Economics 5243

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Hours Friday 9:00-11:30 and by appointment

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1 Purpose

The objective of this course is for you to become knowledgeable users of the linear regression model. The topics include the estimation and specification of the linear regression model, imposition and testing of exact linear parameter restrictions, confidence intervals, estimation of nonlinear models, and an introduction to generalized least squares.

In order to become functionally literate in applied econometrics, it is also necessary for you to learn some of the basics of econometric theory. The basic tools of econometric theory will help to slow the rate of depreciation of your hard-earned econometric human capital. It is well worth your time to learn these tools now, especially if you intend to do any empirical work in the future.

2   Textbooks

Required

> Russell Davidson and James MacKinnon, *Econometric Theory and Methods*, Oxford, 2004.

Most of our lectures and class assignments will come from Davidson and MacKinnon's book. The major shortcoming of this book is that it doesn't contain many empirical examples. Also, it can be rather terse at times and you may need to supplement your reading in ETM with other material. In particular, you may consider Wooldridge's *Introductory Econometrics: A Modern Approach*, which is a nice upper level undergraduate book, when trying to fill in the gaps.

Another book available at the Union bookstore is Cameron and Trivedi's excellent, *Microeconometrics Using Stata*. Everything I know about Stata is written down in *Using Stata for Principles of Econometrics, 3rd edition*. If you ask me a question about Stata, I will look in this book to find the answer.

Recommended

Jeffrey Wooldridge, Introductory Econometrics: A Modern Approach, 4th edition, Southwestern, 2009. This undergraduate book contains much wisdom and great examples. Highly recommended.

Peter Kennedy, *A Guide to Econometrics* 6th edition, Wiley-Blackwell, 2008. This is the most useful econometrics book I've ever owned.

Christopher F. Baum, *An Introduction to Modern Econometrics Using Stata*, Stata Press, 2006.

Lee C. Adkins and R. Carter Hill. *Using Stata for Principles of Economet-*

rics, 3rd edition, John Wiley and Sons, 2008. You probably won't need to buy this, but it is available from Amazon or the Bookstore.

Marno Verbeek *A Guide to Modern Econometrics*, Third edition, John Wiley and Sons, 2008. This book, written by a finance guy, complements ETM fairly well (similar notation and approach), but is much more application oriented.

A. Colin Cameron and Pravin K. Trivedi. *Microeconometrics Using Stata*, The Stata Press, 2009.

Other Sources

James Stock and Mark Watson, *Introduction to Econometrics*, 2nd edition, Addison Wesley, 2007. See the last two chapters for the good stuff.

Fomby, Hill, and Johnson, *Advanced Econometric Methods*, Springer Verlag, 1984. Second Printing, 1988. Old but good treatment of microeconometrics.

Judge et al., *The Theory and Practice of Econometrics*, 2nd Edition, Wiley, 1985. (a.k.a., "Big Judge.") Encyclopedic coverage of the state of econometric knowledge in 1985. Much has changed since then, though. Greene's book, though less thorough, provides a more modern survey.

Judge et al., *Introduction to the Theory and Practice of Econometrics*, 2nd Edition, Wiley, 1988. (a.k.a., "Baby Judge.") This contains very systematic coverage of the basic models. Even though it is old, it is still the best textbook treatment of introductory econometrics available. It is not a cookbook (see Greene for that).

Schmidt, Peter, *Econometrics*, Marcel Dekker, 1976. Theorem/Proof! Essential if taking Econometrics prelims or if you are a stat major, not so useful otherwise. Lee C. Adkins, *Using gretl for Principles of Econometrics, 3rd edition*, forthcoming. This title is available from my website. It is minimally useful if you are not using gretl.

William Greene, *Econometric Analysis*, 6th edition. This is the book used almost everywhere for this course. It is a great resource to have if you already know introductory econometrics. As a way of learning econometrics it is not so good–which is why I don't use it this way. In my opinion the book is just not systematic enough in its development of each topic. It's major strength (completeness of coverage) is what makes it a poor choice for learning econometrics. To thoroughly cover a topic, it has to draw on material covered elsewhere; usually stuff that students haven't learned yet. That said, it is essential to own a copy of this book if you intend to apply econometrics. The coverage is unusually broad, containing many esoteric models, and the examples are great. Watch out for errors, though (there tend to be quite a few–though Bill is especially quick to try to fix them).

3   Prerequisites

This course requires you to work with probability, statistics, calculus, matrix algebra, and to write computer programs (as well as learn econometrics). If you have any doubts about whether your experience is sufficient, please talk to me about it. At a minimum, I assume that you know the basics of differential calculus, matrix algebra, probability theory, and how to use a Windows based microcomputer. If you have any doubts about whether your experience is sufficient, please talk to me about it.

4   Course Outline

1   Review of Regression Models

    1.1   Introduction

    1.2   Distributions, Densities, and Moments

    1.3   The Specification of Regression Models

    1.4   Matrix Algebra

    1.5   Method-of-Moments Estimation

5 Computer Assignments and Homework

You can't expect to learn as much without doing some homework. The problem is, my capacity to grade it is limited, especially given the unusually large enrollment in this class and in Econometrics II this spring. So, the homework operates on the honor system for the most part. I will assign homework and expect you to do it. **I will collect it in sets 2 or 3 times during the semester. I'll give you a few days notice before calling for it.** I will evaluate it based on it's degree of completeness, organization (how easy it is for me to figure out what you've done and whether it is correct), and originality (how similar is it to classmates and to previous year's work). I'll evaluate a sample for correctness. If you wish to have a copy of this, then make a duplicate before you turn it in. I will not return it to you. I'd rather see you try to do it and fail than to copy someone else's work and get it right. Remember that. Also, when you turn in an assignment, turn in a copy of the computer code you used to get your results.

Some of the homework consists of algebraic puzzles, and for these I want to see how you do without my help (fairly common in statistics). This helps me to gauge your aptitude for further study in econometrics. Other assignments are purely empirical in nature and I am certainly willing to discuss these almost anytime, preferably in class so that I don't have to say the same thing 25 separate times. These are important for your progress as an applied social scientist.

The other type of assignment will involve a small amount of applied regression analysis. For this you can use Stata or Gretl. You are responsible for learning to use the software. To help, there are at least two excellent resources available (hint: see the reading list and look for my name). On the class website, I'll also supply links to other useful material.

Stata

Stata is currently available in the CBA labs and on the CBA Trading Floor.

Gretl

Gretl is an acronym for Gnu Regression, Econometrics and Time-series Library. It is a software package for doing econometrics that is easy to use and reasonably powerful. Gretl is distributed as free software that can be downloaded from `http://gretl.sourceforge.net` and installed on your personal computer. Unlike software sold by commercial vendors (SAS, Eviews, Shazam to name a few) you can redistribute and/or modify Gretl under the terms of the GNU General Public License (GPL) as published by the Free Software Foundation.

Gretl comes with many sample data files and a database of US macroeconomic time series. From the Gretl web site, you have access to more sample data sets from many of the leading textbooks in econometrics, including ours *Introduction of Econometrics* by Stock and Watson. Gretl can be used to compute least-squares, weighted least squares, nonlinear least squares, in-

strumental variables least squares, logit, probit, tobit and a number of time series estimators. Gretl uses a separate Gnu program called *gnuplot* to generate graphs and is capable of generating output in LaTeX format. Gretl is under development so you can probably expect some bugs, but in my experience it is pretty stable to use with my Windows XP systems.

So, why use Gretl? Well, its free, its fast, it will work on any platform, and it will do everything we are going to do in this class. If you want to use Gretl instead of Stata, then feel free to do so.

Why use Stata? Stata is a professional piece of software that has many more capabilities than Gretl. In the long-run, knowing how to use Stata could be beneficial. On the other hand, by the time you get around to using Stata, you may have forgotten it all and have to start from scratch anyway. As it turns out, knowing one package well (any package) is a pretty good introduction to other packages.

Early in the course you will begin to use the computer to do portions of your homework. You will be responsible for learning to use the software of your choosing, though I can help you as needed. I will probably use GAUSS examples in class and Stata for regression analysis.

6   Grades

Your grade in this class will be based on your performance on 3 exams and on homework assignments.

Grade Weights	
Midterm Exam 1	42.5%
Final Exam	42.5%
Homework	15%

Grades will be assigned according to the following scale:

Grades

91%–100%	A
76%–90.9%	B
60%–75.9%	C
50%–59.9%	D
< 50%	F

All exams must be taken at the designated time. No make up exams will be given. If you miss an exam you will receive a grade of zero.

Unless you are specifically told otherwise by me, all homework must be turned in at the beginning of the class period on the date that it is due. Homework will not be accepted if late.

7 Attendance

Regular attendance is expected. You are responsible for any material you miss because of absence. In general, I do not permit students to copy my notes. If you miss class and need a copy of the notes, please obtain them from one of your classmates.

8 Cheating Policy

Cheating will not be tolerated. You may not, under any circumstance, use material that comes from the solution manual to any of our textbooks. If you do (and I can usually tell since I know where the errors are) I will consider that an extremely bad case of cheating and I will begin procedures that will earn you an F! for the course.

Any violation of the University's academic integrity policy will be prosecuted according to University regulations. If you are not sure what this is about, then visit the link at the bottom of my website. Basically, you will receive

a grade of 0 on any test or assignment you are caught cheating on. If the violation is especially egregious or it threatens my ability to evaluate work for others in the course, then you could earn an F! for the course and you may be suspended from the University. Remember, you are responsible for the security of your work (in other words, if someone copies your work, you will also receive a zero on the test or assignment).