

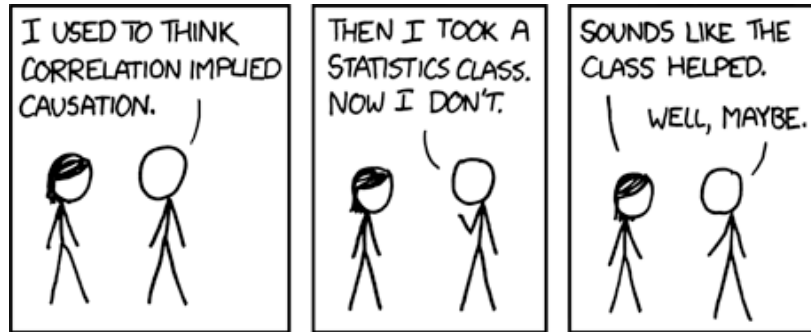
PLAD 7100
Political Research With Quantitative Methods
Fall 2014

Tuesday & Thursday 11–12:15
Gibson Hall 142

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Office hours: Thursday 12:30-2
& and by appointment

“Inductive logic is unlike deductive or symbolic logic. In deductive reasoning, when you have true premises and a valid argument, the conclusion must be true too. Valid deductive arguments do not take risks. Inductive logic takes risks. You can have true premises, a good argument, but a false conclusion. Inductive logic uses probability to analyse that kind of risky argument.”

— Ian Hacking. 2001. *An Introduction to Probability and Inductive Logic*, xi.



<http://xkcd.com/552/>

This course will introduce you to some basic theory and methods for conducting quantitative analyses in political science, with a focus on statistics and econometrics. The primary goals are to give you tools to begin applying quantitative methods to explore and evaluate political science theories, to prepare you for further coursework, and to situate statistics within the broader endeavor of data analysis (and that within the broader endeavor of research).

Thus, we will begin at the beginning—with basic probability theory—then move through single-variable statistical analysis, and conclude with regression analysis. The lectures and problem sets will include a moderate amount of statistical theory, because I believe strongly that familiarity with the underlying theory is critical to the smart application of statistical techniques. The later problem sets will shift the emphasis toward application and data analysis.

There are no prerequisites for the course. The course will include some mathematical content; however, no math beyond high school algebra is assumed before you begin.

Course Requirements

Requirements for this course include lectures, reading, homework assignments, a midterm exam, and a final exam.

The midterm will be held in class as noted on the syllabus below. The final will be a timed take-home. You will be allowed one page of notes (front only) for the midterm, and two pages (i.e., front and back of a single sheet, or front of two sheets) for the final.

Understanding statistics requires learning by doing, and for that reason there are a number of homework assignments—about one a week. The early assignments will consist of “paper-and-pencil” exercises to help solidify your

understanding of basic concepts and procedures; the later assignments will ask you to conduct analysis of real political science data that I provide. I encourage group work on homework assignments, although each student should write up and turn in his or her own set of answers.

Because the material in this course is cumulative, attending class consistently and staying current on the reading and homework is absolutely vital for your success. *Therefore, no incompletes will be given in this course.* In addition, anyone auditing the course is strongly encouraged to attend consistently and to complete the reading and homework assignments.

The statistical software we will use is Stata. The software and documentation are available on the computers in the Politics Department computer lab in Gibson Hall, as well as on some computers in other ITS computer labs (see http://www.itc.virginia.edu/labs/listSoftLocations.php?soft_title_id=125 for a listing). Stata is also available through the “UVa Hive,” a virtual computer lab that you can connect to remotely. See <http://itc.virginia.edu/hive/> for details on installing the appropriate software on your computer (and your iPad!) to access the Hive.

Though you do not need to purchase your own copy of Stata, you may wish to do so, especially if you anticipate further empirical work beyond this course. It is available for Windows, Mac, and Unix platforms at a discount through ITC. See <http://statlab.library.virginia.edu/research-software-support/stata/> for purchase information. (*Note that the student version of Stata, so-called “small Stata,” will not be sufficient to analyze the data sets for some of the problem sets; you will need the standard IC (“Intercooled”) version of Stata.*)

Readings

There are several required books for this course. They should be available from the campus bookstore; used copies of the Wonnacott and Wonnacott book are also readily available on-line at a substantial discount.

Abelson, Robert P. 1995. *Statistics as Principled Argument*. Hillsdale, NJ: L. Erlbaum Associates.

Achen, Christopher H. 1982. *Interpreting and Using Regression*. Thousand Oaks, CA: Sage.

Acock, Alan C. 2014. *A Gentle Introduction to Stata*. Rev. 4th ed. College Station, Texas: Stata Press. (Note errata on the Stata Press website: <http://www.stata-press.com/books/errata/acock4.html>.)

Wonnacott, Thomas H. and Ronald J. Wonnacott. 1990. *Introductory Statistics for Business and Economics*. Fourth Edition. New York: John Wiley & Sons.

In addition, we will read substantial portions of the following book, which is unfortunately out of print. I will make available copies of the relevant sections.

Kelejjan, Harry H. and Wallace E. Oates. 1989. *Introduction to Econometrics: Principles and Applications*. Third Edition. New York: Harper and Row.

Copies of assigned articles and other readings will be available on-line.

Note: At the end of the syllabus I include a set of references to *Stata Journal* articles, most written by Nicholas Cox, that explain some tips, tricks, and useful techniques for managing data, creating analysis graphs, and presenting model results. These are all supplementary (and optional) but they contain a wealth of useful Stata lore.

Homework schedule

A homework assignment will be posted in the “Resources” section of the Collab site each Thursday, due in class the following Thursday.

Course Schedule and Outline

August 26: Welcome & Introduction to the Course

August 28 & September 2: Basic Probability & Descriptive Statistics

Wonnacott & Wonnacott, skim chapter 1, read sections 2-1, 2-2, 2-3 & 2-6; chapter 3

September 5 & 9: Probability Distributions and Random Variables

Wonnacott & Wonnacott, chapters 4-5

September 11 & 16: Sampling and Point Estimation & Introduction to Statistical Computing using Stata

Wonnacott & Wonnacott, chapters 6-7

Abelson, chapter 1

Acock, chapters 1-3

Optional: Stata Documentation; in particular *Getting Started with Stata* and selections from the *Stata User's Manual*

September 18 & 23: Interval Estimation and Hypothesis Testing

Wonnacott & Wonnacott, chapters 8-9

Abelson, chapter 2

Acock, chapters 4, 7

Cohen, Jacob. 1994. "The Earth is Round ($p < .05$)" *American Psychologist* 49(12):997-1003.

Available from Collab.

September 25 & 30: Univariate & Bivariate Data analysis

Wonnacott & Wonnacott, section 2-7

Abelson, chapter 3

Kastellec, Jonathan P., and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science." *Perspectives on Politics* 5(4), pages 755-763.

Epstein, Lee, Andrew D. Martin, and Matthew M. Schneider. 2006. "On the Effective Communication of the Results of Empirical Studies, Part I." *Vanderbilt Law Review* 59(6):1811-71.

Epstein, Lee, Andrew D. Martin, and Christina L. Boyd. 2007. "On the Effective Communication of the Results of Empirical Studies, Part II." *Vanderbilt Law Review* 60(3), pages 801-31.

Acock, chapter 5

October 2: Tabular Data Analysis, Chi-Square; Multivariate Analysis

Wonnacott & Wonnacott, chapter 17

Abelson, chapter 4

Acock, chapter 6

Murnane, Richard J. and John B. Willett. "Reducing Observed Bias by the Method of Stratification." In *Methods Matter: Improving Causal Inference in Educational and Social Science Research*, 286-304

October 7: Review, catch up, etc.

October 9: **Midterm Exam in class**

October 14: UVa Reading Day (no class)

October 16 & 21: Bivariate Regression I

Wonnacott & Wonnacott, chapter 11 and 12-1, 12-2

Achen, pages 1-37

Kelejian & Oates, pages 1-9, 25-33, and 43-86

Acock, chapter 8

October 23 & 28: Bivariate Regression II: Topics

Wonnacott & Wonnacott, 12-3 through 12-5

Achen, pages 37-51

Kelejian & Oates, pages 89-104 & 123-131

Abelson, chapter 5

Optional supplement if you ever read work in social psychology: Acock, chapter 9

October 30 & November 4: Multiple Regression I

Wonnacott & Wonnacott, chapter 13

Kelejian & Oates, chapter 4 (134-161) and 200-202

Acock, chapter 10

November 6 & 11: Multiple regression II

Kastellec, Jonathan P., and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science."

Perspectives on Politics 5(4), **pages 763-768.**

Epstein, Lee, Andrew D. Martin, and Christina L. Boyd. 2007. "On the Effective Communication of the Results of Empirical Studies, Part II." *Vanderbilt Law Review* 60(3), **pages 831-46.**

Abelson, chapter 6

November 13: Regression Topics: colinearity/micronumerosity, dummy variables, interaction terms

Achen, pages 51-79

King, Gary. 1986. "How Not to Lie With Statistics: Avoiding Common Mistakes in Quantitative Political Science."

American Journal of Political Science 30(3):666-87.

Available from Collab; also from <http://links.jstor.org/sici?sici=0092-5853%28198608%2930%3A3%3C666%3AHNTLWS%3E2.0.CO%3B2-3>.

Kelejian & Oates, pages 205-211 and 178-186

Abelson, chapter 7

November 18, 20, & 25: Regression Topics: non-linear relationships, outliers, model specification

Wonnacott & Wonnacott, chapters 14

Bartels, Larry M. 1990. "Five Approaches to Model Specification." *Political Methodologist* 3(2):2-6.

Kelejian & Oates, pages 251-256

Abelson, chapter 8

November 27: No class (Thanksgiving)

December 2: Regression, matching, and “causal inference”

Miller, Michael K. 2013. “The Uses and Abuses of Matching.” Working Paper, George Washington University.
<https://sites.google.com/site/mkmtwo/Miller-Matching.pdf>

Justin Esarey’s blog comments on Miller, and the ensuing discussion, at
<http://politicalmethodology.wordpress.com/2013/07/25/matching-madness-causal-inference-in-political-methodology/>

Abelson, chapter 9

December 4: Review, catch up, and “where do we go from here?”

Stata Journal Articles of Interest

Tables of estimation results

- Gallup, John Luke. 2012. "A New System for Formatting Estimation Tables." *Stata Journal* 12(1):3-28.
- Cox, Nicholas J. 2012. "Speaking Stata: Output to Order." *Stata Journal* 12(1):147-158.
- Newson, Roger B. 2012. "From Resultssets to Resultstables in Stata." *Stata Journal* 12(2):191-213.

In addition, see my handout, "Producing Presentation-Quality Tables and Figures for Regression Models," which describes my own command, `mktab`, as well as a few other options.

Data management and tabulation

- Cox, Nicholas J. 2011. "Speaking Stata: Compared With ..." *Stata Journal* 11(2):305-314.
- Baum, Christopher F. and Nicholas J. Cox. 2007. "Stata Tip 45: Getting Those Data Into Shape." *Stata Journal* 7(2):268-271. <http://www.stata-journal.com/sjpdf.html?articlenum=dm0031>
- Cox, Nicholas J. 2003. "Speaking Stata: Problems with tables, Part I" *Stata Journal* 3(3):309-324. <http://www.stata-journal.com/sjpdf.html?articlenum=pr0010>

Graphing

- Cox, Nicholas J. 2010. "Speaking Stata: Graphing Subsets" *Stata Journal* 10(4):670-681.
- Cox, Nicholas J. 2010. "Speaking Stata: The statsby Strategy" *Stata Journal* 10(1):143-151.
- Buis, Maarten L. and Martin Weiss. 2009. "Stata Tip 81: A Table of Graphs." *Stata Journal* 9(4):643-647.
- Cox, Nicholas J. 2009. "Speaking Stata: Paired, Parallel, or Profile Plots for Changes, Correlations, and Other Comparisons." *Stata Journal* 9(4):621-639.
- Cox, Nicholas J. 2008. "Speaking Stata: Between Tables and Graphs." *Stata Journal* 8(2):269-289. <http://www.stata-journal.com/sjpdf.html?articlenum=gr0034>
- Cox, Nicholas J. 2008. "Stata tip 27: Classifying data points on scatter plots." *Stata Journal* 5(4):604-606. <http://www.stata-journal.com/sjpdf.html?articlenum=gr0023>
- Cox, Nicholas J. 2008. "Speaking Stata: Graphing Categorical and Compositional Data." *Stata Journal* 4(2):190-215. <http://www.stata-journal.com/sjpdf.html?articlenum=gr0004>

Model Interpretation

- Williams, Richard. 2012. "Using the margins Command to Estimate and Interpret Adjusted Predictions and Marginal Effects." *Stata Journal* 12(2):308-331.
- Jann, Ben. 2013. Plotting regression coefficients and other estimates in Stata. University of Bern Social Sciences Working Papers Nr. 1. Available from <http://ideas.repec.org/p/bss/wpaper/1.html>