
PA 819: Advanced Quantitative Methods for Public Policy

University of Wisconsin - Madison

Spring, 2012

Lecture:

Tuesdays, 1:20-3:15 p.m.

Birge B302

Discussion sections

301: Education L150, Fridays 2:25 – 3:15pm

302: Education L159, Thursdays 5:30 – 6:20pm.

Instructor information

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Teaching Assistant:

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Office hours: TBA

Course description and summary

Advanced Quantitative Methods for Public Policy is the second course of a two-course sequence in quantitative analysis at the LaFollette School of Public Affairs. The course begins with a brief review of material covered in the pre-requisite course, Quantitative Tools for Public Policy Analysis (PA 818). We will quickly advance to more complex methods of statistical analysis, as you will inevitably find that the complexities of human and institutional activities frequently demand a more sophisticated strategy for the production and analysis of information that can inform public policy decision-making and our understanding of policy impacts.

The amount of data collected from or about individuals, communities, and institutions has increased rapidly in recent years, and these data are increasingly being used to make major decisions regarding people's health, education, employment, environment and other aspects of social welfare. This course will emphasize the application of statistical concepts and methodologies to the analysis of public policy issues, including the limitations of quantitative methods in generating answers to policy and research questions.

Prerequisite

PA 818 or equivalent (introductory statistics and basic regression)

Required texts and readings

Stock, J.H. & Watson, M.W. (2007). *Introduction to Econometrics* (2nd edition). Boston: Addison Wesley. [There is a 3rd edition, which is more expensive, but you can use either.]

The following is an additional very useful source for more advanced topics (optional):

Murnane, R., & Willett, J. (2010). *Methods Matter: Improving Causal Inference in Educational and Social Science Research*. Oxford University Press.

In addition to the above books, there is an electronic course pack that you can access through MyUW. See the outline of readings below. It is important for you to read them in advance.

Course objectives

By the end of the course, you should:

- Be able to carry out the basic steps of regression analyses using STATA or SAS
- Be able to formulate policy and associated research questions that can be answered using regression analysis
- Be able to design statistical models and identify appropriate data for answering those questions
- Understand how to correctly interpret regression coefficients and associated statistics, such as R^2 , t-stats, and F-stats
- Understand the difference between correlation and causation and the challenges involved in making causal inferences
- Understand the main quasi-experimental methods for making causal inferences outside the context of randomized control trials
- Be able to read, interpret, and understand the basics of academic journal articles that use these quasi-experimental methods

Office hours and other communication

In general, your questions should be directed to the teaching assistant for the course, Wilson Law (wblaw@wisc.edu), either during the discussion section or the office hours. If you have additional questions, you are also free to come see me in my office hours or contact me by email.

Grading

Class participation and effort:	5%
Project:	55%
Part I	10%
Part II	10%
Final	30%
Presentation	5%
Mid-term Exam:	15%
Final Exam:	25%

TOTAL	100%

Class participation: attendance, punctuality, coming prepared to ask questions (i.e., assigned reading done BEFORE lecture) – is essential for this course. The amount of effort you put into preparation and study for this course will be the most important variable predicting how well you will do and what you will gain. You are also expected to attend the discussion sections and to work on problems or assignments as assigned by the TA (although this additional work will not be graded).

Project: In a project that will span the duration of the course, you will take on the role of a researcher or policy analyst and choose a dataset (one among those posted on our course website, or with special permission, a dataset of your choosing), and these data will become the basis for the empirical work you will do in this class. You are encouraged to pair up with another student in class on this project. In particular, you will take the following steps, which are basic to any empirical data project:

1. Pick a policy topic/question and formulate a (causal) research question that addresses that policy topic
2. Identify and read a few policy briefs on the topic and a few journal articles on the research questions (though your literature review should be brief)
3. Outline a simple theory and hypotheses regarding your questions (i.e., discuss what you expect to find and why, probably based somewhat on prior research)
4. Choose a data set appropriate to your research questions.
5. Get to know your data (using descriptive statistics) and identify limitations of your data, refining your research question(s) if needed
6. Identify statistical methods appropriate for your data and questions
7. Specify statistical models
8. Conduct sensitivity analyses (if appropriate) of alternative model specifications
9. Interpret the results of your statistical analyses in terms of the research questions and hypotheses you defined at the onset of the study

To undertake this work, it will be essential for you to become skilled in using a statistical processing program such as Stata or SAS. You will have considerable support for your statistical programming/processing activities via sample programs, supporting documentation, in-class demonstrations, hands-on lab sessions, and a teaching assistant who will help you with the “mechanics” of using the statistical software in empirical

analysis. In addition, in the first two weeks of class, the discussion sections will be used for SAS and Stata training sessions set up specifically for this class in room 3218 of the Social Sciences building. The course TA will also be available in discussion sections to help you with questions about the course material and data analysis. It will be up to you to take advantage of these resources for your project.

Some datasets are posted on our website (NLSY, CPS, NSAF and AddHealth), ready to download and use. I encourage you to use one of these datasets, which are already cleaned and well documented, and for which it will be easier for us to provide you with technical assistance. We can't be responsible for helping you with technical details of other datasets you might choose, e.g., how a particular variable was coded, etc.. If you are interested in looking for other datasets, one useful place to start is the Inter-university Consortium on Political and Social Research (<http://www.icpsr.umich.edu/icpsrweb/ICPSR/>), where numerous datasets are archived. Be sure that you have adequate documentation of any alternative dataset you decide to use.

It is important to emphasize that you will NOT be expected to implement any of the quasi-experimental methods that comprise the second half of the course. However, projects that do so may receive extra credit (if the method is implemented reasonably well). Propensity Score Matching is the quasi-experimental methods that can be most readily implemented.

To facilitate this work, you will hand in the project in parts, following the framework outlined by Wooldridge (see first week's readings and lecture):

Project Part I: Introduction (including policy questions and associated research questions and hypotheses), brief theory and brief literature review, description of data, proposed model specification (5-6 pages double-spaced)

Project Part II: This will begin with an improved version of Part I and you will add the following: preliminary results and their interpretation (e.g., whether the results confirm your hypotheses), plans for refining models, discussion of ways you cannot improve the analysis due to data limitations. (8-12 pages double-spaced)

Presentation: You will present your findings to the class using Powerpoint.

Final Project: This will include your improved versions of Parts I and II (e.g., make edits per the feedback you receive and carry out the above plans for additional analysis) and draw your final conclusions. Do you accept or reject the null hypothesis? What threats to validity might explain the findings? How confident are you? (15-25 pages double-spaced)

PLEASE PROOFREAD your assignment and final paper before submitting them! At a graduate level of study, there is no acceptable excuse for poor writing quality. If English is not your first language, please ask a colleague to proofread your work or see the Writing Center on campus.

Mid-Term Exam: This will cover all material covered to date.

Final Exam: The exam will involve your evaluating an empirical article using a quasi-experimental method. This will be “non-cumulative” but it will be difficult to perform well on the final if you do not understand the material covered earlier.

Statistical Programming Resources

Stata and SAS software are available for use in the La Follette School computer lab or the Social Sciences computing lab (SS 3218). The following books are reasonably good for assistance in learning SAS and/or Stata:

Applied Statistics and the SAS Programming Language by Ronald P. Cody, et al, 2006.

Statistics with STATA

These can be ordered online. Other resources for Stata are the manuals that can be purchased with the software. See below for the University’s pricing on these.

To purchase Stata 10 through SSC, see:

<http://www.stata.com/order/new/edu/gradplans/gp-campus.html>.

Purchasing SAS through DoIT: <http://techstore.doit.wisc.edu/>.

Calendar (underline means no class)

January	24, 31
February	7, 14, 21, 28
March	6, 13, 20, 27
April	[<u>3 – Spring Break</u>], 10, 17, 24
May	1, 8

Topics and Required Course Readings

January 24 – Course Introduction

Stock and Watson (SW), Chapter 1 (review Chapters 2 and 3 as necessary)

Wooldridge, J. (2000) Chapter 19: Carrying Out an Empirical Project.
Introductory Econometrics. South-Western College Publishing.

January 31 – Review OLS

SW, Chapters 4-6

February 7 – More Review

SW, Chapters 7-8

February 14 – Regression with Dichotomous Dependent Variables

SW, Chapter 11

February 21 – Threats to Validity

SW, Chapter 9

February 28 – Missing Data and More on Model Specification

Alison, P. *Missing Data*. pp.72-77. Downloaded January 19, 2012 from:
<http://www.statisticalhorizons.com/downloads/Milsap-Allison.pdf>.

March 6 – Mid-term exam

March 13 – Introduction to Quasi-Experiments; Regression Discontinuity

Shadish, Cook, and Campbell, Chapter 7

Brian A. Jacob and Lars Lefgren (2004). Remedial Education and Student Achievement: A Regression-Discontinuity Analysis, *The Review of Economics and Statistics*, Vol. 86, No. 1 (Feb., 2004), pp. 226-244.

***** Project Part I Due March 16 *****

March 20 – Propensity Score Matching

*** Read Powerpoint slides in advance ***

Mocan, H.N., & Tekin, E. (2002). Catholic Schools and Bad Behavior: A Propensity Score Matching Analysis. NBER Working Paper 9172. Cambridge, MA: National Bureau of Economic Research.
<http://www.nber.org/papers/w9172>

March 27 – Natural Experiments

SW, Chapter 13

Dee, T. & Jacob, B. (2009). The Impact of No Child Left Behind on Student Achievement. NBER Working Paper 15531. Cambridge, MA: National Bureau of Economic Research.
<http://www.nber.org/papers/w15531>

April 3 [No class; spring break]

April 10 – Panel Data; Interrupted Time Series

SW, Chapter 10

Harris, D. and Sass, T. (2011). Teacher training, teacher quality, and student achievement. *Journal of Public Economics*.

***** Project Part II Due April 13 *****

April 17 -- Panel Analysis for Personnel Performance Measurement

Harris, D. (2011). *Value-Added Measures in Education*. Cambridge, MA: Harvard Education Press. [Chapters 4-5]

Harris, D. & McCaffrey, C. (2010). Value-added: Assessing teachers' contributions to student achievement. In M. M. Kennedy (Ed.), *Handbook of Teacher Assessment and Teacher Quality* (pp.251-282). San Francisco: Jossey Bass.

April 24 – Instrumental variables (including 2SLS)

SW, Chapter 12

Hoxby, C.M. (2000). “Does Competition among Public Schools Benefit Students and Taxpayers?” *American Economic Review*, 90(5), pp. 1209-1238.

***** Final Exam (cumulative; 48-hour take home) on April 25-26 *****

May 1 – In-Class Presentations

May 8 – In-Class Presentations

***** Final projects due May 14 *****