HCMG 900: Applied Econometrics

Spring 2019

Atul Gupta 302 Colonial Penn Center
atulgup@wharton.upenn.edu

Overview

This course introduces econometric methods widely used in applied economics research, with a focus on "reduced form" applications. The main goal of the class is for you to make significant progress in your ability to conduct high quality, econometrically sound empirical analysis. Concepts, applications, and practice are emphasized, as opposed to technical derivations of estimators and their properties. The focus is on linear (least squares) and non-linear (e.g. quantile, discrete, count, two-part, and duration) regression models. We cover several modern research designs in detail - difference-in-difference, selection on observables (matching), instrumental variables, synthetic controls, regression discontinuity, and bunching.

Readings

The reading list comprises published articles and some working papers, which should be read *prior* to class. The papers have been chosen to illustrate the application, generally recent, of different empirical methods and strategies. While the reading list is extensive, I will typically ask students to read 2 papers (thoroughly) per class. The remaining papers are listed as useful references. I will post required papers on Canvas. While there is no assigned text book for the class, we will closely follow *Mostly Harmless Econometrics: An Empiricist's Companion* by Angrist and Pischke, as well as some chapters from Andrew Jones' primer, *Applied Econometrics for Health Economists: A Practical Guide* (OHE Research, 2nd ed., 2007). You may also refer to J. Wooldridge, *Econometric Analysis of Cross Section and Panel Data.*

Logistics

The class will meet every Monday 3-6 pm, Colonial Penn Center. Chestnut Room.
Office hours by appointment.

Teaching Assistant

Molly Frean, HCMG PhD student, mfrean@wharton.upenn.edu

Other Requirements and Grading

In addition to reading the assigned papers prior to class, you are required to:

- Complete 3-4 homework assignments. These will mainly involve hands-on data analysis using a supplied data set drawn from the Medical Expenditure Panel Survey or replicate existing papers.
- Attend selected research seminars as requested and possible.
- Conduct an econometric analysis of data and present results to the class (replicate or extend an existing paper or original research).
- Present to the class a paper from the reading list
- Final exam – this will draw on the class material and homework.

Grading: Project – 25%; participation and assignments – 35%; final – 40%

Course outline and Readings

* Indicates student presentation of a paper from the reading list for that class (45 min)
† Indicates papers to be read prior to the class

I. Jan 16 - Introduction and background [Note: This is a Wednesday**]**

A. Course overview
B. Potential outcomes and causal inference

MHE Chapter 2

†Krueger, Alan B. "How computers have changed the wage structure: evidence from microdata, 1984–1989." The Quarterly Journal of Economics 108, no. 1 (1993): 33-60.

†DiNardo, John E., and Jörn-Steffen Pischke. "The returns to computer use revisited: Have pencils changed the wage structure too?" The Quarterly Journal of Economics 112, no. 1 (1997): 291-303.

Jan 21 – No class, MLK Day

II. Jan 28 - Classical estimation and testing

A. Recap of basic estimators (OLS, GLS, WLS) and inference
B. Weighting

MHE Chapters 2, 3 (excl. 3.3)

Solon, Gary, Steven J. Haider, and Jeffrey M. Wooldridge. "What are we weighting for?" Journal of Human resources 50, no. 2 (2015): 301-316.

III. Feb 4 - Classical estimation and testing (contd.) and Matching

A. Transformation
B. Matching / propensity score

MHE Chapter 3.3

Manning, Willard G. "The logged dependent variable, heteroscedasticity, and the retransformation problem." Journal of health economics 17, no. 3 (1998): 283-295.

†Manning, Willard G., and John Mullahy. "Estimating log models: to transform or not to transform?" Journal of health economics 20, no. 4 (2001): 461-494.

†LaLonde, Robert J. "Evaluating the econometric evaluations of training programs with experimental data." *The American economic review* (1986): 604-620.

Heckman, James J., Hidehiko Ichimura, and Petra E. Todd. "Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme." *The review of economic studies* 64, no. 4 (1997): 605-654.

Angrist, Joshua D. "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants." Econometrica (1998): 249-288.

†Dehejia, Rajeev H., and Sadek Wahba. "Propensity score-matching methods for nonexperimental causal studies." *Review of Economics and statistics* 84, no. 1 (2002): 151-161.

Imbens, Guido W. "Nonparametric estimation of average treatment effects under exogeneity: A review." *The review of Economics and Statistics* 86, no. 1 (2004): 4-29.

†Smith, Jeffrey A., and Petra E. Todd. "Does matching overcome LaLonde's critique of non-experimental estimators?" *Journal of econometrics* 125, no. 1-2 (2005): 305-353.

Melissa Garrido, et al., Methods for Constructing and Assessing Propensity Scores, *Health*

Services Research 49(2014): 1701-1720.

Sylvia Helena Barcellos and Mireille Jacobson, The Effects of Medicare on Financial Risk and Financial Strain, *American Economic Journal—Economic Policy* 7 (2015): 41-70.

*Sarsons, Heather. "Interpreting signals in the labor market: evidence from medical referrals." Job Market Paper (2017).

IV. Feb 11 - Instrumental variables (Part 1)

A. Basic concepts

MHE Chapter 4

†Angrist, Joshua D. "Lifetime earnings and the Vietnam era draft lottery: evidence from social security administrative records." The American Economic Review (1990): 313-336.

Angrist, Joshua D., and William N. Evans. "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size." American Economic Review 88, no. 3 (1998): 450-477.

Imbens, Guido W., and Joshua D. Angrist. "Identification and Estimation of Local Average Treatment Effects." Econometrica 62, no. 2 (1994): 467-475.

†Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. "Identification of Causal Effects Using Instrumental Variables." Journal of the American Statistical Association 91, no. 434 (1996): 444-55.

Angrist, Joshua D., and Alan B. Krueger. "Instrumental variables and the search for identification: From supply and demand to natural experiments." Journal of Economic perspectives 15, no. 4 (2001): 69-85.

Keane, Michael P. "Structural vs. atheoretic approaches to econometrics." Journal of Econometrics 156, no. 1 (2010): 3-20.

V. Feb 18 - Instrumental variables (Part 2)

A. LATE applications

Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, Katherine Baicker, and Oregon Health Study Group. "The Oregon health insurance experiment: evidence from the first year." The Quarterly journal of economics 127, no. 3 (2012): 1057-1106.

†Maestas, Nicole, Kathleen J. Mullen, and Alexander Strand. "Does disability insurance receipt discourage work? Using examiner assignment to estimate causal effects of SSDI receipt." American Economic Review 103, no. 5 (2013): 1797-1829.

†Doyle Jr, Joseph J., John A. Graves, Jonathan Gruber, and Samuel A. Kleiner. "Measuring returns to hospital care: Evidence from ambulance referral patterns." Journal of Political Economy 123, no. 1 (2015): 170-214.

*Akerman, Anders, Ingvil Gaarder, and Magne Mogstad. "The skill complementarity of broadband internet." The Quarterly Journal of Economics 130, no. 4 (2015): 1781-1824.

Brinch, Christian N., Magne Mogstad, and Matthew Wiswall. "Beyond LATE with a discrete instrument." Journal of Political Economy 125, no. 4 (2017): 985-1039.

VI. Feb 25 - Instrumental variables (Part 3) and Student proposals

A. MTE

B. Proposal presentations (10-15 min each)

Heckman, James J., Sergio Urzua, and Edward Vytlacil. "Understanding instrumental variables in

models with essential heterogeneity." The Review of Economics and Statistics 88, no. 3 (2006): 389-432.

†Doyle Jr, Joseph J. "Child protection and child outcomes: Measuring the effects of foster care." American Economic Review 97, no. 5 (2007): 1583-1610.

March 4 - Spring Break

VII. March 11 - Panel data approaches (Part 1)

A. Fixed effects, Random effects
B. Differences in differences, D-D-D

MHE Chapter 5

†Card, David, and Alan B. Krueger. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." The American Economic Review 84, no. 4 (1994): 772-793.

†Gruber, Jonathan. "The Incidence of Mandated Maternity Benefits." The American Economic Review, vol. 84, no. 3, 1994, pp. 622–641.

Acemoglu, Daron, and Amy Finkelstein. "Input and technology choices in regulated industries: Evidence from the health care sector." Journal of Political Economy 116, no. 5 (2008): 837-880.

Finkelstein, Amy. "The aggregate effects of health insurance: Evidence from the introduction of Medicare." The quarterly journal of economics 122, no. 1 (2007): 1-37.

*Craig Garthwaite, Tal Gross, and Matthew Notowidigdo, Public Health Insurance, Labor Supply, and Employment Lock, Quarterly Journal of Economics (2014): 653-696.

VIII. March 18 - Panel data approaches (Part 2)

A. Synthetic controls
B. Clustering

†Abadie, Alberto, Alexis Diamond, and Jens Hainmueller. "Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program." Journal of the American statistical Association 105, no. 490 (2010): 493-505.

Moulton, Brent R. "Random group effects and the precision of regression estimates." Journal of econometrics 32, no. 3 (1986): 385-397.

†Moulton, Brent R. "An illustration of a pitfall in estimating the effects of aggregate variables on micro units." The review of Economics and Statistics (1990): 334-338.

Cameron, A. Colin, Jonah B. Gelbach, and Douglas L. Miller. "Bootstrap-based improvements for inference with clustered errors." The Review of Economics and Statistics 90, no. 3 (2008): 414-427.

*Bertrand, M., E. Duflo, and S. Mullainathan, (2004): "How Much Should We Trust Differences-in-Differences Estimates?" Quarterly Journal of Economics, Vol 119, 249-275.

Abadie, Alberto, Susan Athey, Guido W. Imbens, and Jeffrey Wooldridge. "When should you adjust standard errors for clustering?" No. w24003. National Bureau of Economic Research, 2017.

IX. March 25 – Density based designs

A. RD, RD-DD
B. RK

MHE Chapter 6

Imbens, Guido W., and Thomas Lemieux. "Regression discontinuity designs: A guide to practice." Journal of econometrics 142, no. 2 (2008): 615-635.

†Lee, David S., and Thomas Lemieux. "Regression discontinuity designs in economics." Journal of economic literature 48, no. 2 (2010): 281-355.

Lee, David S. "Randomized experiments from non-random selection in US House elections." Journal of Econometrics 142, no. 2 (2008): 675-697.

Hahn, J., P. Todd, and W. Van der Klaauw, (2001), "Identification and Estimation of Treatment Effects with a Regression Discontinuity Design", Econometrica, Vol 69, No. 1, 201-209.

Gelman, Andrew, and Guido Imbens. "Why high-order polynomials should not be used in regression discontinuity designs." Journal of Business & Economic Statistics (2018): 1-10.

Black, Sandra E. "Do better schools matter? Parental valuation of elementary education." The Quarterly Journal of Economics 114, no. 2 (1999): 577-599.

†Card, David, Carlos Dobkin, and Nicole Maestas. "Does Medicare save lives?" The quarterly journal of economics 124, no. 2 (2009): 597-636.

*Anderson, Michael, Carlos Dobkin, and Tal Gross. "The effect of health insurance coverage on the use of medical services." American Economic Journal: Economic Policy 4, no. 1 (2012): 1-27.

McCrary, Justin. "Manipulation of the running variable in the regression discontinuity design: A density test." Journal of econometrics 142, no. 2 (2008): 698-714.

Lalive, Rafael. "How do extended benefits affect unemployment duration? A regression discontinuity approach." Journal of econometrics 142, no. 2 (2008): 785-806.

Card, David, David S. Lee, Zhuan Pei, and Andrea Weber. Regression Kink Design: Theory and Practice. No. w22781. National Bureau of Economic Research, 2016.

X. April 1 – Density based designs (contd.) and Quantile regression

A. Bunching
B. Quantile regression

MHE Chapter 7

Persson, Petra. "Social Insurance and the Marriage Market." (2015).

†Manoli, Day, and Andrea Weber. "Nonparametric evidence on the effects of financial incentives on retirement decisions." American Economic Journal: Economic Policy 8, no. 4 (2016): 160-182.

Einav, Liran, Amy Finkelstein, and Paul Schrimpf. "The Response of Drug Expenditure to Non-Linear Contract Design: Evidence from Medicare Part D." Quarterly Journal of Economics. 130(2), May 2015, 841-899.

Koenker, Roger, and Gilbert Bassett Jr. "Regression quantiles." Econometrica: journal of the Econometric Society (1978): 33-50.

†Buchinsky, Moshe. "Changes in the US wage structure 1963-1987: Application of quantile regression." Econometrica: Journal of the Econometric Society (1994): 405-458.

Abadie, Alberto, Joshua Angrist, and Guido Imbens. "Instrumental variables estimates of the effect of subsidized training on the quantiles of trainee earnings." Econometrica 70, no. 1 (2002): 91-117.

Chernozhukov, Victor, and Christian Hansen. "An IV model of quantile treatment effects."

Econometrica 73, no. 1 (2005): 245-261.

*Powell, David, and Dana Goldman. Disentangling Moral Hazard and Adverse Selection in Private Health Insurance. No. w21858. National Bureau of Economic Research, 2016.

Chernozhukov, V., Fernández-Val, I., Kowalski, A.E. (2014), Quantile Regression With Censoring and Endogeneity, The Journal of Econometrics, 186, 201--221.

Kowalski, Amanda. "Censored quantile instrumental variable estimates of the price elasticity of expenditure on medical care." Journal of Business & Economic Statistics 34, no. 1 (2016): 107-117.

XI. April 8 – Limited dependent variables

A. Logit, Probit
B. Count data models

Jones Chapters 3-6, 9-10

Ethan Katz, Bias in Conditional and Unconditional Fixed Effects Logit Estimation, Political Analysis 9(2001): 379-384.

†Mullahy, John. "Heterogeneity, excess zeros, and the structure of count data models." Journal of Applied Econometrics 12, no. 3 (1997): 337-350.

†Mullahy, John. "Instrumental-variable estimation of count data models: Applications to models of cigarette smoking behavior." Review of Economics and Statistics 79, no. 4 (1997): 586-593.

*Budish, Eric, Benjamin N. Roin, and Heidi Williams. "Do firms underinvest in long-term research? Evidence from cancer clinical trials." American Economic Review 105, no. 7 (2015): 2044-85.

XII. April 15 – Selection models and Duration models

A. Selection models
B. Duration models

†Wainer, Howard, Samuel Palmer, and Eric T. Bradlow. "A selection of selection anomalies." Chance 11, no. 2 (1998): 3-7.

Melinda Buntin and Alan Zaslavsky, Too Much Ado about Two-Part Models and Transformation? Comparing Methods of Modeling Medicare Expenditures, Journal of Health Economics 23 (2004): 525-542.

Heckman, James. "Shadow prices, market wages, and labor supply." Econometrica: journal of the econometric society (1974): 679-694.

Ronen Avraham and Max Schanzenbach, The Impact of Tort Reform on Intensity of Treatment: Evidence from Heart Patients, Journal of Health Economics 39(2015): 273-288.

*Mauro Laudicella, Paolo Li Donni, and Peter Smith, Hospital Readmission Rates: Signal of Failure or Success, Journal of Health Economics 32(2013): 9-21.

Kiefer, Nicholas M. "Economic duration data and hazard functions." Journal of economic literature 26, no. 2 (1988): 646-679.

†Meyer, Bruce D. "Unemployment Insurance and Unemployment Spells." Econometrica 58, no. 4 (1990): 757-782.

Cutler, David M. "The Incidence of Adverse Medical Outcomes Under Prospective Payment." Econometrica: Journal of the Econometric Society (1995): 29-50.

XIII. April 22 - Field experiments and Duration models (contd.)

A. Designing field experiments – Prof. David Abrams (Law) and Mark Neuman (Penn Med)
B. Duration models

XIV. April 29 - Student project presentations

Final Exam (May TBD)