

Econ 513: Practice of Econometrics

Fall 2015
Department of Economics, USC

Instructor

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Course Description

This course is an introduction to the measurement of economic relations. Such relations are useful to assess the effect of a single variable holding other variables constant, the type of effect that economic theory informs us about. The main focus will be on *causal* relations, which are especially important for analyzing the effects of proposed or implemented policies. We will discuss theoretical considerations and practical issues with establishing causality. We then introduce a number of tools that can be used to quantify causal and non-causal relations. We primarily consider linear relations and develop the estimation and inference methods for such relations. An issue that comes up frequently in empirical economic and social science research is that variables that affect an outcome are not chosen at random. We discuss various approaches to dealing with the resulting bias. Finally, we consider nonlinear relations, in particular the relation between a discrete outcome and determining variables.

The emphasis of this course will be on practical applications, including analyses of datasets with econometric software (Stata) and interpreting the results. But sound application of the methods requires understanding the theoretical aspects of economic behavior, study design, model building, econometric estimation, and statistical inference. Hence, these elements will be addressed as necessary.

Learning Outcomes

Upon completion of this course, students should:

- be familiar with the most widely used econometric methods;
- understand the relative advantages and pitfalls of each method for different applications;
- be able to identify and use appropriate methods in their own work or research;
- be able to familiarize themselves with econometric methods that are not discussed in this course, by studying a graduate-level econometrics textbook like Cameron & Trivedi (2005) and the *Methods and Formulas* sections in the Stata manuals.

Course Organization

Lectures are twice a week, on Tuesdays and Thursdays 4:00pm–5:50pm in GFS 116. Besides the lectures, there will be assignments that involve data analysis. We will support Stata, which is available on the USC network. The TA will organize a session in the computer lab to give an introduction to Stata. The data for these assignments will be made available for download on the course site.

Textbook and Additional Literature

We will mostly follow the textbook:

Joshua D. Angrist & Jörn-Steffen Pischke (2015). *Mastering 'Metrics: The Path From Cause To Effect*. Princeton University Press.

We will supplement this book with other materials that discuss the statistical and econometric theory a bit deeper and at a higher level, and that discuss a few topics that are not covered by this book, most notably panel data and discrete dependent variables. The slides of the lectures will be made available on the course web site.

Furthermore, I recommend that you have at least one advanced econometrics text as a reference book, such as

A. Colin Cameron & Pravin K. Trivedi (2005). *Microeconometrics: Methods and Applications*. Cambridge University Press.

This book is quite advanced and the treatment in the lectures will be less technical, but one of the goals of the course is that you will be able to familiarize yourself with topics not covered in the course using this book, or a similar book.

Lectures

A tentative list of topics that will be discussed is the following:

Date	Day	Lecture	Topic
08/25/2015	Tuesday	1	Introduction and overview
08/27/2015	Thursday	2	Causality and treatments
09/01/2015	Tuesday	3	Statistics review
09/03/2015	Thursday	4	Randomized trials
09/08/2015	Tuesday	5	Statistics for large samples
09/10/2015	Thursday	6	Economic relations
09/15/2015	Tuesday	7	Linear regression review
09/17/2015	Thursday	8	Multiple linear regression
09/22/2015	Tuesday	9	Vectors and matrices
09/24/2015	Thursday	10	Assumptions of the linear regression model
09/29/2015	Tuesday	11	Statistical inference for the linear regression model
10/01/2015	Thursday	12	Application: Demand systems
10/06/2015	Tuesday	13	Recap; Q&A
10/08/2015	Thursday	–	<i>Midterm</i>
10/13/2015	Tuesday	14	Local average treatment effects (LATE)
10/15/2015	Thursday	15	Instrumental variables (IV)
10/20/2015	Tuesday	16	Statistical properties of IV
10/22/2015	Thursday	17	Regression Discontinuity (RD)
10/27/2015	Tuesday	18	Fuzzy RD
10/29/2015	Thursday	19	Differences-in-Differences (DD)
11/03/2015	Tuesday	20	DD in state-year panels
11/05/2015	Thursday	21	Application: Returns to schooling
11/10/2015	Tuesday	22	Panel data and pooled OLS
11/12/2015	Thursday	23	Fixed effects and first differences
11/17/2015	Tuesday	24	Random effects and Generalized Least Squares
11/19/2015	Thursday	25	Binary response models
11/24/2015	Tuesday	26	Maximum Likelihood
11/26/2015	Thursday	–	<i>Thanksgiving recess</i>
12/01/2015	Tuesday	27	Statistical inference for binary response models
12/03/2015	Thursday	28	Recap; Q&A

Exams and Grading

Midterm: In class, Thursday, October 8.

Final: The date of the final is set by the College (Thursday, December 10, 4:30pm–6:30pm).

Homework: Five assignments (made available on Thursdays: 09/03, 09/17, 10/22, 11/05, 11/19). The assignments will involve empirical work for which you will use Stata, which is available on the USC network. An introduction to Stata will be provided. You will have one week to return each assignment.

Grading: Grades will be based on assignments (40%), a midterm (30%), and a final examination (30%).

Prerequisites

Econ 318 or equivalent. Some background material will be reviewed in the first few weeks of the course, but this will only be a quick refresher. We assume you have basic knowledge of linear regression as well as probability, statistics, and mathematics.

Disability Accommodations

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30am–5:00pm, Monday through Friday. The phone number for DSP is (213) 740-0776.