

**SOC 351**  
**Counterfactuals and Causal Inference in the Social Sciences**

**Wednesdays 12:30pm – 3:20pm**

Professor Florencia Torche

torche@stanford.edu

**Lathrop Library 294**

McClatchy Hall, Office 244

OH: Mondays 2:00-3:30pm

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**COURSE DESCRIPTION**

The objective of this course is to provide students with theoretical and applied knowledge about methods to answer causal questions using observational, quasi-experimental, and experimental data. Causal questions range from the macro-level, such as “Does capitalism cause democracy (or is it the other way around?)” to micro-level, such as “Does educational attainment increase earnings / health /civic participation?” Addressing causal questions requires thinking counterfactually, an essential skill regardless of whether you use quantitative methods, ethnography, archival research, or comparative-historical approaches.

We will review several quantitative methods designed to address causal questions, including regression-based adjustment for covariates, propensity score matching, fixed effects, differences-in-differences, instrumental variables, regression discontinuity, and sensitivity analysis. Each lecture will include both a formal and intuitive description of the approach, as well as basic tools to implement the method using standard statistical software (such as Stata). We will also read and discuss research papers using each one of these approaches. Along with the technique used, we will discuss the relevance of the question as formulated by the paper, the management of data, the interplay between methodology and theory, and the implications of the findings.

**PREREQUISITES**

The prerequisite for the course is a graduate-level introductory statistics course that includes regression analysis (such as SOC 382 “Sociological Methodology II: Principles of Regression Analysis”, or the equivalent as approved by the instructor). Students should understand the properties of regression including use of indicator (dummy) variables, interactions, and transformations. Basic exposure to logit/probit regression for dichotomous outcomes is also required. Experience with Stata is extremely desirable but not required.

## REQUIRED BOOK

Morgan, Stephen and Christopher Winship. 2015 (Second Edition). *Counterfactuals and Causal Inference. Methods and Principles for Social Research*. Cambridge University Press.

## RECOMMENDED BOOKS

Angrist, Joshua and Jorn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton University Press.

Gelman, Andrew and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press.

Guo, Shenyang and Fraser, Mark. 2010. *Propensity Score Analysis*, Sage Publications.

Imbens, Guido and Donald Rubin 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences*, Cambridge University Press.

## ASSIGNMENTS

Weekly memos: 40% of final grade.

Students are required to submit short (2 double-spaced pages) memos on selected weeks, due at the beginning of class. The purpose of these memos is to critically engage the literature assigned for that week and to prepare for the lecture. Some of the assigned readings describe the methodological approach we'll discuss, but most of them provide examples of published work that uses the method to address an actual research question.

The memo should succinctly formulate the question addressed and the methodological approach used, and offer your own critical appraisal. (Please note: I do not expect you to master the readings' contents prior to the lecture). The memos won't be assigned a letter-grade. Rather, they will help me get a sense of your understanding of the material and to offer feedback if there are issues that need to be addressed, offer suggestions about follow-up readings, etc.

Class participation: 10% of the final grade.

Final paper: 50% of the final grade.

The final paper is a proposal for a research project using one of the causal inference approaches discussed during the course to address a research question. You do not need to actually conduct any empirical analysis for the final paper unless you would like to (see below). The proposal should include the following components:

- An introductory section motivating the question. Why is this question worth studying? Why would addressing this question be relevant/ interesting/ useful? You do not need to conduct a formal literature review, just briefly situate your question within the relevant topical area. The introduction should also clearly state the specific hypothesis/hypotheses you will be testing.

- A methods section that outlines the data source and causal inference approaches that you will use to address the question. This is the core of the paper. You are required to select one causal inference approach to address the question (for example, instrumental variable), as well as an alternative approach (the “second best”) (for example, propensity score matching). The methodological strategy has to be clearly outlined, including the rationale for using it, implementation, advantages of the approach chosen, and potential limitations/problems. You should also explain why you chose the selected technique over the “second best”.

The final paper is expected to be shorter than a standard research paper –about 10-15 double-spaced pages. I encourage you to formulate a question within your own area of substantive interest and, even if you’re not required to perform the empirical analysis, to act as if you were (i.e. take this as a first step of a true empirical paper). You’re welcome to use work that you have done for prior courses as a starting point but the paper you submit for this course should be original.

Note: If you are already working on a project that addresses a causal question or have a project in mind and want to use this course to move to the project to the empirical analysis stage, you are encouraged to do so. If that is the case, please see me to discuss a slightly modified final paper that serves your purposes.

## **COURSE SCHEDULE**

### **Week 1. April 5: Counterfactual Approach in the Social Sciences.**

#### Required Reading:

- Morgan and Winship, Chapter 1 (pages 3-28, skimming is OK) and Chapter 2 (pages 37-74, read carefully).

#### If you want more:

- Paul Holland. 1986. "Statistics and Causal Inference." *Journal of the American Statistical Association* 81:945-70.
- Gary Goertz and James Mahoney. 2012. *A Tale of Two Cultures: Quantitative and Qualitative Research in the Social Sciences*. Princeton University Press.

### **Week 2. April 12: From Regression to Experiments and Back.**

#### Required Reading:

- Kornrich, Sabino, Julie Brines and Katrina Leupp. 2013. “Egalitarianism, Housework and Sexual Frequency in Marriage” *American Sociological Review* 78(1): 26-50.
- Correll, Shelley, Stephen Benard, and In Paik. 2007. “Getting a Job: Is There a Motherhood Penalty?” *American Journal of Sociology* 112:1297-1338.

If you want more:

- Esther Duflo and Emmanuel Saez. 2003. "The Role of Information and Social Interactions in Retirement Savings Decisions: Evidence from a Randomized Experiment," *Quarterly Journal of Economics* 118(3): 815-842.
- Gerber, Alan and Donald Green. 2012. *Field Experiments: Design, Analysis, and Interpretation*. WW Norton.

**Week 3. April 19: No class**

**Week 4. April 26. Propensity Score-Based Approaches**

Required Reading:

- Bingenheimer, J.B., Brennan, R.T., and Earls, F.J. 2005. "Firearm violence exposure and serious violent behavior," *Science* 308: 1323-1326. Recommended: Materials and Methods Supplement, pages 18-28.
- Minkoff, Debra. 2016. "The Payoffs of Organizational Membership for Political Activism in Established Democracies," *American Journal of Sociology* 122(2): 425-468.

If you want more:

- Dehejia, Rajeev and Sadek Wahba. 1999. "Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs" *Journal of the American Statistical Association*, 94: 1053—1062.
- Stuart, Elizabeth. 2010. "Matching Methods for Causal Inference: A Review and a Look Forward." *Statistical Science* 25(1): 1-21.
- Guo and Fraser, Chapter 5.
- Morgan and Winship, Chapter 5.

**Week 5. May 3: Propensity Score Matching in Practice and Sensitivity Analysis**

Required Reading:

- David J. Harding. 2003. "Counterfactual Models of Neighborhood Effects: The Effect of Neighborhood Poverty on High School Dropout and Teenage Pregnancy" *American Journal of Sociology* 109(3): 676-719.
- Lee, Dohoon. 2010. "The Early Socioeconomic Effects of Teenage Childbearing: A Propensity Score Matching Approach" *Demographic Research* 23: 697-736?

If you want more:

- DiPrete, Thomas and Markus Gangl. 2004. "Assessing bias in the estimation of causal effects: Rosenbaum bounds on matching estimators and instrumental variables with imperfect instruments." *Sociological Methodology*, 34, 271-310.

- Rosenbaum, Paul. 2002 (Second Edition). *Observational Studies*. Springer. Chapter 4. "Sensitivity to Hidden Bias".

## **Week 6. May 10. Natural Experiments and Instrumental Variables.**

### Required Reading:

- Angrist, Joshua. 1990. "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records" *The American Economic Review*. 80:313-336.
- Angrist, Joshua, Guido Imbens, and Donald Rubin. 1996. "Identification of Causal Effects Using Instrumental Variables" *Journal of the American Statistical Association*, 91: 444-472

### If you want more:

- Bollen, Kenneth. 2012. "Instrumental Variables in Sociology and the Social Sciences" *Annual Review of Sociology* 38: 37-72.
- Morgan and Winship, Chapter 9.

## **Week 7. May 17. Instrumental Variables in Theory and Practice**

### Required readings:

- Massey, Douglas, Karen Pren, and Jorge Durand. 2016. "Why Border Enforcement Backfired" *American Journal of Sociology* 121(5): 1557- 1600.
- Kirk, David. 2009. "A Natural Experiment on Residential Change and Recidivism: Lessons from Hurricane Katrina" *American Sociological Review* 74: 484-505.

### If you want more:

- Glymour, Maria, Eric Tchetgen Tchetgen, and James Robins. 2012. "Credible Mendelian Randomization Studies: Approaches for Evaluating the Instrumental Variable Assumptions." *American Journal of Epidemiology* 175(4):332-339.
- Imbens, Guido. 2014. "Instrumental Variables: An Econometrician's Perspective" *Statistical Science* 29(3): 323-358.

## **Week 8. May 24: Difference-in-Difference and Fixed Effects**

### Required Reading:

- Torche, Florencia. 2011. "Effect of Stress on Birth Outcomes: Exploiting a Natural Experiment" *Demography* 48(4) 1473-1491.
- Caudillo, Monica and Florencia Torche. 2014. "Exposure to Local Homicides and Early Educational Achievement in Mexico" *Sociology of Education* 87(2): 89-105.

If you want more:

- Morgan and Winship, Chapter 11.
- Halaby, Charles. 2004. "Panel Models in Sociological Research: Theory into Practice?" *Annual Review of Sociology* 30: 507-44.

## **Week 9. May 31: Regression Discontinuity**

Required Reading:

- Niu, Sunny X. and Marta Tienda. 2010. "The Impact of the Texas Top 10% Law on College Enrollment: A Regression Discontinuity Approach." *Journal of Policy Analysis and Management*, 29(1): 84-110.
- Bernardi, Fabrizio. 2014. "Compensatory Advantage as a Mechanism for Educational Inequality: A Regression Discontinuity Based on Month of Birth" *Sociology of Education* 87(2): 74-88.

If you want more:

- Cook, Thomas. 2008. "Empirical Tests of the Validity of the Regression Discontinuity Design" *Annales d'Économie et de Statistique*, 91/92: 127-150.

## **Week 10. June 7: Mediation Analysis, Falsification Tests, and Other Extensions.**

Required Reading:

- Mayer, Susan. 1997. *What Money Can't Buy. Family Income and Children's Life Chances*. Harvard University Press.
- McCabe, Brian. 2013. "Are Homeowners Better Citizens? Homeownership and Community Participation in the United States." *Social Forces* 91(3): 929-954.
- Imai, Kosuke, Luke Keele, Dustin Tingley, and Teppei Yamamoto. 2011. "Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies" *American Political Science Review* 105(3): 765-789.

If you want more:

- Wang, Xiaolu and Michael Sobel. 2013. "New Perspectives on Causal Mediation Analysis" pp. 215-242 in Morgan, Stephen. Ed. *Handbook of Causal Analysis for Social Research*. Springer