Introduction to Statistics and Econometrics

Prof. Wm. Parke   Econ 400
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Purpose   The goal of this course is to have a lot of fun while learning something about statistics.

What is Econometrics?   Think about your other courses in economics. We can summarize the course content as follows: Two lines intersect at a point. The intersection moves around as you shift the lines.

Have you noticed anything missing? Where are those lines in the real world? Econometrics is the science (or art) of trying to figure out where the lines in an economic diagram are by using **real data**. This an immensely practical goal (at least relative to other things you have studied).

For example, econometrics attempts to determine how much sales will increase in numerical terms if you cut the price a specific amount. In other words, we will seek a numerical estimate of the slope of the demand curve, which is the first step in actually maximizing profits.

ECON 400 is the first step in understanding econometrics, which is the major content of ECON 570. Summer 2016 is the last time ECON 400 will not have STOR 155 as a prerequisite.

Textbooks   We will be using *Introduction to Econometrics* by Christopher Dougherty, Fourth Edition. A study guide and data are available online. We will also use *OpenIntro Statistics*, Third Edition, by David M. Diez, Christopher D. Barr, and Mine Cetinkaya-Rundel and Probability and Statistics, Fourth Edition, by Murray R. Spiegel, John Schiller, and R. Alu Srinivasan (Schaum's Outlines).

Web Sites   You will find our course web site at http://parke.econ-courses.com. I also post useful information at http://www.easymetrics.net.

Stata   We will be doing exercises using the Stata statistical package. This is available for purchase, it is on computer lab machines, and it is available via high-speed Internet from the UNC Virtual Computing Laboratory http://vlc.unc.edu.

How much math do I need to take this course?   You need the same amount of math you need to be a reasonably well educated graduate of UNC. You should be comfortable with college algebra. That means you should be able to work with symbols to solve problems. You should know what calculus is, but

you do not need to actually do any calculus.

How are the grades awarded?	We will have an assortment of exercises using both pencil and paper and Stata, one midterm, and a final exam.
Personal Electronic Devices	Unless explicitly authorized, you are not permitted to use a laptop computer, tablet computer, smart phone, or cell phone during class. If your cell phone is set to vibrate and it does so during class, please step into the hallway if you need to respond. Watching movies and videos, playing games, checking the scores on espn.com, shopping, and chatting/texting with friends are disruptive behavior that will not be tolerated.

Outline

We will cover the following topics. The references beginning with "S-" refer to chapters and pages in OpenIntro Stastistics. The references beginning with "P-" refer to chapters and pages in Probability and Statistics (Schaum's Outline). The references beginning with "D-" refer to chapters and pages in Dougherty.

A. Introduction

B. Probability Theory S-2, P 3-10, 34-44, 75-85

C. Distributions of Random Variables S-3, P 108-118

D. **Statistical Inference S-4, P153-162, 195-199, 213-222**
Tests for Means S-5.1
Tests for Proportions S-6.1

Midterm Exam

E. Probability & Statistics D-R (Review of A, B, C, and D)
Random Variables & Moments
aX+b Rules
t Tests

Confidence Intervals

F. Simple Regression (2var) D-1,2, P 265-275
Why is the estimated slope stochastic?
Assumptions
Distribution of beta-hat
t Tests

G. Multiple Regression (3var) D-3,6
Controlling For
Specification Analysis
F Tests D-180,274
How do you pick the best model?

H. Categorical Explanatory Variables D-5
Dummy Variables
F Tests Revisited
Chow Tests
Subsamples & Controlling For

I. Categorical Dependent Variables D-10