Syllabus
Econ 103A – Sec 80   Introduction to Econometrics & Research Methods
San Jose State University
Online – Asynchronous
Fall 2021

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Welcome to Econ 103A, Introduction to Econometrics & Research Methods!

Course Description

Research methods and core econometric techniques for analysis of causal effects, from simple regression through multivariate complex regression analysis. Topics include selecting an appropriate research question, reviewing the relevant literature, and obtaining data. Core econometric techniques used to analyze data in an original term paper.

Grading and Classroom Policy

This is a 4-unit course. The grading scale is: 60-62, D-, 62-68, D, 68-70, D+, 70-72, C-, 72-78, C, 78-80, C+, 80-82, B-, 82-88, B, 88-90, B+, 90-92, A-, 92-98, A, 98-100, A+. I generally don't allow makeup assignments unless there is sufficient notice and a well justified and documented reason.

Weekly Modules

Weekly Modules contains weekly lecture recordings, readings, assignments, and quizzes.

Suggested Textbooks

1.) Bailey, M.W. 2016. Real Econometrics: The Right Tools to Answer Important Questions. Oxford University Press; 1st edition.
Resources: https://global.oup.com/us/companion.websites/9780190296827/

2.) Holian, M. J. Forthcoming. Data and the American Dream: Contemporary Social Controversies and the American Community Survey. Palgrave Macmillan.

3.) Angrist, J. D. and Pischke, J. 2014. Mastering Metrics, Princeton University Press, Princeton, N.J. Resources: www.mastermetrics.com

4.) Stock, J.H. and Watson, M.W. 2011. Introduction to Econometrics. Pearson, 3rd edition
This is the book we use in the graduate econometrics sequence, although it is perfectly accessible to undergraduates.
Any recent edition is suitable. See also the publisher's Student Resources page for replication files for the book in Stata format: http://wps.aw.com/aw_stock_ie_3/178/45691/11696965.cw

Required Computer Software
All students must have installed on their home machines free R and R Studio software. Students whose computers have limited memory are advised to create a free R Studio Cloud account.

Course and Program Learning Objectives (CLOs and PLOs)
This course reinforces PLO3: research methods and PLO5: communication, and introduces PLO4: areas: quantitative methods.
Specific CLOs for this course include:
 CLO 1.) Explain basic methods in econometric sand identify correct procedures
   a) Explain the difference between a variable and a statistic in the context of a regression equation.
   b) Define the terms "causal effect" and "ideal experiment". Explain the difference between descriptive statistics, inferential statistics, and causal inference.
   c) Give two examples of difference-in-means tests, using experimental and observational data, and explain when we can and cannot interpret a difference-in-means as an estimate of a causal effect.
   d) Describe how to use a simple (bivariate) regression model to carry out a difference in means test.
   e) Give an example of a regression coefficient estimate that suffers from omitted variable bias and explain how the regression control technique could reduce bias in the example.
   f) Describe all the numbers in a Stargazer regression table in R; identify the main independent variable of interest, interpret the econometric models, test their statistical significance and evaluate them in terms of any potential bias.
   g) Discuss best practices in estimating standard errors.
   h) Discuss an example of a natural experiment, where: 1.) a difference-in-means is a plausible causal effect, and 2.) where a difference-in-difference(D-in-D) in means is a plausible causal effect.
   i) Finally, explain how an interaction model automates estimation of a D-in-D estimate.

CLO 2: Use technology to analyze data
a) Create summary statistics for variables in a data set using the R software program.
b) Estimate a regression model (coefficients and standard errors) and create a scatterplot with a regression line in R.
c) Download data from the Internet and read it into a statistical software package
d) Run an R script associated with a published research study by modifying the directory path, installing required packages, loading data, and obtaining results.

e) Create a new script by modifying an existing script, and use your original results in a term paper

CLO 3: Prepare a scholarly research paper describing an original regression analysis:
a) Formulate an interesting and important research question.
b) Locate and describe data from Internet or other sources.
c) Search and analyze scholarly literature related to research question.
d) Write a review of econometric literature that is integrated and not merely an annotated bibliography; list and describe relevant studies and their research questions, the data, and methods they used, and the results they found. Highlight any studies that provide compelling estimates of well-defined causal effects or explain why a study does not.
e) Develop, estimate, and interpret a statistical model that can be used with the data to answer a question which is original and contributes to the literature.

Grading:

Your course grade will be determined as follow:

Assignment	Points	Due Dates
HW assignments	25	
Check-in assignments	25	
2,000 word term paper (due in phases)	50	Oct 6th, Nov 17, Dec 1st

Grades will be based on the usual grading scale and out of 100 points.

Detailed rubrics for the term paper can be found at the end of this syllabus. We will have weekly check-in assignments where I will evaluate your progress. I will assess completion of learning objectives, and will assign readings, software and writing assignments that will help you complete the learning objectives. Students will submit assignments on Canvas.

Academic integrity

Cheating or plagiarism (presenting the work of another as your own) will result in a failing grade and sanctions by the University. Faculty members are required to report all infractions. Note: The term paper involves a replication and students will find references in the original studies they can use in their literature review sections. However, do not just paraphrase the description of this literature. I will consider too much paraphrasing to be unoriginal and it may result in a failing grade on the term paper, and reporting to the Student Conduct office.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' web page at http://www.sjsu.edu/gup/syllabusinfo

Term Paper Components and Instructions

Students will write a term paper to analyze an economic/social/behavioral question or to verify a previously published study. The studies listed below are examples of the types of studies students can attempt to verify and then extend or re-analyze in some way.

Outline:

By Oct 6th students will write up 1.) an abstract describing their question or replication and extension study, and 2.) an outline that contains the title, written as a one sentence research question, five sections with section names, a complete bibliographic citation to the study you will attempt to verify, a regression equation you will estimate with a description of the variables, coefficients and estimation subsample. In the regression equation, index variables to make it clear to the reader what is the unit of observation (A household? A person?). Describe one or more original ideas for extending the model. Finally, include any results you may have already produced, even if they are on preliminary stages.

By Nov 17th you will submit a rough draft of your paper. The paper must expand upon the outline and include your best results to date. You will make a short, seven-minute presentation of your rough draft, using slides, later that day. Both your presentation and your draft should discuss best examples in the literature of estimating a well-defined causal effect, and your original contribution to this area. A rubric for presentations is on the last page of this syllabus.

After you receive feedback from the presentation, you will revise the rough draft and submit the final paper by Dec 1st. All papers must have five numbered sections: 1.) Intro, 2.) Literature Review & Economic Theory, 3.) Data Description, 4.) Empirical Results, and 5.) Conclusion, as described in Stock and Watson's "Conducting a Regression Study Using Economic Data" (on Canvas, Files > PDFs). Sections will be about five paragraphs in length and each paragraph about five sentences. This "5x5" suggestion is a rule-of-thumb and need not be followed exactly. However, all papers must have these three tables: Variable Descriptions, Summary Statistics, and Regression Results. Original figures like maps created with GIS software are encouraged but not required; all copied tables and figures are prohibited unless cleared with the instructor. Original tables must be formatted exactly as described in class. Your paper should have seven or more references (listed in a Bibliography section) in Chicago format. All papers must list and describe an equation describing the empirical model, and must contain an abstract. As an example, a brief "letters" style article (like Holian 2020a, 2020b) is close to (though slightly shorter than) what is required here. In particular, compared to a letters article, your paper must have a whole literature review section and table of summary statistics.

Examples of Good Candidates for Replication in this Class

Bailey, James, and Dhaval Dave. "The effect of the Affordable Care Act on entrepreneurship among older adults." Eastern Economic Journal45, no. 1 (2019): 141-159.

Comolli, Chiara Ludovica, and Fabrizio Bernardi. "The causal effect of the great recession on childlessness of white American women." IZA Journal of Labor Economics4, no. 1 (2015): 21.

Costa, Dora L., and Matthew E. Kahn. "Electricity consumption and durable housing: understanding cohort effects." American Economic Review,101, no. 3 (2011): 88-92.

Holian, Matthew J. "The impact of urban form on vehicle ownership." Economics Letters186 (2020a): 108763.zHolian, Matthew J. "The impact of building energy codes on household electricity expenditures." Economics Letters186 (2020b): 108841.

Orrenius, Pia M., and Madeline Zavodny. "The Impact of Temporary Protected Status on Immigrants' Labor Market Outcomes." American Economic Review105, no. 5 (2015): 576-80.

Winters, John V. "Is economics a good major for future lawyers? Evidence from earnings data." The Journal of Economic Education47, no. 2 (2016): 187-191

Term Paper Grading

For Rough Drafts and Term Papers, I will be looking for the things listed in the table below in each section. Of course, following the guidelines of the assignment listed above is important; to repeat, all papers must have:

1.) five sections, 2.) about 25 paragraphs or 125 sentences, 3.) tables of Variable Descriptions, Summary Statistics, and Regression Results, 4.) no copied figures, 5.) References (at least seven)in Chicago format, 6.) an equation describing an empirical model, 7.) an abstract that summarizes the paper, and 8.) One or more JEL codes.

Content is most important. Remember this is a class about using observational data to estimate causal effects, so focus on discussing literature that strives to define and estimate causal effects, evaluate how credible the estimates in the study you replicate are as causal effects, and how your extension adds to our understanding, or improves upon the replication. Grammar is also important. There are formal rules of grammar (Does each paragraph have a topic sentence? Do all sentences develop one controlling idea? Does paper feature appropriate punctuation, syntax, usage? Is the paper free of spelling errors? Are citations used appropriately?) There are also less formal "stylistic" elements of writing: Does paper avoid the passive voice? Overall, is the writing style and voice appropriate? Does it appear the student read contemporary and seminal studies and is it written in the style of the profession? The best way to learn the style of economic writing is to read economic writing; this suggests you should try to actually read the journal articles you review in your literature review section, not just the abstracts. You can also consult various guides to style and writing. In addition to the McCloskey (1985) article that will be discussed in class, a book-length treatment that is widely used across fields is Strunk (2007)

The elements of style. For outlines, rough drafts and final papers, the percentages listed below each criteria are the approximate weight of each section towards your final grade. The difference between the assignments, essentially, is just the level of completeness—an outline may not feature any results, a draft will have results but the writing will be incomplete, and a final paper will be a complete academic-style term paper.

Criteria	Description of Criteria for Rough Drafts and Term Papers
Intro 5%	Reveal the research question to the reader clearly and at the outset. Motivate interest. Describe what this paper does (i.e. how you answer the research question), the main findings, and how the paper is structured.
Literature Review and Economic Theory 40%	This section should describe the relevant theory that is behind the hypotheses tested in past econometric studies. You may be able to describe the theory so precisely that you include a formal mathematical model in this section, but a clear qualitative description of formal theory would be enough. Discuss at least seven econometric studies, noting which provides the most compelling estimate of the causal effect of interest. Explain why (i.e. discuss ways the state-of-the art study handles a well-defined econometric problem such as Omitted Variable Bias.) The literature review must be integrated and not merely an annotated bibliography.
Data and Methods 25%	Describe the data; even though I am grading it and I know where the data comes from, write it for a more general audience. Describe the estimation subsample and present the tables of Variable Descriptions and Summary Statistics. Present the equation you will be estimating here.
Results 25%	Present regression results in a table with several models in different columns. Indicate in the text which of the models is your best attempt at replicating the previously published model. Also indicate which is the best attempt to estimate a causal effect (this may be your extension.)Interpret the results for the reader in terms of the sign, magnitude, economic and statistical significance, as well as the implications for the theory discussed in section 2.
Conclusion 5%	Overall, your paper should aim to discuss a specific causal research question that relates to a relevant economics literature. Acknowledge any limitations. Suggest directions for improvement in future research. Discuss policy implications and how your results can be used in a cost-benefit analysis, if applicable.

Course Schedule

Date	Lecture Topic	Check-In Readings and Dues
Aug 19	Introduction: What is Econometrics?	McCloskey's Economical Writing
Aug 25	Intro to R	Holian Ch 8 (Appendix)
Sep 1	Causality and Data	Holian Ch 1
Sep 8	Ch1: Identification and inference	Bailey Ch 1, Team Member submission Due
Sep 15, 2020	Ch2: Research Habits	Bailey Ch 2
Sep 22, 2020	Ch3: Bivariate Regression	Bailey Ch 3
Sep 29, 2020	Ch4: Hypothesis Testing	Bailey Ch 4
Oct 6, 2020	**Term Paper, Part 1**	Term Paper Part 1 Due
Oct 13, 2020	Ch5: Multivariate OLS	Bailey Ch 5
Oct 20, 2020	Ch6: Dummy Variables	Bailey Ch 6
Oct 27, 2020	Ch7: Specifying Models	Bailey Ch 7
Nov 3, 2020	Ch10: Experiments	Bailey Ch 10
Nov 10, 2020	Term Paper Discussion and Review	
Nov 17, 2020	Student Presentations	Term Paper Draft Due
Nov 24, 2020	Student Presentations	
Dec 1, 2020	Term Paper, Final	