Tufts University
Department of Economics

Ec 202            Prof. David Garman
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Spring 2014            Office Phone: (617) 627–2683

Class Hours:  TuTh 1:30pm (H+ Block)
Classroom: Braker 222

Office: Braker 317
Office Hours: Tu & Th 3:00-4:00, W & F 10:30–11:30 or by appt.

Classroom: Braker 222

Required Texts


Supplemental Texts (on reserve in Tisch under Ec 107)

Prerequisites
Exposure to calculus, mathematical statistics, matrix algebra and Stata. See the “Mathematics and Statistics Review” section below for details on the mathematics, probability and statistics results we will be using.

Learning Objectives
Our goal is to understand and apply some modeling and estimation techniques that are used in every area of economics. We will derive basic theoretical results, develop intuition about those results, use Stata to apply estimation techniques, study some pitfalls that arise in applications, and complete a small applied project.

The Department of Economics’ Learning Objectives for economics students met by this class include:
- addressing economic questions using a toolkit of analytical methodologies, models and results.
- understanding the fundamentals of empirical research, including data gathering and analysis, hypothesis testing, and the use of statistical and econometric methods.
- reading and understanding applied econometrics articles from general-interest economics journals and from other academic outlets.

Outcomes will be measured in several ways. Short weekly quizzes and short weekly homework assignments will be used to encourage engagement and monitor progress. Three exams will be used to assess the level of theoretical knowledge and applied skills acquired in each section of the course. An applied project will be used to evaluate each student’s ability to understand applied econometrics articles, frame a question, collect appropriate data, and use econometric tools to answer the question.

Learning Approach
The only way to learn econometrics is by practicing econometrics. Active engagement in this class is essential.

I will promote engagement by:
- requiring class attendance.
- assigning weekly homework problems to be completed and submitted every Thursday.
- giving a weekly “5 minute” quiz on current material every Tuesday. (No make-ups will be given.)
- being available outside of class to answer questions or discuss problems.

In return, I ask you to:
- arrive on time and attend all class meetings.
- keep up by reading assigned material before class, reviewing it after class, and practicing answering questions.
- ask questions in class and during my office hours.
- see me well before an exam or deadline if you are having trouble or need special accommodations.
- convince me that you are taking the class seriously and making a real effort.
**Stata Assistance**
Mr. Benjamin Limoges will provide Stata assistance in Eaton 208 during dates/times to be listed on Trunk and www.tuftsecon.com.

**Grading**
To earn a passing grade you must show that you have memorized the basic material and can correctly apply it to problems similar to those we have covered. To earn a better grade you will also need to show evidence of understanding the material well enough to explain the intuition behind the problems. To earn an “A” grade you will also need to be able to correctly apply the material to new problems and explain the intuition behind those problems.

The weights for grading will be:
10%  Homework and Weekly Quiz Total  (after dropping your 2 lowest homework and quiz grades).
10%  Project Grade.
80%  total for average of Exams I, II, & III  (all exams are closed book, closed notes).

**Course Outline (the exam dates are firm, the lecture dates are approximate)**
The first few weeks of this course introduce some estimation results that we will use for the rest of the semester. We begin by deriving the least squares or regression estimator and studying its properties under standard assumptions. The remainder of the course covers difficulties that arise in applying regression estimation to real problems. We study the impact of failed assumptions, tests for assumption failure, and ways in which our estimation techniques can be modified to deal with failures.

All listed sections from JW4/JW5, MW and CD15 are required. CD15 is Chapter 15 of the online study guide for Dougherty’s Elements of Econometrics 4th edition and a link to this chapter is posted on Trunk. The listed sections from SW2 contain presentations that many students find easier to understand than those in JW. A few SW2 sections will be assigned, but most are optional.

**Introduction, Data Structures and Bivariate Relationships  (1/16)**
JW4 or JW5 1.1 – 1.4  
Optional: SW2 1.1 – 1.3

**Simple Regression Estimation, Properties, Functional Form  (1/16, 1/21)**
JW4 or JW5 2.1 – 2.6  
Optional: SW2 4.1 – 4.6 , 17.1

**Multiple Regression Estimation and Finite Sample Properties  (1/23, 1/28)**
JW4 or JW5 3.1 – 3.6 & CD15 pp 296 – 300 , 301 (bottom) – 304 , App A , App B  
Optional: SW2 6.1 – 6.8

**Regression Inference  (1/30, 2/4)**
JW4 or JW5 4.1 – 4.2 , 4.4 – 4.6 & CD15 pp 305 – 306 (top) Optional: SW2 5.1 , 7.1 – 7.3 , 7.5

**Asymptotic Properties: Consistency, Normality, Efficiency  (2/6, 2/11)**
JW4 or JW5 5.1 – 5.3 & CD15 p 301 (top)  
Optional: SW2 17.2

**Dummy Independent Variables, Linear Probability Model  (2/13)**
JW4 or JW5 7.1 – 7.7  
Optional: SW2 5.3 , 8.3

**Exam I  (Tuesday 2/18) JW Chs. 1 – 5 , 7 & CD15**

No Class / Monday Schedule  (2/20)

Matching Estimators of Causal Effects  (2/25)
MW  4.1 – 4.7

Regression Estimators of Causal Effects  (2/27)
Heteroskedasticity: Testing and Estimation (3/4)
JW4 or JW5 8.1 , 8.2 (skip F and LM tests) , 8.4 (for case of known function only) & CD15 pp 306 – 307 (top) Optional: SW2 5.4 , 17.5

Scaling, Functional Form, Goodness-of-Fit (3/6)
JW4 or JW5 6.1 – 6.3 Optional: SW2 8.1 – 8.2

Specification, Validity, Measurement Error (3/6)
JW4 or JW5 9.1 , 9.4 Optional: SW2 9.2 (to p 321)

Endogeneity: Bias, Identification, IV and 2SLS Estimation (3/11)
JW4 or JW5 15.1 – 15.5 & CD 15 pp 307 (bottom) - 308 Optional: SW2 12.1 – 12.6

Simultaneous Equations: Bias, Identification, Estimation (3/13)
JW4 or JW5 16.1 – 16.4 Optional: SW2 12.1 – 12.6

Spring Break (no class 3/18 , 3/20)

Identification in the Absence of a Complete Model of Causal Exposure (3/25)
MW 6.1 – 6.5

Instrumental Variable Estimators of Causal Effects (3/27)
MW 7.1 – 7.6

Time Series Regression: Strict Exogeneity, Trends, Seasonality (4/1)
JW4 or JW5 10.1 – 10.5 Optional: SW2 14.1 – 14.4 , 14.6 , 15.1 – 15.3 , 15.5

Exam II (Thursday 4/3) JW Chs. 6 , 8 – 9 , 15 – 16 & CD15 & MW Chs. 4 – 7

JW4 or JW5 11.1 – 11.3 Optional: SW2 14.1 – 14.4 , 14.6 , 15.1 – 15.3 , 15.5

Serial Correlation in Time Series Regression: Testing and Estimation (4/10)
JW4 or JW5 12.1 – 12.4 & CD15 pp 309 - 310

Panel Data (4/15)

Experiments and Quasi-Experiments (4/17)
SW2 13.1 – 13.7

Unit Roots, Spurious Regression, Cointegration (4/22)
JW4 or JW5 18.2 – 18.4 Optional: SW2 16.3 – 16.4

Repeated Observations and the Estimation of Causal Effects (4/24)
MW 9.1 – 9.4

Exam III (Friday 5/2 , 3:30pm – 5:30pm) JW Chs. 10 – 12 , 13 , 14.1 , 18 & SW2 Chs. 10 , 13 & MW Ch. 9

Project Paper Due (Friday 5/9 @ noon)
Class Honor Code:
Giving or receiving aid is not allowed on any quizzes or exams. Behavior during quizzes and exams should be above suspicion. It is permissible to study together on all out-of-class assignments and projects, but all out-of-class assignments and projects must be written up independently by each student. Our class honor code applies to quizzes, exams, homework, and the project paper.

Mathematics and Statistics Review:
Ec 202 makes heavy use of some basic results from mathematics, probability and statistics. None of the results are complicated, but you may need a review if you have not used them recently. Wooldridge’s *Introductory Econometrics* has a very good summary of these results in Appendices A, B, and C. The following outline may help you determine which topics to review.

Mathematics Results in Appendix A
A.1 These summation properties are essential and you should be able to explain and use each property.
A.2 Most of this section is obvious, but review the idea of a “partial effect.”
A.3 There is nothing new here; using percentages is routine for economics students.
A.4 There is not much new here; look at log and exponential forms if you have forgotten them.
A.5 If you have not taken multivariate calculus (Math 13), study the concept of partial derivatives.

Probability Results in Appendix B
B.1 This section contains definitions that should be familiar.
B.2 Joint distributions, conditional distributions, and independence are all essential ideas.
B.3 Expected values and their properties are very important. We will define means, variances, and covariances as expected values and use expected value properties to manipulate their forms.
B.4 You should know: the covariance and variance properties for linear combination of variables, the covariance of independent variables, and the first four properties of conditional expectations.
B.5 You don’t need to memorize the equations for normal (or other) distributions. You do need to know the properties of the normal. You should understand how Chi-Square, T, and F distributions are formed from normal distributions. Be able to look up critical values for these distributions using the tables in Appendix G.

Statistics Results in Appendix C
C.1 Essential concept: random sampling.
C.2 Essential concepts: sampling distribution of an estimator, unbiasedness of an estimator, and the relative efficiency of an estimator.
C.3 We will cover topics from this chapter in class. You are not expected to know them already.
C.4 Can be skipped.
C.5 I don’t emphasize interval estimation so put this section off until you need it.
C.6 This section becomes important when we get to hypothesis testing. Key concepts include: Type I Error, significance level, testing using critical values, and testing using p values.