

Prof. Bryan Caplan

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Econ 637

<http://www.gmu.edu/departments/economics/bcaplan>

Spring, 1999

Econometrics Syllabus

Course Focus:

This course will try to fulfill two goals. First, it will provide a thorough exposure to the economic applications of multiple regression techniques. Second, it will provide a necessarily cursory introduction to a broad variety of more advanced econometric techniques.

Prerequisites:

I assume familiarity with the basics of linear algebra and multivariate calculus. If your knowledge of these is "rusty," you will need to take extra effort to learn them on your own. You will also need to know how to use Windows on a PC.

Texts:

The following texts are required. You may find it cheaper to order them online, from, for example, <http://www.barnesandnoble.com>.

Jack Johnston and John DiNardo, *Econometric Methods* (available in the book store or online)

Richard Herrnstein and Charles Murray, *The Bell Curve* (available online [and discounted at the B&N site!] and at all popular bookstores)

In addition, you must purchase a copy of Eviews; the best place to do so is surely online at <http://www.eviews.com/general/prices.html>. The price is \$65 for the Student version; once you are sure you will be in the class, order it immediately. One or two computers at the Public Choice Center also have Eviews installed, but you cannot count on the availability of these machines.

Grading and Exams:

There will be one midterm and a final exam. The midterm counts for 30%; the final exam is 50%; homework counts for the remaining 20%. These weights are fixed - improvement on later exams will not retroactively raise your grades on earlier exams.

There is no formal grade for participation, but if you are one of the students who (in my judgment) contributes most to the quality of class discussion your grade will be raised if you are on the borderline.

Homework:

There will be approximately six homework assignments during the semester. Depending upon how good a job you do, your homework will receive a check-plus (4 points), a check (3 points), or a check-minus (2 points) if you turn it in; otherwise you receive 0 points. Late homework loses one point. *Late homework is no longer accepted after I pass out my suggested answers for a given assignment.*

Office Hours

The best way to contact me is by email at bcaplan@gmu.edu. Many questions and requests can be satisfied by going to my homepage at <http://www.gmu.edu/departments/economics/bcaplan>. I have two offices: the first is in 326 Enterprise Hall; the number there is 3-1124. I also have a second office at the Public Choice Center; the number there is 3-2324. My official office hours are MWF 1:30-2:30, but you can also schedule an appointment or just drop by and see if I'm available.

Tentative Schedule:

My proposed schedule for the semester follows; you will notice that it follows the textbook closely. If it proves too ambitious, I will try to *simply say less about each topic* rather than cut the topics for the final weeks.

Week 1-2: Relationships Between Two Variables

- Is econometrics worthless?
- Correlation coefficients
- Probability
- Bivariate regression
- R^2 and bivariate regression
- Coefficients and standard errors
- Hypothesis testing with bivariate regressions

- Introduction to Eviews

Readings:

Johnston and DiNardo, chapter 1.

Weeks 3-4: The k-Variable Linear Equation

- Review of linear algebra
- Multiple regression
- The mathematics of multiple regression
- The full rank condition
- R^2 and multiple regression
- Mean of b
- Variance of b and SEs of coefficients
- Estimating σ^2
- Hypothesis testing with multivariate regressions
- Restricted and unrestricted regression
- Eviews and multiple regression

Readings:

Johnston and DiNardo, chapter 3 (except 3.2 and 3.3).

Week 5: Specification Errors; Types and Transformations of Variables

- The assumptions of OLS
- Violations of the assumptions of OLS
- Omitted variable bias
- Trends
- First-differences
- Taking logs
- Taking lags
- Squaring
- Dummy variables
- Cross-sectional data, time series, and panel data (=pooled time series)

Readings:

Johnston and DiNardo, chapter 4.1; 2.1, 2.2, 4.6.

Week 6: Applications and Reflections, I

- Correlation and causation
- The technique of natural experiments
- Analyzing some papers

Readings:

Bryan Caplan, "Has Leviathan Been Bound?" unpub. ms.

David Card and Alan Krueger, "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," *American Economic Review*, v84 n4 September 1994, pp. 772-93.

Week 7: MIDTERM

Weeks 8-9: Estimation and Identification of Systems of Simultaneous Equations

- Simultaneity bias
- Exogeneity and endogeneity
- Principles of identification
- IV/2SLS and identification
- GLS
- SUR
- 3SLS
- Numerical optimization: MLE and GMM
- Appendix: Instrumental variables and measurement error

Readings:

Johnston and DiNardo, chapter 5.5, 9.4-9.6; **skim:** appendix 9.1, 5.4.1, 5.1-5.2, 10.1-10.4.

Week 10: Time Series, I: Basics

- Univariate time series
- AR, MA, ARMA
- Stationarity
- Unit roots
- Appendix: GLS, heteroscedasticity, and autocorrelation

Readings:

Johnston and DiNardo, chapter 7.1-7.3 (skim 7.3.4; skip parts on partial correlation coefficients), 6.1, 6.2.1, 6.3, 6.4, 6.6.1

Week 11: Time Series, II: Systems of Simultaneous Equations

- VARs
- Granger causality

- Impulse response functions
- SE bands
- Structural VARs
- Other identification strategies for time series
- Appendix: Pooled time series

Readings:

Johnston and DiNardo, chapter 9.1, 9.2 (skip parts on nonstationary systems and cointegration), 12.1-12.2, 12.6, 12.8

Week 12: Discrete and Limited Dependent Variable Models

- Discrete choices
- Linear probability model
- Probits
- Logits
- Tobits

Readings:

Johnston and DiNardo, chapter 13.1-13.6, 13.9-13.10.

Weeks 13-14: Applications and Reflections, II

- Do the advanced topics have any value-added?
- More on correlation vs. causation
- Analyzing some papers
- Subordinating econometrics to economic history

Readings:

Murray and Herrnstein, *The Bell Curve*, introduction to Part II; chapters 5-8, 14; appendices 4 and 6.

Bryan Caplan, "War as a Natural Macro Experiment: Did Fiscal Policy Ever Matter?"

Bordo, Michael, Choudhri, Ehsan U. and Schwartz, Anna J. "Could Stable Money Have Averted the Great Contraction?," *Economic Inquiry*, July 1995, pp. 484- 505.

(Additional Paper?)

FINAL EXAM

