

EAD946A: Regression Analysis for Education Policy

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Class time and location

Thursday, 10:20-12:10pm, EH 222 followed by an hour of Stata session from 12:40-1:40pm, 113 Ernst Bessey Hall

Amita's office hours

Thursdays after 3pm, by appointment

Youngran's office hours

Thursdays after the Stata sessions

What is the purpose of this class? What should students hope to know by the end of this class?

The foundation of most modern quantitative analysis of education policy is regression. Regression models provide researchers with a way to extract relationships between variables in data while accounting for the inputs of other variables. Understanding the fundamental theory behind and implementation of regression analysis, as well as the practical use of regression in statistical software packages, is a necessity to read, understand and produce quantitative education policy research. Further, it will provide you with the background needed to follow and utilize causal inference techniques that will be covered in EAD 946B.

In this course students will learn the theoretical basis for ordinary least squares (OLS) regressions, the conditions under which OLS fails to provide causal inference, how to interpret regression output, and how to conduct regression analyses using Stata. Specific topics include discussion of the types of data encountered in education policy research, bivariate regression, multivariate regression, asymptotic properties of linear regression, inference in multivariate regression, linear probability models, discrete variables and interactions, and corrections for heteroskedasticity and clustering, and an introduction to the specific problem of endogeneity that you will spend most of EAD 946B addressing. Each topic will be reinforced through applied readings and homeworks that will incorporate theoretical analysis, interpretation, and the use of Stata.

Text

We will follow closely Professor Jeff Wooldridge's *Introductory Econometrics: A Modern Approach*, 6th edition. Wooldridge, J. (2016), Cengage Learning. The book comes with excellent student resources; we encourage you to use them. (Henceforth JW)

In addition, we recommend that you obtain a copy of *Getting Started with Stata*, Stata Press. Available online at <http://www.stata.com/bookstore/getting-started-windows/> and <http://www.stata.com/bookstore/getting-started-mac/>

In the final few weeks of the class we will also selectively refer to Murnane, Richard and John B. Willett (2010). *Methods Matter: Improving Causal Inference in Educational and Social Science Research*. New York: Oxford University Press. (Henceforth MW)

Class expectations

We expect that students enrolled in this class already have a strong foundation in the basics of quantitative research that is equivalent to topics covered in CEP 932. This would include fundamentals of probability theory, probability distributions, hypothesis testing, sampling, correlations, and inference with means. For students who have not taken a course that covered these topics, it is highly recommended that you take CEP 932 prior to enrolling in this course.

Assignments

There would be periodic academic journal readings with applied concepts in this class, with a particular emphasis on older or classic papers in education policy that relied heavily on the concepts discussed here (i.e. OLS) which have laid the ground for more recent developments including many of the techniques you will encounter in EAD 946B. For graded work, students will work on five homework assignments that will draw from both the substantive discussions in class and the Stata sessions.

More about five graded homework

1. Homework assignments will be made available at the end of Stata session in the weeks indicated in the schedule.
2. Each homework will be worth approximately 20 points.
3. Each homework will consist of a series of Stata questions/exercise and a few substantive theory or application questions based on what we have covered in class.
4. Students will have two weeks to complete the assignment.
5. Students are not allowed to consult with one another about the assignments. You are welcome to clarify any doubts or questions with the instructor or the teaching assistant.

Grading

4.0 > 90%, 3.5 > 80%, 3.0 > 70%, 2.5 > 65%, 2.0 > 60%

Stata sessions

Required Stata sessions offered in conjunction with class will provide hands-on training for conducting independent quantitative analysis using Stata software. These sessions will also be helpful to orient students to homework questions that require the use of Stata.

Late assignment policy

You are expected to turn in the assignments on time. Late submission will affect your grades. If you are unable to complete your work on time due to unavoidable circumstances, please speak to me to ensure that your grades may not be affected.

Absence policy

If you must remain absent from a class, you need to inform me ahead of time. We will identify a way in which you can make-up for the time you lost.

Please also note MSU's Grief Absence Policy (Grief Absence Request Form can be found on the RO home page (<https://reg.msu.edu/>) under "Student Services" "Grief Absence Request Form")

Please note: MSU seeks to ensure that its programs are accessible to all persons. Students in need of special assistance or an accommodation regarding any of the course requirements as outlined in the syllabus and discussed in class are advised to notify me immediately. We will meet privately to discuss a resolution of your issue, which may or may not include an appropriate referral. Confidentiality will be maintained regarding your special needs.

Course Outline (subject to minor changes)

Date	Week	Class topic	Stata topic	Homework
Part I: BASIC CONCEPTS				
Jan 12	1	The Nature of Econometrics and Economic Data. (JW Ch. 1) <i>If time permits we will discuss briefly basics of linear (matrix) algebra and calculus covered in (JW Appendices)</i>	Set-up	
Jan 19	2	The Simple Regression Model. (JW Ch. 2)	Set-up	
Part II: MULTIPLE REGRESSION				
Jan 26	3	Multiple Regression Analysis: Estimation. (JW Ch. 3)	JW Ch1	HW1
Feb 2	4	Multiple Regression Analysis: Estimation. (JW Ch. 3)	JW Ch2	
Feb 9	5	Multiple Regression Analysis: Estimation. (JW Ch. 3)	HW1	
Feb 16	6	Multiple Regression Analysis: Inference. (JW Ch. 4)	JW Ch3	HW2
Part III: FUNCTIONAL FORM, SPECIFICATION, AND BREAKDOWN OF OLS ASSUMPTIONS				
Feb 23	7	Multiple Regression Analysis: Inference. (JW Ch. 4)	JW Ch4	
March 2	8	<i>Multiple Regression Analysis: OLS Asymptotics. (JW Ch. 5)</i> <i>(AMITA AWAY FOR A MEETING)</i>	HW2	
March 16	9	Multiple Regression Analysis: Further Issues (JW Ch. 6) ONLINE	JW Ch6	HW3
March 23	10	Multiple Regression Analysis with Qualitative Information: Binary (or Dummy) Variables. (JW Ch. 7)	JW Ch7	
March 30	11	Policy application How is multiple regression analysis used to inform education policy? What are the key limitations of multiple regression analysis in informing education policy research?	HW3	HW4
April 6	12	Heteroskedasticity and Serial Correlation (JW Ch. 8)	JW Ch8	
April 13	13	Heteroskedasticity and Serial Correlation (JW Ch. 8) Specification and Data Problems (JW Ch. 9)	JW Ch9	
April 20	14	Specification and Data Problems (JW Ch. 9)	JW Ch9	HW5 (SHORTER TIMELINE FOR HW5)
April 27	15	<i>Introduction to Panel Data and Methods, Preview of EAD 946B (JW Ch. 13-14)</i>	HW4	

Notes: We will cover topics highlighted in green depending on time; topics highlighted in red will be covered through the semester. For these topics I will identify pages from MW and an occasional article or two.