Advanced Topics in Dynamic Panel Models

ICPSR Summer Program in Quantitative Methods of Social Research
Simon Fraser University, Vancouver, BC

July 2-4, 2019

Time:	9:00AM-5:00PM
Location:	Tree Island Conference Room (HRBC1510)
Instructor:	Dr. Andrew Q. Philips and Dr. Mark Pickup
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COURSE DESCRIPTION: Data collected over both units (e.g., individuals, states, countries) and time (e.g., days, months, years)—known as time series cross-sectional data or panel data—are common in the social sciences. By gaining leverage both across units and over time, these data help us answer important questions that would be difficult if we only looked at a single point in time (e.g., cross section) or single unit (e.g., time series): the relationship between growth and democracy, whether or not the resource curse exists, or how economic perceptions shape support for the government. Despite these advantages, panel data often show types of heterogeneity and dynamics that make standard regression approaches inappropriate.

This course is designed to survey some advanced topics in panel data. After a review of panel data fundamentals, we will cover topics such as panel unit root and cointegration tests, panel error correction models, and approaches to modeling dynamics in panel data with a small T.

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

- Understand a variety of threats to inference when working with cross-sectional time series data

- Understand techniques to model cross-sectional time series data for a variety of N and T

- Apply what you have learned to your own research

PREREQUISITES: At least one semester long graduate-level regression course. We will use both R/RStudio and Stata in this course. If you are not familiar with both, you should review Philips' "Introduction to Stata" and "Introduction to R" in the course readings folder. We will also release course materials on Dropbox, so please sign up if you do not have an account before the first day of class (a basic account is free).

REQUIRED TEXTS: There are no required texts for this course. Course materials will be made available to you on the first day. There are several additional texts you might find helpful (grouped by topic):

- Time Series

  - Pickup, M. 2014. *Introduction to Time Series Analysis*. SAGE Publications. Quantitative Applications in the Social Sciences. 1st Edition.
  - Box-Steffensmeier, J.M., J.R. Freeman, M.P. Hitt, and J.C.W. Pevehouse. 2015. *Time series analysis for the social sciences.* Cambridge University Press.

– Enders, W. 2010. *Applied Econometric Time Series.* 3rd Edition. John Wiley & Sons.

- Cross-Sectional Time Series

  – Gelman, A., and Jennifer H. *Data analysis using regression and multilevel/hierarchical models.* 2006. Cambridge University Press.

  – Hsiao C. 2014. *Analysis of Panel Data* 3rd Edition. New York, NY: Cambridge University Press.

  – Baltagi, B. *Econometric analysis of panel data.* 2008. 4th Edition. John Wiley & Sons.

  – Wooldridge, J.M. *Econometric analysis of cross section and panel data.* 2010. MIT Press.

SCHEDULE:

Day 1:

Panel data fundamentals, testing and modeling temporal dependence

Required Readings:

- Wilson, S.E. and D.M. Butler. 2007. "A Lot More to Do: The Sensitivity of Time-Series Cross-section Analyses to Simple Alternative Specifications." *Political Analysis* 15:101-123.
- Philips, Andrew Q. n.d. *Cross Sectional Time Series Models for the Social Sciences.* Chapter 2.
- Zhu, L. 2012. "Panel Data Analysis in Public Administration: Substantive and Statistical Considerations." *Journal of Public Administration Research and Theory* 23:395-428.

Suggested Readings:

- King, G. and M.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.
- Williams, L.K., and G.D. Whitten. 2011. "Dynamic simulations of autoregressive relationships." *The Stata Journal* 11(4):1-12.
- Kittel, B., and H. 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.
- 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:

Panel unit root and cointegration tests, unobserved heterogeneity, panel error correction models, and pooled mean group estimators

Required Readings:

- Bell, A., and Jones, K., 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, T.S., and Linzer, D.A., 2015. "Should I use fixed or random effects?" *Political Science Research and Methods* 3(2):399-408.
- Hlouskova, Jaroslava and Martin Wagner. 2006. "The performance of panel unit root and stationarity tests: Results from a large scale simulation study." *Econometric Reviews* 25(1):85-116.
- Pesaran, M.H. ,Shin, Y., and Smith, R.P. 1999. "Pooled mean group estimation of dynamic heterogeneous panels." *Journal of the American Statistical Association* 94(446):621-634.

- Westerlund, Joakim. 2005. "New simple tests for panel cointegration." *Econometric Review* 24(3):297-316.

Suggested Readings:

- Pesaran, M.H. and Smith, R., 1995. "Estimating long-run relationships from dynamic heterogeneous panels." *Journal of econometrics* 68(1):79-113.
- Maddala, G.S. and Shaowen Wu. 1999. "A comparative study of unit root tests with panel data and a new simple test." *Oxford Bulletin of Economics and Statistics, Special Issue* 61(S1):631-652.
- Neal, Timothy. 2014. "Panel cointegration analysis with `xtpedroni`." *The Stata Journal* 14(3):684-692.
- Blackburne, Edward F. III and Mark W. Frank. 2007. "Estimation of nonstationary heterogeneous panels." *The Stata Journal* 7(2):197-208.

Day 3:

Modeling panel data with small T and overcoming Nickell bias (GMM, transformed-likelihood, estimators)

Required Readings:

- Finkel, S.E. 2008. "Linear Panel Analysis." In Scott Menard, editor, *Handbook of Longitudinal Research* New York, NY: Elsevier Press.
- Pickup, M. and V. Hopkins. 2018. "Transformed-Likelihood Estimators for Dynamic Panel Models with a Very Small T." *Working Paper*.
- Wawro, G. 2002. "Estimating Dynamic Panel Data Models in Political Science." *Political Analysis* 10(1):25-48.

Suggested Readings:

- Kripfganz, S. 2016. "xtdpdqml: Quasi-maximum likelihood estimation of linear dynamic short-T panel data models." *Stata Journal*.
- Pickup, M., P. Gustafson, D. Cubranic, and G. 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: June 27, 2019