

# ECON 312: Econometrics

Spring Quarter 2022

Tuesdays and Thursdays, 17:00 - 18:20

Instructor: Magne Mogstad

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## 1 Preliminary outline

The main aim of this course is to develop a knowledge of the econometric methods that are useful to analyze individual level data (microdata). Here is a preliminary course outline. \* indicates that it would be very useful to read the paper prior to the class.

Please note that the inclusion of a paper on the syllabus should not be considered an “endorsement” of that paper’s methods - read critically!

### **Topic 1:**

#### – Defining parameters and arguing their (policy) relevance

Roy models, heterogeneity, and potential outcomes

– Edward Vytlacil & James J. Heckman (2001): "Policy-Relevant Treatment Effects," American Economic Review

– Heckman, James J. 2010. "Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy." Journal of Economic Literature, for now Sections 1 and 2.

– \*Angrist and Pischke (2009): Mostly Harmless Econometrics, for now Chapters 1 and 2.

#### – Randomized controlled trials

– Heckman, James J., and Jeffrey A. Smith (1995): "Assessing the Case for Social Experiments." Journal of Economic Perspectives

– Duflo, Esther, Glennerster, Rachel, and Kramer, Michael (2008): Using Randomization in Development Economics Research: A toolkit. Handbook of Handbook of Development Economics.

– Bitler, Marianne, P., Jonah B. Gelbach, and Hilary W. Hoynes (2006): "What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments." American Economic Review.

### **Topic 2: Controlling for observables**

– Heckman, J., Ichimura, H., Smith, J. and Todd, P. (1998a). Characterizing Selection Bias Using Experimental Data. Econometrica

- Heckman, J. J., Ichimura, H. and Todd, P. (1998b). Matching as an Econometric Evaluation Estimator. *The Review of Economic Studies*
- Heckman, J. J., Ichimura, H. and Todd, P. E. (1997). Matching As An Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme. *The Review of Economic Studies*
- Heckman, J. J. and Hotz, V. J. (1989). Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training. *Journal of the American Statistical Association* 84: 408, 862-874
- \*Angrist and Pischke (2009): Mostly Harmless Econometrics, Ch. 3.
- James Heckman & Salvador Navarro-Lozano, 2004. "Using Matching, Instrumental Variables, and Control Functions to Estimate Economic Choice Models," *The Review of Economics and Statistics*. Discussion about choice of controls and controlling on too much.
- Neale and Johnsen (1996): "The Role of Premarket Factors in Black-White Wage Differences". *Journal of Political Economy*, Vol. 104, No. 5 (Oct., 1996), pp. 869-895
- Reviews:
- Imbens, G. W. (2004). Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review. *The Review of Economics and Statistics* 86. This is a comprehensive review of selection on observables methods.
- \*Imbens, G. W. (2015). Matching Methods in Practice: Three Examples. *Journal of Human Resources* 50: 373-419 This review covers more recent methods and implementation issues.
- Much cited application where observables changes the conclusions drawn:
- Much cited application where observables changes the conclusions drawn:
- Dale, S. B. and Krueger, A. B. (2002). Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables. *The Quarterly Journal of Economics* 117.
- Analysis motivating selection on observables through knowledge of treatment assignment:
- Fagereng, A., M. Mogstad and M. Ronning (2021): Why do wealthy parents have wealthy children? *Journal of Political Economy*.
- Lalonde's paper and subsequent discussion of matching estimators:
- \*Lalonde (1986): Evaluating the Econometric Evaluations of Training Programs with Experimental Data, *American Economic Review*
- Dehejia, R. H. and Wahba, S. (1999). Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs. *Journal of the American Statistical Association* 94. An influential and somewhat controversial (see below) application of selection on observables arguments. Smith and Todd (2005a) argue that the specifications in Dehejia and Wahba (1999, 2002) papers are not robust, then there is a reply and a rejoinder. These papers are well-known and form an important backdrop to the way that economists think about selection on observables approaches.

– Dehejia, R. H. and Wahba, S. (1999). Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs. *Journal of the American Statistical Association* 94. An influential and somewhat controversial (see below) application of selection on observables arguments.

– Dehejia, R. H. and Wahba, S. (2002). Propensity Score-Matching Methods for Nonexperimental Causal Studies. *The Review of Economics and Statistics* 84

– Smith, J. and Todd, P. (2005a). Does matching overcome LaLonde’s critique of nonexperimental estimators? *Journal of Econometrics*

– Dehejia, R. (2005). Practical propensity score matching: a reply to Smith and Todd. *Journal of Econometrics*

– Bunching

– Blomquist et al. (forthcoming 2021): On Bunching and Identification of the Taxable Income Elasticity, *Journal of Political Economy*

– Saez, E. (2010), “Do Taxpayers Bunch at Kink Points,” *American Economic Journal: Economic Policy* 2, 180-212

– Chetty et al. (2011), “Adjustment Costs, Firm Responses, and Micro vs. Macro Labor Supply Elasticities: Evidence from Danish Tax Records,” *Quarterly Journal of Economics* 126

**Topics 3 and 4: Instrumental variables**

– Local average treatment effects (and its extensions)

– \*Angrist and Pischke (2009): *Mostly Harmless Econometrics*, Ch. 4 and 6. This chapter covers the next few papers:

– Imbens, G. W. and Angrist, J. D. (1994). Identification and Estimation of Local Average Treatment Effects. *Econometrica*

– Angrist, J. D., Imbens, G. W. and Rubin, D. B. (1996). Identification of Causal Effects Using Instrumental Variables. *Journal of the American Statistical Association*. Further discussion of LATE from its proponents.

– Heckman, J. J. and Hotz, V. J. (1989). Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training. *Journal of the American Statistical Association* 84: 408, 862-874

– Angrist, J. D. and Imbens, G. W. (1995). Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity. *Journal of the American Statistical Association* 90: 431. LATE-type results for IV/TSLs estimands when the treatment takes multiple values.

– Blandhol, C., Bonney, J., Mogstad, M., and Torgovitsky, A. (2022). “When is TSLs Actually LATE?” NBER Working Paper 29709.

– Kirkeboen, L, Leuven, E. and Mogstad, M. (2016). “Field of Study, Earnings, and Self-Selection” *Quarterly Journal of Economics*, 131, 1057-1111

– Examples of studies applying and arguing the exogeneity (and sometimes policy relevance) of the instruments:

– Angrist, J. D. and Evans, W. N. (1998). Children and Their Parents’ Labor Supply: Evidence from Exogenous Variation in Family Size. *The American Economic Review*.

– Floris T. Zoutman, Evelina Gavrilova, Arnt O. Hopland (2018): “Estimating Both Supply and Demand Elasticities Using Variation in a Single Tax Rate”, *Econometrica*.

– 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. An early and classic example of a fuzzy RDD as IV.

– \*Lee, D. S. and Lemieux, T. (2010). Regression Discontinuity Designs in Economics. *Journal of Economic Literature*, which is a (lengthy) survey on RDD

– Dahl, G. B., Loken, K. V. and Mogstad, M. (2014). Peer Effects in Program Participation. *American Economic Review* 104. Application of fuzzy RDD argument to study peer effects

– Kostol, A. R. and Mogstad, M. (2014). How Financial Incentives Induce Disability Insurance Recipients to Return to Work. *American Economic Review*. A straightforward application of a sharp RDD argument

– Weak instruments

– Andrews I, Stock J, Sun L (2019): Weak Instruments in IV Regression: Theory and Practice. *Annual Review of Economics*.

– Bartik & Simulated Instruments

– Goldsmith-Pinkham, Sorkin, and Swift (2020) Bartik Instruments: What, When, Why, and How. *American Economic Review* 110.

– Borusyak, Hull and Jaravel (forthcoming, 2021) Quasi-Experimental Shift-Share Research Designs. *Review of Economic Studies*.

– Currie and Gruber (1996) Saving Babies: The Efficacy and Cost of Recent Changes in the Medicaid Eligibility of Pregnant Women. *Journal of Political Economy* 104.

– Gruber, J. and E. Saez (2002). The Elasticity of Taxable Income: Evidence and Implications. *Journal of Public Economics* 84.

## **Topic 5: Some approaches to analyze repeated cross-sections and panel data**

– Difference in Differences

– Heckman and Robb (1986): Alternative Identifying Assumptions in Econometrics Models of Selection Bias.

– Ashenfelter and Card (1985): Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Program, *The Review of Economics and Statistics*. Much cited paper using difference-in-differences.

– \*Lalonde (1986): Evaluating the Econometric Evaluations of Training Programs with Experimental Data, *American Economic Review*

– Heckman, J. J. and Hotz, V. J. (1989). Choosing Among Alternative Nonexperimental Methods for Estimating the Impact of Social Programs: The Case of Manpower Training. *Journal of the American Statistical Association* 84: 408, 862-874

– Meyer, Viscusi and Durbin (1995): Workers’ Compensation and Injury Duration: Evidence from a Natural Experiment, *American Economic Review*.

Simple application with available data.

– Cameron, A. C. and Miller, D. L. (2015). A Practitioner’s Guide to Cluster- Robust Inference. *Journal of Human Resources* 50: 317-372 A survey that discusses problems and solutions to clustered standard errors. Section VI is especially relevant for difference-in-differences designs using repeated cross sections.

– Heckman, J., Ichimura, H., Smith, J. and Todd, P. (1998a). Characterizing Selection Bias Using Experimental Data. *Econometrica*

– Athey, S. and Imbens, G. W. (2006). Identification and Inference in Non-linear Difference-in-Differences Models. *Econometrica*

– Event studies

– Callaway and Sant’Anna (2020): "Difference-in-Differences with Multiple Time Periods". *Journal of Econometrics*.

– Abraham and Sun (2020). Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects. Working paper.

– Goodman-Bacon, A (2020). Difference-in-Differences with Variation in Treatment Timing. Working paper.

– de Chaisemartin and D’Haultfoeuille (2020). Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects. *American Economic Review* 110.

– Synthetic control

– 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*.

– Kellogg, M., Mogstad, M., Pouliot, G. and Torgovitsky, A. (2021). Combining Matching and Synthetic Controls to Trade off Biases from Extrapolation and Interpolation. Working Paper

– More on panel data:

– Heckman and Robb (1986): Alternative Identifying Assumptions in Econometrics Models of Selection Bias. This paper discusses how one can use repeated cross-sections and panel data for identification. Contains fixed effects, difference-in-differences, etc.

– \*Angrist and Pischke (2009): *Mostly Harmless Econometrics*, Ch. 5.

## 2 Teaching and Assessment

There will be two lectures held each week, for nine weeks. Lectures will be held Tuesdays and Thursdays 17:00-18:20. The first 2 weeks of lectures will be remote-only (on zoom). There will also be TA sessions each Friday 15:30-16:20, in Saieh 146. There will be assignments given throughout the term, which will be graded by the TAs and counted for the final grade. The assignments will include both analytical problems and empirical problems that will require the use of statistical software (preferably R or STATA). With the exception of the final, assignments may be completed in groups of not more than 3.

Course materials (slides, problem sets etc.) will be uploaded onto the course Canvas page. Professor Heckman will take over instruction in the middle of week 5, and will distribute a separate syllabus for his portion of the class.