

**ECONOMICS 675
EMPIRICAL MICROECONOMETRICS
COURSE OUTLINE**

**Department of Economics - University of Michigan
Fall 2009
Version of September 11, 2009**

Prof. Jeffrey Smith
Office: 306 Lorch Hall
Phone: 764-5359
Email: econjeff@umich.edu
Web page: <http://www-personal.umich.edu/~econjeff>
Office hours: MW 2:45-3:45

Grader: Annika Mueller
Email: amaxinem@umich.edu

Course meetings: MW 1:00-2:30 MH 1401

Course description

The purpose of this course is to expose students to econometric techniques frequently used in applied microeconomic research. One way to think about the course is that it will introduce you to the tools in toolbox. The course will not go into great depth in regard to any particular applied econometric method, but will instead aim to provide you with enough knowledge about each one to know when, and when not, to use it in your empirical research.

Students will be expected to read the assigned papers and be able to discuss not only the econometric techniques used but also the basic economic issues as well.

Prerequisites

The nominal course prerequisites are Economics 671 and 672. The real prerequisite is a good grasp of the topics covered in a first-year graduate textbook such as Johnston and DiNardo, plus a good understanding of linear algebra and probability theory. Some experience with the use of statistical software will be useful but is not necessary.

Problem sets

The problem sets will have two types of questions. The first will be exam-type questions that ask you to “prove” or “show” things or to respond to a written description of some empirical results. This type will be relatively infrequent. For the second type of question, you will be given data and asked to estimate an econometric model and then to interpret the estimates you obtain. In general, both generating and interpreting the estimates correctly are important, with

interpretation weighing most heavily in determining the grade for each problem.

The topics for the problem sets will be some or all of the following:

- Discrete choice models
- Truncated and censored regression models
- Duration models
- Quantile regression
- Variance estimation and power
- Bootstrapping
- Non-parametric regression and matching
- Heckman bivariate normal selection model
- Instrumental variables models
- Regression discontinuity designs
- Difference-in-differences and panel data models

Grades

Grades for the course are based on performance on the problem sets. In particular, your course grade is the average of your grades on the problem sets after dropping the lowest of the grades, where missed problem sets have a grade of zero. Because one problem set grade is dropped, no late problem sets will be accepted.

Statistical software

I support Stata, and provide problem set solution log files in Stata, but you are welcome to use alternative software such as SAS, SPSS, TSP, or Shazam or other programs such as Eviews for the problem sets if you like. Some of the topics in this class are not well covered by these other packages, so learning Stata is strongly encouraged.

A variety of resources for learning Stata can be found here:

<http://www.stata.com/links/resources1.html>

The following book provides a useful guide to the basics of Stata and is a recommended text for this class:

Acock, Alan. 2008. *A Gentle Introduction to Stata, 2nd Edition*. College Station: Stata Press.

This book and many others can be ordered at the Stata web page: www.stata.com.

You can order your own copy of Stata at a very low rate (due to a special arrangement between Stata and the University of Michigan). Go to www.stata.com, click on “Order Stata”, click on “New Purchases, Educational Plans”, and then click on “Gradplans”. You will see that you can order various versions of Stata, either in the form of a one-year “lease” or a permanent purchase. Some of the problem sets in the course use data sets too large for “small” Stata so you should

get regular Stata.

Students with disabilities

“If you believe you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities to help us determine appropriate accommodations. I will treat any information you provide as private and confidential.” Also see <http://www.umich.edu/~sswd/> for more information.

Academic misconduct

Information about what happens if you cheat or otherwise engage in academic misconduct can be found here: <http://www.lsa.umich.edu/academicintegrity/>. Be aware that I will take cheating *very* seriously even if it is the first time you have been caught.

General readings and textbooks

The general texts for the course (which are available at the university bookstore) are:

Wooldridge, Jeffrey. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

Cameron, Colin and Pravin Trivedi. 2005. *Microeconometrics: Methods and Applications*. Cambridge University Press.

Angrist, Joshua and Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics*. Princeton: Princeton University Press.

You might also enjoy the companion book to one of the main texts:

Cameron, Colin and Pravin Trivedi. 2009. *Microeconometrics Using Stata*. College Station, TX: Stata Press.

Enjoyable and interesting background reading for the course is provided by:

Stigler, Stephen. 1990. *The History of Statistics: The Measurement of Uncertainty Before 1900*. Harvard University Press.

Howson, Colin and Peter Urbach. 1993. *Scientific Reasoning: The Bayesian Approach*, 2nd Edition. Open Court Publishing Company.

The following handbook chapters also cover large chunks of the material in the course. Both are available electronically through the UM library.

Heckman, James, Robert LaLonde and Jeffrey Smith. 1999. "The Economics and Econometrics of Active Labor Market Programs." In Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics, Volume 3A*. Amsterdam: North-Holland, pp. 1865-2097.

Angrist, Joshua and Alan Krueger. 1999. "Empirical Strategies in Labor Economics." In Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics, Volume 3A*. Amsterdam: North-Holland, pp. 1277-1366.

If it has been a while since you had any statistics, or even if it has not, you may want to brush up a bit on the basic linear model. The chapters to read for this purpose are:

Wooldridge (2002), Chapters 1-4

Cameron and Trivedi (2005), Chapter 4

Angrist and Pischke (2009), Chapters 1-3

Reading list by topic

A "[*]" denotes the most important readings.

I will post the journal article readings on the CTools site for the course.

Discrete choice models

[*] Wooldridge (2002), Chapter 15

[*] Cameron and Trivedi (2005), Chapters 14 and 15

Maddala, G. S. 1983. *Limited-Dependent and Qualitative Variables in Econometrics*. New York: Cambridge University Press.

Horowitz, Joel and N.E. Savin. 2001. "Binary Response Models: Logits, Probits and Semiparametrics." *Journal of Economic Perspectives* 15(4): 43-56.

Truncated and censored regression models

[*] Wooldridge (2002), Chapter 16

[*] Cameron and Trivedi (2005), Section 16.1-16.4

Chay, Kenneth and James Powell. 2001. "Semiparametric Censored Regression Models." *Journal of Economic Perspectives* 15(4): 29-42.

Duration models

[*] Wooldridge (2002), Chapter 20

[*] Cameron and Trivedi (2005), Chapters 17 and 18

[*] Kiefer, Nicholas. 1988. "Economic Duration Data and Hazard Functions." *Journal of Economic Literature* 26: 646-679.

Quantile regression

[*] Cameron and Trivedi, Section 4.6

[*] Angrist and Pischke, Chapter 7

Koenker, Roger and Kevin Hallock. 2001. "Quantile Regression." *Journal of Economic Perspectives* 15(4): 143-156.

Buchinsky, Moshe. 1998. "Recent Advances in Quantile Regression Models: A Practical Guide for Empirical Research." *Journal of Human Resources* 33: 88-126.

Koenker, Roger. 2003. "Short Course on Quantile Regression."

Nonparametric regression

[*] Cameron and Trivedi (2005), Chapter 9

[*] Härdle, Wolfgang. 1990. *Applied Nonparametric Regression*. New York: Cambridge University Press. Chapters 1-3.

Pagan, Adrian and Aman Ullah. 1999. *Nonparametric Econometrics*. New York: Cambridge University Press.

Li, Qi and Jeffrey Racine. 2007. *Nonparametric Econometrics: Theory and Practice*. Princeton: Princeton University Press.

Matching methods

[*] Wooldridge (2002), Chapter 18, Sections 18.1 to 18.3.

[*] Cameron and Trivedi (2005), Section 25.4

[*] Angrist and Pischke (2009), Chapter 3

[*] Smith, Jeffrey and Petra Todd. 2005. "Does Matching Overcome LaLonde's Critique of Nonexperimental Methods?" *Journal of Econometrics* 125(1-2): 305-353.

[*] Dehejia, Rajeev. 2005. "Practical Propensity Score Matching: A Reply to Smith and Todd."

Journal of Econometrics 125(1-2): 355-364.

[*] Smith, Jeffrey and Petra Todd. 2005. "Rejoinder." *Journal of Econometrics* 125(1-2): 365-375.

[*] Dehejia, Rajeev. 2005. "Final Thoughts." Unpublished Manuscript, Columbia University.

Caliendo, Marco and Sabine Kopeinig. 2006. "Some Practical Guidance for the Implementation of Propensity Score Matching." *Journal of Economic Surveys* 22(1): 31-72.

Busso, Matias, John DiNardo and Justin McCrary. 2009. "Finite Sample Properties of Semiparametric Estimators of Average Treatment Effects," IZA Discussion Paper No. 3998.

Variance Estimation

[*] Wooldridge (2002), Sections 4.2.3, 6.3, 11.5, 17.1, 17.2 and 17.8

[*] Cameron and Trivedi (2005), Chapter 24

[*] Angrist and Pischke (2009), Chapter 8.

Deaton, Angus. 1997. *The Analysis of Household Surveys*. Baltimore: Johns Hopkins University Press, Chapters 1 and 2.

Moulton, Brent. 1990. "An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units." *Review of Economics and Statistics*. 72: 334-338

Bootstrapping

[*] Wooldridge (2002), Section 12.8

[*] Cameron and Trivedi (2005), Chapter 11

[*] Angrist and Pischke (2009), Chapter 8

Brownstone, David and Camilla Kazimi. 1998. "Applying the Bootstrap." Unpublished manuscript, University of California at Berkeley.

Efron, Bradley and Gail Gong. 1983. "A Leisurely Look at the Bootstrap, the Jackknife and Cross-Validation." *American Statistician*. 37(1): 36-48.

Bivariate normal selection model

[*] Wooldridge (2002), Section 17.4

[*] Cameron and Trivdei (2005), Sections 16.5-16.7

Blundell, Richard, Lorraine Dearden and Barbara Sianesi. 2003. "Evaluating the Impact of Education on Earnings in the UK: Models, Methods and Results from the NCDS." *Journal of the Royal Statistical Society, Series A* 168(3): 473-512.

Instrumental variables

[*] Wooldridge (2002), Chapter 5

[*] Cameron and Trivdei (2005), Sections 4.8, 4.9, 6.4, 8.3, 8.4

[*] Angrist and Pischke (2009), Chapter 4

Angrist, Joshua, Guido Imbens and Donald Rubin. 1996. Identification of Causal Effects Using Instrumental Variables." *Journal of the American Statistical Association*. 91: 444-455. [Be sure to also read the comments.]

Heckman, James. 1997. "Instrumental Variables: A Study of Implicit Behavioral Assumptions Used in Making Program Evaluations." *Journal of Human Resources*. 32(3). 441-452.

Kling, Jeffrey. 2001. "Interpreting Instrumental Variables Estimates of the Returns to Schooling." *Journal of Business and Economic Statistics* 19(3): 358-364.

Manning, Alan. 2004. "Instrumental Variables for Binary Treatments with Heterogeneous Treatment Effects: A Simple Exposition." *Contributions to Economic Analysis & Policy* 3(1): 1-14.

Regression discontinuity designs

[*] Cameron and Trivedi (2005), Section 25.6.

[*] Angrist and Pischke (2009), Chapter 6

Van der Klaauw, Wilbert. 2002. "Estimating the Effect of Financial Aid Offers on College Enrollment: A Regression-Discontinuity Approach." *International Economic Review* 43(4): 1249-87.

Hahn, Jinyong, Petra Todd and Wilbert van der Klaauw. 2001. "Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design." *Econometrica* 69(1): 201-09.

Imbens, Guido and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142(2): 615-635.

Difference-in-differences

[*] Wooldridge (2002), Section

[*] Cameron and Trevedi (2005), Sections 22.6 and 25.5

[*] Angrist and Pischke (2009), Chapter 5

Meyer, Bruce. 1995. "Natural and Quasi-Experiments in Economics." *Journal of Business and Economic Statistics*. 13: 151-161.

Eissa, Nada. 1996. "Labor Supply and the Economic Recovery Tax Act of 1981." In Martin Feldstein and James Poterba, eds., *Empirical Foundations of Household Taxation*. Chicago: University of Chicago Press. 5-32.

Heckman, James. 1996. "Comment." In Martin Feldstein and James Poterba, eds., *Empirical Foundations of Household Taxation*. Chicago: University of Chicago Press. 32-38.

Blundell, Richard, Monica Costa Dias, Costas Meghir and John Van Reenan. 2004. "Evaluating the Employment Impact of a Mandatory Job Search Assistance Program." *Journal of the European Economic Association* 2(4): 569-606.

Panel data models

[*] Wooldridge (2002), Chapter 10

[*] Cameron and Trivedi (2005), Chapter 21

[*] Angrist and Pischke (2009), Chapter 5

Moffitt, Robert. 1991. "Program Evaluation with Nonexperimental Data." *Evaluation Review*. 15(3). 291-314.

McKinnish, Terra. 2000. "Model Sensitivity In Panel Data Analysis: Some Caveats About the Interpretation of Fixed Effects and Differences Estimators."

Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics* 119(1): 249-275. [Available from the UM library e-journal collection]

Wolfers, Justin. 2006. "Did Unilateral Divorce Laws Raise Divorce Rates? A Reconciliation and New Results." *American Economic Review* 96(5): 1802-1820.

Course schedule

- 9/9 Introduction to the course
- 9/14 Binary choice models
- 9/16 Binary choice models
- 9/21 Truncated and censored regression models
- 9/23 Truncated and censored regression models
- 9/28 Duration models
- 9/30 Duration models
- 10/5 Quantile regression
- 10/7 Quantile regression
- 10/12 Non-parametric regression
- 10/14 Matching and weighting methods
- 10/19 No meeting – fall break
- 10/21 Matching and weighting methods
- 10/26 Matching and weighting methods
- 10/28 Variance estimation
- 11/2 Variance estimation
- 11/4 Bootstrap
- 11/9 Bootstrap
- 11/11 Bivariate normal selection model
- 11/16 Instrumental variables
- 11/18 Instrumental variables
- 11/23 Instrumental variables
- 11/25 Bonus lecture on multinomial choice models
- 11/30 Regression discontinuity designs
- 11/2 Regression discontinuity designs
- 12/7 Difference-in-differences
- 12/9 Panel data models
- 12/14 Panel data models