ECON 282

Using Econometrics: A Practical Approach

Course Introduction

5 Credits

Dr. Gregory M. Ellis, ellis@u.washington.edu

Economics 282 is a course in economic statistics and econometrics. Econometrics is distinguished by the unification of economic theory and statistical methodology. It is concerned with estimating economic relationships, confronting economic theory with facts, and testing hypotheses involving economic behavior. Specific topics addressed in this course include mathematical statistics, single and multiple variable regression analysis, the Gauss-Markov Theorem, hypothesis testing, model specification, multicollinearity, dummy variables, heteroskedasticity, serial correlation, and distributed lag models.

As a course in applied econometrics, we will frequently use these methods with real world financial and economic data. Students will be introduced to data and regression analysis in EViews. Given the applied nature of much of the coursework, some mathematical, statistical, and computer proficiency will be assumed.

Course Objectives

When you have finished this course, you will be able to:

- Interpret and implement multiple regression and related statistical techniques
- Identify the limitations and pitfalls of regression methods
- Write a focused explanation of the findings of a statistical investigation, clearly and concisely

Requirements

Technology Requirements

The current technology requirements are found in the Online Student Handbook. Given the applied nature of much of the coursework, some mathematical, statistical, and computer proficiency will be assumed.

Completion Requirements

To successfully complete this course, you must do the following:

- Read this course guide and the assigned sections of the texts
- Complete and submit all written assignments
- Participate in specified team activities
- Actively contribute to each lesson's online discussion topic as specified in each lesson

Online Student Handbook

This handbook answers questions about your online learning course, such as how to purchase your text, schedule an exam, arrange for a proctor, obtain a transcript, and get technical help if you need it. The handbook also provides additional resources, such as how to order books or journals from the library and how to study for an online course.

Communicating with Your Instructor and Student Peers

In addition to e-mail, this course offers discussion forums, where you can post your responses to questions the instructor poses, or ask questions.

Required Course Materials

Textbook: A.H. Studenmund, *Using Econometrics: A Practical Guide*, Pearson/Addison Wesley, 6th edition, 2011 (www.pearsonhighered.com/studemund). Also available on Amazon.com.

Software: EViews, Quantitative Micro Software (www.eviews.com). The student version of EViews 8 is available for either PCs or Macs for approximately $40.

About This Course

This course is divided into ten lessons. Each lesson includes video modules, text readings, and a weekly assignment. Weekly assignments are completed on a companion MyEconLab website (developed and administered by Pearson Publishing, publisher of the Studenmund textbook). Some weeks include a discussion forum, in which all students must participate. The final exam is presented at the end of the course.

About the Lessons

Lesson 1: In this lesson, students will be introduced to the subject of econometrics, and students will be able to describe its uses in economics. Students will able to define (and distinguish between) dependent and independent variables, regression coefficients, regression error terms, and regression residuals. Students will also be introduced to the use of the econometric software EViews.

Lesson 2: A variety of statistical principles that will prove useful throughout the rest of the course will be reviewed. Among other concepts, students will review probability density functions, the definitions of the mean and variance of a random variable, and the properties of expected values and variances for functions of random variables. These and other principles are essential for engaging in hypothesis testing of estimated regression equations in subsequent weeks/lessons.

Lesson 3: Students will learn about hypothesis testing in the classical statistics framework. Among other topics, students will learn about the usefulness of the Chi-square, t, and F distributions.

Lesson 4: Students will learn about the primary technique used in estimating regression equations: Ordinary Least Squares (OLS). In particular, students will be able to define OLS estimation and distinguish between R^2 and $\overline{R}^2$ as measures of the overall fit of an estimated regression model. Students will also identify the problems with simply maximizing measures of model fit.

Lesson 5: Students will learn to describe the statistical properties of estimated regression coefficients under different assumptions regarding regression error terms. Students will understand the importance of the Gauss-Markov Theorem for OLS estimation of regression equations. Students will also be introduced to the final project/paper (due in five weeks) concerning the demand for golf, at the golf course level, in the Puget Sound area.

Lesson 6: In this lesson, students will engage in hypothesis testing of estimated regression equations. In particular, students will implement t-tests for hypotheses concerning a single regression coefficient. Then, students will implement F-tests for restrictions involving multiple regression coefficients. Finally, students will be able to describe the all-important tradeoff between the omission of an important variable and the inclusion of an irrelevant variable in a regression model.

Lesson 7: In this lesson, issues concerning model specification are studied. In particular, students will implement specification criteria when choosing functional forms for regression equations. Students will be able to describe the problems posed by multicollinearity among the independent explanatory variables. Finally, students will learn about the various uses of dummy variables in regression models.

Lesson 8: The problem of heteroskedasticity among regression error terms is introduced. Students will learn to detect the presence of heteroskedasticity with the White Test in EViews. Students will also learn to correct for the problems of heteroskedasticity by using weighted least squares and heteroskedasticity-corrected standard errors in EViews.

Lesson 9: In this lesson, students will learn about the pitfalls of ignoring the presence of serially correlated regression errors for OLS estimation of time-series models. Students will detect serial correlation in EViews with a Lagrange Multiplier test. If serial correlation is discovered, students will learn to correct for it by estimating a quasi-differenced regression model in EViews. The final exam (due in two weeks) will be distributed/introduced.

Lesson 10: Distributed lag models are introduced in this lesson. Students will be able to estimate a dynamic model with a Koyck/Geometric Lag structure and calculate the long-run multiplier for an independent variable in a time-series model.

The Final Exam

The final exam will consist of six questions covering material from the entire course. Some questions will be of the short-answer variety asking students to demonstrate their knowledge of statistical and econometric modeling principles. Other questions will require students to estimate a regression model in EViews and perform hypothesis tests. The instructor will provide Datasets for the estimation of regression models. The exam is open-book, and students are encouraged to use the textbook as a reference guide. The exam should take approximately two to three hours to complete.

Answers to the final exam (a Word document) will be due on the Sunday at the end of Week 10 no later than 11:59 PM Pacific Time. Answers submitted up to one week late are eligible for 50% credit. Answers submitted more than one week late receive no credit.

Assessment and Grading

Weekly assignments require students to complete an online MyEconLab assignment each week by Monday no later than 11:59 PM Pacific Time. The MyEconLab homework assignments may be accessed through a link on the class website.

The final project/paper (a Word document) is due on the Sunday at the end of Week 9 no later than 11:59 PM Pacific Time. Final papers submitted up to one week late are eligible for 50% credit. Final papers submitted more than one week late receive no credit. The paper should be no longer than five pages long (not counting technical appendices). The term paper guidelines are discussed in detail in the document entitled Econ282_L5_termpaper.pdf introduced in Week/Lesson 5. Your written submissions will be graded on length specified, extent to which you addressed all of the components of the assignment, and on writing quality.

Grading

Your grade is based on ten assignments, final paper/project, participation in discussion forums, and a final exam as follows:

Assignments: 10 assignments	40%
Final Project/Paper	10%
Discussion Forum Participation	20%
Final Exam	30%
TOTAL	**100%**

Course Schedule

Weekly assignments are due Monday by 11:59 PM Pacific Time at the end of each week.

Week	Lesson	Readings	Other Assignments Due
1	Introduction to the Course and an Overview of Regression Analysis	Studenmund, Chapter 1	
2	Statistical Principles	Studenmund, Chapter 17	
3	Classical Statistics	Studenmund, Chapter 17 Studenmund, Section 5.1	
4	Ordinary Least Squares	Studenmund, Chapters 2 and 3	
5	The Classical Regression Model	Studenmund, Chapter 4	Final Paper/Project Introduced
6	Hypothesis Testing	Studenmund, Chapter 5 Studenmund, Sections 6.1 and 6.2	
7	Model Specification, Multicollinearity, and Dummy Variables	Studenmund, Chapters 6, 7, and 8	
8	Heteroskedasticity	Studenmund, Chapter 10	
9	Serial Correlation	Studenmund, Chapter 9	Final Exam Introduced Final Paper Submitted
10	Distributed Lag Models	Studenmund, Sections 12.1 and 12.2	Final Exam Completed

Course Policies on Collaboration

Students may communicate with other students when completing weekly assignments, but students are expected to do their work on the final project/paper and the final exam on their own (***without*** communication or help from other students). Completion of the final project/paper or the final exam ***with*** any communication or any help from other students is considered cheating. Students cheating will be given no academic credit for their work.

About the Developer

Greg Ellis is not only the developer of this course, but he is also the instructor. His Ph.D. is from the University of California, Berkeley. His main research interests are in the area of natural resource economics. He joined the faculty of the Department of Economics at the University of Washington in 1989. Between 1999 and 2003, he left the University of Washington to be a visiting professor in the Albers School of Business at Seattle University before being rehired at the University of Washington as a Senior Lecturer in 2003. In 2012, he was promoted to Principal Lecturer. He has twice received the Economics Department's teaching award. Among the undergraduate courses he teaches is Economics 482: Econometric Theory and Practice. Economics 482 is a more advanced and theoretical version of econometrics than Economics 382: Introduction to Econometrics. Economics 382 emphasizes the practical implementation of econometric methods, and Dr. Ellis taught it on campus for the first time in the winter of 2014. He is excited to now teach the related Economics 282 as a distance learning course.