

UC San Diego
Winter 2004
Class: T-Th 11-12:20 (Center 113)

Professor Eli Berman
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OH: Th, 12:30-2:30, Econ 218

TAs: Giuseppe Ragusa - gragusa@econ.ucsd.edu Econ 118, Mon 9:30-11:30 am.
Eemei Tang - m0tang@econ.ucsd.edu SH 139, Tues. 2-4pm.

Economics 120B
Econometrics

The course aims to prepare students for practical empirical research in an academic or business setting. It introduces the three basic concepts in econometrics: quantifying uncertainty with confidence intervals; using regression to infer causal relationships; and using regression for prediction. The course covers exotic concepts with strange names, such as heteroskedasticity and instrumental variables. It provides the standard tools necessary to perform and to read empirical research.

The prerequisite is one of EC 120A, Math 183 or ECE109. Students without the prerequisite are welcome to attend the first few classes but must get permission to register.

The material is fairly well covered in *Introduction to Econometrics*, by Jim Stock and Mark Watson, which is *required* reading and is available at the bookstore. Another helpful text is *Introductory Econometrics*, by Arthur Goldberger.

Part of the course involves learning to use a software package called *Stata*. Students have access to *Stata* in the computer lab. Individual copies of *Small Stata* can be purchased at <http://www.stata.com/info/order/new/edu/gradplans/gp3-order.html>. (A one year lease is available). *Stata* is essential for solving problem sets.

Evaluation: There will be a midterm exam (worth about 30% of the grade) on Thursday February 5, a final (about 40%) on Monday March 15, and four problem sets (worth 30% together). No other exams are planned. Exams may be proctored using video.

COURSE OUTLINE:

1. Introduction: Why Study Econometrics?

Who needs data anyway? If you had some, what would you do with it? Econometric models, parameter estimates, prediction and the testing of economic theories. Getting good data: Experimental vs. nonexperimental data. Cross-sections, Time-Series, Panels.
Reading: Stock & Watson - Chapter #1.

2. Probability and Statistics: A quick review

Probability, random variables, the normal distribution and the central limit theorem, inference, interval estimation and hypothesis testing. Asymptotics of the sample mean.
Reading: Chapters #2 and #3.
- Using the *Stata* package

3. Simple Regression (one regressor)

Fitting a line through a cloud of points. Least squares, unbiased estimates, confidence intervals, hypothesis testing, R^2 , heteroskedasticity.
Reading: Chapter #4.

4. Multiple Regression: Estimation

The second explanatory variable, interpreting coefficients, omitted variable bias, efficiency.
Reading: Chapter #5.1-5.4.

5. Causal Inference

Random assignment vs. omitted variable bias. Reading: Ch #11.1-11.4.

6. Multiple Regression: Inference

Confidence intervals (CI) for parameters, CI for predictions, hypothesis testing, single (t) vs. multiple (F) tests. Reporting etiquette.
Reading: Chapters #5.5-5.13.

7. Binary Dependent Variables and Nonlinear Regression

Linear probability model, logit & probit.
Readings: Chapter #9.

8. Sources of Bias: measurement error, sample selection, simultaneity and omitted variables

Omitted Variable Bias revisited, Measurement Error, Sample Selection, Simultaneity.
Reading: Chapter #9.2, 9.3.

9. Identification and Instrumental Variables

Causality, instrumental variables, two-stage least squares, natural experiments.
Reading: Chapters #10, #11.5-11.8; Angrist (1990) *American Economic Review*.