POP77123 Causal Inference from Observational Data

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This module introduces students to the most common methods of causal inference using potential outcomes notation. It starts with the ideal of a randomized experiment, and then moves on to discuss various quasi-experimental research designs, which include instrumental variables, difference-in-differences, and regression discontinuity designs. The module will consist mostly of lectures. In a first step, the various approaches are presented and the key underlying assumptions explained. In a second step, their empirical application is illustrated by way of presentations of published political science research that uses these approaches. Some of the class meetings will also include discussions about how to apply these approaches empirically in your own research.

Learning outcomes
On successful completion of this module students will be able to:

- Understand the potential outcomes framework and the key assumptions underlying causal inference
- Assess the appropriateness of various experimental and quasi-experimental research designs for a variety of research questions posing different identification challenges
- Apply these insights and the statistical knowledge to several data problems

Prerequisites
Concurrent or prior attendance of Quantitative Methods I for Political Science or an equivalent course. A basic knowledge of mathematics, in particular algebra and simple calculus, is beneficial, but not assumed. It is assumed that students have already gained some familiarity with a statistical software such as Stata or R.

Grading

- Participation: 10%
- Assignment: 30%
- Replication Paper +: 60%

Readings
This module will draw heavily on the following book:

> Joshua D. Angrist and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton University Press.

Other useful resources for this module include:

Alan S. Gerber and Donald P. Green. 2012. *Field Experiments: Design, Analysis, and Interpretation*. W.W. Norton & Company.

Thad Dunning. 2012. *Natural Experiments in the Social Sciences: A Design-Based Approach*. Cambridge University Press.

Joshua D. Angrist and Jörn-Steffen Pischke. 2015. *Mastering ´Metrics: The Path from Cause to Effect*. Princeton University Press.

Scott Cunningham. 2021. *Causal Inference: The Mixtape*. Yale University Press. Available for free at https://mixtape.scunning.com/

Guido W. Imbens and Donald B. Rubin. 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction*. Cambridge University Press.

Miguel A. Hernan and James M. Robins. 2020. *Causal Inference: What If?* Boca Raton: Chapman & Hall/CRC. Available for free at https://miguelhernan.org/whatifbook

Kosuke Imai. 2017. *Quantitative Social Science: An Introduction*. Princeton University Press.