

June 25, 2019

Course syllabus: Causal Inference in Sociology (SO7431)

1. General information

The course consists of 7.5 ECTS credit and is at advanced level in Sociology

2. Popular description

Correlation is not causation, this has since long been known to analysts in the social sciences. The ultimate method to obtain causal estimates is to conduct an experiment with treatment and control groups. In the social sciences, experiments may be used in some contexts, but often this alternative is not applicable or even inappropriate because the experimental situation in itself is too synthetic and deviates from normal life. Analysts thus have to work with observational data, which often miss information crucial for making causal interpretations of statistical associations. However, under some circumstances and subject to specific assumptions, one can interpret estimated associations as casual with substantially higher confidence. This course deals with methods that can be used under such circumstances and subject to the specific assumptions. The course offers practical skills in implementing these methods and the theoretical skills needed to understand and value evidence from them.

3. Decision

2018-11-27

4. Entrance qualifications

BSc degree 180 hp including BSc thesis 15 hp, English 6, Quantitative Methods in the Social Sciences 2 (SO7033). Course applicants must have completed the advanced level courses Quantitative Methods in the Social Sciences 2, or the equivalent. Equivalent knowledge must be verified to the course manager at the time of the application. Admitted students can expect only limited practical help with the computer-based assignments in the course. NB: We use the statistical software Stata for all instructions and assignments. The support we are able to offer is dedicated to learning new routines, not managing basic programming.

5. Course contents

The course deals with counterfactual models in quantitative social science. By counterfactual models we mean models that include attempts to handle endogeneity, selection and/or reverse causation through *research design*. The models can be described as special cases of an overarching counterfactual framework which is inspired by the lingua of experimental research. The course deals with the following methods:

1. Experiments, the ideal-typical reference
2. Difference in differences
3. Instrumental variables
4. Regression discontinuity

Each of these methods is built on assumptions in order to indentify the supposedly causal

effect. These assumptions are critical to the interpretation of quantitative estimates. A great deal of the course revolves around the different assumptions invoked when using counterfactual models.

6. Expected learning outcomes

The course has two different expected learning outcomes. After the course, the student is expected to be able to

- a. Conduct analyses based on a counterfactual design, i.e., use, and interpret output from, counterfactual models
- b. Describe and explain the counterfactual designs work, including:
 - Understand the motivation for and the theoretical underpinnings of common counterfactual designs
 - Critically examine and discuss internal and external validity in relation to common counterfactual models
 - Discuss merits and limitations of counterfactual designs for specific research topics

7. Course organization and instruction

The course is provided at half time during approximately 10 weeks. The course is organized around 5 mandatory assignments, with introductory and thematic lectures and voluntary computer laboratories as supplementary learning resources.

7.1. Course assignments

There are five mandatory written assignments. Four computer assignments deal with each design listed under Course contents, where students perform estimation on a provided dataset, write a short report, and write a summary of a published work using the design/methodology focused on. The assignment report may contain a maximum of **2,000** words, and are to be handed in by teams with two students in each team. The composition of the student teams are changed for each assignment and decided by the teacher. In addition to handing in assignments, groups are expected to contribute to a critical discussion of the methodology of a specified published work using the design/methodology in focus.

The assignments are organized around peer review: for the computer assignments, teams are paired and shall provide constructive comments and, if applicable, also practical help during the work with the assignments.

Assignments 1-4 are graded according to the following scale: Pass (P) Fail (F).

The fifth assignment is to individually write a critical examination of published work in a research field of the student's choice. The review should identify gaps in the literature with regard to the causal effect of some variable X on Y, and thereby identify opportunities to contribute to research in this field with a research design employing a design (or possibly a combination of designs) covered in the course. The assignment should contain a description of the design's logic and identifying assumptions, a realistic plan to collect/find real data using this design, and a discussion of strengths and weaknesses of such a research endeavor in relation to its potential contribution to the accumulated knowledge in the research field. The focus of this assignment should be on the *application* of a design on a specific case. In

other words – the research design, its identifying assumptions, and how reasonable these assumptions are – should NOT be described in generic terms but be *related to the specific case*. The maximum number of words (excluding the reference list) is **2,000**. This individual assignment is presented orally and discussed at a seminar in advance of the final deadline. As for the computer assignments, students are organized in peer-review groups and shall provide constructive comments during the work with it.

Assignment 5 is graded according to the scale A-F (cf. grading criteria below), and forms the main basis for the individual grades on the course. In order to receive at least grade E on the entire course, assignments 1-4 all have to be graded P, and assignment 5 needs to receive at least grade E.

In sum, each assignment involves giving peer-review during the work with the assignment, writing a report, and contributing to a critical discussion on the seminars.

All assignments are to be uploaded to the Athena course site no later than **Monday in course week #10**. If a student fails to meet this deadline or submits at least one assignment with substantial errors, s/he may (re)submit a (revised) assignment no later than course week #10+10 semester weeks. At this point in time the course teachers will assess the grading of the student's revised assignments. If a student fails yet again on this occasion, assessment of revised assignments will take place at course week #10+20 semester weeks.

7.2. Instruction

Introductory meetings and seminars for course assignments

Instructions for the assignments (1) through (4) are given at the assignment preparations, where student teams and peer-review team-pairs are organized. These student teams will change across assignments. The assignments are additionally presented at seminars where the course instructors give feedback.

Lectures

The course offers five lectures:

1. Lecture 0:
 - a. Introduction to counterfactual models (+ some of the critique it has been subject to)
 - b. Orientation on the course structure
2. Lecture 1: Experiments
3. Lecture 2: Difference in differences and fixed effects methods
4. Lecture 3: Instrumental variables
5. Lecture 4: Regression discontinuity

Computer laboratories

We offer four different computer laboratories with a focus in practical skills needed in order to conduct assignments 1 to 4. The topics of the laboratories are:

1. Experiments
2. Difference in differences (DD)
3. Instrumental variables

4. Regression discontinuity

8. Examination

The grading criteria are hierarchical (to receive a higher valued grade, all requirements of the lower levels need to be fulfilled for a higher grade), and are qualitatively different.

Grade	Expected learning outcome (a): Describe and explain counterfactual research designs
A	The student can independently identify opportunities for unexploited counterfactual research designs for a specific research topic, and discuss and weight merits and limitations of these.
B	The student can independently discuss issues of internal and external validity of counterfactual designs for a specific research topic.
C	The student can provide a clear account of the theoretical underpinnings of counterfactual designs for a specific research topic.
D	The student can give a clear account of the problems involved in the estimation of causal effects using observational data and motivate the use of counterfactual research designs for a specific research topic.
E	The student can use, and interpret output from, counterfactual research designs. The student can describe and explain the basics of counterfactual research designs. The student has completed all mandatory assignments and has provided peer review feedback on other students' assignment drafts.
Fx	The student makes errors in describing, or explaining, counterfactual research designs. The student makes errors in the use, or the interpretation of output from, counterfactual research designs.
F	The student cannot describe and explain counterfactual research designs. The student cannot use, or interpret, output from counterfactual research designs. The course has to be taken in its entirety at a later point in time.

9. Course schedule

Time edit:

<https://cloud.timeedit.net/su/web/stud1/ri107455X86Z56Q5Z26g3Y40y0056Y35Q03gQY5Q54727.html>

Wk#	Date	Time	Venue	Content	Teacher(s)
1	Tue 3 Sept	13-16	B900	Lecture 0 + Assignment 5 prep	Magnus By
1	Wed 4 Sept	13-15	B800	Lecture 1+Lab 1 prep	Moa Bu
1	Wed 4 Sept	15-17	B389	Self managed lab 1	-
1	Thu 5 Sept	10-12	B389	Lab feedback+Assignment 1 prep	Moa Bu
2	Wed 11 Sept	13-15	B389	Reserved time for student peer review, Assignment 1	-
2	Fri 13 Sept	10.00		Deadline Assignment 1	-
3	Tue 17 Sept	9-12	B900	Seminar on Assignment 1 + article seminar	Moa Bu
3	Wed 18 Sept	13-15	B800	Lecture 2+Lab 2 prep	Martin H
3	Thu 19 Sept	13-15	B389	Self managed lab 2	-
3	Fri 20 Sept	10-12	B389	Lab feedback + Assignment 2 prep	Martin H
4	Wed 25 Sept	13-15	B389	Reserved time for student peer review, Assignment 2	-
4	Fri 27 Sept	10.00		Deadline Assignment 2	-
5	Tue 1 Oct	9-12	B900	Seminar on Assignment 2 + article seminar	Martin H
5	Tue 1 Oct	13-15	B900	Lecture 3+Lab 3 prep	MBy
5	Wed 2 Oct	13-15	B389	Self managed lab 3	-
5	Thu 3 Oct	13-15	B389	Lab feedback+Assignment 3 prep	MBy
6	Wed 9 Oct	13-15	B389	Reserved time for student peer review, Assignment 3	-
6	Fri 11 Oct	10.00		Deadline Assignment 3	-
7	Tue 15 Oct	9-12	B900	Seminar on Assignment 3 + article seminar	MBy
7	Tue 15 Oct	13-15	B900	Lecture 4 + Lab 4 prep	MH
7	Wed 16 Oct	13-15	B389	Self managed lab 4	-
7	Thu 17 Oct	13-15	B389	Lab feedback+Assignment 4 prep	MH
7	Fri 18 Oct	10.00		Deadline Assignment 5 draft	-
8	Wed 23 Oct	13-15	B389	Reserved time for student peer review, Assignment 4	-
8	Thu 24 Oct	10-12;13-15	B900	Seminar on Assignment 5	MBy, MH
8	Fri 25 Oct	10.00		Deadline Assignment 4	-
9	Tue 29 Oct	9-12	B900	Seminar on Assignment 4 + article seminar	MH
10	Mon 4 Nov	10.00		Final submission deadline for all assignments	-

MBu= Moa Bursell, MBy=Magnus Bygren, MH=Martin Hällsten

10. Literature

There is one course book that is required reading. In addition to the book, articles some of which are listed below will have to be read in advance of lectures/seminars. The teachers will give reading instructions during the course.

Course book (required reading)

Angrist, Joshua D., and Jörn-Steffen Pischke. 2009. *Mostly harmless econometrics: an empiricist's companion*. Princeton: Princeton University Press.

Articles (required reading)

Experiments

Jackson, Michelle and David Cox. 2013. The Principles of Experimental Design and Their Application in Sociology. *Annual Review of Sociology*, 39:27-49.

Angrist & Pischke MHE: chapter 2

Seminar reads

Pedulla, David. 2014. The Positive Consequences of Negative Stereotypes: Race, Sexual Orientation and the Job Application Process. *SPQ* 77:75-94.

Bygren, Magnus, Erlandsson, Anni, & Gähler, Michael 2017. Do Employers Prefer Fathers? Evidence from a Field Experiment Testing the Gender by Parenthood Interaction on Callbacks to Job Applications. *European Sociological Review* 33: 337-48.

Salganik, M. J., Dodds, P. S., & Watts, D. J. (2006). Experimental study of inequality and unpredictability in an artificial cultural market. *Science*, 311(5762), 854–856

And: TBA

Diff-in-Diff

Angrist & Pischke MHE: chapter 5

Lechner, Michael. 2011. "The Estimation of Causal Effects by Difference-in-Difference Methods." *Foundations and Trends® in Econometrics* 4:165-224. http://michael-lechner.eu/ml_pdf/journals/2011_Lechner_DiD_2011_ECO%20403%20Lechner_darf%20aufs%20Netz.pdf

Seminar reads

Marie, Olivier, and Ulf Zölitz. 2017. "'High' Achievers? Cannabis Access and Academic Performance." *The Review of Economic Studies* 84:1210-1237. <https://academic.oup.com/restud/article/84/3/1210/3091869>

Card, David. 1990. "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review* 43:245-257. <http://www.jstor.org/stable/2523702>

Nilsson, J. Peter. 2017. "Alcohol Availability, Prenatal Conditions, and Long-Term Economic Outcomes." *Journal of Political Economy* 125:1149-1207. <https://www.journals.uchicago.edu/doi/abs/10.1086/692694>

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. 2010. "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program." *Journal of the American Statistical Association* 105:493-505. <http://dx.doi.org/10.1198/jasa.2009.ap08746>

Instrumental Variables

Kirk, D. S. 2009. "A Natural Experiment on Residential Change and Recidivism: Lessons from Hurricane Katrina" *American Sociological Review* June 2009 vol. 74, 484-505. <http://asr.sagepub.com/content/74/3/484.short>

Mahler, V. 2008. "Electoral turnout and income redistribution by the state: A crossnational analysis of the developed democracies", *European Journal of Political Research*, vol. 47, 161-183. <http://onlinelibrary.wiley.com/doi/10.1111/j.1475-6765.2007.00726.x/full#t2>

Miguel, E. 2004. "Economic Shocks and Civil Conflict: An Instrumental Variables Approach", *Journal of Political Economy*, vol. 112, 725-753. <http://www.jstor.org/stable/10.1086/421174>

Regression Discontinuity

Angrist & Pischke MHE: chapter 6

Lee, David S., and Thomas Lemieux. 2010. "Regression Discontinuity Designs in Economics." *Journal of Economic Literature* 48:281-355. <http://www.jstor.org/stable/20778728>

[Skip 3.5 (p.302-307), 4.3.1-4.3.2 (p. 319 - 327), 5 (336-338), skim through 6 and possibly 7]

Seminar reads

Eggers, Andrew C., Anthony Fowler, Jens Hainmueller, Andrew B. Hall, and James M. Snyder Jr. 2015. "On the Validity of the Regression Discontinuity Design for Estimating Electoral Effects: New Evidence from Over 40,000 Close Races." *American Journal of Political Science* 59:259-274.
<https://onlinelibrary.wiley.com/doi/abs/10.1111/ajps.12127>

Card, David, Carlos Dobkin, and Nicole Maestas. 2009. "Does Medicare Save Lives?" *The Quarterly Journal of Economics* 124:597-636.
<http://qje.oxfordjournals.org/content/124/2/597.short>

Cook, Philip J., and Songman Kang. 2016. "Birthdays, Schooling, and Crime: Regression-Discontinuity Analysis of School Performance, Delinquency, Dropout, and Crime Initiation." *American Economic Journal: Applied Economics* 8:33-57.
<http://www.aeaweb.org/articles?id=10.1257/app.20140323>

Clark, Andrew, and Elena Stanca. 2016. "Individual Well-Being and the Allocation of Time Before and After the Boston Marathon Terrorist Bombing." IZA DP 9882.
<http://ftp.iza.org/dp9882.pdf>

Reference literature (not required reading)

Cunningham, S. 2018. *Causal Inference: The Mixtape*. Open access:
http://scunning.com/cunningham_mixtape.pdf

Deaton, A. and Cartwright, N. 2018. Understanding and Misunderstanding Randomized Controlled Trials, *Social Science & Medicine*, <http://dro.dur.ac.uk/23782/2/23782.pdf>

Gangl, M. 2010. "Causal Inference in Sociological Research" *Annual Review of Sociology* 36:21-47.
<https://www.annualreviews.org/doi/full/10.1146/annurev.soc.012809.102702>

Jacob, Robin, Pei Zhu, Marie-André Somers, and Howard Bloom. 2012. "A Practical Guide to Regression Discontinuity." MDRC.
http://www.mdrc.org/sites/default/files/regression_discontinuity_full.pdf

Morgan, Stephen L., and Christopher Winship. 2015. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. New York, NY: Cambridge University Press.

Samii, C. 2016. Causal Empiricism in Quantitative Research, *The Journal of Politics*, 78:941-955.
<https://www.journals.uchicago.edu/doi/abs/10.1086/686690>