Econometrics   Professor Mark Kazarosian
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Autumn 1999   Office Hours: Tues., 3:00-4:30
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Econometrics

This is a course in the theory and application of regression analysis--a sequel to your statistics course. As in statistics, we will concentrate on problems of <u>estimation</u> and <u>hypothesis testing</u>. Unlike statistics, the primary focus is <u>not </u>on means of distributions, but rather on something much more interesting--relationships between variables. Most social science is about relationships between variables, and we will develop some statistical techniques to estimate the direction and magnitude of these relationships, and test hypothesis about them.

We will first address these topics with a number of simplifying assumptions, and discuss some very nice statistical properties of the estimators we develop--unbiasedness and efficiency (minimum variance.) We will then ask what happens to these properties when the simplifying assumptions do not hold, and ask whether these properties can be revived by adjustments to the estimating technique.

My approach to teaching undergraduate econometrics is based on learning by doing. The text reflects my belief that both an intuitive understanding of the theory, and hands on training are important to develop an understanding and appreciation of econometrics as a powerful, marketable, and fun tool to use. You will learn how an uncountable number of interesting (and even uninteresting) questions can be explored with the use of econometrics.

Learning econometrics requires developing and implementing many skills simultaneously. These skills are math, statistics, economic theory, computer, writing, and common sense. Please be prepared for an exhilarating and rigorous experience. We will cover Chapters 1 through 11 of the text. Those of you who feel a bit rusty on your algebra and basic differential calculus should brush up starting <u>now</u>. I have put a few books on reserve for your math reference.

Regression analysis (econometrics) is done by computer programs. I strongly recommend using STATA for the course, yet feel free to use any one with which you are comfortable for the research paper. ECSTAT is included with the text, but it is NOT GOOD. Student versions of STATA for both Windows platforms and Real Computers (Apples) are available at the computer center. Students wishing to purchase their own copy of Small Stata for Macintosh OR Windows may do so for $55.00 via the Stata Grad Plan (manuals, beyond the 150-page 'getting started' manual, at extra cost). I will provide brochures/order forms; students do the ordering themselves and are then notified when their materials are ready for pickup from Kathy Tubman's office. Typically if orders are faxed in, they are ready for pickup two business days hence.

<u>Text</u>:

>   <u>Using Econometrics--A Practical Guide</u>, by A.H. Studenmund, Addison Wesley Publishing Company. The text is available at the BC Bookstore.

<u>Supplementary Readings</u>:

>   Any major newspaper. Suggestions: Boston Globe, New York Times, Wall Street Journal. There will also be several journal articles assigned during the semester.

Course Requirements:

The requirements for the course (and approximate grade weights) are:

       Midterm Thursday Oct. 21, --20%
       Class Participation and Problem Sets--15%
       Final Exam--Exam Week--35%
       A significant research paper (details below)--30%

If school happens to be canceled (e.g. snow day) on the day of a scheduled exam, the exam will be given the next class meeting. <u>There are no make up exams</u>. If there is an excused absence from an exam, i.e. documentation from the dean, the following or previous exam will be weighted more heavily.

Academic Integrity:

I expect all students to do only their own work on exams, and to make a serious individual effort on the problem sets and research paper. We will discuss collaboration on the problem sets and paper in class.

Research Paper:

One very important component of this course is a significant research paper, done in groups of four students. This will be a practical application of econometrics to test some hypothesis that your group finds interesting. The topic is up to the group and can come from economics or from any other discipline.

Timetable:

Students usually find this research paper to be one of the most rewarding and useful parts of the course. Students also find it one of the most time consuming. Below is a timetable designed to spread this work over the semester. A draft of the paper is due before the end of the semester (Tuesday, Nov. 23, 5:00) allowing some time for some quick extensions and revisions.

September 2:   Opening Day

           -1 1/2 weeks-

September 14 Submit the names of the students in your group.

           -1 week-

September 21 Submit a brief description (abstract) of your group's topic (1 page)

           -3 weeks-

October 12   Submit the first progress report (1-3 pages) (Complete ideas, considerable research completed)

           -3 weeks-   (Reminder: Midterm October 21)

November 2   Submit the second progress report (2-4 pages) (Substantial content--data analysis)
           -4 weeks-

November 23 First draft of the paper due
           -2 weeks-

December 7   Final draft of the paper due (<u>2 copies</u>, please)

Here is a possible outline for the research paper:

I.   Introduction

       -What are the hypothesis being tested?
       -Why are they interesting?
       -What does theory (economic? other?) predict about the relationships being tested?
       -What are your methods? (Briefly)
       -What are your results? (Briefly)

II.   Brief Literature Review

       -What other work has been done on these issues?
       -What has been found?
       -How does your paper differ from the others?

III.   Data

       -What data would you like to have?
       -What data have you been able to obtain?
       -What special data problems did you encounter?

IV.   Empirical Work

       -Regression Analysis
       -Interpretation of the results

V.   Conclusions and Summary

       -What have you learned
       -What are the policy implications?
       -Are there suggestions for future research?

Topic:

The topic of the paper is up to the group, although you should clear it with me. Pick an area where data are readily available, and avoid topics requiring new surveys (although this has been done) or involving simultaneous equations (for example supply and demand.) Experience shows that cross-sectional studies work better than time-series for this assignment, although the later has been done. The Census volumes, for example provide excellent and abundant data on U.S. states and cities. Topics from previous years include:

-State by state variations in divorce rates   -Voter behavior

-Crime rates in U.S. cities   -Wage, earnings or poverty differentials by state

-The determinants of teen-age pregnancies by state

-State by state alcohol consumption   -Baseball attendance across cities

-Salary determination in major league sports

-The determinants of annual strike activity in the U.S.

-Sate by state variations in suicide rates   - Sate by state variations in traffic fatalities

- Sate by state variations in fertility rates   -Voter turnout in Presidential election years

<div align="center"><u>**Course Outline**</u>:</div>

<u>**Part I**</u>   <u>**The Basic Regression Model**</u>

1.   <u>Introduction</u>--<u>An overview of Regression Analysis</u>   (Chapter 1)

The big picture, What is econometrics and regression analysis, The setting, Examples.

2.   <u>Ordinary Least Squares</u>   (Chapters 1, 2)

Single independent models, Multivariate regression, Evaluating quality of the equation.

3.   <u>Learning to Use Regression Analysis</u>   (Chapter 3)

Steps in applied regression analysis, An example with restaurant data.

4.   <u>The Classical Model</u>   (Chapter 4)

The classical assumptions, normally distributed error, sampling distributions of beta hat, Gauss-Markov Theorem, Properties of OLS estimators.

5.   <u>Basic Statistics and Hypothesis Testing</u>   (Chapter 5)

Statistical Inference, Hypothesis testing, The t-test, The F-test.

<u>**Part II**</u>   <u>**Violations of the Classical Assumptions**</u>

6.   <u>Specification: Choosing the Independent Variables</u>   (Chapter 6)

Omitted variables, Irrelevant variables, Examples

7.   <u>Specification: Choosing a Functional Form</u>   (Chapter 7)

Interpretation of the constant term, Alternative functional forms, Intercept and slope dummy variables, Examples.

8.   <u>Multicollinearity</u>   (Chapter 8)

Perfect vs. imperfect, Consequences, Detection, Remedies, Examples.

9.   <u>Serial Correlation</u>   (Chapter 9)

Pure v. impure, Consequences, Durbin-Watson, Generalized Least Squares.

10.   <u>Heteroskedasticity</u>   (Chapter 10)

Perfect vs. imperfect, Consequences, Detection, Remedies, Examples.

11.   <u>A Regression User's Handbook</u>   (Chapter 11)

Checklist, User's guide, Projects, Data, Ethics, Examples.