

Economics 312, Spring 2019

Economics 312, Empirical Analysis III Spring 2019

Instructors:

- James J. Heckman (jjh@uchicago.edu)
- Magne Mogstad (magne.mogstad@gmail.com)

Lecture times: Tuesday and Thursday, 5:00 - 6:20pm

Lecture classroom: Saieh 146

Teaching Assistants:

- Sergei Bazylik (sbazylik@uchicago.edu)
- Eyo Herstad (eyoherstad@uchicago.edu)

TA session times: Wednesday, 6:30 - 7:20pm

TA session classroom: Saieh 146

TA Office Hours: Monday and Friday, 1pm - 2pm

TA Office Hours Room: Graduate Lounge, Saieh Hall, Room 201

If you experience problems with this website, please contact [Jennifer Pachon](#).

Class Overview

This is the third course in the first year empirical economics sequence in the Department of Economics. The goal of this course is to teach economics students to learn from data. The course stresses the use of various econometric methodologies to explain the phenomena and test models in order to address economic policy questions, broadly defined. A variety of approaches will be presented reflecting the interests and training of the two instructors who will co-teach this quarter. They will each take roughly half of the total course time, but in various formats. Heckman will post handouts for each of his lectures. There will also be a weekly tutorial taught by the teaching assistants.

Class Requirements

A final and a series of problem sets due each week in class. Assignments will include both analytical problems and empirical problems that will require the use of statistical software. There will be no midterm exam.

Problem Set Requirements

Problem Sets will be due each week on Tuesday in the beginning of the class. Please submit both a paper copy (hand in to TA) and upload an electronic version to Canvas (no late submissions to Canvas are accepted). Any programming language is accepted for the simulation exercises. If students have any questions on Problem Sets they should first ask TAs and only ask the professors if the TAs are unable to help.

Syllabus, Part 1: Defining Parameters and Arguing Their Policy Relevance

NOTE: Readings marked with an * are essential reading.

Week 1

Roy Models, Heterogeneity, and Potential Outcomes

- *Heckman, James J., and Edward Vytlacil. 2001. "[Policy-Relevant Treatment Effects.](#)" *American Economic Review*, 91(2):107–111.
- *Heckman, James J. 2010. "[Building Bridges between Structural and Program Evaluation Approaches to Evaluating Policy.](#)" *Journal of Economic Literature*, 48(2):356–98.
- Angrist, Joshua D. and Jorn Stefan Pischke. (2009). [Mostly Harmless Econometrics: An Empiricist's Companion](#). Princeton, NJ: Princeton University Press. 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*, 9(2):85–110.
- *Duflo, Esther, Rachel Glennerster, and Michael Kremer. 2007. "[Using Randomization in Development Economics Research: A Toolkit.](#)" In *Handbook of Development Economics*, edited by T. Paul Schultz and John A. Strauss. Amsterdam: Elsevier. Chapter 61, pp. 3895–3962.
- *Bursztyn, Leonardo, Florian Ederer, Bruno Ferman, and Noam Yuchtman. 2014. "[Understanding Mechanisms Underlying Peer Effects: Evidence From a Field Experiment on Financial Decisions.](#)" *Econometrica*, 82(4):1273–1301.
- Bitler, Marianne P., Jonah B. Gelbach, and Hilary W. Hoynes. 2006. "[What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments.](#)" *American Economic Review*, 96(4):988–1012.

Week 2: Controlling for Observables

- Heckman, James, Hidehiko Ichimura, Jeffrey Smith, and Petra Todd. 1998. "[Characterizing Selection Bias Using Experimental Data.](#)" *Econometrica*, 66(5):1017–1098.
- Heckman, James J., Hidehiko Ichimura, and Petra Todd. 1998. "[Matching As An Econometric Evaluation Estimator.](#)" *Review of Economic Studies*, 65(2):261–294.
- Heckman, James J., Hidehiko Ichimura, and Petra E. Todd. 1997. "[Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme.](#)" *Review of Economic Studies*, 64(4):605–654.
- Angrist, Joshua D. and Jorn Stefan Pischke. (2009). [Mostly Harmless Econometrics: An Empiricist's Companion](#). Princeton, NJ: Princeton University Press. Chapter 3.
- Heckman, James, and Salvador Navarro-Lozano. 2004. "[Using Matching, Instrumental Variables, and Control Functions to Estimate Economic Choice Models.](#)" *Review of Economics and Statistics*, 86(1):30–57.
 - Clear discussion about choice of controls and controlling on too much
- Neal, Derek A., and William R. Johnson. 1996. "[The Role of Premarket Factors in Black–White Wage Differences.](#)" *Journal of Political Economy*, 104(5):869–895.

- Imbens, Guido W. 2004. "[Nonparametric Estimation of Average Treatment Effects Under Exogeneity: A Review](#)." *Review of Economics and Statistics*, 86(1):4-29.
 - This is a comprehensive review of selection on observables methods.
- Imbens, Guido W. 2015. "[Matching Methods in Practice: Three Examples](#)." *Journal of Human Resources*, 50(2):373-419.
 - Much cited application where observables changes conclusions drawn:
- Dale, Stacy Berg, and Alan B. Krueger. 2002. "[Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables](#)." *Quarterly Journal of Economics*, 117(4):1491-1527.

LaLonde's paper and the subsequent discussion over matching estimators

- LaLonde, Robert J. 1986. "[Evaluating the Econometric Evaluations of Training Programs with Experimental Data](#)." *American Economic Review*, 76(4):604-620.
- Dehejia, Rajeev H., 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.
 - An influential and somewhat controversial application of selection on observables approaches. Smith and Todd (2005) argue that the specifications in the Dehejia and Wahba papers (1999, 2002) 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, Rajeev H. , and Sadek Wahba. 2002. "[Propensity Score-Matching Methods for Nonexperimental Causal Studies](#)." *Review of Economics and Statistics*, 84(1):151-161.
- Smith, Jeffrey A. , and Petra E. Todd. 2005. "[Does matching overcome LaLonde's critique of nonexperimental estimators?](#)" *Journal of Econometrics*, 125(1):305-353.
- Dehejia, Rajeev H. 2005. "[Practical propensity score matching: a reply to Smith and Todd](#)." *Journal of Econometrics*, 125(1):355-364.

Weeks 3 and 4: Instrumental Variables

Local Average Treatment Effects (and its extensions)

- Angrist, Joshua D. and Jorn Stefan Pischke. (2009). *[Mostly Harmless Econometrics: An Empiricist's Companion](#)*. Princeton, NJ: Princeton University Press. Chapter 3. This chapter covers the next few papers:
 - Imbens, Guido W., and Joshua D. Angrist. 1994. "[Identification and Estimation of Local Average Treatment Effects](#)." *Econometrica*, 62(2):467-475.
 - Angrist, Joshua D., Guido W. Imbens, and Donald Rubin. 1996. "[Identification of Causal Effects Using Instrumental Variables](#)." *Journal of the American Statistical Association* 91 (434):444-455.
 - Further discussion of LATE from its proponents.
 - Angrist, Joshua D., and Guido W. Imbens. 1995. "[Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity](#)." *Journal of the American Statistical Association*, 90(430):431-442.
 - LATE-type results for IV/TSLS estimands when the treatment takes multiple values.

A few examples of studies coming up, applying and arguing the exogeneity (and sometimes policy relevance) of the instruments:

- Angrist, Joshua D., and William N. Evans. 1998. "[Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size](#)." *American Economic Review*, 88(3):450-477.
 - Application showing what you can and cannot learn from LATE.

- 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.
- Dahl, Gordon B., Katrine V. Løken, and Magne Mogstad. 2014. "[Peer Effects in Program Participation](#)." *American Economic Review*, 104(7):2049–2074.
 - Application of fuzzy RDD argument to study peer effects.
- Kostol, Andreas Ravndal, and Magne Mogstad. 2014. "[How Financial Incentives Induce Disability Insurance Recipients to Return to Work](#)." *American Economic Review*, 104(2):624–655.
 - A straightforward application of a sharp RDD argument.

Weak Instruments

- Andrews, Isaiah, James Stock, and Liyang Sun. 2018. "[Weak Instruments in IV Regression: Theory and Practice](#)." Harvard University, Department of Economics. Forthcoming in *Annual Review of Economics*.

Week 5: Analysis of Repeated Cross-Sections and Panel Data

Difference-in-Differences

- Heckman, James J. and Richard Robb. 1986. "[Alternative Identifying Assumptions in Econometric Models of Selection Bias](#)," in *Advances in Econometrics, Volume 5*. G. Rhodes, ed. Greenwich, CT: JAI Press, pp. 243–87.
- Ashenfelter, Orley, and David Card. 1985. "[Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs](#)." *Review of Economics and Statistics*, 67(4):648–660.
 - Much-cited paper using difference-in-differences
- LaLonde, Robert J. 1986. "[Evaluating the Econometric Evaluations of Training Programs with Experimental Data](#)." *American Economic Review*, 76(4):604–620.
- Meyer, Bruce D., W. Kip Viscusi, and David L. Durbin. 1995. "[Workers' Compensation and Injury Duration: Evidence from a Natural Experiment](#)." *American Economic Review*, 85(3):322–340.
 - Simple application with available data.
- Cameron, A. Colin, and Douglas L. Miller. 2015. "[A Practitioner's Guide to Cluster-Robust Inference](#)." *Journal of Human Resources*, 50(2):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, James, Hidehiko Ichimura, Jeffrey Smith, and Petra Todd. 1998. "[Characterizing Selection Bias Using Experimental Data](#)." *Econometrica*, 66(5):1017–1098.
- Athey, Susan, and Guido W. Imbens. 2006. "[Identification and Inference in Nonlinear Difference-in-Differences Models](#)." *Econometrica*, 74(2):431–497.

Event Studies and Synthetic Control

- Abraham, Sarah, and Liyang Sun. 2018. "[Estimating Dynamic Treatment Effects in Event Studies with Heterogeneous Treatment Effects](#)." Unpublished manuscript, MIT, Department of Economics
- 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(490):493–505.

More on Panel Data

- Heckman, James J. and Richard Robb. 1986. "[Alternative Identifying Assumptions in Econometric Models of Selection Bias](#)," in *Advances in Econometrics, Volume 5*. G. Rhodes, ed.

- This paper discusses how one can use repeated cross-sections and panel data for identification. Contains fixed effects, difference-in-differences, etc.

Part 2: Alternative Approaches to Learning from Data

Topic I. Background

Understanding the Foundations of Testing and Inference

- Hacking, Ian. (1965). [*Logic of Statistical Inference*](#). Cambridge, UK: Cambridge University Press.

Replicability and Robustness

- Fogel, Robert. (1987). "[Some Notes on the Scientific Methods of Simon Kuznets.](#)" NBER Working Paper No. 2461.

Positive Economics

- Friedman, Milton. (1953). "[The Methodology of Positive Economics](#)," in M. Friedman, *Essays in Positive Economics*. Chicago: University of Chicago Press.

Abduction

- Heckman, James J. and Brooks S. Payner. (1989). "[Determining the Impact of Federal Antidiscrimination Policy on the Economic Status of Blacks: A Study of South Carolina](#)," *American Economic Review*, 79(1): 138–177.
- Butler, Richard J. and James J. Heckman, and Brooks Payner. (1989). "[The Impact of the Economy and the State on the Economic Status of Blacks: A Study of South Carolina](#)," in D. Galenson, (ed.), *Markets and Institutions*, Cambridge University Press: Cambridge. pp. 321–343.
- Heckman, James J. and Burton Singer. (2017). "[Abducting Economics](#)," *American Economic Review: Papers and Proceedings*, 107(5):298–302.
- Katz, Rebecca, and Burton Singer. (2007). "[Can an Attribution Assessment Be Made for Yellow Rain?](#)" *Politics and the Life Sciences*, 26(1):24–42.
- Guillemin, Jeanne. 1999. *Anthrax: The Investigation of a Deadly Outbreak*. Berkeley: University of California Press.
- Schurz, G. (2008). "[Patterns of Abduction](#)." *Synthese*, 164(2): 201–234.
- Schurz G. and K. Lambert. (1994). "[Outline of a Theory of Scientific Understanding](#)," *Synthese*, 101(1): 65–120.
- Handout: Kautz, Tim. (2013). "[Using Abduction to Solve Empirical Mysteries: Applications to the GED](#)," Department of Economics, University of Chicago.

Calibration vs. Estimation

- Hansen, L. and Heckman, J. (1996). "[The Empirical Foundations of Calibration](#)," *The Journal of Economic Perspectives*, 10(1), Winter, 87–104.
- Kydland, F. and Prescott , E. (1996). "[The Computational Experiment: An Econometric Tool](#)," (in Symposia: Computational Experiments in Macroeconomics) *The Journal of Economic Perspectives*, Vol. 10, No. 1. (Winter, 1996), pp. 69–85.
- Sims, C. (1996). "[Macroeconomics and Methodology](#)," (in Symposia: Computational Experiments in Macroeconomics), *The Journal of Economic Perspectives*, Vol. 10, No. 1. Winter, pp. 105–120.
- Watson, M. (1992). "[Measures of Fit for Calibrated Models](#)." *Journal of Political Economy*.

- Symposium: "Taking the Con out of Economics." *Journal of Economic Perspectives*, 24(2).
 - Angrist, Joshua D. & Jörn-Steffen Pischke (2010). "[The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics](#)." *Journal of Economic Perspectives*, 24(2): 3-30.
 - Leamer, Edward E. (2010). "[Tantalus on the Road to Asymptopia](#)." *Journal of Economic Perspectives*, 24(2): 31-46.
 - Keane, Michael P. (2010). "[A Structural Perspective on the Experimentalist School](#)," *Journal of Economic Perspectives*, 24(2): 47-58.
 - Sims, Christopher A. (2010). "[But Economics Is Not an Experimental Science](#)," *Journal of Economic Perspectives*, 24(2): 59-68.

Topic II. Causal Parameters, Treatment Effects, Structural Equations and Policy Evaluation

- Handout: Pinto, Rodrigo. "[What is a Causal Effect? How to Express It, and why it matters.](#)"
- Heckman, James J. and Pinto, Rodrigo. (2015). "[Causal Analysis after Haavelmo](#)," *Econometric Theory*, 31(1: Haavelmo Memorial Issue, Part One): 115-151.
- Heckman, James J. (2008). "[Econometric Causality](#)," *International Statistical Review*, 76(1): 1-27.
- Heckman, James J. and Vytlacil, Edward J. (2007). "[Econometric Evaluation of Social Programs, Part I: Causal Models, Structural Models and Econometric Policy Evaluation](#)," in *Handbook of Econometrics*, Vol. 6B, J. Heckman and E. Leamer, eds. Amsterdam: Elsevier. pp. 4779-4874.
- Heckman, James J. (2010). "[The Principles Underlying Evaluation Estimators with an Application to Matching](#)," *Annales d'Économie et de Statistique*, 91/92(Econometric Evaluation of Public Policies: Methods and Applications): 9-73.

Topic III. Classical Discrete Choice Theory

- Domencich, T. A. and D. McFadden. (1975). *[Urban Travel Demand: A Behavioral Analysis](#)*. Amsterdam: North Holland.

Topic IV. The Roy Model and the Generalized Roy Model as a Paradigm for Economic Choice Theory

- Heckman, J. J. and Honoré, B. (1990). "[The Empirical Content of the Roy Model](#)." *Econometrica*, 58(5): 1121-1149.

Topic V. Instrumental Variables

- Heckman, J., S. Urzua and E. Vytlacil (2006) "[Understanding Instrumental Variables in Models with Essential Heterogeneity](#)," *Review of Economics and Statistics*, 88(3): 389-432.
- Heckman, James J. and Vytlacil, Edward J. (2007). "[Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Economic Estimators to Evaluate Social Programs and to Forecast Their Effects in New Environments](#)," in *Handbook of Econometrics*, Vol. 6B, J. Heckman and E. Leamer, eds. Amsterdam: Elsevier. pp. 4875-5144.
- Carneiro, Pedro, James J. Heckman, and Edward Vytlacil. (2011). "[Estimating Marginal and Average Returns to Education](#)," *American Economic Review*, 101(6): 2754-2781.
- Carneiro, Pedro, James J. Heckman, and Edward Vytlacil. (2010). "[Evaluating Marginal Policy Changes and the Average Effect of Treatment for Individuals at the Margin](#)," *Econometrica*, 78(1): 377-394.
- [Section 8: "Matching"](#) from Heckman, J. and Vytlacil, E. (2007). "Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Economic Estimators to Evaluate Social Programs and to Forecast Their Effects in New Environments."

Topic VI. Social Experiments

- Deaton, Angus. 2010. "[Instruments, Randomization, and Learning about Development.](#)" *Journal of Economic Literature*, 48(2):424–455.
- [Section 9: "Randomized Evaluations"](#) from Heckman, J. and Vytlacil, E. (2007). "Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Economic Estimators to Evaluate Social Programs and to Forecast Their Effects in New Environments," in J. Heckman and E. Leamer, eds. *Handbook of Econometrics*, Vol. 6. Amsterdam: North-Holland.
- Todd, Petra E., and Kenneth I. Wolpin. 2006. "[Assessing the Impact of a School Subsidy Program in Mexico: Using a Social Experiment to Validate a Dynamic Behavioral Model of Child Schooling and Fertility.](#)" *American Economic Review*, 96(5):1384–1417.

Topic VII. Matching: Nonlinear OLS

- Todd, P. (1999). "[A Practical Guide to Implementing Matching Estimators](#)" Unpublished manuscript, University of Pennsylvania, Department of Economics.
- Todd, P. (2019). World Bank Book.

Topic VIII. Discrete Time Panel Data Methods

- Arellano, M. & Honoré, B. (2001). "[Panel Data Models: Some Recent Developments](#)," in *Handbook of Econometrics*, Vol. 5, edited by Heckman, J.J. & Leamer, E. (Amsterdam: Elsevier Science), pp. 3229–3296, [Sections 1-3](#).

Topic IX. Duration Models

- Heckman, J. J. (2008). [Handout: Multistate Duration Models](#)

Topic X. Dynamic Discrete Choice

- Keane, M.P. & Wolpin, K.I. (1997). "[The Career Decisions of Young Men,](#)" *Journal of Political Economy*, 105(3):473–522.
 - Abbring, J. H. and Heckman, J. J. (2007). "[Econometric Evaluation of Social Programs, Part III: Distributional Treatment Effects, Dynamic Treatment Effects, Dynamic Discrete Choice, and General Equilibrium Policy Evaluation,](#)" in *Handbook of Econometrics*, v. 6B, J. Heckman and E. Leamer, eds. Amsterdam: Elsevier. pp. 5145–5303.
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