

POLS 571 Longitudinal Data Analysis

Spring 2012

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This course covers quantitative methods of time series, panel, time-series-cross-section, and event history (duration) data. I have three major goals for the course. First, I hope to cultivate a broad set of tools so that you can be more conversant with your colleagues and better engage the published material across the discipline. The methods covered in this course are used frequently, and your understanding for the cutting edge research will improve as you can better follow the empirical methodology. Second, I hope you will have a firm foundation on which you can further explore the topics that interest you in greater depth. In the limited class periods, I will be unable to cover everything as deeply as you might like, but I hope to at least expose you to the techniques and point you in the right direction for further exploration. Third, I hope that you will be able to use the methods in your own research. If your research questions call for the methods covered in this course, then you should be able to use them with confidence and analytic rigor.

Structure

The topics covered will unfold in three parts. First, I will lecture on the assigned topics. The lectures will combine mathematical principles from the readings with general intuition on how it all applies to political science research. Second, we will spend time exploring the course concepts in a laboratory environment. We will primarily use Stata, but I will also teach some of the applications in R. Students are welcome to use either type of software. By the third week of the course, each student should obtain data with 1) a time series of at least 50 observations, 2) a panel/TSCS dataset with $N > 10$ and $T > 50$, and 3) a data set that can be used for duration analysis. The data should be clean and ready to use in class. It is possible that a single dataset could meet all these requirements.

Third, in the class period that follows our coverage of a topic, students will take turns guiding discussion of a paper that has additional applications or extensions. The objectives are to drive home concepts that we already learned, see some additional ways in which the methods are used in practice and consider extensions of the concepts. Each presentation (5-10 minutes) will include a summary of the article and a detailed assessment of how the methods used apply to the course concepts. One fruitful avenue of discussion from these presentations is how we can (and should) use the methods in the discussed paper in applications outside of the paper's context (i.e., our own research). I expect all students in the class to have read the papers being presented in advance.

Assignments

- Class Participation (10%)
Students are expected to come prepared to each class ready to discuss the assigned reading. Students will also lead part of the class once during the semester, as described above.

- **Problem Sets (40%)**
Students will complete weekly assignments during the semester. The assignments will ask the students to demonstrate their mastery of the course material. Each assignment will have some questions related to the mathematical foundations of the course topics, some requiring the methods to be used, and some demanding an intuitive interpretation of the findings. Late problem sets will lose one point (out of ten) per day late, starting at the moment that the assignments are collected.
- **Final Project (50%)**
Students will complete a methods paper on a topic of their choosing, using longitudinal data. The paper should be 15-20 pages (double spaced) of text, plus additional pages with tables, figures, notes and references. The paper can be a replication paper of a major work in the literature, or it can be a paper related to an ongoing research project. No more than 20% of the paper can be copied and pasted from a student's existing research project. In the paper, each student should present the hypotheses tested and a brief overview of why the hypotheses are both interesting and justified. The bulk of the paper will be on the research design and results, with a brief conclusion to sum up the findings. The objective is to demonstrate mastery of the course concepts, so the students should explore many different facets of the appropriate methods. The write-up should be clear and concise, with all tables and figures formatted neatly. On the third week of class, each student will turn in a one-page proposal of the research project.

As part of the final-project grade, students will present their work at a conference-style gathering on May 9th (time/location TBA). Each student will have 15 minutes to present the research project, and then there will be 10 minutes of question-and-answer time. Professor Beardsley will provide light refreshments.

Books Needed

Cromwell, Jeff B., Walter C. Labys and Michel Terraza. 1994. *Univariate Tests for Time Series Models*. Thousand Oaks, CA: Sage.
 Brandt, Patrick T. and John Taylor Williams. 2007. *Multiple Time Series Models*. Thousand Oaks, CA: Sage.
 Box-Steffensmeier, Janet M. and Bradford S. Jones. 2004. *Event History Modeling: A Guide for Social Scientists*. New York: Cambridge University Press.

Schedule

1/19: Introduction to the Course and Stata primer

1/24&1/26: Stationarity, serial correlation, independence
 Cromwell et al.: Chs. 1-5

Application and Extension (1/31):

Amara, Jomana. 2007. Evaluating NATO long run defense burdens using unit root tests. *Defense and Peace Economics* 18(2): 157-181.

1/31&2/2: Time Series Hypothesis Testing

Due: Data sets ready for use during class labs; proposal of the research project.

Cromwell et al.: Chs. 6-9

Brandt and Williams: Ch 1

Application and Extension (2/7):

Lebo, Matthew J. and Janet M. Box-Steffensmeier. 2008. "Dynamic conditional correlations in political science. *American Journal of Political Science* 52 (3): 688-704.

2/7&2/9: Multiple Time Series Models

Brandt and Williams: Chs. 2 & 3

De Boef, Suzanna and Luke Keele. 2008. Taking time seriously. *American Journal of Political Science* 52(1): 184-200.

Shellman, Stephen M. 2004. Time series intervals and statistical inference: The effects of temporal aggregation on event data analysis. *Political Analysis* 12: 97-104.

Application and Extension (2/14):

Feld, Lars P. and Christoph A. Scaltegger. 2010. Political stability and fiscal policy: time series evidence for the Swiss federal level since 1849. *Public Choice* 144: 505-534.

2/14&2/16: Panel & TSCS Introduction

Beck, Nathaniel and Jonathan N. Katz. 1995. What to do (and not to do) with time-series cross-section data. *American Political Science Review* 89 (3): 634-647.

Beck, Nathaniel, Jonathan N. Katz and Richard Tucker. 1998. Taking time seriously: time-series-cross-section analysis with a binary dependent variable. *American Journal of Political Science* 42(4): 1260-1288.

Keele, Luke and Nathan J. Kelly. 2006. Dynamic models for dynamic theories: The ins and outs of lagged dependent variables. *Political Analysis* 14(2): 186-205.

Application and Extension (2/21):

Hood III, M.V., Quentin Kidd and Irwin L. Morris. 2008. Two sides of the same coin? Employing granger causality tests in a time series cross-section framework. *Political Analysis* 16 (3): 324-344

2/21&2/23: Unit Heterogeneity

Green, Donald P., Soo Yeon Kim and David H. Yoon. 2001. Dirty pool. *International Organization* 55(2):441-468.

Linzer, Drew and Tom Clark. 2012. Should I use random effects or fixed effects?
Manuscript in progress.

Beck, Nathaniel and Jonathan N. Katz. 2007. Random coefficient models for time-series—cross-section data. *Political Analysis* 15(2): 182-195.

Application and Extension (2/28):

Boix, Carles. 2011. Democracy, development, and the international system. *American Political Science Review* 105(4): 809-828.

2/28&3/1: Dynamic Panel Data

Wawro, Gregoy. 2002. Estimating dynamic panel data models in political science. *Political Analysis* 10(1): 25-48.

Wilson, Sven E. and Daniel M. Butler. 2007. A lot more to do: The sensitivity of time-series cross-section analyses to simple alternative specifications. *Political Analysis* 15(2): 101-123.

Plumper, Thomas, Vera E. Troeger and Philip Manow. 2005. Panel data analysis in comparative politics: Linking method to theory. *European Journal of Political Research* 44: 327-354.

Beck, Nathaniel and Jonathan N. Katz. 2011. Modeling Dynamics in Time-Series—Cross-Section Political Economy Data. *Annual Review of Political Science* 14: 331-352.

Application and Extension (3/6):

Pickering, Jeffrey and Emizet F. Kisangani. 2010. Diversionary despots? Comparing autocracies' propensities to use and to benefit from military force. *American Journal of Political Science* 54(2): 477-493.

3/6&3/8: Binary Responses & GEE & Nonrandom Sample/Treatment Selection

Carter, David B. and Curtis S. Signorino. 2010. Back to the Future: Modeling Time Dependence in Binary Data. *Political Analysis* 18(3): 271-292.

Beck, Nathaniel. 2010. Time is not a theoretical variable. *Political Analysis* 18(3): 293-294.

Carter, David B. and Curtis S. Signorino. 2010. Reply to 'time is not a theoretical variable.' *Political Analysis* 18(3):295-296.

Pang, Xun. 2010. Modeling heterogeneity and serial correlation in binary time-series cross-sectional data: A Bayesian multilevel model with AR(p) errors. *Political Analysis* 18(4): 470-498.

Zorn, Christopher. 2001. Generalized estimating equation models for correlated data: A review with applications. *American Journal of Political Science* 45(2): 470-90.

Application and Extension (3/20):

Spiess, Martin and Martin Kroh. 2010. A selection model for panel data: The prospects of Green Party support. *Political Analysis* 18(2): 172-188.

3/20&3/22: Spatial Autocorrelation

Franzese, Robert J. and Jude C. Hays. 2007. Spatial econometric models of cross-sectional interdependence in political science panel and time-series-cross-section data. *Political Analysis* 15(2): 140-164.

Nathaniel Beck, Kristian Skrede Gleditsch and Kyle Beardsley. 2006. Space is more than geography: Using spatial econometrics in the study of political economy. *International Studies Quarterly* 50(1): 27-44.

Application and Extension (3/27):

Cao, Xun and Aseem Prakash. 2010. Trade competition and domestic pollution: A Panel Study, 1980-2003. *International Organization* 64(3):481-503.

3/27&3/29: Introduction to Event History Models

Box-Steffensmeier and Jones, Chs. 1-3, 11

Bennett, D. Scott. 1999. Parametric models, duration dependence, and time-varying data revisited. *American Journal of Political Science* 43 (1): 256-270.

Application and Extension (4/10):

Kim, Wonik. 2010. Unemployment risks and the origins of unemployment compensation. *Studies in Comparative International Development* 45(1): 57-82.

4/10&4/12: Event History Model Selection and Specification

Box-Steffensmeier and Jones, Chs. 4-8

Application and Extension (4/17):

Alt, James E. and Gary King. 1994. Transfers of governmental power: The meaning of time dependence. *Comparative Political Studies* 27(2):190-210.

4/17&4/19: Frailty, Variance-Corrected Models and Competing Risks

Box-Steffensmeier and Jones, Chs. 9&10

Box-Steffensmeier, Janet M., Suzanna De Boef, and Kyle A. Joyce. 2007. Event dependence and heterogeneity in duration models: The conditional frailty model. *Political Analysis* 15: 237-256.

Jones, Bradford S. and Regina P. Branton. 2005. Beyond logit and probit: Cox duration models of single, repeating, and competing events for state policy adoption. *State Politics and Policy Quarterly* 5: 420-43.

Application and Extension (4/24):

Kentaro Fukumoto. 2009. Systematically dependent competing risks and strategic retirement. *American Journal of Political Science* 53(3): 740-754.

4/24&4/26&5/1 Non-proportional hazards and other extensions

Box-Steffensmeier, Janet M. and Christopher J. W. Zorn. 2001. Duration models and proportional hazards in political science. *American Journal of Political Science* 45(4): 972-988.

Keele, Luke. 2010. Proportionally difficult: Testing for nonproportional hazards in Cox models. *Political Analysis* 18(2):189-205.

Licht, Amanda A. 2011. Change comes with time: Substantive interpretation of nonproportional hazards in event history analysis. *Political Analysis* 19(2): 227-243.

Boehmke, Frederick J., Daniel S. Morey and Megan Shannon. 2006. Selection bias and continuous-time duration models: Consequences and a proposed solution. *American Journal of Political Science* 50(1): 192-207.

Svolik, Milan. 2008. Authoritarian reversals and democratic consolidation. *American Political Science Review* 102(2): 153-168.

Darmofal, David. 2009. Bayesian spatial survival models for political event processes. *American Journal of Political Science* 53(1): 241-257.

5/9: All day conference-style presentations