

# CU Summer 2019 Workshop in Political Methodology: Cross-Sectional Time Series

University of Colorado Boulder

Summer 2019

**Lecture Time:** May 13-16, 9:30-Noon  
**Lab Time:** 1:00-2:30PM  
**Location:** KTCH 1B31  
  
**Instructor:** Dr. Andrew Q. Philips  
**Email:** andrew.philips@colorado.edu  
**Office hours:** by appointment

**Course Description:** Data collected over both units (e.g., municipalities, states, countries) and time (e.g. days, months, years)—known as cross-sectional time series (CSTS) data—are common in a variety of fields in the social sciences. By gaining leverage both across units and over time, this data structure helps us answer important questions that would be difficult if we only looked at a single time period (e.g., cross section) or single unit (e.g., time series). However, CSTS data often show types of heterogeneity that make standard regression approaches inappropriate.

This short course is designed to introduce you to modeling cross-sectional time series (CSTS) data. We will start with a review of modeling dynamics, then pivot to the structure of CSTS data and how to test for various dynamic processes in this context. On the second day, we will discuss approaches to either ignoring unit heterogeneity, modeling it out, or modeling it as something of theoretical interest. On the third day, we will finish up with modeling heterogeneity and discuss how to model CSTS data with a dichotomous dependent variable. On the final day, we cover various approaches to modeling dynamics.

This course places a healthy emphasis on implementing these models using statistical software (Stata and R), visualizing and interpreting the results. Each afternoon, students will get the opportunity to review the labs for each day and apply this approach to either an example dataset or their own data. Students are welcome to work on their own CSTS data projects at this time, although it is not required to have your own data before coming to class.

By the end of this course you should be able to:

- Understand the various issues that can arise when working with these types of data
- Model CSTS data using a variety of approaches
- Incorporate the approaches discussed in the course to your own applied work

In terms of labs, readings, slides, and software, students will have access to a course Dropbox folder, where they can view slides, readings, and any data and labs for the week. We will use a mix of Stata and R (most of the labs will be available for both programs).

**Prerequisites:** It is assumed that students will have taken at least one (and hopefully several) graduate-level regression courses; i.e., it is assumed that students are familiar with OLS at a minimum. If you have no prior R or Stata experience (or need a refresher), please see Philips' "Introduction to R" and "Introduction to Stata" readings in the course Dropbox.

**Grades:** There are no grades for this course

**Participation:** Participation is an integral component of graduate courses. Students are expected to come to every class *having already read the assigned readings for that day*, and should be prepared to discuss them. It is expected that students will attend every class.

**Contact and Office Hours:** The instructor can be contacted at [andrew.philips@colorado.edu](mailto:andrew.philips@colorado.edu).

**Required Texts:** There are no required texts for this course. Required articles will be posted to the course Dropbox.

**Recommended Texts:** You could spend an entire semester on each of the topics (time series, cross-sectional time series) we will briefly cover. Below are helpful additional texts grouped by subject:

- Time Series
  - Pickup, Mark. 2014. *Introduction to Time Series Analysis*. SAGE Publications. Quantitative Applications in the Social Sciences. 1st Edition.
  - Box-Steffensmeier, Janet M., John R. Freeman, Matthew P. Hitt, and Jon C.W. Pevehouse. 2015. *Time series analysis for the social sciences*. Cambridge University Press.
  - Enders, Walter. 2010. *Applied Econometric Time Series*. 3rd Edition. John Wiley & Sons.
- Cross-Sectional Time Series
  - Gelman, Andrew, and Jennifer Hill. *Data analysis using regression and multilevel/hierarchical models*. 2006. Cambridge University Press.
  - Baltagi, Badi. *Econometric analysis of panel data*. 2008. 4th Edition. John Wiley & Sons.
  - Wooldridge, Jeffrey M. *Econometric analysis of cross section and panel data*. 2010. MIT Press.

## Tentative Schedule:

### Day 1:

Course Overview, Modeling Dynamic Processes, and the Structure of CSTS Data

Required Readings:

- Keele, Luke and Nathan Kelly. 2006. "Dynamic models for dynamic theories: The ins and outs of lagged dependent variables." *Political Analysis*. 14(2): 186-205.
- De Boef, Suzanna and Luke Keele. 2008. "Taking time seriously." *American Journal of Political Science*. 52(1): 184-200.
- Philips, Andrew Q. 2018. "Have your cake and eat it too? Cointegration and dynamic inference from autoregressive distributed lag models." *American Journal of Political Science*. 62(1): 230-244.

Suggested Readings:

- Jordan, Soren and Andrew Q. Philips. 2018. "Cointegration testing and dynamic simulations of autoregressive distributed lag models." *The Stata Journal*. 18(4): 902-923.
- Jordan, Soren and Andrew Q. Philips. 2018. "Dynamic simulation and testing for single-equation cointegrating and stationary autoregressive distributed lag models." *The R Journal*. 10(2): 469-488.

### Day 2:

Approaches to Modeling Heterogeneity in CSTS Data

Required Readings:

- Beck, Nathaniel and Jonathan Katz. 1995. "What To Do (and Not To Do) with Time Series Cross-Section Data." *American Political Science Review* 89:634-47.
- Bell, Andrew, and Jones, Kelvyn, 2015. "Explaining fixed effects: Random effects modeling of time-series cross-sectional and panel data." *Political Science Research and Methods*, 3(1):133-153.
- Clark, Tom S., and Linzer, Drew A., 2015. "Should I use fixed or random effects?" *Political Science Research and Methods* 3(2):399-408.

#### Suggested Readings:

- King, Gary and Margaret E. Roberts. 2015. "How robust standard errors expose methodological problems they do not fix, and what to do about it." *Political Analysis* 23: 159-179.
- 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(2):269-293.

## Day 3:

(Heterogeneity Continued), Models for Dichotomous Dependent Variables

#### Required Readings:

- 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: 1260-1288.
- Carter, David B. and Curtis S. Signorino. 2010. "Back to the future: Modeling time dependence in binary data." *Political Analysis* 18(3): 271-292.

## Day 4:

Identification and Modeling Dynamics

#### Required Readings:

- Wawro, Gregory. 2002. "Estimating dynamic panel data models in political science." *Political Analysis* 10(1): 25-48.
- Roodman, David. 2009. "A Note on the Theme of Too Many Instruments." *Oxford Bulletin of Economics and Statistics* 71(1), 135-158.

#### Suggested Readings:

- Roodman, David. 2009. "How to do xtabond2: An introduction to difference and system GMM in Stata." *The Stata Journal* 9(1), 86-136.
- Williams, Laron K., and Guy D. Whitten. 2011. "Dynamic simulations of autoregressive relationships." *The Stata Journal* 11(4):1-12.
- Pickup, Mark, Paul Gustafson, Davor Cubranic, and Geoffrey Evans. 2017. "OrthoPanels: An R package for estimating a dynamic panel model with fixed effects using the orthogonal reparameterization approach." *The R Journal*. 9(1): 60-76.

**Last updated:** May 1, 2019

## University-Mandated Statements

### Accommodation for disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website.

## **Classroom behavior**

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran's status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

## **Honor code**

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code ([honor@colorado.edu](mailto:honor@colorado.edu); 303-492-5550). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

## **Sexual misconduct, discrimination, harassment and/or related retaliation**

The University of Colorado Boulder (CU Boulder) is committed to fostering a positive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (including sexual assault, exploitation, harassment, dating or domestic violence, and stalking), discrimination, and harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or [cureport@colorado.edu](mailto:cureport@colorado.edu). Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website. Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

## **Religious holidays**

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, I will try to accommodate your requests, but you must contact me early in the semester. See the campus policy regarding religious observances for full details.