

PSC 8185: LONGITUDINAL DATA ANALYSIS

Department of Political Science • George Washington University
Fall 2011 • Mondays, 3:30 – 5:30pm • Monroe Hall B36

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Office hours: Open-door policy for graduate students

COURSE DESCRIPTION

This is an advanced political methodology course for Ph.D. students. The course is sort of a hybrid that covers two classes of models for longitudinal data: (1) models for time-series cross-sectional (TSCS) and panel data; and (2) event history (aka, duration, survival, hazard) modeling. Students are expected to have had courses in intro statistics and linear regression. It would be beneficial, but not essential, to have taken a maximum likelihood course.

First, for TSCS and panel data, we will examine data that consist of subjects (e.g., countries or individuals) tracked over a number of years. While panel and TSCS data possess the same inherent structure, we will review the subtle differences between the two and the different methodological considerations at play. We will discuss the many approaches for analyzing these data that exist in political science and beyond. We will hone in on topics such as pooling, unobserved heterogeneity, causal heterogeneity, fixed effects, random effects, random coefficient models, and so forth. The course has a slight bias toward TSCS data over panel data because of the prevalence of debates in comparative politics and international relations about how to model TSCS data.

Event history data is longitudinal in the sense that one examines factors that influence the amount of time it takes for an event to occur. Event history modeling is concerned with explaining the timing of events—*when* events will occur. Some of the issues relevant in panel and TSCS data are also relevant for event history analysis. We will discuss issues such as parametric versus semi-parametric models, discrete-time versus continuous-time models, proportional hazards, duration dependence, unobserved heterogeneity, competing risks, and repeated events.

REQUIRED TEXT

Box-Steffensmeier, Janet M., and Bradford S. Jones. 2004. *Event History Modeling: A Guide for Social Scientists*. New York: Cambridge University Press.

RECOMMENDED TEXTS

Cleves, Mario, William Gould, Roberto Gutierrez, and Yulia Marchenko. 2008. *An Introduction to Survival Analysis Using Stata, 2nd Edition*. College Station, TX: Stata Press.

Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata, 2nd Edition*. College Station, TX: Stata Press.

SOFTWARE

We will rely primarily on Stata. We can also draw comparisons with other software if there is demand. But Stata can handle all of the models we will discuss during the semester.

LEARNING OUTCOMES:

As a result of completing this course, students will:

1. Possess a comprehensive understanding of the methodological issues surrounding panel, TSCS, and event history data.
2. Be prudent methodological consumers and practitioners when it comes to interpreting and applying these types of models.
3. Be able to write a paper—using the methods discussed in class—capable of being published in a professional journal.
4. Be able to write a dissertation chapter using the methods discussed in class.

GRADING

1. **Class attendance and participation** (50 points): Students are expected to complete all of the assigned readings and to have thought about those readings, to attend each class, and to participate in class sessions. For each week, there are “application articles,” which will serve as the basis of class discussion for a portion of the class.
2. **Class presentation** (50 points): Each student will give a brief presentation to the class on an article related to class, preferably one in which you have a particular interest. Students can present on an application article or on a methodological article that explores an advanced topic. Please consult with me about the article or reading you would like to present on. I would like these presentations to commence around week 2 or 3. I would like to spread them out throughout the semester so please let me know your topic as soon as you can so that I can plan accordingly.
3. **Problem sets** (100 points each; 400 points total): There will be four problem sets assigned throughout the semester. Each problem set will require you to demonstrate your understanding of the material and the ability to make appropriate interpretations.

Problem Set 1: Friday, Sept. 30

Problem Set 2: Friday, Oct. 21

Problem Set 3: Friday, Nov. 18

Problem Set 4: TBA (Finals Week)

Important notes on problem sets:

- You will email your assignments to me. I’ll give further instructions later.
- Feel free to work with your classmates on the problem sets. Collaboration can be beneficial for mastering the material. However, *you must do your own work*. That is, while you can work together, *the final product that you hand in must be your own work*.

CLASS POLICIES

University Policy on Religious Holidays:

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance;
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations;

3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities

ACADEMIC INTEGRITY

I personally support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” For the remainder of the code, see: <http://www.gwu.edu/~ntegrity/code.html>

SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM

DISABILITY SUPPORT SERVICES (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: <http://gwired.gwu.edu/dss/>

UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- crisis and emergency mental health consultations
 - confidential assessment, counseling services (individual and small group), and referrals
- <http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices>

SECURITY

In the case of an emergency, if at all possible, the class should shelter in place. If the building that the class is in is affected, follow the evacuation procedures for the building. After evacuation, seek shelter at a predetermined rendezvous location.

COURSE SCHEDULE (Subject to change)

Part I: Panel and TSCS Data

1. **Aug. 29:** *Introduction to the Analysis of Longitudinal Data*

**** No class on Monday, Sept. 5 (Labor Day)**

2. **Sept. 12:** *The Original Beck and Katz Approach to TSCS Data*

Beck, Nathaniel, and Jonathan N. Katz. 1995. “What To Do (And Not To Do) With Time–Series Cross–Section Data.” *American Political Science Review* 89:634–47.

Application articles:

Pollins, Brian M. 1989. “Does Trade Still Follow the Flag?” *American Political Science Review* 83:465–80.

Poe, Steven C., and C. Neal Tate. 1994. “Repression of Human Rights to Personal Integrity in the 1980s: A Global Analysis.” *American Political Science Review* 88:853–72.

Quinn, Dennis P., and Carla Inclan. 1997. "The Origins of Financial Openness: A Study of Current and Capital Account Liberalization." *American Journal of Political Science* 41:771-813.

Morrow, James D., Randolph M. Siverson, and Tressa E. Tabares. 1998. "The Political Determinants of International Trade: The Major Powers, 1907-90." *American Political Science Review* 92:649-61.

Johnson, Gregg B., and Brian F. Crisp. 2003. "Mandates, Powers, and Policies." *American Journal of Political Science* 47:128-42.

3. **Sept. 19:** *The Fixed Effects Approach*

Stimson, James A. 1985. "Regression in Space and Time: A Statistical Essay." *American Journal of Political Science* 29:914-47.

Beck, Nathaniel, and Jonathan N. Katz. 1996. "Nuisance vs. Substance: Specifying and Estimating Time-Series Cross-Section Models." *Political Analysis* 6:1-36.

Beck, Nathaniel. 2001. "Time-Series—Cross-Sectional Data: What Have We Learned in the Past Few Years?" *Annual Review of Political Science* 4:271-93.

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* 15:101-23.

Application articles:

Green, Donald P., Soo Yeon Kim, and David Yoon. 2001. "Dirty Pool." *International Organization* 55:441-68.

Oneal, John R., and Bruce Russett. 2001. "Clear and Clean: The Fixed Effects of the Liberal Peace." *International Organization* 55:469-85.

Beck, Nathaniel, and Jonathan N. Katz. 2001. "Throwing Out the Baby with the Bath Water: A Comment on Green, Kim, and Yoon." *International Organization* 55:487-495.

King, Gary. 2001. "Proper Nouns and Methodological Propriety: Pooling Dyads in International Relations Data." *International Organization* 55:497-507.

4. **Sept. 26:** *The Random Effects Approach; Fixed versus Random Effects*

Reading from: Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press.

Reading from: Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata* (Second Edition). Stata Press.

Bartels, Brandon. 2008. "Beyond 'Fixed Versus Random Effects': A Framework for Improving Substantive and Statistical Interpretations for TSCS, Panel, and Multilevel Data." Working Paper.

Neuhaus, J. M., and J. D. Kalbfleisch. 1998. "Between- and Within-Cluster Covariate Effects in the Analysis of Clustered Data." *Biometrics* 54:638-45.

Zorn, Christopher. 2001. "Estimating Between- and Within-Cluster Covariate Effects, with an Application to Models of International Disputes." *International Interactions* 27(4):433-45.

Application articles:

Goodrich, Ben. 2006. "A Comment on 'Rewarding Impatience.'" *International Organization* 60:499-513.

Blaydes, Lisa. 2006. "'Rewarding Impatience' Revisited: A Response to Goodrich." *International Organization* 60:515-525.

5. **Oct. 3:** *Fixed versus Random Effects; Modeling Dynamics in Panel and TSCS Data*

Heckman, James J. 1981. "Heterogeneity and State Dependence." In *Studies in Labor Markets*, ed. S. Rosen. Chicago, IL: University of Chicago Press.

Wooldridge, Jeffrey M. 2005. "Simple Solutions to the Initial Conditions Problem in Dynamic, Nonlinear Panel Data Models with Unobserved Heterogeneity." *Journal of Applied Econometrics* 20:39-54.

Review Wilson and Butler (2007)

Application articles:

Bartels, Brandon L., Janet M. Box-Steffensmeier, Corwin D. Smidt, and Renee M. Smith. 2011. "The Dynamic Properties of Individual-Level Party Identification in the United States." *Electoral Studies* 30:210-22.

Green, Donald P., and David H. Yoon. 2002. "Reconciling Individual and Aggregate Evidence Concerning Partisan Stability: Applying Time Series Models to Panel Survey Data." *Political Analysis* 10:1-24.

Wawro, Gregory. 2002. "Estimating Dynamic Panel Data Models in Political Science." *Political Analysis* 10:25-48.

6. **Oct. 10:** *More on Dynamics; Additional Model Specifications*

Reading from: Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata* (Second Edition). Stata Press.

Western, Bruce. 1998. "Causal Heterogeneity in Comparative Research: A Bayesian Hierarchical Modelling Approach." *American Journal of Political Science* 42:1233-59.

Beck, Nathaniel, and Jonathan N. Katz. 2007. "Random Coefficient Models for Time-Series–Cross-Section Data: Monte Carlo Experiments." *Political Analysis* 15:182-95.

Plumper, Thomas, and Vera E. Troeger. 2007. "Efficient Estimation of Time-Invariant and Rarely Changing Variables in Finite Sample Panel Analyses with Unit Fixed Effects." *Political Analysis* 15:124-39.

Zorn, Christopher. 2001. "Generalized Estimating Equation Models for Correlated Data: A Review with Applications." *American Journal of Political Science* 45:470–90.

Franzese, Robert J., Jr., and Jude C. Hays. 2007. "Spatial Econometric Models of Cross-Sectional Interdependence in Political Science Panel and Time-Series-Cross-Section Data." *Political Analysis* 15:140-64.

7. **Oct. 17:** *More on Additional Model Specification; Post-Estimation Procedures for Enhancing Substantive Interpretation*

Reading from: Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata* (Second Edition). Stata Press.

Part II: Event History Modeling

8. **Oct. 24:** *The Nuts and Bolts of Event History Analysis*

Box-Steffensmeier and Jones, Chapters 1-2

9. **Oct. 31:** *Parametric Models*

Box-Steffensmeier and Jones, Chapter 3

Application articles:

King, Gary, James Alt, Michael Laver, and Nancy Burns. 1990. "A Unified Model of Cabinet Dissolution in Parliamentary Democracies." *American Journal of Political Science* 34(4): 847-871.

Bueno de Mesquita, Bruce, and Randolph M. Siverson. 1995. "War and the Survival of Political Leaders : A Comparative Study of Regime Types and Political Accountability." *American Political Science Review* 89(December): 841-855.

Bennett, D. Scott, and Allan C. Stam. 1996. "The Duration of Interstate Wars, 1816-1985." *American Political Science Review* 90(June): 239-257.

Martinek, Wendy L., Mark Kemper, and Steven R. Van Winkle. 2002. "To Advise and Consent: The Senate and Lower Federal Court Nominations, 1977-1998." *Journal of Politics* 64(2):337-61.

10. **Nov. 7:** *The Semi-Parametric Approach: The Cox Model*

Box-Steffensmeier and Jones, Chapter 4

Application articles:

Katz, Jonathan N. and Brian R. Sala. 1996. "Careerism, Committee Assignments, and the Electoral Connection." *American Political Science Review* 90(March):21-33.

Box-Steffensmeier, Janet M., Laura W. Arnold and Christopher J. W. Zorn. 1997. "The Strategic Timing of Position Taking in Congress: A Study of the North American Free Trade Agreement." *American Political Science Review* 91(June): 324-338.

Binder, Sarah A., and Forrest Maltzman. 2002. "Senatorial Delay in Confirming Federal Court Judges, 1947-1998." *American Journal of Political Science* 46(1): 190-99.

11. **Nov. 14:** *Discrete-Time versus Continuous-Time Models*

Box-Steffensmeier and Jones, Chapters 5-6

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* 42:1260-88.

Berry, Frances Stokes and William D. Berry. 1990. "State Lottery Adoptions As Policy Innovations: An Event History Analysis." *American Political Science Review* 84(June): 395-415.

12. **Nov. 21:** *Time-Varying Covariates, Model Selection, Diagnostics*

Box-Steffensmeier and Jones, Chapters 7-8

Box-Steffensmeier, Janet M., and Christopher J. W. Zorn. 2001. "Duration Models and Proportional Hazards in Political Science." *American Journal of Political Science*. 45(October): 951-67.

13. **Nov. 28:** *Heterogeneity*

Box-Steffensmeier and Jones, Chapters 9

Zorn, Christopher J.W. 2000. "Modeling Duration Dependence." *Political Analysis* 8(Autumn): 367-80.

Application articles:

Bennett, D. Scott. 1997. "Testing Alternative Models of Alliance Duration, 1816-1984." *American Journal of Political Science* 41:846-78.

Box-Steffensmeier, Janet M., Peter M. Radcliffe, and Brandon L. Bartels. 2005. "The Incidence and Timing of PAC Contributions to Incumbent U.S. House Members, 1993-94." *Legislative Studies Quarterly* 30(November):549-79.

Hettinger, Virginia, and Christopher Zorn. 2005. "Explaining the Incidence and Timing of Congressional Responses to the U.S. Supreme Court." *Legislative Studies Quarterly* 30(February):5-28.

Scherer, Nancy, Brandon L. Bartels, and Amy Steigerwalt 2008. "Sounding the Fire Alarm: The Role of Interest Groups in the Lower Court Confirmation Process." *Journal of Politics* 70(4):1026-39.

14. Dec. 5: *Multiple Events and Competing Risks*

Box-Steffensmeier and Jones, Chapter 10

Box-Steffensmeier, Janet M., and Christopher Zorn. 2002. "Duration Models for Repeated Events." *Journal of Politics* 64(November):1069-94.

Box-Steffensmeier, Janet M., and Suzanna De Boef. 2006. "Repeated Events Survival Models: The Conditional Frailty Model." *Statistics in Medicine*. 25(20, October): 3518-3533.

Application articles:

Diermeier, Daniel, and Randy T. Stevenson. 1999. "Cabinet Survival and Competing Risks." *American Journal of Political Science* 43(October):1051-68.

Zorn, Christopher, and Steven R. Van Winkle. 2000. "A Competing Risks Model of U.S. Supreme Court Vacancies, 1789-1992." *Political Behavior* 22(June):145-66.

ADDITIONAL RECOMMENDED READINGS

Models for Panel and TSCS Data

Hsiao, Cheng. 2003. *The Analysis of Panel Data (Second Edition)*. New York: Cambridge University Press.

Baltagi, Badi. 2005. *Econometric Analysis of Panel Data (Third Edition)*. New York: Wiley.

Wooldridge, Jeffrey M. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.

Event History Modeling

Blossfeld, Hans-Peter, and Gotz Rohwer. 2001. *Techniques of Event History Analysis*. Hillsdale, NJ: Erlbaum.

Blossfeld, Hans-Peter, Gotz Rohwer, and Katrin Golsch. 2007. *Event History Analysis with Stata*. Hillsdale, NJ: Erlbaum.

Hosmer, David W., and Stanley Lemeshow. 1998. *Applied Survival Analysis: Regression Modeling of Time*. New York: John Wiley & Sons.

Hougaard, Philip. 2000. *Analysis of Multivariate Survival Data*. Springer-Verlag.

Therneau, Terry and Patricia Grambsch. 2000. *Modeling Survival Data: Extending the Cox Model*. New York: Springer-Verlag.