POL 9594 Time Series Analysis
Summer 2022
Monday, Tuesday, and Thursday 1-4:00pm

Prof. Matthew Lebo
Office: SSC 7239
Email: matthew.lebo@uwo.ca (usually the best way to contact me)

I. Overview:

This course introduces students to time series methods and to the applications of these methods in political and social science. This is going to go fast! We will begin with defining key concepts of time series analysis and then move on to testing for the univariate characteristics of our data. We will cover regression models for stationary, non-stationary, and fractionally integrated data. We'll spend a day on forecasting as well. We will also study some more advanced techniques in time series analysis including cointegration, error correction models, bounds approaches, ARCH, GARCH, and ARFIMA methods. We will also spend some time learning about methods for studying time-varying relationships such as repeated cross-sectional analysis and dynamic conditional correlations.

II. Computer Work

We will be using Stata for most or all of the material. This is available to you through Western's server.

Most class materials, such as class notes, data sets and readings, will be put on OWL

III. Required and Recommended Texts

Two books are required for the course:

Suzanna Linn, Matthew Lebo, and Clay Webb. *We're working on it!* A Practical Guide to Time Series Analysis. I will share pdfs of chapters. **LLM**

Box-Steffensmeier, Freeman, Hitt, and Pevehouse. 2014. *Time Series Analysis for the Social Sciences*. Cambridge University Press. **BFHP**

Other good time series books:
Enders, Walter. *Applied Econometric Time Series, 4th Edition*. New York: John Wiley and Sons. 2014. ISBN: 978-1-118-80856-6. Find a used copy – maybe the international version – a new copy is ridiculously expensive. Or the second or third edition is fine too.

Pickup, Mark. 2015. *Introduction to Time Series Analysis*. Thousand Oaks, California: Sage.

Box-Steffensmeier and Jones. 2004. Event History Modeling: A guide for Social Scientists. Cambridge University Press.

Box, George E.P., Gwllyum M. Jenkins, and Gregory C. Reinsel. *Time Series Analysis: Forecasting and Control* 4th Edition. 2008. ISBN 978-0-470-27284-8.

Pindyck, Robert. S. & Daniel L. Rubinfeld. *Econometric Models and Economic Forecasts, 2nd Edition* (or later). New York: Mcgraw-Hill. 1981. ISBN: 0-07-050096-7.

McCleary and Hay. 1980. *Applied Time Series Analysis for the Social Sciences. An out-of-print classic.*

Engle, R.F. and C.W.J. Granger, Eds. *Long-run Relationships: Readings in Cointegration.* Oxford, UK: Oxford University Press. 1991. ISBN: 0-19-828338-5. *A classic book by the guys who won the Nobel Prize in large part for developing this methodology.*

IV. Course Requirements
Students are expected to do all the assigned reading and to attend all classes.
Course evaluation will be based on:

3 graded homework assignments: 10% each.
One paper: 40%.
Final Exam: 30%

I strongly advise students to begin data collection very early in the semester. With a good data set in hand you can do some research on a substantive problem and by the time you analyze the data for a term paper you will have many key parts to a possible journal submission.

V. Class Schedule and Readings
(note: some tweaking of this will be done)
Read before the class for which these are assigned.

Class 1 May 30th
Topic: Introduction to the course and review of time series fundamentals
- Notation and terminology
- Autoregression, autocorrelation and serial correlation
- Stationarity
- Exogeneity
- Weak dependence
- Trending, cycling and structural breaks
- Instability and integration

Readings:
LLW, Chapters 1 & 2.
Pickup, Mark. 2015. *Introduction to Time Series Analysis.* Thousand Oaks, California: Sage
        Publications, Inc., Chapter 1 and Chapter 2.

Class 2 May 31st Topic: Testing for autocorrelation, integration, stationarity, and testing.
Reading:
LLW Chapters 2 and 3.
BFHP – Chapter 2.

Class 3 June 2nd Topics: Exogeneity
Reading:
LLW Chapter 4

Class 4 June 6th Topic: Regression Models for Stationary Time Series.
Reading:
LLW Chapter 5
BFHP – Chapter 3.

Class 5 June 7th Topic: The ADL and the GECM
Readings:
Matthew Lebo, Patrick Kraft, and Ellen Key. 2022. "Cointegration testing with the GECM" *Political Science Research Methods*.
Matthew Lebo and Taylor Grant. 2016. "Equation Balance and Dynamic Political Modeling." *Political Analysis* 24(1): 69-82.
Mark Pickup and Paul Kellstedt. 2022. "Balance as a pre-estimation test for longitudinal analysis." *Political Analysis*.
Recommended:
Keele, Luke. 2007. "Social Capital and the Dynamics of Trust in Government." *American Journal of Political Science* 51(2): 241–254.
Casillas, Christopher J, Peter K Enns, and Patrick C Wohlfarth. 2011. "How Public Opinion Constrains the US Supreme Court." *American Journal of Political Science* 55(1): 74–88.
De Boef and Keele. 2008. "Taking Time Seriously." *AJPS*.

Class 6 June 9th Topic: Unit Roots, Cointegration, and Error Correction Models.
Reading:
LLW Chapter 6.
BFHP – Chapter 5-6.
Murray, Michel P. 1994. "A Drunk and Her Dog: An Illustration of Cointegration and Error Correction." *The American Statistician* 48:37-9.
Clarke, Harold D. and Marianne C. Stewart. 1994. "Prospections, Retrospections, and Rationality: The 'Bankers' Model of Presidential Approval Reconsidered." *AJPS*, 38(4):1104-23.
Recommended:
Durr, R. 1993. "What Moves Policy Sentiments." *APSR* 87(1):158-172.
Engle, R.F. and Clive W.J. Granger. 1991. *Long Run Econometric Relationships: Readings in Cointegration*. New York: Oxford University Press.
Grant, Taylor and Matthew Lebo. 2016. "Error Correction Methods with Political Time Series." *Political Analysis* 24(1) 3-30.
Luke Keele, Suzanna Linn, and Clayton Webb. 2016. "Treating Time with all Due Seriousness." *Political Analysis* 24(1) 31-41.

Class 7: June 13th
Topic: Near Integration, Fractional Integration, and Fractional Cointegration.
Reading:
BFHP Chapter 7.
Enders. Chapter 4.
Box-Steffensmeier, Janet M. and Renee M. Smith. 1996. "The Dynamics of Aggregate Partisanship." *American Political Science Review* 90(3):567-80.
Clarke, Harold D. and Matthew J. Lebo. 2003. "Fractional (Co)integration and Governing Party Support in Britain. *British Journal of Political Science* 33:283-301.
DeBoef, Suzanna and Jim Granato. 1997. "Near-Integrated Data and the Analysis of Political relationships." *American Journal of Political Science*, 41(2):619-40.

Recommended:

DeBoef, Suzanna. 2000. "Modeling Equilibrium Relationships: Error Correction Models with Strongly Autoregressive Data." *Political Analysis* 9(1):78-94.

Lebo, Matthew J., Robert Walker and Harold Clarke. 2000. "You Must Remember This: Dealing with Long Memory in Political Analyses." *Electoral Studies* 19:31-48.

Class 8: June 14th
Topic: Bounds Approaches to Inference with Time Series
Readings:
LLW Chapter 7.

Clayton Webb, Suzanna Linn, and Matthew Lebo. "Beyond the Unit Root Question: Drawing Inferences about Long Run Relationships Given Uncertain Univariate Dynamics."

Clayton Webb, Suzanna Linn, and Matthew Lebo. Forthcoming. "A Bounds Approach to Inference using the Long Run Multiplier." *Political Analysis.*

Philips, Andrew Q. 2018. "Have your cake and eat it too? Cointegration and dynamic inference from autoregressive distributed lag models."

Recommended:

Pesaran, M. Hashem, Yongcheol Shin, and Richard J. Smith. "Bounds Testing Approaches to the Analysis of Level Relationships." *Journal of Applied Econometrics* 16:289-326.

Class 9 June 16th Topic: Time Series Regression Models and Election Forecasting
Reading:
Time Series Regression Models:
Gujarati 17.
Hamilton 8-9.
DeBoef and Keele. 2008. "Taking Time Seriously." *American Journal of Political Science*.
Forecasting:
BFHP Second half of Chapter 7

Pindyck, Robert and Daniel L. Rubenfeld, "Estimating and Forecasting with Time Series Models" Chapter 18 in *Economic Models and Econometric Forecasting* 4th Ed. NY: McGraw Hill, 1998: 549-579.

Lebo and Norpoth. 2007. "The PM and the Pendulum: Dynamic Forecasting of British Elections."
Recommended:
Pindyk and Rubenfeld, Sections 6.2 and 9.1.

Class 10 June 20th
Topic:
Topic: Vector Autoregression, Exogeneity, Granger Causality, and Seemingly Unrelated Regressions
Reading:
LLW. *A Practical Guide to Time Series Analysis*. Cambridge University Press. Chapters 8-9.
BFHP – Chapter 4.
Recommended:
Freeman, John R. 1983. "Granger Causality and the Time Series Analysis of Political Relationships." *American Journal of Political Science* 27:327-358.

Freeman, John, J. Williams, and T. Lin. 1989. "Vector Autoregression and the Study of Politics." *American Journal of Political Science:* 842:77.

Brandt, Patrick T., John T. Williams. 2007. Multiple Time Series Models. Thousand Oaks, California: Sage Publications, Inc., Chapters 2 (remainder) and 3.

Moore, Will H. And David J. Lanoue. 2003. "Domestic Politics and US Foreign Policy: A Study of Cold War Conflict Behaviour." The Journal of Politics 65:376-96.

Thurman, W., and M. Fisher. 1988. "Chickens, Eggs, and Causality, or Which Came First?" *American Journal of Agricultural Economics* 237-238.

Clarke, Harold, Marianne Stewart, Michael Ault, and Euel Elliott. 2005. "Men, Women and the Political Economy of Presidential Approval." *BJPS*, 35:31-51.

Class 11 June 21st
Topic:
ARCH, GARCH, and Dynamic Conditional Correlations.
Reading:

Douglas Kriner and Liam Schwartz. "Partisan Dynamics and the Volatility of Presidential Approval." *BJPS* 39:609-31.

Paul Gronke and John Brehm. 2002. "History, Heterogeneity, and Presidential Approval: A Modified ARCH Approach." *Electoral Studies*.

Lebo, Matthew and Janet Box-Steffensmeier. 2008. "Dynamic Conditional Correlations in Political Science." *American Journal of Political Science* 52(3): 688-704.

Recommended:

Gujarati, Chapter 12.

Engle, Robert F. 2002. "Dynamic Conditional Correlation – A Simple Class of Multivariate GARCH." *Journal of Business and Economics Statistics* 17:425-46.

Kellstedt, Paul M., Suzanna Linn, and A. Lee Hannah. 2015. "The Usefulness of Consumer Sentiment: Assessing Construct and Measurement." *Public Opinion Quarterly* 79(1): 181-203.

Bauwens, Luc, et al. 2006. "Multivariate GARCH Models: A Survey" *Journal of Applied Econometrics* 21:79-109.

Class 12 June 22nd
Topic: Pooled Cross-Sectional Time Series, Rolling Cross-Sectional Models, Messy PCSTS, and MLMs
Reading:

Lebo, Matthew and Christopher Weber. 2015. "An Effective Approach to the Rolling Cross Sectional Design." *American Journal of Political Science.*

Recommended Reading:

Sayrs, Lois. 1989. *Pooled Times Series Analysis*. Sage, pp. 7-32.

Burkhardt, R. and M.Lewis-Beck. 1994. "Comparing Democracy: The Economic Development Thesis." *American Political Science Review* 88:903-10.

VII. Academic Integrity:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report and suspected instances of academic dishonesty.