

PhD Workshop: Program Evaluation - Microeconomic Methods and Practical Applications with Stata

Outline

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- **Objectives:** The aim of this workshop is to provide participants with a deeper understanding of microeconomic program evaluation. We will use the potential outcome approach as a general principle to examine identification and estimation of treatment effects under various types of assumptions. Several methods, e.g., matching, instrumental variables, difference-in-differences, and regression-discontinuity design will be discussed and implemented. The course will be split in six theoretical and six practical sessions.
- **Location/Room/Time:** March 5-7, 2014, 9am-5pm (theoretical sessions in the morning, practical sessions in the afternoon); Room GW2, B2280.
- **Requirements/Pre-Requisites:** During the practical sessions we are going to implement the discussed estimators with STATA. Hence, a basic knowledge of STATA (data handling, running do-files, etc.) is a pre-requisite for the course. If you are not familiar with STATA you might want to check the online introduction (including lecture movies) from the UCLA Academic Technology Service <http://www.ats.ucla.edu/stat/Stata/>. The relevant estimation commands and ado-files will be explained during the course.

This is the preliminary outline with a reading list. Even though the course will not presume knowledge of the reading list, it may be helpful for a better understanding to have read some of the papers. The papers which will be heavily discussed during the course are indicated with (*).

1. Introduction in Program Evaluation

- The Evaluation Framework
- Parameters of Interest and Selection Bias
- Social Experiments
- Linking the Potential-Outcome Framework to Textbook Econometrics
- Selection on Observables and Unobservables
- Effect Heterogeneity

Blundell and Costa Dias (2002), Caliendo and Hujer (2006*), Imbens and Wooldridge (2009*), LaLonde (1986*)

2. The Principle of Unconfoundedness and the Implementation of Matching Estimators

- The Basic Idea of Matching under Unconfoundedness
- Redefining Selection Bias
- How Matching and Regression under UCF differ
- Exact Matching and Covariate Matching
- The Balancing Property of the Propensity Score
- Estimating the Propensity Score
- Overlap and Common Support
- Choosing a Matching Algorithm
- Assessing the Matching Quality
- Effect Estimation
- Sensitivity Analysis

- Combining Propensity Score Matching with Other Methods

Caliendo and Kopeinig (2008*), Dehejia and Wahba (1999*), Imbens (2004*), Smith and Todd (2005a*), Heckman, Ichimura, Smith, and Todd (1998), Lechner (1999), Rosenbaum and Rubin (1983), Rosenbaum and Rubin (1985b), Rubin (1974), Abadie and Imbens (2006), Dehejia (2005), Heckman, Ichimura, and Todd (1998), Hirano, Imbens, and Ridder (2003), Imbens (2000), Lechner (2001), Lechner (2002), Rosenbaum and Rubin (1985a), Sianesi (2004), Smith and Todd (2005b)

3. Difference-in-Differences

- Motivation
- Formal Approach
- Estimation
- Threats to Validity
- Combining DiD with Matching

Card (1990*), Card and Krueger (1994*), Ashenfelter (1978), Card and Krueger (2000), Gruber (1994), Hong (2013)

4. Instrumental Variables

- Basic Model
- Formal Approach
- Multiple Instruments and 2SLS
- IV in the Treatment Effect Framework
- Heterogeneous Treatment Effects and LATE

Angrist (1990*), Card (1993*), Card (1995*), Heckman (1997*), Angrist, Imbens, and Rubin (1996), Angrist and Krueger (1991), Imbens and Angrist (1994), Angrist and Lavy (1999), Hahn, Todd, and Van der Klaauw (2001), Angrist and Evans (1998), Bound, Jaeger, and Baker (1995), Angrist and Krueger (1999), Imbens and Angrist (1994), McClellan, McNeil, and Newhouse (1994)

5. Regression Discontinuity Design

- Motivation
- Sharp RDD
- Fuzzy RDD
- Practical Advice and Threats for Validity
- Outlook: More Complicated RDD Setups

Imbens and Lemieux (2008*), Lee and Lemieux (2010*), Lee (2008), Imbens and Kalyanaraman (2012), Hoekstra (2009), Angrist and Lavy (1999), Heckman, LaLonde, and Smith (1999), Calonico, Cattaneo, and Titiunik (2013b), Calonico, Cattaneo, and Titiunik (2013a), Almond, Doyle, Kowalski, and Williams (2010), Cattaneo and Farrell (2013) McCrary (2008)

References

- ABADIE, A., AND G. IMBENS (2006): "Large Sample Properties of Matching Estimators for Average Treatment Effects," *Econometrica*, 74(1), 235–267.
- ALMOND, D., J. J. DOYLE, A. E. KOWALSKI, AND H. WILLIAMS (2010): "Estimating Marginal Returns to Medical Care: Evidence from At-Risk Newborns," *The Quarterly Journal of Economics*, 125(2), 591–634.

- ANGRIST, J. (1990): "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records," *American Economic Review*, 80(3), 313–336.
- ANGRIST, J., AND A. KRUEGER (1991): "Does Compulsory School Attendance Affect Schooling and Earnings?," *Quarterly Journal of Economics*, 106(4), 979–1014.
- ANGRIST, J. D., AND W. N. EVANS (1998): "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," *The American Economic Review*, 88(3), pp. 450–477.
- ANGRIST, J. D., G. W. IMBENS, AND D. B. RUBIN (1996): "Identification of Causal Effects Using Instrumental Variables," *Journal of the American Statistical Association*, 91(434), 444–472.
- ANGRIST, J. D., AND A. B. KRUEGER (1999): "Empirical Strategies in Labor Economics," in *Handbook of Labor Economics*, ed. by O. Ashenfelter, and D. Card, pp. 1277–1366. Elsevier Science B.V., Amsterdam.
- ANGRIST, J. D., AND D. LAVY (1999): "Using Maimonidis' Rule to Estimate the Effect of Class Size on Scholastic Achievement," *Quarterly Journal of Economics*, 114(2), 533–575.
- ASHENFELTER, O. (1978): "Estimating the Effects of Training Programs on Earnings," *Review of Economics and Statistics*, 60(1), 47–57.
- BLUNDELL, R., AND M. COSTA DIAS (2002): "Alternative Approaches to Evaluation in Empirical Microeconomics," *Portuguese Economic Journal*, 1, 91–115.
- BOUND, J., D. JAEGER, AND R. BAKER (1995): "Problems with Instrumental Variables Estimation when the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak," *Journal of the American Statistical Association*, 90(430), 443–450.
- CALIENDO, M., AND R. HUIJER (2006): "The Microeconometric Estimation of Treatment Effects - An Overview," *Allgemeines Statistisches Archiv*, 90(1), 197–212.
- CALIENDO, M., AND S. KOPEINIG (2008): "Some Practical Guidance for the Implementation of Propensity Score Matching," *Journal of Economic Surveys*, 22(1), 31–72.
- CALONICO, S., M. D. CATTANEO, AND R. TITIUNIK (2013a): "Robust Data-Driven Inference in the Regression-Discontinuity Design," Working paper.
- (2013b): "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs," Working paper.
- CARD, D. (1990): "The Impact of the Mariel Boatlift on the Miami Labor Market," *Industrial and Labor Relations Review*, 43(2), 245–257.
- (1993): "Using Geographic Variation in College Proximity to Estimate the Return to Schooling," NBER Working Papers 4483, National Bureau of Economic Research, Inc.
- (1995): "Earnings, Schooling, and Ability Revisited," in *Research in Labor Economics*, ed. by S. Polachek, vol. 14. JAI Press, Greenwich Connecticut.
- CARD, D., AND A. B. KRUEGER (1994): "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," *The American Economic Review*, 84(4), pp. 772–793.
- (2000): "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply," *The American Economic Review*, 90(5), 1397–1420.
- CATTANEO, M. D., AND M. H. FARRELL (2013): "Optimal Convergence Rates, Bahadur Representation, and Asymptotic Normality of Partitioning Estimators," *Journal of Econometrics*, 174(2), 127–143.
- DEHEJIA, R. (2005): "Practical Propensity Score Matching: A Reply to Smith and Todd," *Journal of Econometrics*, 125, 355–364.
- DEHEJIA, R. H., AND S. WAHBA (1999): "Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs," *Journal of the American Statistical Association*, 94(448), 1053–1062.
- GRUBER, J. (1994): "The Incidence of Mandated Maternity Benefits," *The American Economic Review*, 84(3), 622–641.
- HAHN, J., P. TODD, AND W. VAN DER KLAUW (2001): "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design," *Econometrica*, 69(1), 201–209.
- HECKMAN, J. (1997): "Instrumental Variables - A Study of the Implicit Behavioral Assumptions Used in Making Program Evaluations," *The Journal of Human Resources*, 32(3), 441–462.
- HECKMAN, J., H. ICHIMURA, J. SMITH, AND P. TODD (1998): "Characterizing Selection Bias Using Experimental Data," *Econometrica*, 66(5), 1017–1098.

- HECKMAN, J., H. ICHIMURA, AND P. TODD (1998): "Matching as an Econometric Evaluation Estimator," *Review of Economic Studies*, 65(2), 261–294.
- HECKMAN, J., R. LALONDE, AND J. SMITH (1999): "The Economics and Econometrics of Active Labor Market Programs," in *Handbook of Labor Economics Vol. III*, ed. by O. Ashenfelter, and D. Card, pp. 1865–2097. Elsevier, Amsterdam.
- HIRANO, K., G. IMBENS, AND G. RIDDER (2003): "Efficient Estimation of Average Treatment Effects using the Estimated Propensity Score," *Econometrica*, 71(4), 1161–1189.
- HOEKSTRA, M. (2009): "The Effect of Attending the Flagship State University on Earnings: A Discontinuity-Based Approach," *The Review of Economics and Statistics*, 91(4), 717–724.
- HONG, S.-H. (2013): "Measuring the Effect of Napster on Recorded Music Sales: Difference-In-Differences Estimated under Compositional Changes," *Journal of Applied Econometrics*, 28(2), 297–324.
- IMBENS, G. (2000): "The Role of the Propensity Score in Estimating Dose-Response Functions," *Biometrika*, 87(3), 706–710.
- (2004): "Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review," *The Review of Economics and Statistics*, 86(1), 4–29.
- IMBENS, G., AND J. ANGRIST (1994): "Identification and Estimation of Local Average Treatment Effects," *Econometrica*, 62(2), 467–475.
- IMBENS, G., AND K. KALYANARAMAN (2012): "Optimal Bandwidth Choice for the Regression Discontinuity Estimator," *Review of Economic Studies*, 79(3), 933–959.
- IMBENS, G., AND J. M. WOOLDRIDGE (2009): "Recent Developments in the Econometrics of Program Evaluation," *Journal of Economic Literature*, 47(1), 5–86.
- IMBENS, G. W., AND T. LEMIEUX (2008): "Regression discontinuity designs: A guide to practice," *Journal of Econometrics*, 142(2), 615 – 635.
- LALONDE, R. (1986): "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," *American Economic Review*, 76(4), 604–620.
- LECHNER, M. (1999): "Earnings and Employment Effects of Continuous Off-the-Job Training in East Germany After Unification," *Journal of Business Economic Statistics*, 17(1), 74–90.
- (2001): "Identification and estimation of causal effects of multiple treatments under the conditional independence assumption," in *Econometric Evaluation of Labour Market Policies*, ed. by M. Lechner, and F. Pfeiffer, pp. 1–18. Physica-Verlag, Heidelberg.
- (2002): "Programme Heterogeneity and Propensity Score Matching: An Application to the Evaluation of Active Labor Market Policies," *The Review of Economics and Statistics*, 84(2), 205–220.
- LEE, D. (2008): "Randomized experiments from non-random selection in U.S. House elections," *Journal of Econometrics*, 142(2), 675–697.
- LEE, D. S., AND T. LEMIEUX (2010): "Regression Discontinuity Designs in Economics," *Journal of Economic Literature*, 48(2), 281–355.
- MCCLELLAN, M., B. J. MCNEIL, AND J. P. NEWHOUSE (1994): "Does More Intensive Treatment of Acute Myocardial Infarction in the Elderly Reduce Mortality?," *Journal of the American Medical Association*, 272(11), 859–866.
- MCCRARY, J. (2008): "Manipulation of the running variable in the regression discontinuity design: A density test," *Journal of Econometrics*, 142, 698–714.
- ROSENBAUM, P., AND D. RUBIN (1983): "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, 70(1), 41–50.
- (1985a): "The Bias due to Incomplete Matching," *Biometrics*, 41(1), 103–116.
- (1985b): "Constructing a Control Group Using Multivariate Matched Sampling Methods that Incorporate the Propensity Score," *The American Statistician*, 39(1), 33–38.
- RUBIN, D. (1974): "Estimating Causal Effects to Treatments in Randomised and Nonrandomised Studies," *Journal of Educational Psychology*, 66, 688–701.
- SIANESI, B. (2004): "An Evaluation of the Swedish System of Active Labour Market Programmes in the 1990s," *The Review of Economics and Statistics*, 86(1), 133–155.
- SMITH, J., AND P. TODD (2005a): "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?," *Journal of Econometrics*, 125(1-2), 305–353.
- (2005b): "Rejoinder," *Journal of Econometrics*, 125, 365–375.