

Economics 640 - Econometrics

Course Syllabus - Fall 2010

Course	Economics 640	Mon/Wed: 5:00-6:15 P.M.
Instructor	Dr. Hisham Foad	Storm Hall 260
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Office Hours	Monday 3:30-4:30	
	Tuesday 1:30-3:30	
	Thursday 10:00-12:00	
	*Other times by appointment	

Overview

Econometrics is based on the application of statistical methods for estimating economic relationships, testing economic theories, and the evaluation and implementation of policy. Econometrics is distinct from mathematical statistics in that the former is primarily concerned with evaluating observational, rather than experimental data. Economists use econometrics to test economic theories and to estimate relationships between economic variables. While econometrics is often used to make macroeconomic forecasts, researchers also use econometric methods to evaluate causal relationships such as the effect of technology on classroom performance, the impact of immigration on labor wages, and the extent to which membership in a customs union affects trade just to name a few. In fact, the vast majority of empirical research in economics utilizes econometrics.

Learning Outcomes

This course presents an introduction to the fundamental methods employed by econometricians as well as the key issues faced when dealing with observational data. We will begin with the basic linear regression model and analyze the theory behind its estimation. From there we will add refinements and discuss how to estimate a relationship when the assumptions necessary for the basic model do not hold. By the end of the course you will be able to:

- Estimate relationships between economic variables
- Conduct hypothesis tests on economic theory using observational data
- Analytically derive ordinary least squares estimators and discuss their statistical properties
- Test for the presence of multicollinearity and heteroskedasticity in a regression model
- Correct for multicollinearity and heteroskedasticity in regression models
- Know how and when to implement instrumental variables estimation
- Understand and test for the unique problems faced when using time-series rather than cross-sectional data
- Estimate and identify simultaneous equation models.

Readings

The main textbook for this course is Jeffrey Wooldridge, *Introductory Econometrics*, 4th Edition. Course lectures will be structured on the chapters in this text, although specific details may often diverge from the textbook.

An optional supplement is Peter Kennedy, *A Guide to Econometrics*. This book provides an excellent intuition to the nuts and bolts in the Wooldridge text. Although success in the course is not contingent on acquiring this book, I highly recommend that you obtain a copy. Another useful book along the lines of Kennedy's text is *Basic Econometrics* by Damodar Gujarati.

Exams

There will be three closed book exams. The exams are not cumulative, covering only the material discussed in class up to that point. That said, each section of this course builds upon the section preceding it, so it behooves you to stay current in your studies and not fall behind. The exams are tentatively scheduled for the following dates:

Exam I	October 11th
Exam II	November 10th
Exam III	December 18th (8AM-10AM)

I do not offer any make-up exams. If you know that you will be unable to make one of the dates above, please talk to me as soon as possible. If I deem that you have a valid excuse, we can work something out. However, you must talk to me *before* the exam. Any excuses used after an exam is missed will result in a zero for the exam, no exceptions.

Problem Sets

I will assign five problem sets over the course of the semester. You will have about two weeks to complete these problem sets and turn them in to me for grading. Though you may work on these problems in groups, each student must turn in their own work. These assignments will reflect the material we are discussing in class and are designed to be a good preparation for the exams. Students must turn in hard copies of the problem sets to me at the beginning of the class period on which they are due. I will not accept any problem sets turned in after the due date.

Research Project

You will be required to write a short (6-8 pages: double spaced, 12 point font) empirical paper utilizing the tools learned in class. A successful paper will address the following questions:

- What is the main issue you are examining and why is it relevant?
- What empirical model will you use to address this issue?
- What dataset will you use and how is it relevant to your model?
- What do your empirical results tell you about your hypothesized relationship?
- What are two potential problems with your results and how would you go about fixing them?
- How would you describe your key result(s) to a non-economist?

Your papers will be due on the last day of class, December 8th. Please note that this is before the final. To encourage you to get an early start on the paper, you must turn in a proposed abstract (200-500 words) to me by November 1st at the absolute latest (I will be happy to take them before then). In your abstract you must identify the issue you seek to address and the dataset you will use. Please feel free to come see me during office hours if you are having a hard time thinking of paper topics or have any general questions about the project. I am also happy to look over any drafts of your paper and

provide feedback up to one week before the paper is due (i.e. get drafts to me no later than December 1st).

Grading

Your grade in this course will depend on 3 exams, 5 take-home problem sets, and 1 research project. Your final grade will depend on the following weights:

Exams	60% (20% each)
Problem Sets	25% (5% each)
Research Project	15%

I will compute your grade as a weighted average of your scores on exams, problem sets, and the research project. For example, a student who scored an 88 average on exams, an 82 average on the problem sets and a 94 on research project would have a final average of:

$$0.6*88 + 0.25*82 + 0.15*94 = 52.8 + 20.5 + 14.1 = 87.4 \text{ (B+)}$$

I employ a standard grading scale in which 80-82 is a B-, 83-86 is a B, 87-89 is a B+ and so forth. In determining a grade distribution, I aim for an average score across the class of a 78 and a standard deviation of 10 points. If the average or standard deviation differs greatly from these targets on any one assignment, then I will utilize a curve. However, I will never curve your grade downward, only up. Thus, if the average is well above a 78 there will be no downward curve and you should be proud of your collectively fine performance!

Attendance

While attendance is not mandatory, it is highly recommended. Past experience has indicated that there is a very strong and positive correlation between attendance and exam scores. The lectures will cover some material not in the textbook, and you can save yourself a lot of time and frustration by showing up and paying attention in class. Econometrics can be a tricky subject to pick up at first and since it is so cumulative in nature, once you get lost it can be very difficult to recover. A way to prevent this from occurring is to attend class regularly, ask questions, and see me for extra help when needed.

Blackboard

This course has a dedicated blackboard site which you should have access to. To get to blackboard, go to <http://blackboard.sdsu.edu> and login by entering your red id and password (the same one you use for WebPortal). I will regularly post lecture notes, homework assignments, and class announcements to the site, so it is your responsibility to check it daily. You can post questions to the site outside of office hours as well as use it to communicate with the class. Please let me know if you do not have access to the site as soon as possible.

Academic Integrity

I consider academic dishonesty to be a serious offense, and follow a zero tolerance policy in this regard. You can do very well in this course if you are willing to put in the work, and any benefit you may perceive from cheating is far outweighed by the penalty not only to your academic performance, but your personal integrity as well. By registering for this course you have self identified as being interested in learning the tools of econometric analysis. Cheating is not the way to do this. All students should familiarize themselves with the SDSU Standards for Student Conduct available at <http://csrr.sdsu.edu/conduct1.html>.

I also ask that you be courteous to your fellow classmates and the class itself. Please arrive to class promptly and turn off your cell phones. Refrain from talking when your classmates or I have the floor.

If you have a question or a point to make, raise your hand and I will call on you. I will not tolerate rudeness toward your classmates and anyone guilty of this will be asked to leave that class period. I reserve the right to lower your grade if you are consistently showing up late to class or leaving early. If you need to leave class early, please let me know *beforehand*.

Accommodating Disabilities

If you have or acquire any sort of disability that may require accommodation, feel free to discuss it with me at your convenience. If you want to find out what services are available on campus, contact Student Disability Services, Suite 3100, Calpulli Center, (619) 594-6473.

Tentative Course Outline, Subject to Change

Topic	Textbook Chapters
<i>Fundamentals of Econometrics</i>	
1. Introduction	Chapter 1
2. Review of Probability and Statistics	Appendices A and B
a. Random Variables	
b. Statistical Distribution	
c. Expected Value and Variance	
d. Random Sampling	
e. The Tradeoff between Bias and Efficiency	
3. The Basic Regression Model	Chapter 2
a. Deriving OLS - Minimizing Squared Errors	
b. Deriving OLS - Method of Moments	
c. The Gauss-Markov Assumptions	
4. Properties of OLS	Chapter 2
a. Sums of Squares and R^2	
b. Statistical Properties of OLS Estimators	
<i>Multivariate Regression Analysis</i>	
1. Regression with Multiple Variables	Chapter 3
a. The k-variable Regression	
b. Reinterpreting the Gauss-Markov Assumptions	
2. Estimation Issues with Multivariate Regression	Chapter 3
a. Irrelevant and Omitted Variables	
b. Multicollinearity	
Exam I: October 11th	
3. Simple Hypothesis Testing	Chapter 4
a. One and Two-sided t-tests	
b. p-values and Confidence Intervals	
4. Joint Hypothesis Testing	Chapter 4
a. Testing Multiple Linear Restrictions	
b. Testing General Linear Restrictions	
c. Properties of the F-Statistics	

Tentative Course Outline, Continued

Topic	Textbook Chapters
5. Large Sample Properties of OLS	Chapter 5
a. Consistency	
b. Asymptotic Normality	
c. The Lagrange Multiplier Test	
<i>Specification and Functional Form</i>	
1. Alternatives to the Linear Regression Model	Chapter 6
a. Data Scaling	
b. Logarithmic and Quadratic Transformations	
c. Residual Analysis	
2. Regression with Qualitative Variables	Chapter 7
a. Dummy Variables and Constant Terms	
b. Interaction Effects	
3. Testing for Specification Error	Chapter 9
a. Functional Form Mis-specification	
b. Proxy Variables	
c. Measurement Error and Non-Random Sampling	
<i>Heteroskedasticity and Endogeneity Bias</i>	
1. Heteroskedasticity: Non-Constant Variance	Chapter 8
a. Inference in the Presence of Heteroskedasticity	
b. Testing for Heteroskedasticity	
c. Generalized Least Squares	
Exam II: November 10th	
2. Instrumental Variables	Chapter 15
a. Endogenous Explanatory Variables	
b. Selecting Suitable Instruments	
c. Inference under IV Estimation	
d. Two Stage Least Squares	
3. Simultaneous Equations	Chapter 16
a. Simultaneity Bias	
b. Estimating Structural Equations	
c. Rank and Order Conditions for Identification	
d. Seemingly Unrelated Regressions	
<i>Time Series</i>	
1. Basic Estimation with Time Series Data	Chapter 10
a. The Gauss-Markov Assumptions with Time Series Data	
b. Time Trends and Seasonality	
c. Autoregressive and Moving Average Processes	
2. Stationarity and Persistence	Chapter 11
a. Distribution Stability over Time	
b. Asymptotic Properties of Time Series OLS	
c. Lagged Dependant Variables with High Persistence	
3. Heteroskedasticity in Time Series	Chapter 12
a. Serially Correlated Errors	
b. Testing for Serial Correlation	
c. Correcting for Serial Correlation	
Exam III: December 18th (8-10AM)	