Assumption University
Department of Business Economics
Class Time: Tue 8.30-12
Class Room: MSM1003

Instructor: Dhanoos (Dee) Sutthiphisal
Office: SG339
Office Hours: Mon/Wed 8.30-9.45
E-mail: d.sutthiphisal@gmail.com
LMS: http://lms.au.edu/course/view.php?id=225
Class Web: www.deefred.net/Dee

ECO 3715: INTRODUCTION TO ECONOMETRICS **SECOND TERM 2011**
MAJORS

Course Objectives

The goal of this course is to introduce you to the methods economists use to empirically test economic theories in the real world, i.e. applying statistical methods to the analysis of economics data. Such techniques have increasingly been used in corporate, government, and academic settings to analyze markets, to create forecasts, to evaluate public policies, and to test economic theories.

In this course, we will particularly focus on regression analysis (uncovering and quantifying relationships among various variables) with the emphasis on both the theory underlying such analysis and the actual application of the theory to analyze real world problems.

(Note that because of time limits, throughout most of the course we will assume that the data we have are "well-behaved" or in an "ideal conditions." Nor will we spend much time on time series regression analysis although it is an important area in econometrics.)

Course Prerequisites

It is assumed that you are familiar with basic concepts of probability and statistics (by having taken at least one probability and statistics course) as well as calculus and basic algebra. No knowledge of matrix algebra is required.

Software

To help you gain a hands-on experience in applying the theories you learn in class to real world problems, you are required to use STATA (one of the most popular econometric software on the market) for problem sets and a term project for this course. (I will test your knowledge of the software in the exams.) Although I provide a supplementary note that helps you familiarize with STATA and you can use Google to read more on most, if not all, STATA commands, you may not feel that it is enough. If so, I recommend that you obtain or read the following (any of the earlier version is fine as well).

- Christopher F. Baum, *An Introduction to Modern Econometrics Using Stata*, Stata Press, 2006 – This book discusses most of what you need for an empirical analysis with STATA.
- STATA Base Document Set, STATA Press, 2011 – This is a set of reference documents that cover all STATA commands (except someone else's own ado programs, no matter how popular they are).

Textbooks

There is no required textbook for this course. My detailed class notes and required readings are sufficient to do well in this course. However, I recommend that you obtain or read one of the suggested textbooks listed below (any of the earlier version is fine as well).

- Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*, Fourth Edition (Thomson South-Western, 2008) – The notation and mathematical proofs in this book are very different from my class notes. So, it is best not to read the math stuffs in the book. However, this book contains a great number of examples that show you how we can apply what we learn in class to actual real world problems. More importantly, the book discusses most, if not all, issues (both consequence and correction) that you will need to know when doing econometric analysis. So, grab this book if you think you need a reference book for most econometric analysis that you will have to do after you are done with this course. You just need to read the text, not the math stuffs.

- Michael P. Murray*, Econometrics: A Modern Introduction*, First Edition (Addison Wesley, 2005) – This book has a very good treatment of basic econometric theories by providing clear explanations and intuitions behind the theoretical concepts. The notation and mathematical proofs in this book are slightly different from what I use, but not as confusing as Wooldridge. The book also discusses common issues (both consequence and correction) that you will need to know when doing econometric analysis. The only problem with this book is that it provides very few, if not none, empirical examples of how we can apply the concepts to real world data. So, get this book if you are more mathematically/theory inclined.

- Damodar N. Gujarati (and Dawn C. Porter), *Basic Econometrics*, Fifth Edition (McGraw-Hill/Irwin, 2008). This book is less advanced than Wooldrige's and Murray's books. Not surprisingly, the book covers less econometric techniques than the other two books. In addition, the theoretical presentation of the concepts in this book is a bit cumbersome, and the notation in this book is slightly different from what I use. But, this book is very easy to read, and has quite a bit of real world examples, though not as much as Wooldrige's book. So, get this book if you do not like my class notes (which tend to be a bit dry) and want to read someone else's book instead.

Students may also find the following textbooks useful. (All these books offer a great discussion on regression analysis but not on probability theory.)

- Damodar N. Gujarati (and Dawn C. Porter), *Essentials of Econometrics*, Fourth Edition (McGraw-Hill/Irwin, 2009) – Less advanced than *Basic Econometrics*.

- Robert S. Pindyck and Daniel L. Rubinfeld, *Econometric Models and Economic Forecasts*, Fourth Edition (McGraw-Hill, 2000) – Slightly more advanced than Wooldridge's book.

- Jack Johnston and John DiNardo, *Econometric Methods*, Fourth Edition (McGraw-Hill, 1996) – A nice classic book that efficiently discusses the concepts (but more technical), read Chapters 1 and 2 only (the Chapters beyond Chapter 2 are too advanced for this course).

Language of Instruction

English is the only language of instruction for this course. This means you must communicate in English with the instructor both in and outside of classroom (such as writing the exam or seeking help during office hours). You must also speak to your classmate in English during class. (This policy is imposed to maintain the quality, and more importantly the fairness of my teaching.)

Course Requirements

There are 2 exams in this course: midterm and final. The midterm is on Wednesday January 25, and the final is on Saturday March 31. The final is cumulative. These exams will consist of T/F, problem-solving (theory), empirical questions and STATA programming questions. In addition to the two exams, you are required to complete a term project (there may be questions about it in the final). Deadline for the term project and how to submit it are discussed on the following page. Instructions for the term project will be posted on the Class Web by December 23. I will be happy to provide some assistance for the project during my office hours. Also, if you hand in your project draft at least 2 weeks before the deadline, I will give you suggestions that may help increase your grade for the project.

Class Notes, Readings and Problem Sets

Class notes, readings and problem sets (with solutions) will be posted on the Class Web. Use them at your own risk. I have tried to eliminate typing errors when preparing these materials. However, it is very likely that there are still (a few) errors in the notes and the solutions. You must use your own judgment when utilizing these materials. (I would appreciate it if you could let me know where the errors are so that the future generation of students can benefit from better class materials.)

This course requires a lot of work. Some of the materials we cover may seem insurmountable for you at first. But, I believe that my learning-by-doing teaching style will help you master even the most complex concepts that we will cover. Although the problem sets will not be counted towards your grade, it is in your best interest to familiarize yourself with the concepts given in class by solving the problems. (It is very crucial that you do the problem sets on your own instead of just reading the provided solutions.) The project will help you see a bigger picture of how you can apply what you learn in class to an actual real world problem. The required readings will also be helpful in understanding course materials and answering questions in the exams. Here is the list of readings. The required readings are marked as ● and the optional readings are listed as ○. (See class schedule for when we will cover each reading.)

- ○ *STATA Base Document Set*, STATA Press, 2011.
- ○ Christopher F. Baum, *An Introduction to Modern Econometrics Using Stata*, Stata Press, 2006.
- ○ Dhanoos Sutthiphisal, "Learning-by-producing and the Geographic Links between Invention and Production: Evidence from the Second Industrial Revolution," *Journal of Economic History* (Dec. 2006)
- ● Daniel S. Hamermesh and Jeff E. Biddle, "Beauty and the Labor Market," *The American Economic Review*, Vol. 84, No. 5. (Dec., 1994), pp. 1174-1194.

- Mariko Sakakibara and Lee Branstetter, "Do Stronger Patents Induce More Innovation? Evidence from the 1998 Japanese Patent Law Reforms," *RAND Journal of Economics*, Vol. 32, No. 1 (Spring 2001), pp. 77-100.
- Gregory C. Chow. "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," *Econometrica*, Vol. 28, No. 3. (Jul., 1960), pp. 591-605.
- Javier Escobal and Sonia Laszlo, "As Time Goes By: Measurement Error in Access to Market Data. Evidence from Peru," *Mimeo*, McGill University, 2004.
- Daron Acemoglu, Simon Johnson and James A. Robinson, "The Colonial Origins of Comparative Development: An Empirical Investigation," *The American Economic Review* Vol. 91 (Dec. 2001), pp. 1369-1401.
- John C. Brown and Timothy W. Guinnane, "Regions and Time in the European Fertility Transition: Problems in the Princeton Project's Statistical Methodology," *Mimeo*, Yale University, 2004.

Office Hours and Review

Regular office hours are listed on the first page. For each exam, I will schedule extra office hours which will be announced in class a week before the exam. However, you should not let questions accumulate until the week before an exam. It is not healthy to panic at the last minute and it is difficult to work things out under pressure. More importantly, the course materials are highly cumulative. Therefore, there will be a snowballing effect if you do not keep up with the materials. It will be very hard to catch up.

For students with a legitimate time conflict with the office hours, you can make an appointment with me by email when you need help. In addition, I will give review sessions on Tuesday Jan 10 for the midterm, and on Tuesday March 13 for the final.

Communication Policies

In addition to office hours, please feel free to ask me questions via the Internet. I encourage you to use the forum function in the Learning Management System (LMS) to ask me questions since they may also benefit your classmates. Should you need to contact me via email, please use the email address stated on the first page. You must write the course number and title (Econ 3715: Econometrics) on the email subject. Please do not contact me via any other email addresses (e.g. the au.edu one). I will not open any email without the proper subject heading, nor will I respond to an email sent to other email addresses. For the night before each exam, I will answer your e-mails if and only if I receive them BEFORE 10 PM.

If there is an important announcement (e.g. extra office hours), I will make it on LMS News and Announcements forum. To be able to receive my announcements, you need to be enrolled in the class LMS. Also, make sure your LMS profile has your current email address.

Exam Policies

The midterm scores and grades will be posted on the Class Web. You are not allowed to keep your exams. If you would like to review your exams, please see me during my office hours or make an appointment.

Grade Appeals

If you are not satisfied with how your exam term/project is graded, you may submit a grade appeal in writing. If you choose to do so, your entire exam/term project will be reviewed. There will not be a partial re-grading, and you may receive a lower grade after the appeal.

Grade Assignment

You will receive a letter grade for each exam and the term project. Your grade for each exam is based on a class distribution, whereas your grade for the term project is based on your own performance. The grade you receive for this course will be from the scheme below that yields the highest grade.

Scheme 1		Letter Grade	Numeric Grade	Course Grade Lower Bound
Term Project	25%	A	4.00	3.875
Midterm	25%	A-	3.75	3.500
Final	50%	B+	3.25	3.125
		B	3.00	2.875
		B-	2.75	2.500
Scheme 2		C+	2.25	2.125
Term Project	25%	C	2.00	1.875
Midterm	0%	C-	1.75	1.500
Final	75%	D	1.00	0.875
		F	0.00	0.000

For example, suppose you receive a B- for the term project, a C for the midterm and an A for the final. Scheme 2 is obviously better than Scheme 1 and will give you: 2.75 x 0.25 + 4.0 x 0.75 = 3.7 < 3.85 → an A-. Hence, your course grade would be an A-.

Term Project Deadline and Late Penalties

Extensions for submission of term project will only be given in cases of illness, where a medical certificate is provided. You need to submit a hard copy of the term project to me (for grading purpose) as well as an electronic version to TurnItIn.com (to verify authenticity). (Using TurnItIn.com will help me focus my grading on your ideas rather than putting an effort to check the authenticity of your work. Hence, I can give you the mark fairly and promptly.) By 9am (Bangkok time) of Friday March 16, you must submit an electronic version to TurnItIn.com. Exclude tables, figures and appendix from your electronic submission. The hard copy can be submitted after 9am but must be before 5pm of the due date (March 16). You must also submit your STATA log files and/or do files either by including them in the hard copy or by emailing them to me electronically on the project due date. No need to edit the files, I will just use them to confirm the authenticity of your work. It is virtually impossible for the two groups to have similar files.

Only one submission is needed for a group. However, you need to list the names of the team members as well as their student IDs clearly. Also, if you encounter a problem with your TurnItIn submission on the due date, send me an email with your work file(s) as attachment.

I will use the electronic time stamp as an evidence that you submit your work on time and we will settle the TurnItIn submission later.

A project submitted late (electronically) will lose three letter grades a day (each 24-hour period from the deadline) including during the weekend. For example, suppose you earn an A- for the project that was 1 day late. Your project grade will be a B- instead of an A-. (Your project will be first assigned points without considering whether you are late or not. Then, the mark down will be applied.) No project will be accepted after 9.30am of the 5th day after the due date. (Except in cases where a medical note has been supplied AND you have made arrangements with me in advance.)

Failure to use TurnItIn.com to submit the work will result in a mark of zero for the term project.

Academic Integrity

The instructor and Assumption University value and enforce academic integrity. All students must understand the meaning and consequences of cheating, plagiarism and other academic offences. See the required Supplementary Note 1: Academic Integrity for more information.

Course Schedule

Dates for topics to be covered are tentative and subject to changes. You are expected to read all readings marked as ● in the reading list. The readings listed as O are optional. LN = Lecture Note. SN = Supplementary Note.

Class No	Date	Topics	Remarks	Readings
1	Tue Nov 29	Introduction and Math Review	• What is econometrics? • How do economists conduct an empirical analysis? • Examples for questions of interest • Data types • Review: sum operators and calculus	• LN1: Introduction • SN1: Academic Integrity o SN2: Math Review o SN3: How to Read an Empirical Paper
1	Tue Nov 29	Statistic Review	• Random variables • Probability distributions • Expectation • Variance • Joint distributions • Conditional distribution • Conditional expectation	• LN2: Statistic Review
2	Tue Dec 6		• Independence • Covariance • Correlation coefficient • Some useful probability distributions (normal, chi-square, t and F)	• LN2: Statistic Review
2	Tue Dec 6	Introduction to Estimation	• Sample vs. population • Asymptotic theories (plim, LLN, CLT) • Properties of estimators: unbiasness, efficiency, MSE • Examples: Math and Monte Carlo simulations	• LN3: Introduction to Estimation o SN4: Asymptotic Theories
3	Tue Dec 13		• Properties of estimators: consistency, asymptotic normality • Examples: Math and Monte Carlo simulations	• LN3: Introduction to Estimation

Class No	Date	Topics	Remarks	Readings
Lab	Fri Dec 16	Introduction to STATA	• General information • Log files • Summary statistics • General syntax • Manipulating data • Constructing tables • Merging data sets	• SN5: Introduction to STATA o Baum (2006) o STATA Base Document Set
3	Tue Dec 13	Introduction to Statistical Inference	• Confidence interval with known variance • Hypothesis testing with known-variance (z-test, chi-square-test, p-value) • Type I and Type II errors • Confidence interval with unknown variance	• LN4: Introduction to Statistical Inference
4	Tue Dec 20		• Hypothesis testing with unknown-variance (t-test, F-test) • ANOVA • Example: Learning-by-producing • Example: STATA • Moving away from simple statistical inference to OLS	• LN4: Introduction to Statistical Inference o Sutthiphisal (2006)

Class No	Date	Topics	Remarks	Readings
4	Tue Dec 20	OLS Estimation	• Introduction to regression analysis	• LN5: OLS Estimation
5	Tue Dec 27		• Parameter estimations for two-variable model • Algebraic properties of OLS estimators • Goodness of fit • Application: Rescaling data • Caveat in interpreting LS coefficients (e.g. causality) • Example: Learning-by-producing	• LN5: OLS Estimation o Sutthiphisal (2006)
6	Tue Jan 10		• Multiple regression model (coefficient interpretation and estimation) • Partitioned (step-wise) regressions • Omitted variable bias • Application: demean • Application: detrend • Example: STATA	• LN5: OLS Estimation
6	Tue Jan 10	Midterm Review		
X1	Wed Jan 25	Midterm Exam	• Materials from class 1-6 and STATA • Students will be given STATA commands, and then asked to explain what the commands do	• LN1: Introduction • LN2: Statistic Review • LN3: Introduction to Estimation • LN4: Introduction to Statistical Inference • LN5: OLS Estimation • SN5: Introduction to STATA

Class No	Date	Topics	Remarks	Readings
7	Tue Jan 31	OLS Assumptions	• CR assumptions • The meaning of OLS coefficient: A revisit • Finite sample properties of OLS estimators (mean, variance, covariance, distribution)	• LN6: OLS Assumptions
8	Tue Feb 7		• Finite sample properties of OLS estimators (Gauss-Markov Theorem, variance estimation) • Large sample properties of OLS estimators • NeoCR model • Example: Math	• LN6: OLS Assumptions o SN3: Asymptotic Theories
9	Tue Feb 14	OLS Specification	• Meaning of OLS coefficient: A review • Linearity of regression function (quadratic, interaction, semi-log, log-log, standardized coefficients)	• LN7: OLS Specification
10	Tue Feb 21		• Constancy of parameters (dummy variable: intercept, slope)	• LN7: OLS Specification
11	Tue Feb 28		• Perfect collinearity and multicollinearity • Example: Beauty and the labor market • Example: Japanese Patent Reforms	• LN7: OLS Specification • Hamermesh and Biddle (1994) • Sakakibara and Branstetter (2001)

Class No	Date	Topics	Remarks	Readings
11	Tue Feb 28	OLS Inference	• The error terms • CNR model • Distribution of OLS estimators	• LN8: OLS Inference
12	Tue Mar 6		• Confidence interval • Single hypothesis testing • Joint hypothesis testing • Interpreting STATA outputs • Some caveats on testing (e.g. limitation of significance test)	• LN8: OLS Inference o Chow (1960)
13	Tue Mar 13	OLS Validity: A Brief Introduction	• Consequence, detection and remedy of each CR assumption violation (specification errors, heteroscedasticity, correlated errors, measurement errors, endogeneity, non-normal errors	o LN9: OLS Validity o Escobal and Laszlo (2004) o Acemoglu, Johnson and Robinson (2001) o Brown and Guinane (2004)
13	Tue Mar 13	Final Review		
X2	Sat Mar 31	Final Exam	• Materials from class 1-28 and STATA • Students will be required to write a set of STATA commands to generate a particular set of output, based on the term project • Questions on required articles	• LN3: Introduction to Estimation • LN4: Introduction to Statistical Inference • LN5: OLS Estimation • LN6: OLS Assumptions • LN7: OLS Specification • LN8: OLS Inference • SN5: Introduction to STATA • Hamermesh and Biddle (1994) • Sakakibara and Branstetter (2001)