Department of Economics
University of Southern California

Introduction to Econometrics

Professor Vittorio Bassi   Spring 2022
                                                                                                        Economics 318

Lectures times: Monday/Wednesday 10:00-11:50am

Lecture location: Week 1 and 2: Zoom: https://usc.zoom.us/j/96850503096 (PW: 940669)

Week 3 onwards: In person: Grace Ford Salvatori Hall (GFS), Room 207

Email: vbassi@usc.edu

Office Hours: Wednesday 12:50-1:50pm, KAP 306B

Please sign up for an office hour slot with Professor Bassi here:
https://docs.google.com/spreadsheets/d/1v3TMKiVXxExYX2Nsnfo2e9rrGOnO4tls_VCMrG_8qVw/edit?usp=sharing

If you can't make this time or the slots are full, please send me an email to reschedule.

Discussion Sections: Mon 6-6:50pm at Center for International and Public Affairs (CPA) 161
                                   Wed 6-6:50pm at Center for International and Public Affairs (CPA) 111

Teaching Fellow: Yi-Ju Hung

        Email: yijuhung@usc.edu

        Office Hours: Tue 12:50-1:50 pm and Thu 12:50-1:50 pm, in KAP (third floor)

Please sign up for an office hour slot with the TA here:
https://docs.google.com/spreadsheets/d/1FLT1VP_GeOwnWXi1wq6EIweapgln27xShCH7hdDlzaY/edit?usp=sharing

Course Overview

This course follows Introduction to Statistics for Economics (Econ 317). It is intended to provide students with an understanding of and experience with the key methods economists use to quantify the relationships among variables. A major goal is to prepare students to carry out high quality statistical analysis themselves.

The main focus will be on multivariate regression and causal inference. Topics will include functional form, heteroskedasticity, serial correlation, omitted variables and simultaneity bias, instrumental variables, and forecasting. If time permits, I will also cover implementation of some basic machine learning techniques at the end of the course. We will consider a number of types of data, including cross-sectional data, time series data, and panel data. Practical as well as theoretical issues will be discussed in how to distinguish correlations from causal effects.

Students will become proficient in the use of STATA, a leading computer program for statistical analysis in the social sciences. We will go through the steps of obtaining and coding data for use in an

analysis. Review sessions and problem sets will provide experience in the use of econometric techniques to analyze of data.

Policy for Online and In-person Classes

The current plan is that classes will be online (remote) in Week 1 and 2 and will be in person from Week 3 onwards. Week 1 and 2 classes will be held live on Zoom (at the links provided above) but they will also be recorded and the recordings will be uploaded on Blackboard shortly after. There will not be a recorded version of in-person classes. In-person classes will be in person only.

Attendance of the lectures/discussion sessions held online in Week 1 and 2 is encouraged whenever possible, but not required. For online classes, students will be able to access the recorded lectures and discussion sessions at all times on Blackboard. There will be no components of this course that require participation to the sessions held online (synchronous participation is encouraged but not required). Attendance of the in-person classes is instead mandatory.

Students are responsible for the appropriate use and handling of the online recordings as per University policy. Please see the existing SCampus policies regarding class notes here (https://policy.usc.edu/scampus-part-c/). As per University policy, students are not permitted to create their own class recordings without the instructor's permission.

Students are encouraged to keep their camera on whenever possible during the live online sessions, though this is not required for participating to the live online sessions.

Readings:

Required Text

Jeffrey M. Wooldridge, Introductory Econometrics: A Modern Approach

   You do NOT need to purchase the latest version of the textbook (7th edition) – any edition after the 4th edition is fine, since there is little difference between the editions except for the price. You can also search online for digital versions: these are often available for a lower cost.

Supplementary Texts

   If we are able to cover the material as on the calendar, I will give an introduction to machine learning during the last 1.5 weeks of the course. An excellent book is An Introduction to Statistical Learning by James, Witten, Hastie and Tibshirani. The material in the textbook is at more advanced level than in this course, and I will not go into that level of detail in class. You do not need a copy, it is only a reference – all test and problem set material will be based on class lectures. Statisticians are more generous than economists, so you can get a free copy on Professor James' website at http://www-bcf.usc.edu/~gareth/ISL/ISLR%20First%20Printing.pdf.

STATA

   The computer program STATA will be used extensively in the course. The program has good help facilities and guides available for free on the internet. UCLA maintains an excellent web site devoted to STATA (https://stats.idre.ucla.edu/stata/). TA sections will be used to go over key STATA commands. If you have a question, you can likely google it and find an answer. Popular sites for answering questions about Stata include Statalist and StackOverflow.

   STATA is available on public computers around campus, but it will probably be helpful to have on your personal computer. The current version is Version 17, but Versions 11 to 16 are equally fine.

You can purchase STATA by following the instructions at https://itservices.usc.edu/stats/stata/,
You can choose either STATA IC, SE, or MP. STATA IC is fine for the course and most research
projects, and the least expensive option ($45 for a 6 month license).

Requirements (% of the final grade)

1. Problem sets (20%)

2. Quizzes (20%)

3. Empirical Project (10%)

4. Mid-term exam (20%)

5. Final exam (30%)

Problem Sets: Problem sets will include both analytical problems and empirical problems that involve
computing. Your lowest problem set grade will be dropped, so you can miss one with no questions
asked. However, it is recommended that you attempt all of the problem sets. **I do not accept late
problem sets.** You are permitted to work in groups on the problem sets, but you must do all your own
computing and write up your own answers. You must indicate the name of group members on your
assignment. Unless otherwise indicated, the problem sets are due at the start of class on the day of the
deadline.

The problem sets will be graded by the TA. I will randomly select around half of the questions on the
problem set to be fully graded based on correctness. The remaining problems will be graded based on
completion rather than correctness. You can check the remaining problems against the solutions.

Quizzes: These will be posted each week to blackboard and contain 10 questions, each worth 10 points.
They are to ensure that you are keeping up with the material even during weeks that you do not have
problem sets. Quizzes are open-book, meaning that you can use your textbook and class notes when taking
them. However, you cannot consult with other students. Quizzes for a particular week must be taken by
Sunday night at 11:59pm. The lowest 2 quiz grades will be dropped, so you are fine if you have to miss
some.

Your graded responses to the quiz questions are available after Sunday night at 11:59pm, so you can see
what you got wrong/the right answer. To access these, go to the Grade Center for the course and click on
your grade for that particular quiz. This will take you to a page that displays your results, as well as the
correct answer and an explanation of why that answer is correct.

Empirical Project: For this project, you will work independently to apply the data analysis and econometrics
skills you have learned in the class. You will analyze real-world data to answer an important economic
question and write up a short (no more than 4 page) report on it. Unlike in the labs, you will not have
detailed guidance on how to complete each step of the project: you will have to decide on how to
merge, rearrange, and clean the data sets to make them usable.

TA Sessions:
Attendance at the weekly TA sessions is **highly recommended**. During the TA sessions, the TAs will
instruct you in how to use Stata, which is necessary for completing the problem sets. You will also be
tested on your knowledge of Stata during the exams. The TAs will also go over important concepts from
class and problem sets.

Schedule of Readings and Lecture Topics

Class attendance and participation in the in-person classes is mandatory. It is highly recommended that you do the reading or read the slides for a particular class **before** coming to class so that you are prepared and can ask questions if you were confused.

	Topics	Readings	PSet	Lab/TA session
Week 1 January 10	Course introduction Overview of Types of Economic Data Working with data in Stata	Chapter 1		
January 12	Basic Mathematical Tools *Please note: no TA sessions in Week 1*	Appendix A		
Week 2 January 17	**Martin Luther King Day (No class)**			Lab #1: Job training (Part 1)
January 19	Fundamentals of Probability Properties of Data	Appendix B1-B5		
Week 3 January 24	Finish Probability			Lab #2: Job training (Part 2)
January 26	Linear Models	Ch 2.1-2.2		
Week 4 January 31	OLS estimation	Ch 2.3-2.5	PS #1 due	Lab #3: Microcredit (Part 1)
February 2	Multiple Linear Regression	Ch 3.1-3.2		
Week 5 February 7	Multiple Linear Regression Begin on Statistical Inference	Ch 3.3, 3.4, 3.5		Lab #4: Microcredit (Part 2)
February 9	Statistical Inference	Appendix C		
Week 6 February 14	Statistical Inference with Linear Regression	Ch 4.1-4.3	PS #2 due	Lab #5: Vietnamese Firms
February 16	Testing Multiple Hypotheses	Ch 4.4-4.5		
Week 7 February 21	**President Day (No class)**			Review Session for Midterm
February 23	Developing and Using Regression Models	Ch 6.1-6.3		
Week 8 February 28	Dummy variables; decomposing group differences; interaction terms	Ch 7.1-7.3	PS #3 due	Lab #6: Functional Forms and Interactions 1
March 2	**Midterm Exam – this will cover material through Feb 23 (Chapter 6)**			
Week 9 March 7	Linear Probability Model; Logit; Probit	Ch 7.4-7.7 Ch 17.1-a,d		Lab #7: Functional Forms and Interactions 2
March 9	Heteroskedasticity-Robust Inference	Ch 8		
Week 10 March 21	Experiments/Randomized Controlled Trials	*Lecture notes*		Lab #8: Titanic
March 23	Experiments/Randomized Controlled Trials (continued)	*Lecture notes*	PS #4 due	
Week 11 March 28	Difference-in-Differences Estimators	Ch 13.1-13.4		Lab #9: Education Experiment
March 30	First Difference Estimators	Ch 13.5		
Week 12	Fixed Effects Models	14.1-14.2		Lab #10:

				Minimum Wage
April 4				Minimum Wage
April 6	Instrumental Variables	Ch 15.1-15.3	PS #5 due	
Week 13 April 11	Two Stage Least Squares and Testing for Endogeneity	Ch 15.4-15.5		Lab #11: Murder
April 13	Time Series Data	Ch 10.1-10.2		
Week 14 April 18	Functional Form, Dummy Variables, and Index Numbers Trends and Seasonality	Ch 10.4-10.5		Lab #12: Quarter of birth
April 20	Introduction to Machine Learning	ISLR 6.1 and 6.2		
Week 15 April 25	Machine Learning part 2	ISLR 6.1 and 6.2	PS #6 due	Review session for final
April 27	Review session for Final			
May 1			Empirical Project Due	
May 9	**Final Exam (8-10am)**			

Additional Resources
Below I list some resources that you may find useful for this course or future courses. None of the material is required, but all should be available at the library. I have listed some additional econometrics books, but the Wooldridge text is the best.

Econometrics
1. Mastering Metrics and Mostly Harmless Econometrics by Angrist and Pischke. These are short textbooks with an emphasis on the applications of the tools we develop in this course. Mostly Harmless Econometrics is more advanced.
2. Introduction to Econometrics by Stock and Watson. This textbook is at a slightly lower level to Introductory Econometrics by Wooldridge.

STATA
3. Microeconometrics Using Stata: Revised Edition by Cameron and Trivedi. An in-depth overview of econometrics with STATA.
4. Statistics with STATA by Hamilton. A good guide to Stata.
5. STATA guides at UCLA and Princeton. Both include tutorials, detailed help files, and web videos.

Applied Economics
6. Freakonomics and Superfreakonomics discuss a number of applied economics papers. If you read some of the papers that the books are based on, you will see that they use the econometrics you learn in this course.
7. Some excellent podcasts about applied economics is NPR's Planet Money and The Indicator, as well as the BBC's More or Less.
8. The site websites http://microeconomicinsights.org/ and http://voxeu.org/ provide short summaries of economics articles on a variety of topics. Most of the articles are empirical, and many use techniques covered in the course.

Policy on Missed Exams

Students must take the exams at the scheduled times. The only valid grounds for a make-up exam is a valid medical excuse with documentation, or extenuating circumstances for which prior arrangements have been made with the instructor. No credit will be given for unexcused, missed exams. Student will receive an F for the course if the final exam is missed for an unexcused absence. If you have a valid reason for missing the final exam, and can document it, you will be awarded an incomplete.

Under the USC ARR Grade Handbook, students are never permitted to omit taking the final exam or take it early. The only possible grounds for taking the final exam at a different time from the rest of the class are: (1) two final examinations that are scheduled for the same time; or (2) more than two final examinations on the same day. If this situation applies to you, you must contact both me and the other involved professors no later than two weeks prior to the examination dates.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A - https://policy.usc.edu/student/scampus/.

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. Academic misconduct will not be tolerated, and any violations will be reported to the University for adjudication. Portions of your exams will be photocopied before being returned to you to ensure that no alterations are made to test booklets after return in an attempt to receive a higher grade.

Statement for Students with Disabilities
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 (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website for DSP and contact information: (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Emergency Preparedness/Course Continuity in a Crisis
In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies. See the university's site on Campus Safety and Emergency Preparedness.

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

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

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

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class.
equity.usc.edu

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate
investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations.
dsp.usc.edu

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

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for
each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially
declared emergency makes travel to campus infeasible. emergency.usc.edu

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency
or to report a crime.*
Provides overall safety to USC community. dps.usc.edu