Economics 8379
The George Washington University
Spring 2020
M, 3:30-6:00, 1776 G St. C112

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Syllabus

Course Description: This is a course in econometric methods and practice for applied microeconomists. The course will begin with a review of least squares methods and an introduction to causality, differing views of this concept in economics and statistics, and the related debate within economics between so-called reduced form methods and structural methods. We then spend several weeks discussing extensions of the linear regression model that rely, in part, on something like the linear regression model's assumption of exogeneity. This includes nonparametric regression, matching estimators, nonlinear least squares estimators, maximum likelihood, and simulation-based estimation. We will consider discrete choice models and duration models. We will then talk about point and set identification in structural models.

The rest of the course considers solutions to endogeneity. We start by studying linear and nonlinear instrumental variables estimation. We then introduce the problem of heterogeneous treatment effects using the Roy model framework and consider estimation of marginal treatment effects. We move on to regression discontinuity and related methods. We then cover difference-in-differences, the synthetic controls method, and other panel data models. Time-permitting, we will lastly cover the use of machine learning methods in causal inference/structural econometrics.

Learning Objectives: The primary objective of this course is to provide PhD students with a set of empirical tools that will prepare them for writing their dissertation. By the end of the course, students (1) should be able to assess the identification strategy and causal claims of empirical research, including their own and (2) should have an expanded toolkit of identification strategies and estimators.

Assessments: Your grade in the course will be determined by weekly homework assignments (50%) and a paper (50%).

Paper: There will be two options for the paper: (1) replication of an applied econometric study or (2) preliminary work on an original research question. These papers must apply methods discussed in class. A proposal will be due February 24th. More information on the paper will be provided early in the semester.

Homework Assignments: There will be 8-10 homework assignments. These assignments will predominantly consist of computational exercises, though they will include some analytical questions as well. Students are encouraged to work together on these assignments. However, each student must submit their own work. For exercises involving computation, your code must be submitted.

Participation: Students are expected to attend every class and actively participate in discussion.

Website: Assignments, readings, lecture notes, etc. will be posted to my personal page:
benjamindwilliams.weebly.com/econ-8379-spring-2020

Texts: Readings will be from "Microeconometrics: Methods and Applications" by Cameron and Trivedi (henceforth, **CT**), "Mostly Harmless Econometrics" by Angrist and Pischke (henceforth, **AP**), and from journal articles, working papers, or my own notes posted on the course website. I also strongly recommend obtaining "Microeconometrics Using Stata" by Cameron and Trivedi.

Reading List

This is a schedule of lectures for the semester, along with tentative reading assignments for each week. While I may update the readings during the semester, the topics of each lecture will not change. Make sure to check the course website for updates throughout the semester.

1. Introduction

Readings for first session:

Chapters 1 and 2 in **AP**

Heckman, James J. (2008). "Econometric Causality," International Statistical Review, 76(1): 1-27.

Additional references:

- Horowitz, Joel L. The Bootstrap in Econometrics. Statist. Sci. 18 (2003), no. 2, 211–218.
- Chapter 11 in **CT**

Readings for second session:

Chapter 8 in **AP**

Deaton, A. and Nancy Cartwright, (2018). "Understanding and misunderstanding randomized controlled trials", Social Science & Medicine, vol. 210, pp. 2-21.

Young, A. (*forthcoming*). "Channelling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results". The Quarterly Journal of Economics.

Imbens, Guido W., and Michal Kolesar. "Robust standard errors in small samples: Some practical advice." Review of Economics and Statistics 98.4 (2016): 701-712.

Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. (2017). When should you adjust standard errors for clustering? (No. w24003). National Bureau of Economic Research.

Athey, S., & Imbens, G. W. (2017). The econometrics of randomized experiments. In Handbook of Economic Field Experiments (Vol. 1, pp. 73-140). North-Holland.

2. Methods based on the conditional independence assumption

Readings:

Chapter 3 in **AP**

Todd, P. (2008) Matching estimators. The New Palgrave Dictionary of Economics, 2.

Smith, J. and Todd, P. (2005). Does matching overcome LaLonde's critique of nonexperimental estimators? Journal of Econometrics, 125(1), 305-353.

Campolieti, M., Gunderson, M.K. and Smith, J.A., 2014. The effect of vocational rehabilitation on the employment outcomes of disability insurance beneficiaries: new evidence from Canada. IZA Journal of Labor Policy, 3(1), p.10.

Dale, S. B., & 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(4), 1491-1527.

Caliendo, M. and Kopeinig, S., 2008. Some practical guidance for the implementation of propensity score matching. Journal of economic surveys, 22(1), pp.31-72.

3. Nonparametric and semiparametric estimation

Readings:

Chapter 9 in **CT** (our focus will be primarily on Sections 9.4, 9.5, 9.6.2, 9.7.2, and 9.7.3)

Sections 1-3 from Heckman, J.J., Lochner, L.J. and Todd, P.E., 2006. Earnings functions, rates of return and treatment effects: The Mincer equation and beyond. Handbook of the Economics of Education, 1, pp.307-458.

Ichimura, H. and Todd, P.E., 2007. Implementing nonparametric and semiparametric estimators. Handbook of econometrics, 6, pp.5369-5468.

4. Nonlinear models

Readings:

Section 3.4.2 in **AP**

Chapters 5, 14, 15, 17 in **CT**

Christensen, J. P. and Nicholas M. Kiefer, (1994). "Measurement error in the prototypical job-search model". Journal of Labor Economics, 12(4).

Kleven, Henrik Jacobsen, Camille Landais, and Emmanuel Saez. 2013. "Taxation and International Migration of Superstars: Evidence from the European Football Market." American Economic Review, 103 (5): 1892-1924.

5. Simulation methods

Readings:

Chapter 12 in **CT**

Gourieroux, C., Monfort, A. and Renault, E. (1993). Indirect inference. Journal of Applied Econometrics, 8(S1), S85-S118.

Aguirregabiria, V. and P. Mira. (2010). "Dynamic discrete choice structural models: A survey", Journal of Econometrics, 156.

Altonji, J., Smith, A., and I. Vidangos. (2013) "Modeling earnings dynamics". Econometrica, 81(4).

6. Identification in Structural Models

Readings:

Ciliberto, and E. Tamer (2009). "Market structure and multiple equilibria in the airline markets." Econometrica, 77(6).

7. Linear instrumental variables

Readings:

Sections 4.1-4.3 and 4.6 in **AP** (skip 4.6.3)

Sections 4.8, 4.9 and Chapter 6 in **CT**

8. Nonlinear instrumental variables

Readings:

Section 4.6.3 in **AP**

Sections 4.8, 4.9 and Chapter 6 in **CT**

9. Instrumental variables and heterogeneity

Readings:

Sections 4.4 and 4.5 in **AP**

Chapters 16, 18, 19 in **CT**

Heckman, J. J., Urzua, S. and Vytlacil, E. (2006). Understanding instrumental variables in models with essential heterogeneity. The Review of Economics and Statistics, 88(3), 389-432.

Carneiro, P., Heckman, J. J., & Vytlacil, E. J. (2011). Estimating marginal returns to education. American Economic Review, 101(6), 2754-81.

10. Regression Discontinuity

Readings:

Imbens, G. W., and Lemieux, T. (2008). Regression discontinuity designs: A guide to practice. Journal of Econometrics, 142(2), 615-635.

11. Difference-in-differences and beyond

Readings:

Chapter 5 in **AP**

12. Panel data

Readings:

Chapters 21-23 in **CT**

13. Machine learning methods in econometrics

Readings:

TBA