AAE636: Applied Econometric Analysis I
Fall 2010 Course Outline/Syllabus

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

Required Textbook:


Stiegert, Kyle W. 2010. 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:

(15 points) Introduction and motives for the research.
(15 points) Integration of the literature review into the paper.
(20 points) Model and pretests.
(20 points) Results and inference.
(15 points) Conclusions
(15 points) Grammar, writing quality.

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. A good project to develop would be on a) something you already know about and/or b) something you could be 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. Plagiarism is a serious issue, which has become more prevalent in the internet age. Your research paper should contain proper citations and all text, unless in quotes, should be your own.

Course Outline [Woolridge chapters or pages]

1 **Regression Analysis [ch 1]**
   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 [appendixes A, B, C]**
   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 [ch 2]
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 [appendix D]
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 [chs 3, 4]
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 [ch 4]
6.1 Introduction
6.2 General Linear Hypothesis
6.3 Single Linear Hypothesis
6.4 Linear Restrictions
6.5 Testing \( H_0 : \beta_2 = \beta_3 = \ldots = \beta_k = 0 \)
6.6 Added Variable Test
6.7 The “Chow Test"
6.8 Units of Measurement
6.9 Prediction (Forecasting)
7 Dummy Variables [ch 7]
   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 [ch 8]
   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 [selected parts from chs 10, 11, 12]
   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 [chs 6, 9]
   12.1 Introduction
   12.2 Omitted Variable Bias
   12.3 Errors in Variables
   12.4 Detecting Model Mispecification
   12.5 Selecting Models

13 (not in notes packet)
   Woolridge, chapters 13, 14: panel data methods.

14 (not in notes packet)
   Woolridge, chapters 15, 16: IV and simultaneous equations models.
Bibliography


Turnitin.com and Research Resources. “Preventing Plagiarism: Resources for Educators”
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Research Project:
___________/ (15 points) Introduction and motives for the research.
___________/ (15 points) Integration of the literature review into the paper.
___________/ (20 points) Model and pretests.
___________/ (20 points) Results and inference.
___________/ (15 points) Conclusions
___________/ (15 points) Grammar, writing quality.

_________ % Final Grade

Comments: