Course Syllabus

Eco 5350.001
Introductory Econometrics
Spring 2010
TTh 2:00 – 3:20 PM
303 Umphrey Lee Bldg

Purposes of Course:

There are four major purposes of this course. The student will demonstrate understanding of:

1. The **Classical Linear Regression Model**, its maintained assumptions and optimal properties. This model is by far the most frequently used by economists to analyze economic data.
2. How to apply the Classical Linear Regression Model to economic data for the purposes of **hypothesis testing** and **prediction**.
3. How to determine, vis-à-vis **diagnostic statistics**, when the **maintained assumptions** of the Classical Linear Regression Model are violated and how to address the violations so that **correct statistical inferences** can be drawn.
4. The details of some **statistical computer programs** frequently used by economists to analyze economic data.

Evaluation of the Student:

There will be **one mid-term exam**, a **final exam** (comprehensive), some **quick quizzes** (QQs), and **homework assignments**. The QQs will be 5-10 minute quizzes given on occasion based on material covered in the previous lecture and assigned readings. The weights of each of these items are as follows: mid-term exam (30%), QQs (20%), homework assignments (20%), and the final exam (30%). The lowest QQ score and lowest homework score will be dropped from the calculation of the grade average. You must obtain a doctor's letter if you are to be excused from any exams, QQs, or homework assignments.

As it concerns the homework assignments, I don't mind if you consult with your classmates on assignments you are uncertain about or if you seek the help of others as it regards computer usage and the interpretation of computer output. What I will not accept, however, are carbon copy homework answers. You have to write your own homework results up. You should view the homework assignments as preparing you for your mid-term and final exams and helping you get acclimated to the computer. Always, if you need any help in this course, do not hesitate to see my research assistant or me. Homework handed in late will automatically be reduced in grade by 10% before grading commences. If homework is more than one week late, a grade of zero (0) will be assigned.
Recommended Textbook:

Office: Room 301M, Umphrey Lee Bldg., 214-768-2559

Office Hours: Tuesday and Thursday, 3:30 – 5:00 PM or by appointment

E-mail: tfomby@smu.edu

Class Website: http://faculty.smu.edu/tfomby

Teaching Assistant: Zhihong Dong - her e-mail address is zdong@smu.edu

Important Dates to Remember:

First Day of Class: Tuesday, January 18

Spring Break: March 12 – 20, Saturday - Sunday

Last Day to Drop a Class: Wednesday, April 6

University Holiday – Good Friday: April 22

Last Day of Instruction in this class: Thursday, April 28

Final Exam Date: Friday, May 6, 8:00 AM – 11:00 AM in Room 303 Lee

* Disability Accommodations: Students needing academic accommodations for a disability must first contact Ms. Rebecca Marin, Coordinator, Services for Students with Disabilities (214-768-4557) to verify the disability and establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4.)

* Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester,
and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

* **Excused Absences for University Extracurricular Activities**: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

**Grading Scale:**

My grading scale in this course is as follows:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>92-100</td>
<td>A</td>
</tr>
<tr>
<td>90-91</td>
<td>A-</td>
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<tr>
<td>60-61</td>
<td>D-</td>
</tr>
<tr>
<td>0-59</td>
<td>F</td>
</tr>
</tbody>
</table>

**TOPICS**

**Introduction**

I. An Introduction to Econometrics
   A. Why Study Econometrics?
   B. What is Econometrics?
   C. Some Examples
      i. County Tax Assessor and House Prices
      ii. Starting Salaries following Law School
      iii. How Efficient is the Stock Market?
   D. The Webpage for the Course
   E. Publisher’s Website for data used in your Textbook: [http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470626739&bcsId=6211](http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470626739&bcsId=6211)
Then click on “Data Files” and you will see the data resources that are available.

Reference: Chapter 1, PE.

Review of Computer Programs: SAS, EVIEWS, STATA

II. A Brief Introduction to SAS (Statistical Analysis System)
   A. The Layout of a Typical SAS Program
      i. The Data Step
      ii. The Procedure Step
   B. Execution of a SAS Program
      i. Program File
      ii. Log File
      iii. Listing File
   C. SAS INSIGHT
      i. Data Layout
      ii. Data Utilities
   D. SAS Help File

Reference: Classroom Lecture

III. A Brief Introduction to EVIEWS (Econometric Views)
   A. Importing Data to EVIEWS
   B. Executing Simple Procedures
      i. Showing Data
      ii. Graphing Data
      iii. Estimating a Multiple Regression Equation by Ordinary Least Squares
      iv. “Views” of the Regression Equation
   C. Printing Output and Graphs

Reference: Classroom Lecture

IV. A Brief Introduction to STATA
   A. Working with the Example Data Sets
   B. Executing Simple Procedures
      i. Showing Data
      ii. Graphing Data
      iii. Estimating a Multiple Regression Equation by Ordinary Least Squares
      iv. “Views” of the Regression Equation
   C. Printing Output and Graphs

Reference: Classroom Lecture
Brief Review of Basic Statistics

V. Review of Some Basic Statistical Concepts
The Problem of Test of Equal Means of Two Normal Distributions
A. Sampling Distribution of Test Statistic under the Null Hypothesis
B. One or Two-sided Alternative?
C. Concept of Acceptance and Critical Regions of Test
D. The P-value of a Test

References: Appendix C of PE and Classroom Lecture

Review of Data Types

VI. Basic Data Types Used in Econometrics
A. Cross-Section Data
B. Time-Series Data
C. Pooled Cross-Section and Time-Series Data
   i. Varying Cross-Sections
   ii. Panel Data

Reference: Classroom Lecture

Regression Analysis with Cross-Sectional Data

VII. The Simple (Bivariate) Linear Regression Model – Point Estimation
A. Assumptions of the Classical Normal Linear Regression Model
B. Population Regression Function vs. Sample Regression Function
C. The Method of Ordinary Least Squares
D. The Ordinary Least Squares Estimators of $\beta_1$ and $\beta_2$
E. Sampling Distributions of $b_1$ and $b_2$ without assuming normality of errors
F. Sampling Distributions of $b_1$ and $b_2$ with normality of errors
G. Estimation of $\sigma^2$: $\hat{\sigma}^2$
H. Relationship between LS Slope Coefficient and Sample Correlation Coefficient
I. Consistency of $b_1$ and $b_2$
J. The Gauss-Markov Theorem (BLU)
K. The Rao-Blackwell Theorem (MVU)

Reference: Chapters 2 in PE

VIII. The Simple Linear Regression Model – Hypothesis Testing and Confidence Intervals
A. Partitioning the Total Sum of Squares
B. The ANOVA Table
C. The F-test of Overall Significance
D. Tests of Individual Coefficients
E. Confidence Intervals for Coefficients
F. Tests of Linear Combinations of Coefficients
G. Least Squares Prediction
H. Confidence Intervals for Prediction
I. Applications

References: Chapters 3 and 4 in PE

IX. Multiple Regression Analysis
A. A Matrix Algebra Presentation of the Multiple Regression Model
B. The ANOVA Table
C. The Overall F-Test
D. The Subset F-Test
E. Multicollinearity and its Consequences
F. Model Specification: Consequences of Omitted Variables and Irrelevant Variables
G. Measures of Goodness of Fit: $R^2$, $\bar{R}^2$, AIC, SBC
H. Sticky Wicket 1: Choice of Functional Form for Regression
I. Sticky Wicket 2: Detection and Treatment of Outliers
J. Sticky Wicket 3: Distortion of P-values Arising from Multiple Comparisons

References: Chapters 5 and 6 in PE and Classroom Lectures

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**MIDTERM EXAM**
**Approximately Thursday, March 10**

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X. Multiple Regression Analysis with Qualitative (Dummy) Explanatory Variables
A. Some Uses of Dummy Variables
B. Dummy Variable Trap and Reference Group
C. Chow Test for Structural Difference in Regression Equations

References: Chapter 7 in PE and Classroom Lectures

XI. Heteroskedasticity
A. Nature of Heteroskedasticity
B. Consequences of Heteroskedasticity
C. Tests for Heteroskedasticity
   i. White’s Test without Cross Product Terms
   ii. White’s Test with Cross Product Terms
D. Weighted Least Squares and Aitken’s Theorem
E. White's Heteroskedasticity Consistent (Robust) Standard Errors

References: Chapter 8 in PE and Classroom Lectures

**Regression Analysis with Time-Series Data**

XII. Regression Analysis with Time Series Data – No Cointegration Case
A. Spurious Regressions
B. Transformation of Variables to Stationary Form
   i. Checking the Autocorrelation Function
   ii. Dickey-Fuller Unit Root Tests
C. The ARDL Model
   i. Modeling the Autoregressive Part First
   ii. Modeling the Lagged Values of the Exogenous Variables Next
   iii. Lag to White Noise
   iv. Testing the Residuals for White Noise
   v. Heteroskedasticity and Autocorrelation Consistent (HAC) Standard Errors
   vi. Understanding the Steady State and Multipliers of the ARDL Model

References: Chapter 9, Chapter 12, Sections 1 – 3 in PE, and Classroom Lectures

XIII. Regression Analysis of Time Series Data – Cointegration Case
A. Cointegration and Error Correction (ECM) Model
   i. Testing for Cointegration
   ii. Estimating the ECM
   iii. Hypothesis Tests in the ECM
B. Applications
   i. The Prices of Organic vs. Non-organic Oranges
   ii. The Use of Futures Prices to Predict Future Spot Prices

References: Chapter 12, Sections 4 – 5 in PE and Classroom Lectures

XIV. Time Permitting – Brief Overview of Other Courses in Econometrics

**Tentative Dates of Lecture Topics Listed by Parts of Course Outline**

I. – IV. Jan. 18, 20
V. – VI. Jan. 25, 27
VII. Feb. 1, 3, 8
VIII. Feb. 10, 15, 17
IX. Feb. 22, 24, Mar. 1, 3

Review for Mid-Term Exam, Mar. 8

Mid-term Exam, Mar. 10

X. Mar. 22, 24

XI. Apr. 5, 7

XII. Apr. 12, 14, 19

XIII. – XIV. Apr. 21, 26, 28

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Final Exam

Friday, May 6, 8:00 AM – 11:00 AM in Room 303 Lee

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