Causal Inference in Applied Econometrics

last update: August 21, 2026

Course description
Many of the big questions in the social sciences (and economics) deal with cause and effect. How does immigration affect pay and employment levels? How does a longer education affect someone's future income? These questions are difficult to answer because we have nothing to use as a comparison. We do not know what would have happened if there had been less immigration or if that person had not continued studying.
However, the Laureates of the Nobel Prize in Economics in 2021 - David Card, Joshua Angrist, and Guido Imbens - have shown that it is possible to answer these and similar questions using natural experiments. The key is to use situations in which chance events or policy changes result in groups of people being treated differently, in a way that resembles clinical trials in medicine.
If you are curious about how economists can draw plausible conclusions about cause and effect I invite you to join this course. The course covers core methods and seminal applications dealing with causal inference.
We will work though assumptions, diagnostics, practical examples. Moreover, students will present and discuss applications or extensions of such designs with practical examples from recent papers.
Participation is possible for MAGKS and GGS members.

Syllabus

1. Introduction and Potential Outcome Framework
2. Randomized Controlled Trials
3. Matching / Selection on Observables
4. Linear Regression and Causality
5. Instrumental Variables and LATE
6. Regression Discontinuity Designs
7. Difference-in-Differences / modern DiD; Staggered Treatment Adoption
8. Synthetic Control Method

Course Work
Active participation in the course, selection of a suitable research paper, and presentation of the paper (approx. 12 minutes). All participants are expected to be familiar with the papers presented and to actively participate in the discussions.

The course is worth 6 ECTS credits.

Contact

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Registration via `https://www.uni-giessen.de/de/fbz/fb02/fb/professuren/vwl/stockburger/lehre/promotion/registration_causal_inference`
Maximum number of participants: 20 Registration deadline: September 16, 2026

Tentative Schedule

Lecture Sessions

The lecture sessions will take place from Monday, October 05 to Wednesday, October 07, 2026, from 09:00 to 15:30 at Justus Liebig University Giessen, Licher Strasse 68, room tba.

	time	topic
Monday	09:00 – 10:30	Introduction; Potential Outcome Framework
(Oct-05)	10:45 – 12:15	Randomized Controlled Trials (RCT)
	13:00 – 14:30	Matching / Selection on Observables
	14:45 – 15:30	Regression
Tuesday	09:00 – 10:30	Instrumental Variables (IV)
(Oct-06)	10:45 – 12:15	IV / LATE
	13:00 – 14:30	Regression Discontinuity Design (RDD)
	14:45 – 15:30	RDD
Wednesday	09:00 – 10:30	Difference-in-Differences (DiD)
(Oct-07)	10:45 – 12:15	DiD
	13:00 – 14:00	Modern DiD / Staggered Treatment Adoption
	14:15 – 15:00	Synthetic Control Method (SCM)
	15:00 – 15:30	Wrap-up; Preparation for Presentations

Presentation Sessions

The presentation sessions will take place on Friday, October 16 and Friday, October 23, 2026, from 09:30 to 12:30. The presentation sessions may be held in a hybrid or online format.

	time	topic
Friday	09:30 – 10:50	Study presentations 1–4
(Oct-16)	10:50 – 11:10	Break
	11:10 – 12:30	Study presentations 5–8
Friday	09:30 – 10:50	Study presentations 9–12
(Oct-23)	10:50 – 11:10	Break
	11:10 – 12:30	Study presentations 13–16

- Schedule subject to adjustment depending on the number of presentations.
- Each study is allocated a 20-minute slot: approx. 12 minutes presentation + 8 minutes discussion.

- Everyone should be familiar with all studies and actively participate in the discussion.

Literature: (preliminary; to be updated)

Literature on Causal Inference in general:

- Angrist, J. D., and Pischke, J. S. (2014). *Mastering 'Metrics: The Path from Cause to Effect.* Princeton University Press.
(online material)
- Angrist, J. D., and Pischke, J. S. (2013). *Mostly Harmless Econometrics. An Empiricist's Companion.* Princeton University Press.
(MHE – online access)
- Cunningham, S. (2021). *Causal inference: The Mixtape.* Yale University Press.
(The Mixtape – online access)
- Huntington-Klein, N. (2021). *The Effect: An Introduction to Research Design and Causality.* CRC Press.
(The Effect – online access)
- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data.* MIT press. (Chapter 18: Estimating Average Treatment Effects)
(Panel-Wooldridge – online access)

Potential Outcome Framework:

- Neyman, J. S. (1923). On the application of probability theory to agricultural experiments. Essay on principles. section 9.(translated and edited by D. M. Dabrowska and T.P. Speed, Statistical Science (1990), 5, 465-480). *Annals of Agricultural Sciences*, 10:1–51
- Fisher, R. A. (1935). The Design of Experiments. *Oliver and Boyd, Edinburgh*
- Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford economic papers*, 3(2):135–146
- Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of educational Psychology*, 66(5):688

Randomized Controlled Trials:

- Baicker, K., Taubman, S. L., Allen, H. L., Bernstein, M., Gruber, J. H., Newhouse, J. P., Schneider, E. C., Wright, B. J., Zaslavsky, A. M., and Finkelstein, A. N. (2013). The oregon experiment-effects of medicaid on clinical outcomes. *New England Journal of Medicine*, 368(18):1713–1722

- Carter, S. P., Greenberg, K., and Walker, M. S. (2017). The impact of computer usage on academic performance: Evidence from a randomized trial at the united states military academy. *Economics of Education Review*, 56:118–132

- Finkelstein, A., Taubman, S., Wright, B., Bernstein, M., Gruber, J., Newhouse, J. P., Allen, H., Baicker, K., and Group, O. H. S. (2012). The oregon health insurance experiment: evidence from the first year. *The Quarterly journal of economics*, 127(3):1057–1106

- Krueger, A. B. (1999). Experimental estimates of education production functions. *The quarterly journal of economics*, 114(2):497–532

- Taubman, S. L., Allen, H. L., Wright, B. J., Baicker, K., and Finkelstein, A. N. (2014). Medicaid increases emergency-department use: evidence from oregon's health insurance experiment. *Science*, 343(6168):263–268

Matching Methods:

- Abadie, A. and Imbens, G. W. (2006). Large sample properties of matching estimators for average treatment effects. *econometrica*, 74(1):235–267

- Cochran, W. G. (1968). The effectiveness of adjustment by subclassification in removing bias in observational studies. *Biometrics*, pages 295–313

- Crump, R. K., Hotz, V. J., Imbens, G. W., and Mitnik, O. A. (2009). Dealing with limited overlap in estimation of average treatment effects. *Biometrika*, 96(1):187–199

- Diamond, A. and Sekhon, J. S. (2013). Genetic matching for estimating causal effects: A general multivariate matching method for achieving balance in observational studies. *Review of Economics and Statistics*, 95(3):932–945

- Rosenbaum, P. R. and Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1):41–55

- Shonchoy, A. (2010). Seasonal migration and the effectiveness of micro-credit in the lean period: Evidence from bangladesh. *Institute of Developing Economies Discussion paper No*, 294

Regression and Causality:

- Angrist, J. D. and Pischke, J.-S. (2014). *Mastering 'Metrics: The Path from Cause to Effect*. Princeton university press

- Pei, Z., Pischke, J.-S., and Schwandt, H. (2019). Poorly measured confounders are more useful on the left than on the right. *Journal of Business & Economic Statistics*, 37(2):205–216

Instrumental Variables:

- Angrist, J. D. and Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings? *The Quarterly Journal of Economics*, 106(4):979–1014
- Card, D. (1993). Using geographic variation in college proximity to estimate the return to schooling. working paper version available at: `http://www.nber.org/papers/w4483`
- Card, D. (2001). Estimating the return to schooling: Progress on some persistent econometric problems. *Econometrica*, 69(5):1127–1160
- Staiger, D. and Stock, J. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65(3):557–586
- Stock, J. H., Wright, J. H., and Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20(4):518–529
- Wald, A. (1940). The fitting of straight lines if both variables are subject to error. *The annals of mathematical statistics*, 11(3):284–300

Regression Discontinuity Designs:

- Almond, D., Doyle Jr, J. J., Kowalski, A. E., and Williams, H. (2010). Estimating marginal returns to medical care: Evidence from at-risk newborns. *The Quarterly Journal of Economics*, 125(2):591–634
- Angrist, J. D. and Lavy, V. (1999). Using maimonides' rule to estimate the effect of class size on scholastic achievement. *The Quarterly Journal of Economics*, 114(2):533–575
- Carpenter, C. and Dobkin, C. (2009). The effect of alcohol consumption on mortality: regression discontinuity evidence from the minimum drinking age. *American Economic Journal: Applied Economics*, 1(1):164–82
- Carpenter, C. and Dobkin, C. (2011). The minimum legal drinking age and public health. *Journal of Economic Perspectives*, 25(2):133–56
- Imbens, G. W. and Lemieux, T. (2008). Regression Discontinuity Designs: A Guide to Practice. *Journal of Econometrics*, 142(2):615–635
- McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics*, 142(2):698–714

Difference-in-Differences:

- Snow, J. (1855). *On the mode of communication of cholera*. John Churchill
- Ashenfelter, O. and Krueger, A. (1994). Estimates of the economic return to schooling from a new sample of twins. *The American economic review*, pages 1157–1173

- Card, D. and Krueger, A. B. (1994). Minimum wages and employment: A case study of the fast-food industry in new jersey and pennsylvania. *American Economic Review*, 84(4):772–93
- Todd, P. E. and Wolpin, K. I. (2003). On the specification and estimation of the production function for cognitive achievement. *The Economic Journal*, 113(485):F3–F33
- Carpenter, C. and Dobkin, C. (2011). The minimum legal drinking age and public health. *Journal of Economic Perspectives*, 25(2):133–56
- Roth, J., Sant'Anna, P. H., Bilinski, A., and Poe, J. (2023). What's trending in difference-in-differences? a synthesis of the recent econometrics literature. *Journal of Econometrics*

Synthetic Control Method:

- Abadie, A. and Gardeazabal, J. (2003). The economic costs of conflict: A case study of the basque country. *American economic review*, 93(1):113–132
- Abadie, A., Diamond, A., and Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of california's tobacco control program. *Journal of the American statistical Association*, 105(490):493–505
- Abadie, A., Diamond, A., and Hainmueller, J. (2015). Comparative politics and the synthetic control method. *American Journal of Political Science*, 59(2):495–510
- Athey, S. and Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. *Journal of Economic Perspectives*, 31(2):3–32