

ECONOMICS 675 EMPIRICAL MICROECONOMETRICS COURSE OUTLINE

**Department of Economics - University of Michigan
Fall 2014
Version of November 12, 2014**

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

GSI: Bryan Stuart
Email: bastuart@umich.edu
Office: Angell Hall Classroom B
Office hours: M 10:30-11:30; Th 1:15-2:15

Course meetings: MW 1:00-2:30 B844 EH
Optional Friday sessions: F 4:00-5:00 173 Lorch

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.

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.

Grades

The following graded activities are available in this course:

1. Traditional problem sets
2. Open-ended problem sets

3. Present in one of the optional Friday reading groups
4. Monte Carlo study
5. Take-home final exam

The traditional problem sets are graded on the scale of “check plus”, “check”, “check minus” and (hopefully very unusual) “zero”.

All of the other graded activities are graded on a 0-100 scale.

There are two options for the final grade:

Option 1: Best seven grades on traditional problem sets.

Option 2: The average grade on the best 100 points worth of graded activities:

Traditional problem sets: 15 points (15 / 10 / 5 / 0)

Open-ended problem set: 30 points [maximum two]

Presentation in Friday reading group: 30 points [maximum one]

Monte Carlo study: 70 points (one author), 40 points (two authors), 30 points (3 authors)

Take-home final exam: 30 points

For example, suppose that you do three traditional problem sets and get a “check plus” on all of them, plus one open ended problem set on which you get a 30 and one presentation in a Friday reading group, on which you get 25 / 30. That best 100 points of graded activity would then equal $15 + 15 + 15 + 30 + (25/30) * 25$.

The highest course grade that can be obtained via Option 1 is “A”. You must do Option 2 if you want to get an “A+”

If you turn in at least seven traditional problem sets, plus at least one other thing, I will calculate your grade under both options and give you the higher of the two.

Traditional problem sets

The topics for the traditional problem sets will be:

Discrete choice models

Truncated and censored regression models

Multinomial choice models

Duration models

Quantile regression

Non-parametric regression and matching

Robust variance estimation

Bootstrap variance estimation

Bivariate normal selection model

Instrumental variables models

Regression discontinuity designs
Difference-in-differences and panel data models

Your write-ups for the problem sets should consist of two portions:

1. Answers to the questions, with whatever text is required to explain them. The idea is to practice writing up empirical analyses as you would for a paper.
2. A well-commented and easy-to-read Stata log file showing how you got the answers to the empirical questions.

A document describing how to easily produce publication-ready tables and otherwise meet the formatting requirements will be made available on the Ctools page.

Problem set write-ups not in this format will receive substantial grade penalties.

Open-ended problem sets

Topics for the open-ended problem sets will be:

1. Duration models (using the German administrative data)
2. TBA

These are just like traditional problem sets in all respects except that basically you are handed a data set and a question and told which class of methods to use to answer the question.

The format of what you turn in is the same as with traditional problem sets except that there is a maximum page length of 12 pages, typed, double-spaced, 12 point font, one inch margins. This includes any tables and figures.

Friday reading groups

The Friday reading groups will meet to discuss new applied econometrics papers. A student will present / discuss the paper under economics rules (i.e. interruptions allowed for clarifying and substantive questions or comments). The group will last for 50 minutes. Prof. Smith and the GSI will both attend whenever they are in town, but the intention is for the discussion to be driven mainly by the students.

The papers we will cover are:

Huber, Martin, Michael Lechner and Conny Wunsch. 2013. "The Performance of Estimators Based on the Propensity Score." *Journal of Econometrics* 175:1-21.

Abadie, Alberto, Susan Athey, Guido Imbens and Jeffrey Wooldridge. 2014. "Finite Population Causal Standard Errors." NBER Working Paper No. 20325.

Carniero, Pedro, James Heckman and Edward Vytlačil. 2011. "Estimating Marginal Returns to Education." *American Economic Review* 101(6): 2754-2781.

Gelman, Andrew and Alberto Abadie. 2014. "Why High Order Polynomials Should Not Be Used in Regression Discontinuity Designs." NBER Working Paper No. 20405.

Please email Prof. Smith if you are interested in presenting. Be sure to indicate which papers you would like to present.

Monte Carlo study

This is basically a term paper. Like a Monte Carlo analysis in the literature, you should study the performance of alternative estimators within some class using simulated data that is designed to highlight particular aspects of the applied econometrics.

Monte Carlo studies may be formally done in teams of two or three authors. All authors receive the same grade. See above for per-author point values.

Examples of Monte Carlo studies with an applied econometric flavor will be posted to the CTools page.

A proposal of at most five pages, typed, double-spaced, 12 point font, one inch margins is due at 5 PM on Friday, October 3. The proposal should describe the estimators you plan to examine and indicate how your analysis will add to what is already known.

Proposals will be reviewed and approved or not. At most five proposals will be approved.

The Monte Carlo analysis should not exceed 25 pages, typed, double-spaced, 12 point font, one inch margins. This includes any tables and figures.

Take-home final exam

The "take-home" final will consist of up to six pages, typed, double-spaced in 12 point Times Roman font, with one inch margins of comments on a published paper. The paper for the "take-home" final will be announced on the last day of class, December 12. Exams will be due by 5 PM on Tuesday, December 16.

Turning stuff in

Please turn all graded work in via the CTools page.

Statistical software

Stata is available at all full service workstations in computing centers on campus. A list of

computing centers on campus is here: <http://www.itcs.umich.edu/sites>.

Lots of information on Stata can be found here: <http://www.stata.com/links/resources1.html>

You can order your own copy of Stata at a very low rate; see the information here:

<http://www.stata.com/order/new/edu/gradplans/us-pickup/>

Some of the data sets for this course are not small, so do not get the version of Stata that handles only small data sets.

Problem sets should be completed using Stata.

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

Acock, Alan. 2010. *A Gentle Introduction to Stata, 3rd Edition*. College Station: Stata Press.

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

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.”

More on the department policy is here:

<http://www.lsa.umich.edu/econ/undergraduatestudy/policiesandprocedures>

More on the university policy is here: <http://ssd.umich.edu/>

Academic misconduct

The course complies with the economics departmental policy on academic misconduct, which you can find here:

<http://www.lsa.umich.edu/econ/undergraduatestudy/policiesandprocedures>

The university provides additional information on academic misconduct here:

<http://www.lsa.umich.edu/academicintegrity/>

General readings and textbooks

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

Wooldridge, Jeffrey. 2010. *Econometric Analysis of Cross Section and Panel Data*, 2nd Edition. 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.

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.

These two recent surveys are also very relevant:

Imbens, Guido and Jeffrey Wooldridge. 2009. "Recent Developments in the Econometrics of Program Evaluation." *Journal of Economic Literature* 47(1): 5-86.

Blundell, Richard and Monica Costa-Dias. 2009. "Alternative Approaches to Evaluation in Empirical Microeconomics." *Journal of Human Resources* 44(3): 565-640.

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

Readings in history, philosophy and interpretation

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 methods debate has attracted a lot of interest and discussion. It provides some conceptual background for some of the topics considered in ECON 675, particularly matching / weighting methods and instrumental variables:

Heckman, James. 2010. "Building Bridges Between Structural and Program Evaluation Approaches to Evaluating Policy." *Journal of Economic Literature* 48(2): 356-398.

Imbens, Guido. 2010. "Better LATE than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)." *Journal of Economic Literature* 48(2): 399-423.

Deaton, Angus. 2010. "Instruments, Randomization and Learning about Development." *Journal of Economic Literature* 48(2): 424-455.

And you might like:

Kennedy, Peter. 2002. "Sinning in the Basement: What are the Rules? The Ten Commandments of Applied Econometrics." *Journal of Economic Surveys* 16(4): 569-589.

The Spring 2010 issue of the *Journal of Economic Perspectives* is also devoted to a discussion of current "big picture" issues in applied econometrics.

Humor

The following paper should provide some much-needed, but still related, smiles at the end of a hard day:

Smith, Gordon and Jill Pell. 2003. "Parachute Use to Prevent Death and Major Trauma Related to Gravitational Challenge: Systematic Review of Randomized Control Trials." *British Medical Journal* 327: 1459-1461.

Reading list by topic

Readings for each topic are contained in the lecture notes themselves.

Course schedule

- 9/3 Introduction to the course
- 9/5 Optional GSI session: Stata programming
- 9/8 Binary choice models

9/10 Truncated and censored regression models
 9/12 Optional GSI session: Tables and figures

 9/15 Multinomial choice models [Guest lecturer: Bryan Stuart]
 9/17 Duration model
 9/19 No optional GSI session

 9/23 Duration models
 9/25 Quantile regression
 9/27 Optional GSI session: How to do a Monte Carlo analysis

 9/29 Quantile regression
 10/1 Non-parametric regression
 10/3 Monte Carlo analysis proposals due

 10/6 Matching and weighting methods
 10/8 Matching and weighting methods
 10/10 Bonus reading group: Huber, Lechner and Wunsch (2013) [Oxana Azgaldova]

 10/13 No meeting – fall break
 10/17 Variance estimation

 10/20 Variance estimation
 10/22 Decomposition methods [Guest lecturer: Bryan Stuart]

 10/27 Bootstrap
 10/29 Bootstrap
 10/31 Bonus reading group: Abadie, Athey, Imbens and Wooldridge (2014) [Ariel Binder]

 11/3 Bivariate normal selection model
 11/5 Instrumental variables

 11/10 Instrumental variables
 11/12 Instrumental variables

 11/17 Regression discontinuity designs
 11/19 Regression discontinuity designs
 11/21 Bonus reading group: Gelman and Imbens (2014) [Will Boning]

 11/24 Difference-in-differences
 11/26 Bonus lecture: Heterogeneous treatment effects (day before American Thanksgiving)

 12/1 Panel data models
 12/3 Panel data models
 12/5 Bonus reading group: Carneiro, Heckman, and Vytlacil (2011) [Ben Hopkins]

12/8 Partial equilibrium structural methods [Guest lecturer: Eric Chyn]
12/10 Measurement error models
12/16 Take-home finals and Monte Carlo analyses due