of Economic Studies* 65, pp. 361-393

Giorgio E. Primiceri (2005), "Time Varying Structural Vector Autoregressions and Monetary Policy," *Review of Economic Studies* 72, pp. 821–852

Siddhartha Chib, Federico Nardari and Neil Shephard (2002), "Markov Chain Monte Carlo Methods for Stochastic Volatility Models", *Journal of Econometrics* 108, pp. 281-316

Torben G. Andersen, Timothy Bollerslev, and Francis X. Diebold (2002), "Parametric and Nonparametric Volatility Measurement," in *Handbook of Financial Econometrics*, edited by Yacine Aït-Sahalia and Lars P. Hansen, Amsterdam, North Holland (http://home.uchicago.edu/~lhansen/abd_handbook_101304.pdf)

Robert Engle (2002), "Dynamic Conditional Correlation: A Simple Class of Multivariate Generalized Autoregressive Conditional Heteroskedasticity Models," *Journal of Business & Economic Statistics* 20(3), pp. 339-350