AAE636: Applied Econometric Analysis I
Fall 2009 Course Outline/Syllabus

Instructor:
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Class Time/Place: T, Th 9:30-10:45 B30 Taylor Hall
Office Hours: [T, W, Th 11AM-2PM], [by appt.]
Class WEB-Site: aae.wisc.edu/aae636

Required Textbook:

Stiegert, Kyle W. 2009, AAE636 Course Notes. Bob’s Copy Shop

Supporting Textbooks

Course Pre-Requisites: Students should have a minimum of one semester of derivative calculus, one junior-level (intermediate) undergraduate course in statistics, and one junior-level (intermediate) undergraduate course in microeconomics. This course will be fairly computer intensive using STATA econometrics software. Students are assumed to be proficient in the basics of EXCEL. Advanced undergraduate students with an interest in graduate studies are encouraged to take this course.

Course Objectives: This course provides an intensive introduction to methodologies for analyzing economic problems using quantitative methods. There will be an emphasis on linking microeconomic theory to estimation techniques, and interpreting the results of various quantitative exercises. At the end of this course, students should have become proficient in developing and interpreting linear multiple regression models as applied to a variety of economic problems and data. Additional emphasis is placed on procedures for dealing with economic data, developing a research proposal, and in developing critical thinking skills useful in applied economic analysis.
Grading

Final course grades will be determined using the following weights:

Course Evaluation
   25% - Homework Assignments
   25% - Midterm
   30% - Final Exam
   20% - Research Project

The research project grade is determined using the following rubric:
(10 points) Proposal - due on the Friday of the 10th semester week. A proposal should define and motivate the topic, provide the start of a short literature review, describe the model and plan for collecting the data. If you have the data, then present and discuss these data using graphs and tables.
(10 points) Introduction and motives for the research.
(10 points) Integration of the literature review into the paper.
(20 points) Model and pretests.
(20 points) Results and inference.
(10 points) Conclusions
(10 points) Grammar, writing quality.
(10 points) Extra Credit for noted excellence in any of the above areas.

You should get started with your project. Think about a researchable problem, talk to your advisor(s), talk to fellow students, and read about public policy issues. If you can identify a topic, then review the literature using econlit or other search engines. Oftentimes, updating an older study or borrowing a model from a very similar study represents good strategies for writing your first paper in graduate school. Improving a project you worked on previously is also a good strategy. It is important you work on something that you either a) know something about or b) are willing to invest substantial time to learn about. Once you have a topic and a model, see if there are data to test your hypotheses. I will be available after every class to talk about your projects.

Note: students are required to review and become familiar with the materials at the Plagiarism.org Learning Center. A turnitin.com document, available at our website, contains similar information.

Course Outline
1 Regression Analysis
   1.1 What is Econometrics?
   1.2 Economic Models/Relationships/Expressions
   1.3 Statistical Model
   1.4 The Meaning Of Linearity
   1.5 Data Types/Issues
   1.6 8-Step Approach to Economic Analysis
   1.7 Two-Variable Regression

2 MATH and STATS Primer
   2.1 Introduction
2.2 Random Variables
2.3 Characteristics of Probability Distributions
2.4 Probability Distributions
2.5 Statistical Inference: Estimation
2.6 Inference: Hypothesis Testing

3 Two-Variable Regression Model
3.1 Ordinary Least Squares
3.2 The OLS Model: Assumptions
3.3 Standard Errors of Least-Squares Estimators
3.4 Properties of Least-Square Estimators
3.5 $R^2$: A Measure of Goodness of Fit

4 Matrices
4.1 Introduction
4.2 Vectors
4.3 Column Form of a Matrix
4.4 Equality of Matrices
4.5 Matrix Addition
4.6 Matrix Subtraction
4.7 Scalar Multiplication
4.8 Matrix Multiplication
4.9 Multiplication of Vectors
4.10 Other Concepts
4.11 Transposition of Matrices
4.12 Symmetric Matrix
4.13 Quadratic Form
4.14 Matrix Inverse
4.15 Linear Dependence and Rank
4.16 Calculus and Matrices
4.17 RV’s and Var-Cov Matrices
4.18 Multivariate Normal Distribution

5 The Multiple Regression Model
5.1 The Setup
5.2 Model Assumptions
5.3 Least Squares Estimation
5.4 Expected Value and Var-Cov Matrix
5.5 Hypothesis Tests for Individual Parameters
5.6 Confidence Intervals
5.7 The $R^2$ measure
5.8 The Adjusted $R^2$ Measure

6 Restrictions and Tests
6.1 Introduction
6.2 General Linear Hypothesis
6.3 Single Linear Hypothesis
6.4 Linear Restrictions
6.5 Testing $H0: \beta_2 = \beta_3 = \ldots = \beta_k = 0$
6.6 Added Variable Test
6.7 The “Chow Test"
6.8 Units of Measurement
6.9 Prediction (Forecasting)

7 Dummy Variables
   7.1 Examples of Model Variations
   7.2 Multi-Classification and Interaction Terms
   7.3 Varying Parameters on Independent Variables
   7.4 Varying Intercept and Parameters
   7.5 A Chow-type Test
   7.6 Piecewise Regression Model

8 Multicollinearity
   8.1 Consequence of Multicollinearity
   8.2 Detecting Multicollinearity
   8.3 Dealing with Multicollinearity
   8.4 Omitted Variables Bias

9 Generalized Least Squares
   9.1 Decomposition of $\Omega$
   9.2 The GLS Estimator of the $\beta$ vector
   9.3 Hypothesis Tests under GLS Estimation
   9.4 General Linear Hypotheses Under GLS Estimation
   9.5 $R^2$ Measure Under GLS Estimation
   9.6 A Simple Example of GLS

10 Heteroscedasticity
    10.1 Introduction
    10.2 An Intuitive View
    10.3 Detection of Heteroscedasticity
    10.4 “Exact” GLS Estimation
    10.5 “FGLS” Estimation Under Heteroscedasticity
    10.6 Other Remedial Measures

11 Autocorrelation
    11.1 Introduction
    11.2 First Order Autocorrelation
    11.3 OLS Estimators under Autocorrelation
    11.4 Testing for First-Order Autocorrelation
    11.5 “Exact” GLS Estimation Under First-Order Autocorrelation
    11.6 “FGLS” Under First-Order Autocorrelation
    11.7 Distribution Form of $\beta$

12 Model Specification Issues
    12.1 Introduction
    12.2 Omitted Variable Bias
    12.3 Errors in Variables
    12.4 Detecting Model Mispecification
    12.5 Selecting Models

Bibliography


Turnitin.com and Research Resources. “Preventing Plagiarism: Resources for Educators”