POLS 607 Spring 2025
Allen ?? Thurs. 1–3:50pm
Advanced Research Methods II: Panel Data Econometrics

Instructor:
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Purpose

Panel, sometimes called time-series-cross-sectional (TSCS), data is very common throughout political science, and much ink has been spilled on trying on trying to make the best inferences we can from it. In this course, we will consider the econometric issues and benefits of using panel data and how it applies to political science research. This will include considering the relative merits of different approaches for modeling unobserved heterogeneity, an overview of classic approaches to panel data, and a survey of recent advances in using panel data for causal inference (e.g., the explosion of differences-in-differences literature in recent years).

Course Requirements

Evaluation is based on four components: problem sets, presentations, participation, and a final paper. There will be about 5 (± 1) problem sets given over the course of this semester, which will be weighted equally to make up 50% of the final grade. Students will take turns presenting the articles from readings and answering "good questions" from fellow students, these presentations will compose 15% of the final grade. Participation is worth 10% and will be judged based on (a) asking "good questions," (b) being willing to volunteer or attempt to answer in-class questions, (c) being a good colleague to your fellow students (e.g., taking on a presentation for a sick colleague). The final paper is worth 25% of the final grade.

Problem sets

Problem sets will be a combination of theoretical problems and applied data analysis. They will be distributed and submitted using GitHub Classrooms. By the next class, please register a github account (I recommend getting an official, but free, academic account) and send the email you used to register to me. A PDF and video on the course website covers this in more detail as well.

A complete problem set will be a repository that includes

- A pdf write up that answers any questions and presents data results in a professional manner (proper tables and figures)
- Extensively commented code that produces all the results and figures in your write up

Course website and texts

The course website is `https://github.com/ccrismancox/POLS607`. No textbooks are officially required, but I strongly recommend you own a quality econometrics textbook that includes panel topics such as Greene, Wooldridge, or Hansen. You should own *at least* one of these texts by now. Having a good chatty read like *Causal Inference: The Mixtape* or *Mostly Harmless Econometrics* is also a good idea.

Presentations and good questions

At the start of the semester, I will randomize you into a queue. Readings and good questions will be assigned to the queue in order at the end of each class. We will rotate through the queue as often as needed. Trading is allowed, but you are responsible for making sure that the material is either covered by you or arranging a substitute. Not all readings will be presented.

Student presentations on articles should be roughly 20-30 minutes with (again roughly) the following form:

1. Present the main points of the article
2. Work through any important results, proofs, or derivations
3. Restate the main applied points (i.e., what should we do or not do in situations)

4. Worked example(s) with R using either real or simulated data to illustrate the main points

5. Q&A from fellow students

When a student asks what I think is a deep, insightful, or otherwise just plain good question, they will be rewarded through their participation grade. One good question a week (if available) will be added to the readings for the following week with the task of answering that question falling on the next student in the queue. Answering the question will likely require outside reading and you should prepare a full presentation as above. Asking good questions is part of your participation grade so don't clam up out of a sense of solidarity. Trust me, this is how you actually learn these things.

The paper

Each student will be required to write an article-length research paper applying any techniques discussed in this class. This paper does not need to be original/unique to this class, but if you are using it for another on-going seminar, please be sure that you have permission from that professor (you have my permission to double dip). Ideally, this paper will be an early draft of a third-year paper, dissertation chapter, or other future article. Updating an in-progress paper or previously used seminar paper is acceptable you feel that is the best use of your time.

A preliminary/incomplete draft is due on March 13th and the final draft is due on April 17th. All students will receive all the drafts in both cases. For the incomplete draft, everyone will prepare written feedback for everyone else and submit it to them. For the April draft, everyone will read all the papers and be randomly assigned to discuss one of them as if you were a conference discussant. On the last day of class, we will run a mini-conference where you present your projects and receive feedback.

Academic Integrity

From the Student Rules: "Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be

sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities on the website `https://aggiehonor.tamu.edu/`. Please be familiar with the University's academic honesty policies. Violations will be handled with the utmost seriousness.

An Aggie does not lie, cheat or steal, or tolerate those who do.

Course topics

We will proceed through the following topics and get as far as we can in the time we have.

1. One and two-way heterogeneity in panel settings: Pooled, random effects, within, and other estimators
   (a) Abadie, Alberto. Susan Athey, Guido W. Imbens, and Jeffery M. Wooldridge. 2023. "When Should you Adjust Standard Errors for Clustering?" *The Quarterly Journal of Economics*. 138(1):1–35
   (b) MacKinnon, James G. and Matthew D. Webb. 2018. "The Wild Bootstrap for Few (Treated) Clusters." *Econometrics Journal*.
   (c) Cameron, A. Colin and Douglas L. Miller. 2015 "A Practitioner's Guide to Cluster-Robust Inference." `https://cameron.econ.ucdavis.edu/research/Cameron_Miller_JHR_2015_February.pdf`.
   (d) Bell, Andrew and Kelvyn Jones. 2015. "Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data." *Political Science Research and Methods*. 3(1):133–153.
2. Classically advanced panel models: Instruments, dynamics, non-stationary data, and time-invariant effects
   (a) Gessler, Theresa, and Sophia Hunger. 2022. "How the refugee crisis and radical right parties shape party competition on immigration." *Political Science Research and Methods* 10(3): 524–544.

(b) Christian, Paul and Christopher B. Barrett. 2024. "Spurious Regression and Panel IV Estimation: Revisiting the Causes of Conflict." *The Economic Journal*. 134(659):1069–1099.

3. Multilevel modeling and Bayesian estimators

   (a) Gelman, Andrew. 2006. "Multilevel (Hierarchical) Modeling: What it Can and Cannot Do." *Technometrics*. 48(3):432-435

   (b) Shor, Boris, Joseph Bafumi, Luke Keele, and David Park. 2007. "A Bayesian Approach to Time-Series Cross-Sectional Data." *Political Analysis*. 15:165-181.

   (c) Hazlett, Chad, and Leonard Wainstein. "Understanding, choosing, and unifying multilevel and fixed effect approaches." *Political Analysis* 30(1):46–65.

4. Design-based inference part 1: Review of potential outcomes, experimental ideal, and selection into sample/treatment

   (a) Mixtape chapters 1, 3, 4, & 8

5. Design-based inference part 2: Introduction to differences-in-differences

   (a) Mixtape chapter 9

   (b) Card, David and Alan B. Kruger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review*. 84(4): 772–793.

6. Design-based inference part 3: Recent advances in differences-in-differences

   (a) Goodman-Bacon, Andrew. 2021. "Difference-in-differences with variation in treatment timing." *Journal of econometrics* 225(2): 254–277.

   (b) Callaway, Brantly, and Pedro HC Sant'Anna. 2021. "Difference-in-differences with multiple time periods." *Journal of econometrics*. 225(2): 200–230.

   (c) Sun, Liyang and Sarah Abraham. 2021. "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects." *Journal of Econometrics*. 225(2): 175–199.

7. Recent advances in differences-in-differences continued

(a) Roth, Jonathan, Pedro H.C. Sant'Anna, Alyssa Bilinski, and John Poe. "What's trending in difference-in-differences? A synthesis of the recent econometrics literature." Journal of Econometrics 235, no. 2 (2023): 2218-2244.

(b) Callaway, Brantly, Andrew Goodman-Bacon, and Pedro H.C. Sant'Anna. 2024. "Difference-in-differences with a continuous treatment." No. w32117. National Bureau of Economic Research. `https://www.nber.org/system/files/working_papers/w32117/w32117.pdf`

(c) Hassell, Hans JG, and John B. Holbein. 2024. "Navigating potential pitfalls in difference-in-differences designs: reconciling conflicting findings on mass shootings' effect on electoral outcomes." *American Political Science Review*. FirstView.

(d) Li, Zikai, and Anton Strezhnev. "A Guide to Dynamic Difference-in-Differences Regressions for Political Scientists." `https://osf.io/kxw92/download`.

8. Design-based inference part 4: Other dynamic panel approaches

   (a) Blackwell, Matt. 2013. "A Framework for Dynamic Causal Inference in Political Science." *American Journal of Political Science*, 57(2): 504-519.

   (b) Blackwell, Matt and Adam Glynn. 2018. "How to Make Causal Inferences with Time-Series Cross-Sectional Data under Selection on Observables." *American Political Science Review*. 112(4): 1067–1082.

9. Panel data with binary outcomes

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

   (b) Beck, Nathaniel and Jonathan Katz. 2001. "Throwing the Baby Out with the Bath Water: A Comment on Green, Kim, and Yoon." *International Organization*. 55(2): 486–495.

   (c) Crisman-Cox, Casey. 2021. "Estimating Substantive Effects in Binary Outcome Panel Models: A Comparison." *Journal of Politics*. 83(2): 532–546.

10. Other panel GLMs

(a) Crisman-Cox, Casey and Keigo Tanabe. 2024. "Simple Approaches to Addressing Unobserved Heterogeneity in Systems of Binary Outcome Equations." To be distributed.

(b) Wooldridge, Jeffrey M. 2023. "Simple approaches to nonlinear difference-in-differences with panel data." *The Econometrics Journal* 26(3): C31-C66.

11. Grouped binary duration data

(a) Beck, Nathaniel, Jonathan N. Katz, and Richard Tucker. 1998. "Taking Time Seriously: Time-Series-Cross-Sectional Analysis with a Binary Dependent Variable." *American Political Science Review.* 42(4):1260–1288.

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

12. Model-based inference with TSCS (discussion)

(a) Keane, Michael P. 2010. "Structural vs. atheoretic approaches to econometrics." *Journal of Econometrics.* 156(1):3–20

(b) Rust, John. 2010. "Comments on: 'Structural vs. atheoretic approaches to econometrics'. by Michael Keane" *Journal of Econometrics.* 156(1):21–24.

(c) Heckman, James J. and Urzúa, Sergio. 2010. "Comparing IV with structural models: What simple IV can and cannot identify." *Journal of Econometrics.* 156(1):27–37.

(d) Imbens, Guido W. 2010. "Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)." *Journal of Economic Literature* 48(2):399–423.

(e) Canen, Nathan and Kristopher Ramsay. 2023. "Quantifying Theory in Politics: Identification, Interpretation and the Role of Structural Methods." *Journal of Theoretical Politics.*

(f) Crisman-Cox, Casey and Michael Gibilisco. 2021. "Estimating signaling games in international relations: problems and solutions." *Political Science Research and Methods.* 83(2): 532–546.

Final Disclaimer

The schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.