

Econometrics I

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Hours: Monday 10:30-noon, Wednesday 1:30-3:00, and by appointment

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1 Objective

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, principle of maximum likelihood estimation, imposition and testing of exact linear parameter restrictions, testing nonnested hypotheses, testing of nonlinear hypotheses, detection of structural change, an introduction to the general linear regression model, and feasible GLS estimation of autocorrelated and seemingly unrelated regression models.

2 Recommended Textbooks

Johnston, Jack and John DiNardo. *Econometric Methods*, 4th edition. McGraw-Hill, 1997.

Judge, Hill, Griffiths, Lutkepohl, Lee, *Introduction to the Theory and Practice of Econometrics*, John Wiley & Sons, 1988.

Kennedy, Peter, *A Guide to Econometrics* 4th edition, MIT Press.

Greene, William H., *Econometric Analysis*, 4th edition, Prentice Hall, 2000.

A Companion to Theoretical Econometrics, edited by Badi Baltagi.
Blackwell Publishers, 2001.

Other Resources

SAS/IML User's Guide, Version 6

SAS/IML Software: Changes and Enhancements through Release 6.11

SAS/ETS User's Guide, Version 6, Second Edition

Fomby, Hill, and Johnson, *Advanced Econometric Methods*, Springer Verlag, 1984. Second Printing, 1988.

Jan Kmenta, *The Elements of Econometrics*.

Judge et al., *The Theory and Practice of Econometrics*, 2nd Edition, Wiley, 1985.

Schmidt, Peter, *Econometrics*, Marcel Dekker, 1976.

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. I suggest that you read through Appendix B (statistics) and Appendix A (matrix algebra) *Econometric Methods* to refresh your memory. If you have any doubts about whether your experience is sufficient, please talk to me about it.

4 Course Outline

1. Introduction
2. Probability Review (Chapter 1, Johnston)
3. Statistical Inference: Estimation and Hypothesis Testing (Chapters 1-3 Johnston)
4. Classical Linear Regression Model (Chapters 1, 2, 3 Johnston & 4, Kennedy)
 - (a) Assumptions

- (b) Estimators
 - i. MOM
 - ii. OLS estimator
 - iii. Maximum likelihood Estimator
 - iv. Using OLS when Gauss–Markov assumptions are violated
- 5. Using Prior Information in Regression (Chapter 12, Kennedy)
 - (a) Restricted Least Squares (Section 6.2, ITPE II and Section 7.3, Greene)
 - (b) Biased Estimators and Pretests
- 6. Wrong Regressors, Nonlinearities, and Parameter Inconstancy (Chapter 4, Johnston and Chapter 6, Kennedy)
 - (a) Parameter Constancy
 - (b) Tests of Structural Change
 - (c) Testing Nonlinear Restrictions (Section 7.9, Greene)
 - (d) Nonnested Hypothesis Tests (Section 8.5, Johnston and Section 7.10, Greene)
- 7. Dummy Variables (Section 4.6, Johnston)
- 8. ML, GLS, and IV Estimators (Chapter 5, Johnston)
- 9. General Linear Regression Model (Chapter 6, Johnston)
 - (a) Consequences for Least Squares
 - (b) Efficient Estimation: GLS
 - (c) Estimation when Ω unknown
 - (d) Heteroscedasticity
 - (e) FGLS estimation: Autocorrelation
 - (f) FGLS estimation: Seemingly Unrelated Regression (Appendix 9.1, Johnston)
 - (g) Systems of Simultaneous Equations (Chapter 9,4-9.6, Johnston)
- 10. Generalized Method of Moments Estimation (Chapter 10, Johnston)

5 Econometrics II

Econometrics II will be offered in the Spring of 2002. The course will pick up where this one leaves off. The tentative outline is:

1. Stationary and Nonstationary Time Series (Section 2.5 Johnston)
2. Univariate Time Series Modeling (Chapter 7 Johnston)
3. Autoregressive Distributed Lags (Chapter 8 Johnston)
4. VARs and Error Correction Models (Sections 9.1-9.3 Johnston, Appendix 9.2 Johnston)
5. Computationally Intensive Methods: Monte Carlo, Bootstrap, Nonparametric Density Estimation and Nonparametric Regression (Chapter 11 Johnston)
6. Nonlinear Estimation: Estimators and Algorithms
7. Introduction to Panel Data (Chapter 12 Johnston)
8. Introduction to Discrete and Limited Dependent Variable Models (Chapter 13 Johnston)

6 Computer Assignments

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 SAS system. SAS can be used on either the mainframe computer or on a personal computer (PC). The specific SAS modules that we will be working with are IML (Interactive Matrix Language) and ETS. IML is a high level programming language that uses a syntax very similar to the matrix algebra notation commonly used in econometrics. Learning IML will improve your understanding of econometrics and give you more power to solve econometric problems you encounter. I will show you some of the basics on how to use this specific module.

GAUSS is a mathematical programming language that is similar to SAS IML. In fact GAUSS is superior to IML in many respects. EViews and SHAZAM are other software packages that contain preprogrammed regression routines. Although I will not require you to learn either of these software packages, I want you to feel free to experiment with them. Both are very powerful in their respective specialties and can be used to check many of the results obtained in your IML programs.

I will assign a number of homeworks during the course, I want you to turn them in in sets at the times I designate in class.

7 Grades

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

Grade Weights

Exam 1	25%
Exam 2	25%
Exam 3	25%
Homework	25%

Grades will be assigned based on the following scale.

Grades

90%–100%	A
76%–90%	B
60%–75%	C
50%–60%	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.

8 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.

9 Cheating Policy

Cheating will not be tolerated. Any violation of the University's academic dishonesty policy will be prosecuted according to University regulations. You

will receive a grade of 0 on any test or assignment on which you are caught cheating. In addition, 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).