ECO 6375-001 Professor T. Fomby
Econometrics III Fall 2008
MW 3:30 – 4:50 PM 303 Lee

COURSE OUTLINE

Purpose of Course:

This course is a continuation of ECO 6374 Econometric Methods II. It is a **survey course** on **some** of the **basic methodologies** used for statistical inference in economics. Emphasis will be placed on computer analysis of applications. This course is a pre-requisite for the 7000 level econometrics courses.

Evaluation of Student:

The student will be evaluated in three areas: (1) computer exercises, (2) a classroom presentation on an empirical economic topic, possibly reviewing the empirical work previously done in a frontier area of economics, and (3) an empirical term paper involving original research due at the end of the semester in lieu of a final exam. Each of these three areas will carry equal weight in the determination of a student's grade in the course. With respect to the computer exercises, students may consult with each other on the execution of the computer programs and the logic of the computer programs but each student is responsible for writing up his/her own answers to the exercises.

Recommended Textbook:

Econometric Methods with Applications in Business and Economics by Christiaan Heij, Paul de Boer, Philip Hans Franses, Teun Kloek, and Herman K. van Dijk (Oxford University Press, 2004), hereafter referred to as **EMABE**.

Office: Room 301M, Umphrey Lee, 214-768-2559.
Office Hours: Monday and Wednesday 1:00 – 2:30 PM or by appointment
E-mail: tfomby@smu.edu
Class Website: http://faculty.smu.edu/tfomby

Important Dates to Remember:

First Day of Class: Monday, Aug. 25

Labor Day Holiday: Monday, Sept. 1

Tuesday, Sept. 2: Follows Monday Class Schedule

Fall Break: Monday and Tuesday, Oct. 13 – 14

Thanksgiving Holiday: Thursday and Friday, Nov. 27 - 28

Last Day to Drop Classes: Wednesday, Nov. 5

Last Day of Instruction: Friday Dec. 5

Term Paper due in Lieu of Final Exam Date: Tuesday, Dec. 9 at noon.

* **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)

TOPICS

MLE and NUMERICAL OPTIMIZATION

I. Maximum Likelihood Estimation and Related Inference
  A. Example: The Classical Normal Linear Regression Model
  B. Theory of Estimation
    i. Regularity of Density
    ii. Consistency
    iii. Asymptotic Normality
    iv. Cramer-Rao Lower Bound and Best CUAN Estimators
    v. Invariance of ML Estimates
  C. Inference
    i. Wald Test
    ii. Lagrangian Multiplier Test
    iii. Likelihood Ratio Test
  D. Inference on Nonlinear Functions of Parameters – the Delta Method

References: 1.3 and 4.3 in **EMABE.**

II. Numerical Optimization Techniques
  A. Gradient Methods
    i. Method of Steepest Ascent
    ii. Newton-Raphson Method
    iii. Quasi-Newton Methods
  B. Method of Scoring
  C. Gauss-Newton Method
  D. Method of Berndt, Hall, Hall, and Hausman (BHHH)
  E. Problem of Local versus Global Optima
    i. Simulated Annealing
    ii. Genetic Algorithm
  F. Application: Logit Estimation:

References: 4.2.3 in **EMABE.**

Goffe, et. al. (1994), "Global Optimization of Statistical Functions with Simulated Annealing," Journal of Econometrics, 60, 65-99

Dorsey and Mayer (1995), "Genetic Algorithms for Estimation Problems with Multiple Optima, Nondifferentiability, and Other Irregular Features," Journal of Business &Economic Statistics, 13, 53-66.

NOMINAL, ORDINAL, DURATION, AND COUNT DEPENDENT VARIABLE MODELS

III. Special Dependent Variable Models and Some Applications
- A. Probit and Logit
- B. Multinomial Probit and Logit (both unordered and ordered)
- C. Duration Models
- D. Poisson Regression

References: 6.1, 6.2, and 6.3 in **EMABE** and lecture notes for Poisson Regression

MODELS FOR TIME SERIES DATA

IV. Linear Time Series Analysis and Its Applications
- A. ARMA Models
- B. Unit Root Tests
- C. Spurious Regression Models
- D. Time Series Regression

References: 7.1, 7.2, 7.3, 7.5 in **EMABE** and Classroom discussion

V. Cointegration Analysis
- A. Definition
- B. Single Equation Methods
- C. Granger Representation Theorem and the ECM
- D. Johansen Tests of Cointegration
- E. Hypothesis Testing in Cointegrated Systems

References: 7.6.3 in **EMABE** and Classroom discussion

VI. Volatility Models
- A. ARCH
- B. GARCH
- C. M-GARCH
- D. VaR analysis

References: 7.4.3 in **EMABE** and Classroom discussion.

TIME PERMITTING:

NONTRADITIONAL MODELS

VII. Copulas and Measures of Dependence
- A. Static Copulas
- B. Dynamic Copulas

Reference: Classroom lectures.

VIII. Quantile Regression Models
- A. Estimation
- B. Slope Equality Test
- C. Symmetric Quantiles Test

Reference: **EVIEWS** Manual, Chapter 31 and classroom lectures

IX. Spatial Regression
- A. Moran's I
- B. Spatial Lag Model
- C. Spatial Error Model
- D. Diagnostic Testing
- E. **GeoDa** Computer Program

Reference: **GeoDa** Manual and Classroom Lectures