COURSE DESCRIPTION

This course will introduce the student to a wide range of micro-econometric models commonly used in data analyses and empirical research within academia, business, and policy analysis, with a focus on three broad aims. First, we will learn and discuss the interpretation of the parameters and the various advantages, limitations, and assumptions underlying each estimator. Second, we will develop and study each estimation method with an emphasis on application, seeing how each method is used in practice, and on implementation, learning how to apply each estimation method within a statistical software package. Third, the focus is on deriving causal effects based on observational data.

LEARNING OBJECTIVES

The course objectives are to provide students with:

1. A firm understanding of the potential outcomes framework, and the challenges confronted in deriving causal inferences due to endogeneity and selection on unobservables.
2. A firm understanding of, and the ability to identify and appropriately apply, a range of estimation techniques useful for addressing endogeneity and selection bias.
3. A firm understanding of and the ability to identify and appropriately apply estimation techniques useful for analyzing:
   - Panel data
   - Limited and categorical outcomes
• Count / discrete outcomes
• Selection effects
• Treatment effects

4. Familiarity in reading, presenting, and critiquing applied papers
5. Competency in STATA in order to estimate and apply the techniques learned in the course

Upon completion of the course, students should be able to formulate a research question, assemble sample data, assess empirical challenges, identify and estimate appropriate models to address the challenges, generate inferences, and effectively communicate this process and the results in an empirical research paper.

TEXTS

We will use selected chapters and material from the following texts, in addition to journal articles. Readings from 2-4 and journal articles will be posted on Blackboard.


   (This is an undergraduate-level text for a refresher on multivariate regression modeling and provides a less advanced and introductory treatment of some of the concepts.)


Additional reference (not required)


SOFTWARE

A standard statistical software package such as STATA will be required and used throughout the course. We will learn how to estimate each of the techniques using STATA. Assignments and the empirical research paper are expected to be completed using STATA.
GRADING

STATA-based Assignments 20%
Article Presentation 20%
Midterm Exam 20%
Empirical Research Paper - Report 30%
Empirical Research Paper - Presentation 10%

Assignments
Problem sets will be posted on the Blackboard site, and will consist of data analyses and applications/interpretations/diagnostics of the microeconometric methods. They will require the use of STATA.

Article Presentation
Each student will present and lead the discussion on at least one applied journal article that utilizes the microeconometric methods we will learn in the course. The presentation should summarize the article, including the data, empirical challenges encountered, and the reasons underlying the choice of the econometric methods, as well as include a critique of the article. Presentations will be scheduled alphabetically.

Midterm Exam
There will be one in-class midterm exam, which will test basic understanding of the concepts and material that we cover in class.

Empirical Research Paper
The paper is due on the final day of class (May 4th). The paper will address some particular research question in empirical microeconomics or any business discipline. It should formulate and state the research question, identify and assemble the data for the analyses, identify and apply the appropriate econometric methods (which must comprise at least one of the methods that we cover in this course), and discuss the results and any limitations of the analyses. Students will present their paper to the class on the final day.

TENTATIVE COURSE OUTLINE

WEEK 1-2  Introduction & Foundations
  Maximum likelihood estimation
  Refresher on multivariate regression modeling & OLS
  Binary outcomes: OLS vs. Logit vs. Probit
  Expected outcomes framework and counterfactuals
  Endogeneity and selection bias
  Identification problem & observational data
Matching methods / propensity score
Introduction to STATA

Readings: AP Chs. 1-2, 3 (omitting 3.4.1 & 3.4.3)
SW Chs. 1, 4-9 (Refresher on multivariate regression models)
MV Ch. 2
Guo, Barth and Gibbons (Children and Youth Services Review, 2006)

WEEK 3  Panel Data Methods
Pooled cross sections & longitudinal data structures
Fixed effects vs. random effects
Differenced models
Hausman test
Dynamic linear models
Non-standard standard errors
Clustering and serial correlation within panels

Article Presentation

Readings: AP Ch. 5 (p. 221-227)
SW Ch. 10
MV Ch. 10
JW Ch. 10

WEEK 4-5  Difference-in-Differences (DD) Models
Simple & conditional DD estimator
Counterfactual & common trends assumption
Diagnostics & event study
Synthetic controls
Propensity-score weighted DD estimator
Falsification / Placebo checks

Article Presentations

Readings: AP Ch. 5
SW Ch. 13


**WEEK 6-7 Instrumental Variables (IV)**

Causal inference
IV in practice & 2SLS
Diagnostics
Reduced forms, ITT vs. LATE
Endogenous Treatment Effects
Bivariate Probit
Dynamic Panel GMM Estimator (Arellano-Bond)

**Article Presentations**

**Readings:**
- AP Ch. 4
- SW Ch. 12
- MV Ch. 5
- JW Chs 5, 6.2
WEEK 8  Regression Discontinuity Design (RDD)
      Sharp vs. fuzzy RDD
      Fuzzy RDD as IV
      Parametric / functional forms
      Non-parametric local linear regression
      Optimal bandwidth

Finalize topic & plan for empirical research paper
Problem Set I (Panel Data, DD/DDD, IV) Due
Article Presentation

Readings:  AP Ch. 6

WEEK 9  Midterm Exam
Article Presentation

WEEK 10-11  Limited Dependent Variables
      Count Data Models
      Poisson regression model
      Negative binominal model
      Categorical outcomes
      Multinomial logit
      Independence of Irrelevant Alternatives
      Conditional logit
      Ordered probit

Article Presentations

Readings:  MV Ch. 7
A. C. Cameron & P. Trivedi, “Models of Count Data”
Microeconometrics: Methods and Applications, 2005.
A. C. Cameron & P. Trivedi, “Multinomial Models”,
Microeconometrics: Methods and Applications, 2005.

WEEK 12  Heckman Sample Selection
Sample selection bias
Tobit model
Heckman sample selection model
Exclusion restriction vs. functional form identification
Two-part models

Article Presentation

Readings:  MV Ch. 7

WEEK 13  Heterogeneous Effects
Moderators & interactions
Quantile regression
Finite mixture models

Article Presentation


WEEKS 14-15  Special Topics
Mediation analysis
Dealing with missing data & top-coding
Multiple imputations

Article Presentation
Problem Set 2 (RDD, Limited Dependent Variables, Heterogeneity) Due

Empirical Research Paper due last day of class (May 4\textsuperscript{th})
Presentations (May 4\textsuperscript{th})

** Tentative topics may change depending on the pace of the class.**