PS9591B: Regression and Causal Inference (Methods 2)

Department of Political Science – Western University, Winter 2022
Tuesday 10:30-12:30pm and Wednesday 4-5pm, Online (January) and in SSC 7210

Instructor: Dr. Mathieu Turgeon (mturgeo4@uwo.ca)
Office hours: Monday 10-12pm or by appointment
Teaching assistant: Alvaro Pereira (aperei65@uwo.ca)
Office hours: Thursday 10-12:30

Course description

This course introduces students to basic statistical techniques used to estimating and testing causal relationships. Evaluating causal claims is best done using an experimental design like randomized controlled trials, but most of the data available to political scientists, however, is observational in nature. Drawing causal inferences from observational data is a hard task but not an impossible one, given careful treatment of the data. A series of methodological tools are available to scholars to evaluate causal arguments and hypotheses using observational data and this course introduces the most commonly used ones for cross-sectional data structures—observations of subjects (like individuals, polities or countries) at the one point or period of time. At the end of this course, students should be able to interpret most of the empirical analyses reported in political science journals and monographs and produce their own empirical analyses to estimate and test causal relationships of interest.

Course objectives

- learn how to use data to answer cause-and-effect questions;
- understand the conditions under which we can identify causal relationships by making comparisons;
- learn how to use methodological tools like randomized trials, regression analysis, regression discontinuity designs and difference-in-differences to evaluate causal relationships;
- learn how to interpret empirical analyses reported in political science journals and monographs;
- learn how to produce empirical analyses to estimate and test causal relationships.

Course texts

The required texts for this course are:

1 Wooldridge, J. M. (2012). *Introductory econometrics: A modern approach*. South-Western Cengage Learning. 5th Edition. **PDF freely available on the web**.

2 Angrist, J. D., Pischke, J. S. (2014). *Mastering 'metrics: The path from cause to effect*. Princeton University Press.

Additional readings will be posted on OWL.

Course assessment

Students will be assessed as follows:

- **Class participation (15%)**: students will be randomly asked to solve problems in the classroom at least three times during the semester. Be ready when you come to class!
- **Homework (50%)**: There will be five assignments, each worth 10 points of the final grade.
- **Final take-home exam (35%)**: Students will be given a replication exercise. More details will be provided in class.

Topics and readings

Week #1 (January 11–12): Course Introduction

Review of syllabus, class organization, and installation of datasets for in-class exercises and assignments.

Week #2 (January 18–19): Introduction to causal inference

1. Wooldridge: Chapter 1;
2. Angrist and Pischke: Introduction;
3. Gerber, A. S., Green, D. P. (2012). Field experiments: Design, analysis, and interpretation. WW Norton. Chapter 1. (see Resources tab on OWL);
4. Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., Vermeersch, C. M. (2016). Impact evaluation in practice. The World Bank. Chapter 3. (see Resources tab on OWL)

Week #3 (January 25–26): Core concepts of experimental designs

1. Druckman, J. N., Green, D. P., Kuklinski, J. H., & Lupia, A. (Eds.). 2011. *Cambridge Handbook of Experimental Political Science*. Cambridge University Press. Chapter 2. (see Resources tab on OWL);
2. Angrist and Pischke: Chapter 1;
3. Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., Vermeersch, C. M. (2016). Impact evaluation in practice. The World Bank. Chapter 4. (see Resources tab on OWL)

Week #4 (February 1–2): The simple regression model (SRM)

1. Wooldridge: Chapter 2.

Week #5 (February 8–9): The multiple regression model (MRM): estimation, Part 1

1. Wooldridge: Chapter 3.
2. Angrist and Pischke: Chapter 2.

Week #6 (February 15–16): The multiple regression model (MRM): estimation, Part 2

1. Wooldridge: Chapter 3.
2. Angrist and Pischke: Chapter 2.

*****(February 22-23): Spring reading week. Enjoy the break!*****

Week #7 (March 1–2): The multiple regression model (MRM): inference, Part 1

1. Wooldridge: Chapter 4.

Week #8 (March 8–9): The multiple regression model (MRM): inference, Part 2

1. Wooldridge: Chapter 4.

Week #9 (March 15–16): The multiple regression model (MRM): further issues

1. Wooldridge: Chapters 6 and 8.

Week #10 (March 22–23): The multiple regression model (MRM) with qualitative information: binary (or dummy) variables

1. Wooldridge: Chapter 7.

Week #11 (March 29–30): The regression discontinuity design (RDD)

1. Angrist and Pischke: Chapter 4;
2. Cattaneo, M. D., Idrobo, N., Titiunik, R. (2019). A practical introduction to regression discontinuity designs: Foundations. Cambridge University Press. Chapters 1 and 2. (see Resources tab on OWL);
3. Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., Vermeersch, C. M. (2016). Impact evaluation in practice. The World Bank. Chapter 6. (see Resources tab on OWL)

Week #12 (April 5–6): Difference-in-differences (DiD)

1. Angrist and Pischke: Chapter 5;
2. Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., Vermeersch, C. M. (2016). Impact evaluation in practice. The World Bank. Chapter 7. (see Resources tab on OWL)