

Econometrics I

Econ 926

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411 McConnell Hall

Fall 2009, Term 2

Office Hours: 2:00 - 3:30 p.m. Tues. and 1-3:00 pm Thurs.,
and by appointment

The objective of this class is to understand the theory, application and possible problems of regression analysis and other basic econometric methods, and how to interpret empirical results and develop and test hypotheses. In so doing, we will show how regression analysis can be applied to economic data and be used to test the implications of economic theories. In pursuit of this overall objective, the requirements for the class and the course outline and reading list are presented below.

Readings

The 'required' textbook is Introduction to The Theory and Practice of Econometrics, by Judge, Hill, Griffiths, Lutkepohl and Lee (henceforth referred to as "Judge"), second edition. This book is available at the Durham Book Exchange. You may be able find a used book online or borrow one from a fellow graduate student. Alternatively, if you own or have access to another graduate econometrics textbook, you may be able to use it. In particular, Greene's book, listed below, is an excellent substitute for Judge. I also **strongly** recommend that you borrow or buy either Gujarati's or Wooldridge's book (or a comparable undergraduate econometrics text) described below. In general, there are many econometrics books out there; if there is one you are interested in using for this course, please feel free to show it to me and I will tell you how useful it will be. Finally, you may find a basic statistics book useful in reviewing statistical concepts, and one or more of the other supplementary textbooks listed below helpful in clarifying the material presented in class.

I have also typed up a portion of the class notes that is available on the course's blackboard site. Guides to using SAS and Stata are also available on Blackboard. To learn about how to access SAS and Stata, go to <http://at.unh.edu/acs/services/software/> and click on SAS 9.2. Most of the other suggested or required readings are available through blackboard, online library services such as JSTOR or the reserve desk at the library.

Requirements of the Course

1. Homework Assignments

There will be five homework assignments throughout the course of the semester. Homework assignments typically consist of three parts: 1) theoretical questions/proofs, 2) questions over assigned readings, and 3) exercises involving the estimation of actual models with data I provide. For this third component, we will primarily be using SAS, a statistical package. While you must learn how to use SAS, if you have an interest in using another package then you should check with me on an individual basis.

Answer keys will be available for the first two parts of each assignment. On or after the due date, there will be a 20-30 minute quiz over those two parts, typically constructed by taking a sample of the actual questions or by asking about the questions and proofs/articles. The third part of the assignment, the programming questions, will be graded directly and are due at the beginning of class, unless otherwise stated.

2. Research Paper

You are also required to write a term paper in which you set up and estimate (using **multiple regression** analysis) an economic model and interpret the results. You must have **at least twenty observations** in your sample. The paper must include the following:

- 1) an explanation of the economic model and equation(s) chosen for estimation,
- 2) the description and source of the data used in the analysis,
- 3) a discussion of the problems suspected and/or detected in estimation, and
- 4) the hypothesis test(s) suggested by the model and an interpretation of the results.

Ch. 19 from *Introductory Econometrics* by Wooldridge (listed below and placed on reserve) discusses how to undertake such a project and provides possible topics and data sources. I strongly urge you to read this BEFORE even thinking about your project! Other helpful resources include 1) *Doing Economics* by Steven A. Greenlaw, which is a handbook geared to teaching advanced undergraduates how to do research projects; chapters 8 and 9 are especially helpful in discussing data issues, and 2) the “Data Watch” section in the *Journal of Economic Perspectives*, which discusses in detail a particular dataset and how it may be used. Appendix E in Gujarati (4th ed) lists a variety of web sources of data.

The paper should be machine-generated, double-spaced and no more than 20 pages in length (with 11 point font or larger and 1 inch margins), except for any tables or figures. You must include page numbers in the document. You also must include all relevant computer printouts (both the 'log' and output parts of the program), including one that clearly lists your data. (If your sample has more than 50 observations, a partial listing combined with descriptive statistics, will suffice.) You must also report the sources of your data; for those obtained from the internet, I need the name of the organization providing the data, the title of the publication and the web site. I have placed out on Blackboard a truly outstanding research paper by a student in one of my previous classes as an example.

A short proposal (~1 page) that clearly lays out your model, defines the variables included and describes the data you plan to use is due no later than November 12th. (I would encourage you to do this sooner!) This proposal must include a precise description of the variables you plan to use (including their source), the functional form of the equation you plan to estimate and your hypotheses. It should explain why you believe the relationship holds and why you have chosen the variables you have. I will read your proposal, give you feedback and suggestions and, hopefully, approve your idea. In the event that I identify major problems, I will give you one chance to submit a revised proposal for my evaluation. My evaluation of these proposals is for your benefit – I can identify any major problems for you and also offer helpful suggestions. I also will not penalize for you any issue (e.g., omitted variables, other types of model misspecification) that was present in the proposal but that I did not identify in my evaluation.

The paper itself is due at the beginning of class on our last day, Thursday, December 10th. ANY late papers will be docked 10% per day.

Grading Procedure

There will be one midterm worth 25% of your final grade and a comprehensive final exam that makes up 30% of your grade. No make-up exams will be given. If you must miss an exam, notify me before the test. The paper comprises 25% of your grade, and the remaining 20% is from the homework assignments (quizzes + graded part).

Highly Recommended Supplementary Texts: (all are on reserve at library)

1. Basic Econometrics, by Gujarati, any edition. (The reading list refers to the fourth edition.) This is an excellent undergraduate text that, while fairly rigorous (although it does not use matrix notation), is clear in its exposition and emphasizes the intuition behind results. I strongly recommend this book for all students except those with an extensive background in econometrics and statistics. Indeed, a wise practice would be to read Gujarati carefully before a given topic is covered in class, and then read Judge afterwards.
2. Introductory Econometrics, by Wooldridge, any edition. (The reading list refers to the 4th edition.) This is also an undergraduate text that has a more applied approach (less emphasis on theory and intuition) than Gujarati, but has an expanded list of topics such that it may be more useful to you in the future. (For instance, I often use this textbook in my own research to look up a particular test, etc.)
3. Elements of Econometrics, by Kmenta. This is a graduate text with a presentation that is generally at a slightly lower level than Judge (and higher than Gujarati). It relies too heavily on scalar notation, but often provides more intuition and "how to" directions than Judge does.
4. Econometric Analysis, by William Greene, any edition. (The reading list refers to the sixth edition.) This book is on the same level as Judge, but unfortunately is often sparser in its derivations and its organization is quite different from mine. In places, however, its coverage is more thorough, better organized and easier to understand than Judge. You could use this book interchangeably with Judge; thus, readings from both books (where available) are provided for all topics.
5. A Guide to Econometrics, by Peter Kennedy (any edition). This book discusses econometrics at a fairly advanced level but with *very little mathematical derivations!* Written more like a handbook than a textbook, it seeks to provide intuition, not rigor.
6. The Practice of Econometrics: Classic and Contemporary, by Berndt. This is a unique book that blends the implications of certain economic theories with the practice of econometrics, often giving a historical perspective as well. Two of the chapters are required readings. While not extremely helpful in developing econometric theory, it makes econometrics much more interesting by discussing real world applications. It may also make the study of graduate economic theory (macro or micro) more interesting by emphasizing *its* real world applications.

COURSE OUTLINE AND READING LIST

(approximate dates covered are listed and ** denotes recommended reading)

I. Introduction to Econometrics and Methods of Estimation (September 29th)

- Ch. 1, and pp. 59-68
- **Gujarati, Introduction
- **Wooldridge, Ch. 1 and 19

II. The Two Variable Linear (Simple Regression) Model

- A. Basic Ideas and Estimation (Sept 29-Oct 1)
 - **Gujarati, Chs. 1-3, plus Appendix to Ch. 3
 - **Kmenta, Ch. 7.1-7.3; Greene, pp. 221-225, 238-39
 - **Wooldridge, Ch. 2
- B. Statistical Inference and Testing (October 1-8)
 - **Gujarati, Chs. 4-5, plus Appendices to these chapters
 - **Kmenta, Ch. 7.4

C. An Example (covered on homework questions)

- "The Capital Asset Pricing Model: An Application of Bivariate Regression Analysis," Ch. 2 in Berndt.

III. Multiple Regression Analysis

A. Review of Matrix Algebra (used throughout, not covered explicitly)

--Appendix A

**Gujarati, Appendices B and C

**Greene, Appendix A; Kmenta, Appendix B

**Wooldridge, Appendix D

B. Basic Ideas and Estimation (October 8-13)

--Ch. 5

**Gujarati, Ch. 7 and its appendix

**Wooldridge, Ch. 3 and Appendix E

**Johnston, pp. 168-181

**Greene, Chs. 2-3; Kmenta, pp. 392-99, 402-03

C. Statistical Inference and Testing -- the Importance of Normality (October 13-15)

-- Ch. 6

--"The Bankruptcy of Statistical Significance," Eastern Economic Journal, Summer 1992

**Gujarati, Ch. 8

**Wooldridge, Ch. 4 and 5

**Johnston, pp. 181-200

**Kmenta, pp. 403-22, 426-30

**Greene, Ch. 4-5

D. Examples (homework)

-- "The Measurement of Quality Change: Constructing an Hedonic Price Index for Computers Using Multiple Regression Analysis," Ch. 4 in Berndt.

IV. Extensions of the Model

A. Functional Form (October 15-20)

--p. 175, pp. 193-98

**Gujarati, pp. 175-83, 226-29

**Wooldridge, Ch. 6

**Greene, pp. 112-20

B. Dummy Variables (October 20-22)

1. Theory

--Judge, Ch. 10, pp. 420-435

**Gujarati, Ch. 9 and its Appendix

**Wooldridge, Ch. 7

**Greene, pp. 106-112 and 120-28; Kmenta, Ch. 11.1

2. Examples (homeworks)

--"Does Sex Still Matter? New Evidence From the 1980's," Economic Inquiry, January 1988

--"Pay and Performance in Major League Baseball: The Case of the First Family of Free Agents," Journal of Human Resources, Summer 1982.

**"Analyzing Determinants of Wages and Measuring Wage Discrimination: Dummy Variables in Regression Models," Ch. 5 in Berndt.

C. Detection of Influential Outliers (October 22-27)

--pp. 892-97

** Kmenta, pp. 422-26

**Wooldridge, pp. 325-29

---Midterm Exam on November 5th from 9 am to noon---

V. Problems Encountered in Estimation/Violations of the Classical Assumptions

--"Household Responses to Pricing Garbage by the Bag," American Economic Review,
September 1996

A. Multicollinearity (October 27-29)

--Ch. 21, except pp. 865-867

**Gujarati, Ch. 10

**Greene, pp. 59-61; Kmenta, Ch. 10.3

**Wooldridge, pp. 95-102

B. Non-normality of Disturbance (November 3)

--pp. 887-892

**Greene, pp. 92-96; Kmenta, pp. 260-267

C. Nonzero Mean of Disturbance (November 3)

**Kmenta, pp. 267-269

D. Nonscalar Covariance Matrix (November 3– 10)

--Ch. 8, 9 (pp. 351-56)

--Ch. 13, pp. 358-70

**Greene, pp. 148-58; Kmenta, Ch. 12.1

1. Heteroskedasticity (November 12-17)

--pp. 356-383

--"The Effects of Firm Size on Profit Rates in U.S Manufacturing," Southern Economic Journal,
July 1985

**Gujarati, Ch. 11 and its appendix

**Wooldridge, Ch. 8

**Greene, pp.158-75; Kmenta, Ch. 8.2, pp. 366-373

2. Correlated Errors (November 17-19/24)

-- pp. 384-414

--"Economic Performance and The Determination of Presidential Elections in the U.S.,"
American Economist, Fall 1988

**Gujarati, Ch. 12

**Greene, Ch. 19; Kmenta, Ch. 8.3

**Wooldridge, Chs. 10 -12

--An extra class meeting is tentatively scheduled for November 20th from 10 am to noon---

E. Model Specification Error and Choice (November 19/24-December 3)

--pp. 235-240, 838-46, 850-52

**Gujarati, Ch. 13

**Wooldridge, Ch. 9

**Kmenta, Chs. 10.4, 11.10

**Greene, Ch. 7

F. Stochastic Explanatory Variables (December 3-10)

--Ch. 13

**Gujarati, Ch. 13, pp. 467-72, pp. 601-612

**Kmenta, Chs. 8.4, 9.1

**Greene, pp. 49-50, and Ch. 12 (pp. 314-333)

VI. A Brief Overview of (Other) Areas for Future Study (December 10)

A. Simultaneous Equations Models

--Chs. 14 and 15(skim!!!)

--"Health Scare', Excise Taxes and Advertising Ban in the Cigarette Demand and Supply," Southern Economic Journal, October 1985.

**Gujarati, Chs. 18-20

**Berndt, Chs. 8-10; Kmenta Chs. 13.1-13.3, Greene, Chs. 12 (pp. 318-21) and 13

B. Pooling Time Series and Cross-sectional Data

**pp.468-490

**Gujarati, Ch. 16

**Kmenta, Ch. 12.2, Greene, Ch. 9

C. Limited Dependent Variables

**Ch. 19

**Gujarati, Ch. 15

**Berndt, Ch. 11; Kmenta, Chs. 11.5-11.6, Greene Ch. 23

-----**FINAL EXAM ON WEDNESDAY, DECEMBER 16TH AT 10 AM – 1 PM**-----