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ECON 8848: Applied Microeconometrics, Spring 2014
Syllabus and Schedule
Office Hours: MW 11:00 AM-12:00 PM
Economics 14A
Other times by appointment

Course Description:

Students who are successful in this course will be well prepared to conduct empirical research across a broad range of fields, although the tools are used most frequently in the applied microeconomics fields. The course provides a "user's guide" to many of the most commonly used econometric techniques, with a heavy focus on implementation and interpretation. We will begin the course with a STATA boot camp, quickly becoming familiar with the software package including programming techniques and data management skills. We will then move through a range of econometric topics, making sure to practice each technique in STATA. I hope to live up to the following quotation by Edward Leamer in his article *Let's Take the Con out of Econometrics* (AER, 1983):

> *"Methodology, like sex, is better demonstrated than discussed, though often better anticipated than experienced."*

Prerequisites:

To enroll in this course, you must have a working knowledge of statistics and econometrics equivalent to that obtained in ECON 7818 and ECON 7828.

Course Materials:

There is no required textbook for this course, although I will provide references to a number of books and articles for the interested student. We will also read and discuss several articles. Some of these articles will be "theory" articles, discussing the relative merits of estimators or developing and applying new ones. Others will be "application" papers, usually papers that use a technique we have discussed in an honest and useful way. I will also provide lecture notes, and you will find these and the assigned articles posted or linked on the Desire2Learn website. You should read the articles assigned prior to coming to class and be prepared to answer questions and participate in discussions. Please bring a copy (paper or electronic) of the papers we are discussing with you to class.

Students are not required to purchase their own copies of STATA, although those desiring to do so qualify for a substantial discount through the University's GradPlan. More information is available through a link posted on the Desire2Learn website. I recommend starting with Stata/IC. The price is $189 for a perpetual license (one that never expires).

Note: SMALL STATA WILL BE INSUFFICIENT FOR THIS COURSE.

You will receive a copy of the STATA documentation in PDF format if you choose to purchase your own. If you expect to use STATA beyond this course, you can feel free to purchase a more

advanced copy (SE or MP), but the Intercooled version will allow you to complete all the requirements of this course.

I will use STATA during some lectures to demonstrate estimators and methods that we cover. If you have STATA installed on a laptop, you may find it useful to bring on those days.

Requirements and Grading:

Your grade will depend on your performance on a number of assignments, according to the table below:

Assignment	Weight	Due Date
Problem Sets	15%	Every 1-2 weeks (~10 total)
Paper Replication/Extension	30%	Friday, 5/2 5 PM Hard Copy in my Office
Midterm	25%	Wednesday, 3/13 In Class (tentative date)
Final Exam	30%	Wednesday, 5/7 7:30-10:00 PM

Problem Sets will be posted at the onset of the course with deadlines every 1-2 weeks. These problem sets will allow you to gain direct experience with all of the econometric techniques we cover. All assignments will be STATA-based, although they will require answering interpretation/"thinking" questions as well. These problem sets will not require proofs; rather, they will ask you to simulate or to demonstrate a particular property using real-world or simulated data. Five percentage points of your overall grade will be based on whether you complete the assignments and turn them in on time. I will also choose two assignments at random to grade in depth, and these grades will account for the remainder of your grade. Note that the problem sets are fairly short and simple to start and become more difficult as we tackle more complicated material.

Paper Replication/Extension: Unlike the harder sciences, the field of economics places a relatively small weight on the value of replication. Nevertheless, economists make mistakes all the time, and some of them go undiscovered forever. So, as a means to practice all of the skills we are developing, and in service of the broader good, you will replicate the primary analysis of a paper in a field that is of interest to you. You should choose a published paper that relies on publicly available data or on data that the authors have made freely available. The paper's central identification strategy should be one of the methods we cover in this course. You should also provide at least one extension to the original work. Possible extensions include adding additional years of data, running additional specifications (e.g. functional form, RD instead of DiD, etc.), and subjecting the results to additional robustness checks. Alternatively, you could use similar methods in a slightly different context – different geography, different time period, etc. A hard copy of this paper will be due in my office by close of business on May 3.

Note that although this assignment requires the replication of the primary analysis from a published paper, you *may not borrow any language from the original paper without proper citation.* I will require that you complete and attach the department's academic integrity cover sheet for the assignment.

http://www.colorado.edu/Economics/graduate/AcademicIntegrityAgreement.pdf

The Midterm will cover material from the beginning of the course through lecture on March 11. The exam will take place during our normal class meeting on Wednesday, March 13. You *will not* have to do any STATA programming for the midterm. Instead, the questions will focus on the interpretation and implementation of techniques we have discussed. The questions will thus be very similar to the interpretation questions asked on the problem sets. You may also be asked questions about the papers that we read.

The Final Exam will be nominally cumulative, but it will focus heavily on material covered after the midterm. It will be similar in format to the midterm. Our assigned time from the Registrar is 7:30-10:00 PM on Wednesday, May 7. Note that our non-standard meeting time is not assigned an exact slot. I have chosen the time assigned to courses meeting MW 10:00-10:50 AM). University policy provides students with three or more exams on the same day the right to reschedule exams following the first two.[1] Any student wishing to invoke this right should notify me as soon as possible and no later than February 28. I will ask for a printed copy of your schedule to verify the conflict.

Final Letter Grades will be a weighted average of each of the components listed above. Prior to averaging, I will assign letter grades to each component based on the scores a good student at this level could reasonably be expected to attain.

Writing: Please note that this course requires a great deal of writing. The goal of the course is to prepare you to conduct and *to write about* original research in applied microeconomics. As you will soon find, the writing and communication components of applied econometrics are at least as important as the actual econometric skills. In grading papers, exams, and problem sets, I place an appropriate weight on students' ability to communicate their understanding and interpretation of the methodologies and results.

Seminar Series: You are strongly encouraged to attend the Economics department seminar series, especially when the speaker presents on an empirical applied micro topic. Learning to conduct and present original research is the key to your success in the discipline. These seminars are an excellent resource for you in that endeavor.

Late Assignments/ Missed Examinations Policy: Problem Sets will be turned in through the Desire2Learn website where they will receive a time stamp. You will have no less than one week to work on a given problem set, and each will be due on a Friday by 5 PM. Following a 5-minute grace period, I will assign zero credit toward the "completion" component of the Problem Set grade for any assignment turned in after the deadline. In the event that the problem set is randomly selected to be graded in detail, I will deduct 1 point for each half day it is late, and assignments submitted more than 48 hours after the due date will receive no credit.

The paper replication must be turned in on time. I will deduct 25 percent of the grade for each day after the deadline when it is turned in.

If you miss the midterm or the final exam you will receive no credit unless you provide documentation of a medical or family emergency. In the case of a documented emergency, the missed exam will be given no weight in the calculation of the final grade and other assignments

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[1] http://www.colorado.edu/policies/final_exam.html
[2] I would ideally cover these topics, but in the past, we have not had sufficient time. The citations are provided for

will be reweighted accordingly. There will be no make-up exams. If you foresee any conflict that will prevent you from taking an exam, please let me know as soon as possible and at least two weeks beforehand.

A note on my role: I will always be willing to offer you assistance with any assignment for this course, including the final paper. I will strongly suggest, however, that you form study groups for the problem sets and use the other members of your group as your initial resource in solving programming problems. In addition, I cannot generally offer help on projects that are unrelated to this course, e.g. work you are doing as part of your dissertation or as an RA for other faculty members. My goal in offering this course is to create a critical mass of well-trained graduate students who can then continue to learn more on their own and begin to serve as a resource to each other.

Tentative Schedule

Topic	Tentative Dates
Introduction and STATA Basics	1/13, 1/15
NO CLASS – MLK Day	1/20
Advanced STATA	
Descriptive Statistics, Figures and Tables	1/22
Programming – Loops, Macros	1/27
Simulation	1/29
Linear Regression Review	
Functional Forms – Logs, Polynomials, Categorical Variables, Interaction Models	2/3, 2/5
Review of FWL and the meaning of "controlling for"	2/10
The Experimental Ideal	
Treatment Effects – Potential Outcomes Framework	2/12
Causality in an OLS Regression – the CIA	2/17
Propensity Score Methods	2/19
Advanced Data Management	2/24
Panel Data Models	
Difference-in-Differences	2/26, 3/3 – paper
RE, FE, FD	3/5, 3/10 – paper(s)
MIDTERM EXAM	3/12
NO CLASS – Individual Meetings	3/17, 3/19
NO CLASS – Spring Break	3/24, 3/26
Variance Estimation in Panel Models	3/31, 4/2, 4/7 - papers
Instrumental Variables	
Basics – Constant Treatment Effects	4/9, 4/14 - paper
Local Average Treatment Effects	4/16
Regression Discontinuity	4/21, 4/23 – papers
Binary Dependent Variables	4/28
Wrap-Up	4/30
FINAL EXAM	5/7 7:30-10:00 PM

Other University Policies:

Disability Accommodation

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Center for Community N200, and http://www.colorado.edu/disabilityservices.

If you have a temporary medical condition or injury, see Temporary Injuries under Quick Links at Disability Services website (http://disabilityservices.colorado.edu/) and discuss your needs with me.

Religious Observances

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this course, please inform me no later than two weeks prior to any conflict you foresee, sooner if possible, so that we may find an alternative arrangement for you to complete the requirements of the course. See full details at http://www.colorado.edu/policies/fac_relig.html

Classroom Behavior

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See policies at:

http://www.colorado.edu/policies/classbehavior.html and

http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

Discrimination and Harassment

The University of Colorado Boulder (CU-Boulder) is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). CU-Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this CU-Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion,

sexual orientation, gender identity, gender expression, or veteran status. Individuals who believe they have been discriminated against should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 303-492-5550. Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at http://hr.colorado.edu/dh/

Academic Integrity

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at

http://www.colorado.edu/policies/honor.html and at

http://honorcode.colorado.edu

Reading List

The list below provides a guide to how to get the most out of your available resources for this course. Your most directly relevant text will be our lecture notes. They will provide you with the basics of all of the material that we cover in each class meeting. There are also two books that I think fit nicely with the applied nature of this course and offer a good complement to our in-class discussion. They are both relatively inexpensive, and I would recommend them as your best additional resources for learning the topics we cover. I also strongly recommend having one or more graduate econometrics textbooks for reference. Finally, we will read a few papers that actually apply the methods we are discussing. These are listed below in bold. Additional references that we will probably not have time for are listed in standard font. The links are active, but you will need to be on-campus or connected through VPN.

Books with an Applied Focus. I highly recommend getting a copy of each of these books, as they will provide a very useful supplement to my lectures and notes. Angrist and Pischke is relatively inexpensive (~$35), and I would strongly suggest that each of you get a copy. The Cameron and Travedi book is great, and it is specifically tailored for people learning STATA. A good strategy might be to order one for each study group (~$70). As of this writing, they are currently listed together on Amazon as "Frequently Bought Together"

Angrist and Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion.* **AP**

Cameron and Trivedi (2009). *Microeconometrics Using STATA.* **CT-STATA**

Econometrics Reference Books. I am not going to require you to have any particular one of these. I would recommend that you find at least one of the following books that you find useful as a reference book. I have tried to include the relevant sections where possible in the main table below.

Cameron and Trivedi (2005). *Microeconometrics: Methods and Applications.* **CT**

Davidson and MacKinnon (2004). *Econometric Theory and Methods.* **DM**

Wooldridge (2002). *Econometric Analysis of Cross Section and Panel Data.* **W**

Papers. Papers listed in **bold** are required reading and will be discussed in class during one of the meetings scheduled for the topic. Exact dates will be announced as we see how we are progressing. The additional papers listed are for reference for the interested student.

Topics and Readings

Readings marked with a [*] indicate that if I were you, and I had limited time to read non-required readings, I would prioritize these.

Introduction and STATA Basics
- **Lecture Notes**
- [*] CT-STATA Chapter 1

STATA Programming
- **Lecture Notes**
- [*] CT-STATA Chapter 1.5-1.8, 4

STATA Descriptive Stats, Figures and Tables
- **Lecture Notes**
- [*] CT-STATA Chapter 2

STATA Data Management
- **Lecture Notes**
- [*] CT-STATA Chapter 2

Functional Forms
- **Lecture Notes**
- AP – Chapter 3, various parts
- CT-STATA Chapter 3.3
- CT – Chapter 4.1-4.4

FWL and Multiple Regression
- **Lecture Notes**
- Lovell(2008) A Simple Proof of the FWL Theorem, Journal of Economic Education, Vol. 39 No. 1 (Winter 2008)
- DM pp. 68-?
- Zax Textbook, Chapter 12, Section 12.4 pp. 26-35

The RCT/Treatment Effects
- **Lecture Notes**
- [*] AP – Chapter 2
- W – Chapter 18

Omitted Variable Bias
- **Lecture Notes**
- [*] AP – Chapter 3.2
- DM – 2.4-2.5
- W – Chapter 4.3

Propensity Score Matching
- **Lecture Notes**

- - Smith and Todd (2005) Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators? *Journal of Econometrics*, Vol 125, No. 1-2, pp. 305-353
  - Dehejia (2005) Practical Propensity Score Matching: A Reply to Smith and Todd, *Journal of Econometrics*, Vol 125, No. 1-2, pp. 355-364
  - Smith and Todd (2005) Rejoinder, *Journal of Econometrics*, Vol 125, No. 1-2, pp. 365-375
  - [*] CT – Chapter 25.4
  - W – Chapter 18.1-18.3

Panel Data – Fixed Effects, etc.
  - **Lecture Notes**
  - **Ashenfelter and Krueger (1994) Estimates of the Economic Return to Schooling from a New Sample of Twins, *American Economic Review*, Vol. 84, No. 5 (Dec., 1994) pp. 1157-1173**
  - McKinnish (2008) Panel Data Models and Transitory Fluctuations in the Explantory Variable. *Advances in Econometrics.* Vol. 21 2008.
  - [*] AP – Chapter 5.1, 5.3, 8.2
  - [*] CT-STATA Chapter 8
  - CT – Chapter 21
  - W – Chapter 10

Difference-in-Differences
  - **Lecture Notes**
  - **Davis (2004) The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster. *The American Economic Review*, Vol. 94, No. 5 (Dec., 2004), pp. 1693-1704**
  - Meyer (1995). Natural and Quasi-Experiments in Economics. *Journal of Business and Economic Statistics.* Vol. 13, No. 2 pp. 151-161
  - [*] AP – Chapter 5.2
  - CT – Chapter 22.6
  - W – p.130, p. 284

Getting the Standard Errors Right
  - **Lecture Notes**
  - **Bertrand et. al. (2004) How Much Should We Trust Differences-in-Differences Estimates? *Quarterly Journal of Economics*, Vol. 119, No. 1, Pages 249-275**
  - **Moulton (1990) An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units, *Review of Economics and Statistics*, Vol. 72, No. 2 (May, 1990), pp. 334-338**
  - Cameron, Gelbach, and Miller (2006) Robust Inference with Multi-Way Clustering, *NBER Technical Working Paper* No. 327
  - [*] AP – Chapter 8.2

Instrumental Variables
  - **Lecture Notes**
  - Imbens and Angrist (1994) Identification and Estimation of Local Average Treatment Effects. Econometrica, Vol. 62, No. 2 (Mar., 1994), pp. 467-475

- o [Bound, Jaeger, and BAPer (1995) Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogeneous Explanatory Variable is Weak. *Journal of the American Statistical Association*, Vol. 90, No. 430 (Jun., 1995), pp. 443-450](#)
- o **[Field and Ambrus (2008) Early Marriage, Age of Menarche, and Female Schooling Attainment in Bangladesh, *Journal of Political Economy*,Vol 116, No. 5, pp. 881-930](#)**
- o [*] AP – Chapter 4
- o [*] CT-STATA Chapter 6
- o CT – Chapter 4.8-4.9
- o DM – Chapter 8
- o W – Chapter 5, 18.4

Regression Discontinuity
- o **Lecture Notes**
- o [Imbens and Lemieux (2008) Regression Discontinuity Designs: A Guide to Practice. *Journal of Econometrics.* Volume 142, Issue 2, February 2008, Pages 615-635](#)
- o **[Matsudaira (2008) Mandatory Summer School and Student Achievement. Journal of Econometrics. Volume 142, Issue 2, February 2008, Pages 615-635](#)**
- o [*] AP – Chapter 6

Binary Dependent Variables
- o **Lecture Notes**
- o [*] CT-STATA Chapter 14
- o CT – Chapter 14
- o W – Chapter 15.1-15.8

Additional Topics[2]

Event Study Models
- o [Jacobson, LaLonde, and Sullivan (1993) Earnings Losses of Displaced *The American Economic Review*, Vol. 83, No. 4 (Sep., 1993), pp. 685-709](#)

Selection
- o [*] CT-STATA - Chapter 16
- o [*] W – Chapter 17

Propensity Score Reweighting
- o [DiNardo, Fortin and Lemieux (1996) Labor Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach *Econometrica*, Vol. 64, No. 5 (Sep., 1996), pp. 1001-1044](#)

Duration Models

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[2] I would ideally cover these topics, but in the past, we have not had sufficient time. The citations are provided for those interested in pursing these topics independently.

- [*] Meyer (1990) Unemployment Insurance and Unemployment Spells. *Econometrica*, Vol. 58, No. 4 (July 1990), pp. 757-782
- CT – Chapter 17
- W – Chapter 20

Discrete Choice Models
- Train (2009) Discrete Choice Methods with Simulation, Cambridge University Press
- [*] CT-STATA Chapter 15
- CT – Chapter 15
- W – Chapter 15.9-15.10