Course Syllabus

Eco 6352
Applied Econometric Analysis
Spring 2015
Prof. Tom Fomby
MW 5:00 – 6:20 PM
251 Maguire

Purpose of Course: This course is a follow-up to the introductory econometrics course ECO 5350. (Eco 5350 is a prerequisite for this course or you may be allowed to take this class by instructor permission if you have had substantial training in statistics including regression analysis.) The major purpose of this course is to extend the student's econometric toolkit to Generalized Linear models (GLMs), Panel Data methods, and, time permitting, time series regression methods. Many of the examples used in the course will be taken from the fields of microeconometrics, macroeconometrics, and marketing research.

The student will learn the essentials of and demonstrate proficiency in

- The Maximum Likelihood Method including numerical optimization techniques and methods of statistical inference
- Quasi (Robust) Maximum Likelihood Estimation and Inference
- Generalized Linear Models including Logit/Probit models, Unordered and Ordered Multinomial Logit/Probit Models, Truncated and Censored Regression Models, Duration Models, and Count Models
- Static Panel Data Models including Fixed and Random Effects Models along with the Hausman Specification test
- Dynamic Panel Data Models
- Running SAS, EVIEWS, and R Computer programs


Computer Usage: We will be using three software packages, R, SAS, and EVIEWS in this course. The R package is what is called “freeware” or “shareware.” All one has to do is go to the website http://CRAN.R-project.org/ and download the “base” R package. For an introduction to the R language see chapters 1 and 2 of the Kleiber/Zeileis book. We will also be using the EVIEWS and SAS programs. The EVIEWS program is available on several PCs on campus, in particular in the computer lab in the economics department suite in Umphrey Lee Building (301W Lee). With respect to SAS (Statistical Analysis System) there are two major ways to access it for your homework problems and instruction in class. First, for students who do not have personal computers or laptops, you can access SAS in the computer labs on campus, and, in particular, in the economics department computer lab. Second, for students who own a laptop or personal computer, you can access SAS and other software programs through Access.SMU (SMU’s Virtual Computer Lab system). The delivery system to your computer is via Citrix Receiver. You can go to the website http://www.smu.edu/BusinessFinance/OIT/Services/AppsSMU and then look on the right of the page to find a link for instructions on how to install the Citrix Receiver to your PC or laptop. Before you can run SAS on your computer, you have to install Citrix Receiver on your machine. Citrix Receiver provides you with “virtual” access to the SAS software in that Citrix makes it appear that you have SAS installed on your own computer when, in fact, it is being accessed from an SMU server on campus. After you install the Citrix Receiver on your computer, you can then logon to the Citrix Receiver by entering your student ID and personal password. Once into Citrix Receiver, you can run any of the software packages that are available in Access.SMU.

Evaluation of Student:

The evaluation of the student consists of three parts:

- Quick Quizzes (30%)
- Exercises (30%)
- Term Paper (in lieu of final exam) involving an empirical study of your own choice in the social or marketing sciences using one of the techniques discussed in this course. The paper is to be turned in on Wednesday, April 29. (40%). An abstract of your proposed term paper should be handed in to me no later than the first class meeting after our spring break (Monday, March 16) so that I can make sure you have picked an acceptable and workable topic for your term paper. (You can talk with me earlier than this date if you want some early feedback on your paper.) In addition to turning in your term paper, I am going to require each student to give a 20 minute Power Point presentation on their term paper during the last two class meetings of the semester (Wednesday, April 29 and Monday, May 4). The grade on the Term paper grade will be based on the written part of the paper (67%) and on the presentation (33%). The Term paper is to be no longer than 25 pages including bibliography, tables, graphs, etc. It can be a replication of some published study or an original research topic of one’s own choosing. In the beginning of the paper there should be a solid discussion of the topic that is being analyzed and how the student is planning to analyze the topic.
Additional Information on QQs, Homework Exercises, and Term Paper:

The Quick Quizzes (QQs) will consist of a short answer and/or multiple-choice quiz that will be administered in the first five minutes of the class. The QQs are designed to see if you have retained the information of the previous lecture and if you have done any assigned readings that I may have asked you to do. In addition to keeping the students current in the class and providing review material for the mid-term and final exams, the QQs allow me to keep track of student attendance which I consider when writing recommendation letters for students. It is my policy to drop your lowest QQ score before calculating your QQ average.

With respect to homework exercises, students can confer with each other with respect to programming advice and discussion of basic ideas but in the final analysis each student is expected to write up his/her own homework answers and not make copies of others’ homework. Copying someone else’s homework to hand in as one’s own work is a violation of the SMU Honor Code and will be dealt with according to the rules of the SMU Honor Code. It is important to know that the homework assignments are very important in that the basic ideas covered by them invariably show up on the mid-term and final exams. If you know you are going to be missing a class on the day a homework exercise is due, hand in your homework in advance to receive full credit for your work. Any homework that is handed in late will be given a one letter grade reduction for each day of tardiness. It is my policy to drop your lowest exercise score before calculating your exercise average.

To assist the student in writing the term paper, the library has a wonderful resource for economics data related to previous research in the social sciences. See the link: http://www.icpsr.umich.edu/icpsrweb/landing.jsp
ICPSR maintains a data archive of more than 500,000 files of research in the social sciences. It hosts 16 specialized collections of data in education, aging, criminal justice, substance abuse, terrorism, and other fields. Ms. Julia Stewart (Julia@smu.edu) is the SMU Librarian in charge of economic resources. Also see the Central University Libraries’ economics resource guide at http://guides.smu.edu/economics.

If you must miss a class due to legitimate circumstances beyond your control, be sure and contact me beforehand so that I will know of your circumstances. If excused, I will correspondingly excuse you from any QQ that is given that day. I want to emphasize that diligent attendance in this course is essential because a lot of the course material presented in class will be from my personal class notes and can’t be found in any textbook per se. Note: After 4 unexcused class absences, I reserve the right to administratively drop students from the class.

My grading scale in this course is as follows:

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<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>92-100</td>
<td>A</td>
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<tr>
<td>90-91</td>
<td>A-</td>
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<tr>
<td>88-89</td>
<td>B+</td>
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<td>82-87</td>
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<td>78-79</td>
<td>C+</td>
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<tr>
<td>72-77</td>
<td>C</td>
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</tbody>
</table>
Classroom Website: http://faculty.smu.edu/tfomby/

Office: Room 301M, Umphrey Lee, 214-768-2559. E-mail address: tfomby@smu.edu.

Office Hours: 3:00-4:30 PM MW or by appointment.

My Graduate Teaching Assistant: Yixiang Zhang. His E-mail address is: yixiangz@smu.edu.
If you should need extra tutorials or help outside of my office hours, contact Mr. Zhang and he will be happy to go over concepts that you may not fully understand.

Important Dates to Remember:

First Day of Class: Wednesday, January 21
MLK Day: Monday, January 19 (No Class)
Spring Break: Monday – Sunday, March 9 – 15 (No Classes)
Last Day to Drop Classes: Wednesday, April 18
Last Day of Semester in this Class: Monday, May 4
Final Exam Date: Term Paper in lieu of Final Exam due Wednesday, April 29 in class. There will be no in-class final exam.

General comments on work and class etiquette:

In order to succeed in this class, constant work is essential. Come to class. Read all assigned readings, complete all exercises on time, and prepare for the Quick Quizzes. Don’t get behind. If there is something in class discussion or homework assignments that you don’t understand, don’t hesitate to ask me in class, after class, during office hours, or through e-mail.

Obviously, general rules of etiquette apply: cell phones are to be turned off during class and miscellaneous reading material stowed away.

Some Standard Stuff You Should Know

Excused Absences for University Extracurricular Activities:

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)
Disability Accommodations:

Disability Accommodations: Students needing academic accommodations for a disability must first contact Disability Accommodations & Success Strategies (DASS) at 214-768-1470 or www.smu.edu/alec/dass.asp to verify the disability and to 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:

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.)

Honor Code:

All SMU students are bound by the Honor Code (see SMU Student Handbook for a complete discussion of the SMU Honor Code). The code states that “any giving or receiving of aid on academic work submitted for evaluation, without the express consent of the instructor, or the toleration of such action shall constitute a breach of the Honor Code.” A violation can result in an “F” for the course and an Honor Code Violation on your transcript.
I. Introduction to R Software
   A. Brief History of R
   B. How to download “base” R software
   C. How to download AER package
   D. Run some simple R programs in Chapter 1 of Kleiber/Zeileis
   E. R Graphics
   F. Exploratory Data Analysis with R
   G. R Gui Interfaces: Which to use? Rcmdr or R-Studio?

Excerpt on point G from:
http://www.slideshare.net/leo0650/analyticsstudiovcmdr-120214171157phpapp02?next_slideshow=1

“Comparison and Guidelines• R-Studio is more flexible and powerful, and provides direct access to R code• Rcmdr is simpler and more user friendly, particularly when focusing on statistical diagnostics and analysis• Both are good for viewing data, neither is good for editing it• Use Rcmdr with structured, conventional data (rectangular, with variables in columns and cases in rows), whenever the task involves running statistical tests• Use R-studio for any project that requires direct interaction with code and/or manipulation of complex data• Note that you can invoke Rcmdr from within R-Studio and it will work fine on a single user installation; also note that when the user requests a plot in Rcmdr, it will NOT immediately appear in the plot window of R- Studio – this is a known bug that may be fixed in future versions” (Slide 9)
By Jeffrey Stanton, School of Information Studies, Syracuse University (on slideshare.net)

Reference: Chapters 1 and 2 in Keliber/Zeileis

II. A Brief Introduction to SAS
   A. APPS.SMU and Accessing Computer Programs on SMU’s Virtual Server – Downloading Citrix Receiver
   B. Introduction to SAS (SAS = Statistical Analysis System)
      i. Program Editor in SAS 9.4
      ii. Data Steps and Procedure Steps
      iii. Log and Listing Files
   C. Inputting Data
      i. Direct Input
      ii. Infile Statement

Reference: Class presentation

III. Maximum Likelihood Estimation and Testing
   A. Example: Classical Normal Linear Regression Model
   B. Properties of ML Estimators
      i. Consistency
      ii. Asymptotic Normality
iii. Asymptotic Efficiency
C. Three Test Methods: Likelihood Ratio, Wald, and LM tests

Reference: Classroom Presentation

IV. Quasi (Robust) Maximum Likelihood Estimation and Testing
A. Mean Function assumed to be correctly specified
B. Sandwich Variance-Covariance Matrix
C. Example: White’s Standard Errors
D. Example: Newey-West Standard Errors

Reference: Classroom Presentation

V. Numerical Methods for Maximum Likelihood Estimation
A. Analytic Solution – Example: Least Squares in Classical Normal Linear Regression Model
B. Non-analytic Solution – Example: Logistic Model
   i. Newton-Raphson method
   ii. Other methods
   iii. Global Concavity – guaranteed convergence

Reference: Class Presentation

V. Logit/Probit Models
A. Likelihood Function
B. Variance-Covariance Matrix
C. Interpretation of Coefficients
D. Model Selection
E. Applications/Target Marketing and Bond Ratings

References: Chapter 4 in Franses/Papp and Section 5.2 in Kleiber/Zeileis

VI. Unordered Multinomial Dependent Variable
A. Likelihood Function
B. Variance-Covariance Matrix
C. Interpretation of Coefficients
D. Model Selection
E. Application: Choice between 4 Brands of Yogurt

References: Chapter 5 in Franses/Papp and Section 5.5 in Kleiber/Zeileis

VII. Ordered Multinomial Dependent Variable
A. Likelihood Function
B. Variance-Covariance Matrix
C. Interpretation of Coefficients
D. Model Selection
E. Application: Community Reinvestment Act data – Jeff Gunther

References: Chapter 6 in Franses/Papp and Section 5.5 in Kleiber/Zeileis
VIII. Limited Dependent Variable Models
   A. Truncation versus Censoring
   B. Truncated Regression Model
   C. Censored Regression Model
   D. Interpretation of Coefficients
   E. Model Selection
   F. Application: Modeling donations to charity

References: Chapter 7 in Franses/Papp and Section 5.4 in Kleiber/Zeileis

IX. Duration (Survival) Dependent Variable Models
   A. Definition of Density, Survival, and Hazard Functions
   B. Exponential, Weibull, Loglogistic, and Lognormal density functions and their corresponding
      Survival and Hazard functions
   C. Cox Proportional Hazard Model
   D. Interpretation of Coefficients
   E. Model Selection
   F. Applications: Modeling Interpurchase times and durations of expansions in the US
      economy

References: Chapter 8 in Franses/Paap and class presentation on business cycle analysis

X. Count Models
   A. Poisson Model and the equidispersion assumption
   B. Negative Binomial Model
   C. Zero Inflated Models
   D. Interpretation of Coefficients
   E. Model Selection
   F. Applications: Number of Recreational Boat trips, Number of Software system installations,
      Number of Boat arrivals at port

References: Section 5.3 in Kleiber/Zeileis

XI. Static Linear Panel Models
   A. Two Period Panel Models – Difference in Difference Approach
   B. Fixed Effects Models
   C. Random Effects Models
   D. The Hausman Test
   E. Model Selection
   F. Application: Rental prices in college towns

Information will be handed out in class.

XII. Dynamic Linear Panel Models
   A. Specification of Dynamic Panel Model
   B. Arellano and Bond method
C. Application: Dynamic Demand Model for Cigarette consumption

Reference: B.D. Baltagi, *Econometric Analysis of Panel Data*, Chapter 8. Information will be handed out in class.

END OF COURSE