University of Houston Department of Political Science
POLS 6385: Time Series Methods
Spring 2009
Mondays and Wednesdays, 10:00-11:30 pm, PGH 405

Instructor: Tim Hellwig
Office: PGH 447D
Office hours: M-W 2:30-4:00 pm, or by appointment
E-mail: thellwig@uh.edu
Phone: 713-743-3914

Course Description

This course provides a general introduction to time series analyses in the social sciences, with an emphasis on applications in political science. The course is organized to provide students with working knowledge of two major approaches to time series analysis, Box-Jenkins/ARIMA and regression procedures. After introducing some of the concepts essential to dynamic modeling, the course begins by examining Box-Jenkins, or ARIMA modeling. In this context, we will examine how to build and test transfer function/intervention models. We then turn to times series regression and consider how the properties of time-series modeling involve additional (diagnostic) challenges but also additional (substantive) benefits compared to cross-sectional analyses. We then will devote consecutive weeks considering vector autoregression, unit-root tests and (fractional) cointegration, time series models for heteroskedasticity and regime-switching models, and pooled cross-sectional time series designs. While we'll spend considerable time on the technical problems involved in time-series, the primary emphasis is on applied work and on "doing" time-series.

This course assumes successful completion of the first year statistics sequence, POLS 6480 and 6841, or its equivalent. If you have questions or concerns about the technical nature of the course, please come see me.

Learning Outcomes

By the end of the course, students will be able to read and critically evaluate the contemporary research in political science, economics, and political economy which employ time-series models for testing hypotheses. Students also will be equipped to perform correctly-specified time-series designs in their own research.

Readings and Assignments

The following texts have been ordered for this course and are available at the UC bookstore. All required readings are taken from these texts, from a CD available from me, or from the web (from URL provided, otherwise JSTOR). Other materials may be made available via my website, http://www.polsci.uh.edu/hellwig/courses/courses.htm

Walter Enders. 2004. *Applied Econometric Time Series*, 2nd ed. Hoboken, NJ: Wiley.

Patrick T. Brandt and John T. Williams. 2006. *Multiple Time Series Models*. Thousand Oaks, CA: Sage.

Recommended Texts
Other books that may serve as helpful references and may be used in the course include:

Charemza, W.W. and Derek F. Deadman. *New Directions in Econometric Practice*. 2nd edition. Aldershot: Edward Elgar, 1997.

Goldberg, Samuel. 1958. *Introduction to Difference Equations*. New York: John Wiley and Sons.

John D. Hamilton. 1994. *Time Series Analysis*. Princeton, NJ: Princeton University Press.

David F. Hendry. 1995. *Dynamic Econometrics*. Oxford: Oxford University Press.

R.R. Huckfeldt, C.W. Kohfeld, and T.W. Likens. 1982. *Dynamic Modelling: An Introduction*. Beverly Hills, CA: Sage.

G.S. Maddala and In-Moo Kim. 1998. *Unit Roots, Cointegration, and Structural Change*. Cambridge: Cambridge University Press.

McCleary and Hay. 1980. *Applied Time Series Analysis for the Social Sciences*. Beverly Hills, CA: Sage (out of print but useful)

R.S. Pindyck and D.L. Rubenfeld. 1991. *Econometric Models and Economic Forecasts*, 3rd ed. New York: McGraw-Hill.

STATA Time-Series Reference Manual. 2005. College Station, TX: Stata Press (OPTIONAL)

J.M. Wooldridge. 2006. *Introductory Econometrics*, 3rd ed. Mason, OH: Thomson.

Data and Software:
This class requires analysis of data which you collect. Each member of the class will be required to gather time serial data for use during the semester. The length of the series should be at least 40 time points – the longer, the better. You don't have to use the same data for the whole semester, but you are welcome to do so. For software, the Social Science Data Lab has licenses for RATS and STATA. RATS (Regression Analysis of Time Series) is specifically geared for time series and, as such, there are many "canned" procedures available. Accordingly, we will spend some course sessions in the lab going over the RATS commands. STATA has become widely used in political science, though is not specifically designed for time series analysis (it keeps improving, though!). You are also free to use other programs, such as R or Eviews. We will occasionally meet in the Social Science Data Lab (4th floor, PGH) to go over the software commands.

Evaluation of student performance:
Students are expected to attend all classes and complete all the required reading before each class session (for maximum understanding, read the pieces again immediately after class).
Evaluation will be based on the following:

Participation (includes in-class presentation of article): 10%
Problem set: 10%, due around Feb 2
Paper 1 - ARIMA modeling: 20%, due around Feb 25
Paper 2 - Time series regression and VAR: 20%, due around Mar 25
Paper 3 - Unit roots and Cointegration: 20%, due around Apr 29
Final exam: 20%

Papers should show evidence of integrating material from the readings and applying them to your own data analysis. Since the work is cumulative, it is imperative that you not fall behind. Given possible changes to the schedule, paper due dates are tentative – I will announce firm deadlines as we proceed. I will pass out the problem set and paper assignments in advance.

ADA Statement: The American with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact UH's Center for Students with Disabilities (CSD) at (713) 743-5400.

TENTATIVE COURSE OUTLINE
The course outline follows below. Please note that the expected time allotted to each topic may (and probably will) change. I will announce in class what readings/assignments you should have completed as we proceed. I expect we will get through all or most of the topics during the semester, though we may need to spend a bit more time on some topics and a bit less on others than is indicated in the outline. I reserve the right to make adjustments to this schedule as we proceed. On this note, do let me know as we progress if there are topics which you are particularly interested in or which are particularly relevant to your research. Any changes to the schedule will be announced in advance in class.

Week 1: Jan 19 (MLK holiday), Jan 21
Topic: Introduction, discuss data

- Box Steffensmeier, Jan, John Freeman, and Jon Pevehouse. "Modeling Social Dynamics." Chapter 1 of *Time Series Analysis for Social Science*, in progress (on CD)

Week 2: Jan 26 & 28
Topic: Linear Difference Equations
Required:

- Enders, sections 1.1-1.4 of chapter 1
- Box Steffensmeier, Jan, John Freeman, and Jon Pevehouse. "Time Series Models as Difference Equations." Chapter 2 of *Time Series Analysis for Social Science*, in progress (on CD)
- Sprague, John. 1981. "One Party Dominance in Legislatures." *Legislative Studies Quarterly* 6(2): 259-285.
- Przeworski, Adam, and John Sprague. 1986. *Paper Stones: A History of Electoral Socialism*, skim pp. 1-11, read 57-99, 187-192. (on CD)

Recommended:

- Goldberg, Samuel. *Introduction to Difference Equations*, pp. 9-87 (focus on pp. 9-21, 34-39, and 50-87 and skim the rest)
- Huckfeldt, Kohfeld, and Likens, ch. 1-3.

Weeks 3 & 4: Feb 2, 4, 9 & 11
Topic: Box-Jenkins - Univariate ARMA Models
Required:

- McCleary and Hay, ch. 2 (on CD)
- Enders, ch. 2
- Li, R.P. 1976. "A Dynamic Comparative Analysis of Presidential and House Elections." *AJPS* 20(4): 670-691.
- Green, D., B. Palmquist, and E. Schickler. 1998. "Macropartisanship: A Replication and Critique." APSR 92(4): 833-899.

Recommended:

- MacKuen, M., Erikson, R., and Stimson, J. 1989. "Macropartisanship." APSR 83(4): 1125-42.
- Haynie, Stacia. 1992. "Leadership and Consensus on the U.S. Supreme Court." JOP 54(4): 1158-69.

Weeks 5 & 6: Feb 16, 18, 23 & 25
Topic: Multivariate Analysis
Intervention Analysis
Required:

- McCleary and Hay ch. 3 (on CD)
- Enders pp. 239-247
- D. Hibbs. 1977. "Political Parties and Macroeconomic Performance." APSR 71(4): 1467-1479.
- B. Dan Wood. 1988. "Principals, Bureaucrats, and Responsiveness in Clean Air Enforcements." APSR 82(1): 213-236.

Transfer Functions
Required:

- Enders pp. 247-264
- J. Alt. 1985. "Political Parties, World Demand, and Unemployment." APSR 79(4): 1016-1040.
- Edward G. Carmines and James A. Stimson. 1986. "On the Structure and Sequence of Issue Evolution." *The American Political Science Review*, Vol. 80, No. 3., pp. 901-920.

Recommended:

- McCleary and Hay Ch. 5
- Norpoth, H. 1986. "Transfer Function Analysis." In W. D. Berry and M. S. Lewis-Beck, eds. New Tools for Social Scientists. Beverly Hills and London: Sage Publications.
- Clarke, H. D., J. Rapkin and M. C. Stewart. 1994. "A President Out of Work: The Economics and Politics of Presidential Approval in the Bush Years." *British Journal of Political Science* 24: 292-305.

- M. Suzuki and H.W. Chappell, Jr. 1996. "The Rationality of Economic Voting Revisited." JOP 58(1): 224-236.

Week 7: Mar 2 & 4
Topic: Principles of Time-Series Regression Analysis
Required:

- Pindyck and Rubinfeld, pp. 159-170 and 229-242 (on CD)
- Luke Keele and Nathan J. Kelly. 2006. "Dynamic Models for Dynamic Theories: The Ins and Outs of Lagged Dependent Variables." *Political Analysis* http://www.polisci.ohio-state.edu/faculty/lkeele/pa2006.pdf
- Robert H. Durr, John B. Gilmour, and Christina Wolbrecht. 1997. "Explaining Congressional Approval." *American Journal of Political Science* 41:175-207.
- DeBoef, Suzanna, and Keele, Luke J. 2008. "Taking Time Seriously: Dynamic Regression." *AJPS* 52:1, 184-200.

Recommended:

- D. Hibbs. 1973-4. "Problems of Statistical Estimation and Causal Inference in Time Series Regression models." Sociological Methodology, pp. 252-270.
- N. Beck. 1991. "Comparing Dynamic Specifications: The Case of Presidential Approval." *Political Analysis* 3:51-88

Week 8: Mar 9 & 11
Topic: Vector Autoregression
Required:

- Enders, Applied Econometric Time Series, Chapter 5, sections 5.5-5-10 (pp. 264-295)
- Brandt and Williams. 2006. *Multiple Time Series Models*, pp. 1-50, 59-70
- Freeman, J. R., J. T. Williams and T. Lin. 1989. "Vector Autoregression and the Study of Politics." AJPS 33:842-77.
- Wood, B.D., C.T. Owens, and B.M. Durham. 2005. "Presidential Rhetoric and the Economy." JOP 67(3): 627-645

Recommended:

- Brandt and Williams. 2006. *Multiple Time Series Models*, pp. 50-84
- Freeman, John R. 1983. "Granger Causality and the Time Series Analysis of Political Relationships." AJPS 27: 327-58.
- Williams, John T. 1990. "The Political Manipulation of Macroeconomic Policy." APSR 84: 767-96.
- Edwards, George C. III, and B. Dan Wood. 1999 "Who Influences Whom? The President, Congress, and the Media." APSR 93(2): 329-44.

SPRING BREAK (March 16 and 18)

Week 9: Mar 23 & 25
Topic: Unit Roots, Cointegration, and Error Correction Models
Required:

- Enders, Ch. 4, sections 4.3-4.7 (pp. 170-199) and Ch. 6, sections 6.1-6.6 (pp. 319-347)

- Murray, M. 1994. “A Drunk and her Dog: An Illustration of Cointegration and Error Correction.” *The American Statistician* 48(1): 37-39.
- Clarke, H. D. and M. C. Stewart. 1994. “Prospections, Retrospections and Rationality: The 'Bankers' Model of Presidential Approval Reconsidered.” American Journal of Political Science 38:1104-23.
- De Boef, Suzanna, and Paul Kellstedt. 2004. “The Political (and Economic) Origins of Consumer Confidence.” AJPS 48(4): 633-49.

Recommended:

- De Boef, Suzanna. 2001. “Modeling Equilibrium Relationships: Error Correction Models with Strongly Autoregressive Data.” *Political Analysis* 9(1): 78-94.
- Clarke, H. D. and M. C. Stewart. 1995. “Economic Evaluations, Prime Ministerial Approval and Governing Party Support: Rival Models Reconsidered.” BJPS 25: 145-70.
- Krause, George. 1977. “Voters, Information Heterogeneity, and the Dynamics of Aggregate Economic Expectations.” AJPS 41: 1170-1200.

Week 10: Mar 30 & Apr 1
Topic: Near Integration, Fractional Integration and Fractional Cointegration
Required:

- DeBoef, Suzanna and Jim Granato. 1997. “Near-integrated Data and the Analysis of Political Relationships.” American Journal of Political Science 41: 619-40.
- Lebo, M., R. W. Walker and H. D. Clarke. 1999. "You Must Remember This: Dealing with Long Memory in Political Analyses." Electoral Studies 19:31-48.
- Box-Steffensmeier, J.M., and R.M. Smith. 1996. “The Dynamics of Aggregate Partisanship.” APSR 90(3): 567-580.
- Box-Steffensmeier, J.M, S. De Boef, and T. Lin. 2004. “The Dynamics of the Gender Gap.” APSR 98(3): 515-28.

Recommended:

- Clarke, H. D. and M. Lebo. 2003. "Fractional (Co)Integration and Governing Party Support in Britain." British Journal of Political Science 33: 283-301.
- Box-Steffensmeier, J.M., and R.M. Smith. 1998. “Investigating Political Relationships using Fractional Integration Methods. AJPS 42(2): 661-89.
- DeBoef, Suzanna. 2000. “Modeling Equilibrium Relationships: Error Correction Models with Strongly Autoregressive Data.” *Political Analysis* 9(1): 78-94.

Week 11: Apr 6 & 8
Topic: Time Series Models for Heteroskedasticity
Required:

- Enders, chapter 3
- Gronke, Paul, and John Brehm. 2002. “History, Heterogeneity, and Presidential Approval: A Modified ARCH Approach.” *Electoral Studies* 21(3): 425-52. (on CD)
- Jensen, N., and Schmith, S. 2005. “Market Responses to Politics: The Rise of Lula and the Decline of the Brazilian Stock Market.” *Comparative Political Studies* 38: 1245-70. (on CD)
- Hellwig, Timothy. 2007. “Economic openness, policy uncertainty, and the dynamics of government support.” *Electoral Studies* 26: 772-86.

Recommended:

- Maestas, Cherie, and Robert Preuhs. 2000. "Modeling Volatility in Political Time Series." *Electoral Studies* 19: 95-110. (on CD)
- William Bernhard and David Leblang (2006) "Polls and Pounds: Public Opinion and Exchange Rate Behavior in Britain", *Quarterly Journal of Political Science*: Vol. 1:No. 1, pp 25-47. [available free at http://www.qjps.com/]

Week 12: Apr 13 & 15
Topic: Regime Switching , Time-varying Coefficients, and Structural Change
Required:

- Freeman, J., J. Hays, and H. Stix. 2000. "Democracy and Markets: The Case of Exchange Rates." AJPS 44: 449-468.
- Leblang, David, and Bumba Mukherjee. 2004. "Presidential Elections and the Stock Market: Comparing Markov-Switching and (FI)GARCH Models of Stock Volatility." *Political Analysis* 12:296-322
- Wood, B. Dan, Jon Bond, and Richard Fleischer. 2003. "The Time Varying Effect of Public Approval on Presidential Success in Congress." *Journal of Politics* 65: 92-110.
- Lebo, Matthew J., and Janet M. Box-Steffensmeier. 2008. "Dynamic Conditional Correlations in Political Science." AJPS 52(3): 688-704.

Recommended:

- Enders pp. 200-207
- Perron, Pierre. 1989. "The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis." *Econometrica* 57: 1361-1401
- Beck, N. 1983. "Time-varying Parameter Regression Models." AJPS 27: 557-600.
- Wood, B. Dan. 2000. "Weak Theories and Parameter Instability." AJPS 44(3): 603-18.

Weeks 13 & 14: Apr 20, 22, 27 & 29
Topic: Pooled Time-Series Cross-Sectional Analysis
Required:

- Stimson, J. A. 1985. "Regression in Space and Time: A Statistical Essay." AJPS 29: 914-47
- N. Beck and J. Katz. 1995. "What do to (and not to do) with Time-Series Cross-Section Data." APSR 89: 634-647.
- N. Beck. Time-Series—Cross-Section Methods. Forthcoming, Oxford Handbook of Political Methodology. Available at http://politics.as.nyu.edu/docs/IO/2576/beck.pdf
- Kittel, Bernhard, and Hannes Winner. 2005. "How reliable is pooled analysis in political economy? The globalization-welfare state nexus revisited." *European Journal of Political Research* 44: 269-93.
- N. Beck, J. Katz, and R. Tucker. 1998. "Taking Time Seriously: Time-Series Cross-Section Analysis with a Binary Dependent Variable." AJPS 42: 1260-1288.

Recommended and more applications:

- Green, D. P., S.Y. Kim, and D.H. Yoon. 2001. "Dirty Pool." *International Organization* 55(2): 441-68.

- Carter, David B., and Curtis S. Signorino. "Back to the Future: Modeling Time Dependence in Binary Data" working paper available at http://www.rochester.edu/college/psc/signorino/research/CarterSignorino2007.pdf
- Garrett, Geoffrey, and Deborah Mitchell. 2001. "Globalization, government spending and taxation in the OECD." *European Journal of Political Research* 39: 145-77.
- Rudra, Nita. 2005. "Globalization and the Strengthening of Democracy in the Developing World." AJPS 49(4): 704-30.
- Radcliff, B. and P. Davis. 2000. "Labor Organization and Electoral Participation in Industrial Democracies." AJPS 44(1): 132-41.
- Tavits, Margit. 2008. "The Role of Parties' Past Behavior in Coalition Formation." APSR 102(4): 495-507.

Week 15: May 4

Catch up, review, *or* choose topic(s) below

Topic: Spatial Econometrics

- Beck, N., K.S. Gleditsch, and K. Beardsley. 2006. "Space is More than Geography: Using Spatial Econometrics in the Study of Political Economy." *International Studies Quarterly* 50: 27-44 – available at http://www.blackwell-synergy.com/doi/pdf/10.1111/j.1468-2478.2006.00391.x?cookieSet=1
- Franzese, R.F., and J.C. Hays. nd. "Spatial Econometric Models for the Analysis of TSCS Data in Political Science." Working paper, University of Michigan. Available at http://www-personal.umich.edu/~franzese/FranzeseHays_SpatialEcon_PA.Final.pdf

Topic: Bayesian Time Series

- Brandt, P.T., and J.R. Freeman. 2006. "Advances in Bayesian Time Series Modeling: Theory Testing, Forecasting, and Policy Analysis." *Political Analysis* 14(1): 1-36.