USCPrice

Sol Price School of Public Policy

PPD 558 Multivariate Statistical Analysis

Fall 2022 Tuesday 2:00pm – 5:20pm
Course Location: RGL 100
Section 51221D

Instructor: Emma Aguila, Ph.D.
Biography: http://priceschool.usc.edu/emma-aguila/
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TA Office Hours and Office: Mondays 10:30am – 11:30am. By appointment or during office hours.
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Course Description

This course will provide you with the analytical and quantitative skills required to conduct applied statistical research. It will also teach you to think critically about methodology and proper interpretation of results when reading and analyzing empirical research such as that found in academic journals, white papers, and policy papers from national and international organizations.

The foundation of this course is multivariate regression analysis. We will begin by learning Ordinary Least Squares (OLS) models and then expand our coverage to logistic models, panel data, and experimental methods to evaluate the impact of public policies. We will discuss common problems with these methods, techniques for diagnosing and addressing these problems, and selecting the appropriate econometric tools to answer any given question.

Learning Objectives

This course will train students to be effective practitioners and sophisticated consumers of quantitative research methods for policy analysis. While we will use econometric theory, it is a means to an end: this course has a strong applied (rather than theoretical) orientation, so our coverage of econometric theory will be limited to those elements that directly serve the primary goal of enabling students to be successful users of quantitative empirical analysis.

The goal of this course is to train students to effectively use econometrics methods in solving complex policy, management, and planning problems. This goal will be achieved through lectures, discussions, in-class student presentations and activities, problem sets, and completion of a final paper. For the final paper, students will be required to use these methods in a research or policy paper and present the main findings.

Prerequisite(s): Applied Social Science Statistics (Stat Lab, PPD502x, PPD525, or equivalent)

Course Notes

The course utilizes Blackboard (http://blackboard.usc.edu) for posting lecture slides, assignments, syllabus, and readings.

Technological Proficiency and Hardware/Software Required

The Stata software package is required for in-class data analysis, take-home assignments, and the final project.

There are several different versions of Stata available. The required version of Stata is Stata/BE (Basic Edition). You should bring a laptop with Stata installed to all class meetings, as we will use Stata during lectures, and in-class exercises.

Please note that for Students that expect to continue using Stata for other courses or for their doctoral dissertation Stata/SE (Standard Edition) is recommended. Students in this class will use large data sets for their Analysis Project described below. Students will be able to access Stata/SE using USC CloudApps (for free), open the large datasets, and keep only variables needed for their Analysis project. They will be able to save a smaller dataset which students can use with Stata/BE. Stata/BE allows up to 2,048 variables. Large datasets used in this course may have more than 10,000 variables. For more information to access the USC Virtual Desktop Interface (VDI), please see https://itservices.usc.edu/vdi/.

Required Readings and Supplementary Materials

Required and optional readings are noted as such. There is one required textbook and two optional.

REQUIRED

A.H. Studenmund (2016). Using Econometrics: A Practical Guide. 7th Edition, Pearson/Addison-Wesley.

Stata companion:
https://media.pearsoncmg.com/ph/bp/bp_studenmund_econometrics_7/Using_Stata/UsingStata.html
Textbook resources website: https://media.pearsoncmg.com/ph/bp/bp_studenmund_econometrics_7/index.html

Note: The 6th edition of the Studenmund text can be used instead (successful completion of the course does not require the newest edition), but the 7th edition has incorporated some substantial revisions.

OPTIONAL
Alan C. Acock (2012). A Gentle Introduction to Stata. Revised Sixth Edition, Stata Press.
This book covers Stata basics and some foundational topics from this course.

There are also many free online resources for learning how to use Stata that you may find to be helpful. For example, UCLA's stats group provides tutorials at http://www.ats.ucla.edu/stat/stata/default.htm

For Ph.D. Students, I recommend more advanced readings from:

Khandker, Shahidur R.; Koolwal, Gayatri B.; Samad, Hussain A. 2010. *Handbook on Impact Evaluation*: Quantitative Methods and Practices. World Bank. https://openknowledge.worldbank.org/handle/10986/2693 License: CC BY 3.0 IGO. This book (freely available as a pdf from the World Bank) provides more advanced coverage of post-midterm topics such as experimental methods and difference-in-difference, and also provides a useful reference for students looking to learn about material beyond that covered in PPD 558, such as propensity score matching and regression discontinuity methods.

Joshua D. Angrist and Jorn-Steffen Pischke, Mostly Harmless Econometrics (2009). Princeton University Press.
A. Colin Cameron and Pravin K. Trivedi, Microeconometrics Using Stata (Revised Edition, 2010), Stata Press.

You will also be asked to read various journal articles as noted in the syllabus that will be made available on Blackboard (http://blackboard.usc.edu.)

Grades and assignment submission policy:

Students are expected to complete all assignments on time. Unless otherwise specified, assignments are due at the beginning of class on the date indicated via Blackboard. Late assignments will incur a penalty of 10% if submitted late but still on the due date, 20% if submitted the following day, and 30% if submitted the day after that; after this point, the assignment will no longer be accepted.

Students will complete a midterm exam and final exam, along with 5 problem sets, and an analysis project. Overall scores for the course will be calculated from these components using the weights specified below, with the caveat that I reserve the right to assign a non-passing grade on the basis of extremely poor exam performances even if a student receives high scores on the group project and other assignments completed outside of class with the potential assistance of other students.

Category	% of Grade
Problem Sets (5% each)	25
Midterm Exam	25
Analysis Project	25
Final Exam	25
TOTAL	100

Grading Scale

93-100	A	73-76	C
90-92	A-	70-72	C-
87-89	B+	67-69	D+
83-86	B	63-66	D
80-82	B-	60-62	D-
77-79	C+	< 59	F

ANALYSIS PROJECT (25%)

Students, working in small groups, will use multivariate econometric analysis methods studied in this course to address a policy issue. The project will be done in groups of 5 or 6 people. I will make an exception for PhD students using the project as part of their dissertation. Each group must choose a policy issue, select an appropriate method from the techniques learned in the course, perform the analysis, and write up the results. You must clearly differentiate your analysis from previous work (it doesn't need to be a topic that has never been studied, but your analysis must contribute something new, not just replicate what others have done).

Group formation: In **Week 1,** students will provide me information on their policy interests and their background in statistics. I will form groups based on this information by **Week 3**.

Project Proposal Description: You are expected to work on this project throughout the semester. In **Week 3 and Week 4**, we will discuss the datasets you can use and how to formulate a research question. You must email a project description to me by the start of class on **Week 5** using the Project Description_PPD558.doc file available in Blackboard. This should be a 1.5-page maximum description of the problem you will be addressing (i.e., policy issue and research question), the expected dependent variable, an initial causal model, a description of the data you plan to use, sources of those data, and timeline.

Data, Methods, and Preliminary Descriptive Analysis: By the start of class on **Week 8**, groups must send the instructor via email the assignment called Analysis Project Data and Methods.doc available in Blackboard. In this assignment, you will

describe in more detail the dataset, variables, and model that you will estimate based on those data. Be certain to justify the variables, data, and model you have chosen. You will also show descriptive analysis of the variables.

Methods and Preliminary Regression Results: By the start of class on **Week 10**, groups must send the instructor via email the assignment called Methods and Results.doc available in Blackboard. In this assignment, you will describe the regression you chose, describe the variables used in the model and will present preliminary results of the regression (in the form of standard tables of regression output) and any other analyses conducted (e.g., diagnostic tests). You will also provide an explanation of the results. Be certain to justify the variables you have chosen according to previous literature or findings. Finally, provide an updated timeline for completion of the remainder of the project.

Final project presentation: Presentations should be done in PowerPoint. Guidelines for the presentation will be available on Blackboard. I will check a first draft of your presentation and written report on **Week 11.** Groups will present their projects in class in **Week 12** and **Week 13**, 2-3 weeks prior to the due date of the final paper (allowing additional time to revise your projects after receiving feedback from me and from your classmates). Each group must send by email their presentations to the TA and me before the class on **Week 12** and **Week 13**. Your comments and questions during class in **Week 12** and **Week 13** are strongly encouraged.

Final written report: The final paper must be submitted (as a Microsoft Word document) by email before the class on **Week 15**. If you miss this deadline, your paper will be considered late. Your grade will be penalized 10 percent each day it is late.

Supporting Stata files submitted with final written report: In addition to submitting your paper, you must email your final dataset (in Stata format) and do-file to me (by the same deadline) in order to allow reproduction of your analysis.

Format Written Final Report:

Your written report should be modeled after a client-focused report such as a GAO report (www.gao.gov) or other examples posted on Blackboard from the World Bank and other international organizations. It must include the following sections (in the order given here):
- A one-page executive summary (e.g., GAO Highlights). The summary should review the policy question motivating the analysis and the major findings.
- A background section that describes the motivation for the analysis, including information on your intended audience/client, the problem you are addressing, and the context.
- A review of the relevant research.
- A detailed description of your data, their sources, how they were collected, and their reliability. Any limitations of the data should be described here.
- A description of your methods and why they are appropriate.
- A section on the results of your analysis and any limitations or concerns about its validity. The regression results must be presented in tabular form (as seen in the various research papers we will read throughout the course).
- A conclusion section that develops the implications of your analysis for the problem or policy you are addressing.
- A references section that identifies the sources of all material cited in your paper.
- Two technical appendices; the first appendix should list all variables used in the analysis and their descriptive statistics, and the second should provide the Stata output showing your regression results.

The report must not exceed 10 pages (double-spaced, 12-point Times New Roman font, 1-inch margins), not including the executive summary, tables, figures, references, and technical appendices.

Evaluation of your own contribution and others in the Group: Each student (with the exception of any who are working alone, of course) must complete a peer evaluation in which you assess the contributions of your group members. These evaluations are completely confidential and will never be shown to your group members. Please respond honestly, and do not discuss these evaluations with anyone else (either before or

after you complete them). These peer evaluations are important to give me a better sense of how groups worked, and to provide an opportunity for you to bring to my attention any issues that arose over the course of this project (**you are also encouraged to come speak with me throughout the course regarding any serious issues that arise and cannot be resolved internally**). In particular, I will give serious consideration to comments indicating that a student did not contribute satisfactorily to the group (did not do a fair share of the work, was uncooperative, did not meet agreed-upon deadlines, etc.) when assigning individual grades for the project, as well as positive comments noting particularly outstanding contributions. The evaluation forms will be made available on Blackboard once the final papers are turned in, and must be submitted via email within one week of the project due date.

A note to anyone contemplating giving less than full effort and free-riding on the work of your teammates: you are not the first to think of this strategy, and your predecessors who have attempted it have found this to be an extremely unsuccessful strategy (both in terms of their individual grades for this project, and their prospects for group work for the remainder of their degree programs – a reputation for not contributing your fair share to group projects is easily acquired but not so easily removed, and will follow you well beyond this class). Low individual effort on the group project is rarely an issue in this class, but in case you happen to be one of the unusual individuals who decides to attempt it, ***you have been warned!***

Grading of final project:
Your grade will be based on the final project paper (50 out of 100 points), the presentation (20 out of 100 points), submission of project proposal, data, methods, and descriptive analysis section, methods and preliminary results sections, and first draft of final project (20 out of 100 points), and the evaluation (10 out of 100 points).

Course Schedule: A Weekly Breakdown
The table below provides the weekly topic and assignments by date given and date due.

	Topics/Daily Activities	Readings from primary textbook	Deliverables *(due by beginning of class unless otherwise specified)*
Week 1 Aug 23	Course Introduction	Studenmund 6E Ch. 17 (available online here)	
Week 2 Aug 30	Regression Analysis: Estimation and Evaluation	Studenmund Ch. 1-3, 5	
Week 3 Sep 6	Regression Analysis: Assumptions, Properties, and Model Specification	Studenmund Ch. 4, 6-7	Problem Set 1
Week 4 Sep 13	Heteroskedasticity and Serial Correlation	Studenmund Ch. 9-10	Problem Set 2
Week 5 Sep 20	Practical Challenges and Diagnostic Tools	Studenmund Ch. 8 & 11	Analysis Project Description Due TODAY
Week 6 Sep 27	*In-class analysis exercise 1* and instructions exam		Problem Set 3
Week 7 Oct 4	**Midterm exam**		
Week 8 Oct 11	Categorical Dependent Variable Models	Studenmund Ch. 13	Analysis Project Data, Methods, and Preliminary Descriptive Analysis Due TODAY
Week 9 Oct 18	Experimental Methods	Studenmund Ch. 16 (through p. 472)	Problem Set 4
Week 10 Oct 25	Panel Data and Fixed Effects	Studenmund Ch. 16 (starting p. 473)	Analysis Project Methods and Preliminary Regression Results Due TODAY
Week 11 Nov 1	*In-class analysis exercise 2*		Problem Set 5 Submit first complete draft of final project DUE TODAY
Week 12 Nov 8	*Project presentations*		Presentation slides for groups presenting this week
Week 13 Nov 15	*Project presentations*		Presentation slides for groups presenting this week
Week 14 Nov 22	Thanksgiving Break (no class)		
Week 15 Nov 29	*Final thoughts & course review class*		Final Written Project & Evaluation Due TODAY
Thursday, Dec 8	**Final exam** 2:00 – 4:00pm		

Readings by Topic: *(more supplemental readings may be added throughout the semester)*

Course Introduction

Before the next class, you may wish to review the statistics material that you are expected to know already: Studenmund 6E Chapter 17 (online [here](#)), and review slides on Blackboard

Regression Analysis: Estimation and Evaluation

Studenmund Chapters 1-3, 5

Regression Analysis: Assumptions, Properties, and Model Specification

Studenmund Chapters 4, 6-7

Graddy, Elizabeth (2001), "Juries and Unpredictability in Products Liability Damage Awards," *Law & Policy*, 23:1, 29-45.

Heteroskedasticity and Serial Correlation

Studenmund Chapters 9-10

Practical Challenges and Diagnostic Tools

Studenmund Chapters 8 & 11

Categorical Dependent Variable Models

Studenmund Chapter 13

Graddy, Elizabeth, and Ke Ye (2008), "When Do We 'Just Say No'? Policy Termination Decisions in Local Hospital Services," *Policy Studies Journal*, 36:2, 219-242.

Aguila, Emma, and Julie Zissimopoulos (2013), "Retirement and health benefits for Mexican migrant workers returning from the United States," *International Social Security Review*, 66:2, 101-125.

Experimental Methods

Studenmund Chapter 16 (through p. 472); *Angrist & Pischke Chapter 2; Khandker, Koolwal, and Samad Chapters 3 and 5*

Aguila, Emma (2011), "Personal Retirement Accounts and Saving." *American Economic Journal: Economic Policy*, 3, 1-24.

Aguila, Emma, and Maria Casanova (2019), "Short-Term Impact of Income on Cognitive Function: Evidence from a Sample of Mexican Older Adults." *Journal of Aging and Health*. Online before print. https://doi.org/10.1177/0898264319841155.

Panel Data and Fixed Effects

Studenmund Chapter 16 (starting p. 473); *Angrist & Pischke Chapter 5*

Joyce, Geoffrey F., Julie Zissimopoulos, and Dana P. Goldman (2013), "Digesting the Doughnut Hole," *Journal of Health Economics*, 32, 1345-1355.

King, Andrew A., and Michael J. Lenox (2001), "Does It *Really* Pay to be Green? An Empirical Study of Firm Environmental and Financial Performance," *Journal of Industrial Ecology*, 5:1, 105-116.

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Student Accessibility Services - (213) 740-0776
https://osas.usc.edu/
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity
Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in
which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.