Introduction to Econometrics

Course Description

This course will familiarize students with the use of data and with statistical techniques in order to enable them to test economic hypotheses. The principle statistical framework developed in the course is multiple regression analysis which estimates the statistical link between a dependent variable and its multiple determinants. The course will explore the issues associated with multiple regression and will develop techniques used to solve problems encountered in analyses.

The course is highly applied but some aspects of the underlying theory will need to be mastered as well. Students will see a variety of empirical techniques and will often use STATA to implement these techniques. The principle goals of the course are:

- To familiarize students with the basic techniques and analytical tools of regression analysis so that they can apply these tools to future work and study.
- To acquaint students with the tools necessary to understand, interpret, and evaluate scholarly empirical work.
- To develop and refine the skills of economic inquiry and problem solving design through independent work with large data sets.

Readings

Recommended for Purchase:


On Canvas, excerpts from:


(Mandatory) STATA Lab

As part of this course, you will attend a weekly STATA tutorial session. STATA is a statistical software package that we will use extensively throughout the course. STATA will allow you to apply some of the concepts and tools that we are learning in the course to real data. It will allow you to answer real, and occasionally really interesting, questions. Details on how to access STATA will be presented in lab. The lab work and assignments will be incorporated into your final course grade.

Problem Sets

Problem Sets will be distributed roughly every week (to week and a half) for the first 12 weeks of the course. The exact number is still to be determined but you should expect roughly 8 to 10. They will be handed out one week before they will be due. I have included in the tentative schedule the due dates for all problems sets but these are subject to change with the rate of progress in the class. Problem sets will be graded on a check, check plus, check minus scale. Late problem sets will not be accepted for credit. **You may work in groups of 2 or 3 if you prefer.** Each person must submit their own problem set. **You MUST clearly name any individual with whom you worked.**

Application Exercise

The application exercise is the most important course assignment. Students will be given a data set to analyze and will be asked to work in groups of three or four students. Each group will develop a hypothesis to test, use the data and the statistical techniques developed in the course to test the hypothesis and then make recommendations for policy makers based on their results. Class will be suspended at times during the exercise period to allow application groups to work and meet with me. A set of special classes will be held for student presentations of their application results. These presentations will be formal and will constitute a portion of each student’s grade.

Exams

There will be one in-class midterm exam and a three-hour final exam. If you miss the midterm for a valid reason- which must be approved by me before the exam- your final exam will have the weight of both midterm and final exams.

Grading

The weights for each assignment are given below:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Class Participation:</td>
<td>5%</td>
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<tr>
<td>Problem Sets:</td>
<td>10%</td>
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<tr>
<td>Midterm Exam:</td>
<td>17.5%</td>
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<tr>
<td>Application Exercise:</td>
<td>17.5%</td>
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<tr>
<td>Lab:</td>
<td>20%</td>
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<tr>
<td>Final Exam:</td>
<td>30%</td>
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Policy on Extensions

Extensions will be granted only in the case of bona fide emergencies, such as illness or extenuating personal circumstances. Note that a great deal of work in other classes is "par for the course" in college—it is not an extenuating circumstance.

Academic Integrity

Cheating on any exam will result in

1. an automatic failure in the course and
2. reporting the incident to the College of Arts and Sciences as required by the University.

See [http://www.bc.edu/publications/ucatalog/policy.shtml#integrity](http://www.bc.edu/publications/ucatalog/policy.shtml#integrity) for a full discussion of the university’s policies and procedures regarding academic integrity.

Accommodations for Learning Disabilities

If you have a learning disability, you are strongly encouraged to request accommodations for this course. Exams are lengthy and have some time pressure. Please register with either Kathy Duggan (Kathleen.duggan@bc.edu) Associate Director, Academic Support Services, the Connors Family Learning Center (learning disabilities and ADHD) or Suzy Conway (suzy.conway@bc.edu), Assistant Dean for Students with Disabilities (all other disabilities). Advance notice and appropriate documentation are required for accommodations.

TENTATIVE SCHEDULE

Readings marked with an (*) are optional. They address more advanced mathematical descriptions. All other readings are required and should be read prior to the class for which the reading is assigned.

**Tuesday 1/19**

**Introduction to Research Questions and Design**  
Wooldridge Chapter 1, Appendix A.1, (B.1, B.2)  
Light, et. al. Chapter 2, pp. 12-21, 32-40  
---- Summation Notation Exercise and handout ----

**Thursday 1/21**

**Covariance and Correlation**  
Wooldridge Appendix B.3, B.4 (Covariance and Correlation sections only)  
Wonnacott and Wonnacott, Ch. 5.1, pp. 103-108.

**Tuesday 1/26**

**Introduction to Simple Regression**  
Wooldridge, Chapters 2.1-2.3  
Wooldridge Appendix A.2, B.4 (Conditional Expectation section only)

**Thursday 1/28**

**Simple Regression: The Assumptions of the General Linear Model**  
Wooldridge, Chapters 2.2-2.3, 2.5

***PROBLEM SET 1 DUE—Tuesday 2/2 ***

**Tuesday 2/2**

**Introduce paper**  
Catch-up Day (Get up to date, Review: intuition, math, STATA)

**Thursday 2/4**

**Simple Regression- Violating the Assumptions: Alternate Functional Forms**  
Wooldridge, Chapters 2.4, 2.6  
Wooldridge Appendix A.4
Tuesday 2/9  
**Simple Regression: Expected Values and Variance of Beta Estimate**  
Wooldridge, Chapter 2.5, Appendix B.3

***PROBLEM SET 2 DUE— Thursday 2/11 ***

Thursday 2/11  
**Multiple Regression: Motivation, Mechanics, and Interpretation**  
Omitted Variable Bias and Multicollinearity  
Wooldridge, Chapter 3.1-3.4, 6.3  
Kennedy Chapter 3.1-3.3 with general notes, pp. 40-47; and

Tuesday 2/16  
**Multiple Regression: Hypothesis Testing**  
Wooldridge, pp. 93-94, Chapter 4.1, 4.2, Appendix C.6, C.1, C.2  
(ignore the discussion of relying on large sample sizes for now)

Thursday 2/18  
**Multiple Regression: One-tailed Tests, p-values, and Confidence Intervals**  
Wooldridge, Chapter 4.3, Appendix C.5

***PROBLEM SET 3 DUE— Tuesday 2/23 ***

Tuesday 2/23  
Catch-up Day

Thursday 2/25  
**Multiple Regression: Dummy Variables and Interaction Terms**  
Wooldridge, Chapter 7.1-7.3, 7.4, 7.6, 6.2.  

***PROBLEM SET 4 DUE (by email) --Sunday 2/28 9 pm ***

Tuesday 3/1  
Catch-up and review

Thursday 3/3  
Midterm Exam

*Spring Break March 7-11*

Tuesday 3/15  
**Joint Hypothesis Testing**  
Wooldridge, Chapter 4.4 - 4.6.  
Kennedy, Chapter 4.3, pp. 52-53, 62-64.

Thursday 3/17  
**plim and Consistent Estimators; CLT and Large Sample Size**  
Wooldridge, Chapter 5

***PROBLEM SET 5 DUE—Tuesday 3/22 ***

Tuesday 3/22  
Catch-up Day

*Easter Break*

Tuesday 3/29  
**Multiple Regression— Violating the Assumptions: Measurement Error**  
**Review of Functional Form, Multicollinearity**  
Wooldridge, Chapter 9.4, Review Chapter 6.  
Barry and Feldman, pp. 18-37.  
Kennedy, Chapter 6.2 and 6.3, pp. 93-97, 100-105
SYLLABUS 01/07/16

***PROBLEM SET 6 DUE—Thursday 3/31 ***

Thursday 3/31  Qualitative Dependent Variables  
Wooldridge, Chapter 7.5, 7.7, 17.1  
Kennedy, Chapter 16.1, pp. 241-244, 246-250.

Tuesday 4/5  Catch up Day

Thursday 4/7  Preparation of APPLICATION EXERCISE – No regularly scheduled class—FIRST SCHEDULED MEETING WITH PROFESSOR – This can be scheduled for the previous week if your group is ready

***PROBLEM SET 7 DUE—Tuesday 4/12 ***

Tuesday 4/12  Multiple Regression—Violating the Assumptions: Heteroskedasticity  
Wooldridge, Chapter 8.  
Berry and Feldman, pp. 73-89.  
Kennedy, Chapter 8.3, pp.115-117, 124-126.

Thursday 4/14  Heteroskedasticity continued.

***PROBLEM SET 8 DUE—Tuesday 4/19 5 pm ***

Tuesday 4/19  Instrumental Variables.  
Wooldridge, Chapter 15.  

Thursday 4/21  Preparation of APPLICATION EXERCISE – No regularly scheduled class—SECOND SCHEDULED MEETING WITH PROFESSOR

Tuesday 4/26  Multiple Regression—Introducing Time Series (if time)  
Violating the Assumptions: Autocorrelation  
Wooldridge, Chapter 10 and 12

Thursday 4/28  PRESENTATION OF APPLICATION EXERCISE IN CLASS

Tuesday 5/3  PRESENTATION OF APPLICATION EXERCISE IN CLASS

***PROBLEM SET 9 DUE—Thursday 5/5 ***

Thursday 5/5  Lecture: Overview of semester and what else econometrics has to offer  
Note: I will not spend much time discussing the final during this lecture. Instead, I will provide an overview of the econometrics topics covered this semester and provide some heuristic linkages to more advanced econometric techniques students may run into while reading journal articles. I will be available for a separate Q&A session (time and place TBA)

Monday 5/16  Final Exam 9 am - noon