Topics in Microeconometrics
(Aka Program Evaluation and Causal Inference)

Description

This course provides an introduction to recent advances in methods for program and policy evaluation. Causal inference seeks to estimate the impacts of programs or policy interventions on outcome variables of interest. For example, labor economists are interested in estimating the causal effect of a training program on earnings.

We first discuss the general framework based on counterfactual outcomes and then cover the main methods available to the empirical researcher. For each method, we discuss key theoretical results, implementation issues and applications from leading research papers. We pay particular attention to the fact that the different methods make different assumptions about the mechanism based on which people are assigned to the program. We start with the assumption that program assignment is conditionally randomized. Suitable methods in this case include matching and regression methods. Then we discuss methods that rely on longitudinal information to recover causal effects. We further discuss instrumental variable methods that are suitable in the case of confounded assignment. The last part of the lecture covers the regression discontinuity design that exploits deterministic assignment rules generating discontinuities in the probability of receiving the program.

The course consists of weekly lectures and exercise sessions (6 ECTS credits in total). The lectures take place twice a week during the first half of the term. The exercise sessions start in the second week and run until the end of the term.

Target Audience and Prerequisites

The course is designed for Master (and doctoral) students who want to become familiar with modern econometric methods for program evaluation and causal inference. Participants are expected to have attended an introductory Econometrics course at the Master level and to have knowledge of statistics and regression models at the level of e.g., Stock and Watson (2012) or Wooldridge (2013).

Assessment

Grading will be based on a written final exam covering topics discussed in the lecture and exercise sessions. Parts of the exam may require you to interpret Stata-output and to comment on tables showing empirical results. In addition, we reward your active participation in the exercise sessions. You will have the opportunity to prepare the solution to selected exercises and present them in class. If your grade in the presentation is better than your grade in the final exam, the oral grade contributes to your overall grade for the course with a weight of 20%. This rule applies only if the final exam is taken during one of the two exam periods of this term.

Overview of Topics and Applications

1. Introduction
   - Potential Outcomes Approach
   - Social Experiments in Theory and Practice

   - Application 1: Heckman et al. (1999, 2000)
   - Application 2: Black et al. (2003)

2. Matching and Regression
   - Conditional Independence, Common Support
   - Exact Matching and Regression
   - Propensity Score Matching

   - Application 1: LaLonde (1986)
   - Application 2: Dehejia and Wahba (1999, 2002)

3. Difference-in-Differences Design
   - Data Requirements and Identifying Assumptions
   - Details of estimation and inference

   - Application 1: Card and Krueger (1994)
   - Application 2: Pischke (2007)

4. Instrumental Variable (IV) Methods
   - Constant Effects IV
   - Heterogeneous Effects IV and Local Average Treatment Effect
   - Weak Instruments

   - Application 1: Card (1995)
   - Application 2: Angrist and Krueger (1991)

5. Regression Discontinuity Design
   - Sharp and Fuzzy Design
   - Graphical and Econometric Analysis
   - Application 1: Lee (2008)
   - Application 2: Angrist and Lavy (1999)

Course Materials and Reading List

All lecture notes, problem sets, and additional materials will be posted on the ILIAS platform. The lecture notes summarize the key points covered in this course. To gain a deeper understanding of each topic we recommend you to study also the core background readings indicated below. The main background readings are the textbooks by Angrist and Pischke (2009), chapters 1-6, and Wooldridge (2010), chapter 21, as well as the survey articles by Imbens and Wooldridge (2009), and DiNardo and Lee (2011). The video course by Angrist (n.d.) gives a good nontechnical overview of the methods. Additional references will be given in class.

Angrist, Joshua D. (n.d.): Mastering Econometrics, Marginal Revolution University, retrieved September 14, 2022 from: https://mru.org/mastering-econometrics.

Angrist, Joshua D. and Jörn-Steffen Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton and Oxford: Princeton University Press.

DiNardo, John and David S. Lee (2011). Program Evaluation and Research Designs, in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Vol. 4A, Amsterdam: Elsevier Science, ch. 5, 463-536.

Imbens, Guido and Jeffrey M. Wooldridge (2009). Recent Developments in the Econometrics of Program Evaluation, *Journal of Economic Literature*, 47(1), 5-86.

Wooldridge, Jeffrey M. (2010): *Econometric Analysis of Cross Section and Panel Data*, Cambridge (MA): MIT Press, second edition.

The course will also cover applications from original research articles. Specifically, we will discuss the following papers in some detail:

Angrist, Joshua D. and Victor Lavy (1999). Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement, *Quarterly Journal of Economics*, 114(2), 533-575.

Angrist, Joshua D. and Alan B. Krueger (1991). Does Compulsory School Attendance Affect Schooling and Earnings?, *Quarterly Journal of Economics*, 106(4), 979-1014.

Black, Dan A., Jeffrey A. Smith, Mark C. Berger, and Brett J. Noel (2003). Is the Threat of Reemployment Services More Effective Than the Services Themselves? Evidence from Random Assignment in the UI System, *American Economic Review*, 93(4), 1313-1327.

Card, David (1995). Using Geographic Variation in College Proximity to Estimate the Return to Schooling, in L. Christofides, E.K. Grant, and R. Swindinsky (eds.), *Aspects of Labour Economics: Essays in Honour of John Vanderkamp*, Toronto: University of Toronto Press; also published as NBER Working Paper No. 4483.

Card, David and Alan B. Krueger (1994). Minimum Wages and Employment: A Case Study of the Fast Food Industry in New Jersey and Pennsylvania, *American Economic Review*, 84(4), 772-784.

Dehejia, Rajeev and Sadek Wahba (1999). Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs, *Journal of the American Statistical Association*, 94(448), 1053-1062.

Deheija, Rajeev and Sadek Wahba (2002). Propensity Score-Matching Methods for Nonexperimental Causal Studies, *Review of Economics and Statistics*, 84(1), 151-161.

Heckman, James J., Neil Hohmann, Jeffrey Smith, and Michael Khoo (2000). Substitution and Dropout Bias in Social Experiments: A Study of an Influential Social Experiment, *Quarterly Journal of Economics*, 115(2), 651-694.

Heckman, James J., Robert J. LaLonde, Jeffrey A. Smith (1999). The Economics and Econometrics of Active Labor Market Programs, in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Vol. 3, Amsterdam: Elsevier Science, ch. 31, 1865-2097.

LaLonde Robert (1986). Evaluating the Econometric Evaluations of Training Programs Using Experimental Data, *American Economic Review*, 76(4), 602-620.

Lee, David S. (2008). Randomized Experiments from Non-Random Selection in U.S. House Elections, *Journal of Econometrics*, 142(2), 675-697.

Pischke, Jörn-Steffen (2007). The Impact of Length of the School Year on Student Performance and Earnings: Evidence from the German Short School Years, *Economic Journal*, 117(523), 1216-1242.

Additional References

Stock James H. and Mark W. Watson (2012). *Introduction to Econometrics*. Boston (MA): Pearson, third international edition.

Wooldridge, Jeffrey M. (2013). *Introductory Econometrics: A Modern Approach*, Cincinnati (OH): Thomson South-Western, fifth edition.