

POLS 500C

Advanced Statistical Methods

Spring 2014

Department of Political Science
Southern Illinois University

1 Instructor Information

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Office Hours: 12:00-2:00 T,Tr or by Apt
Class Location: Faner 3075
Course Time: Monday, 2:00-4:30

2 Course Description

This course serves to introduce and strengthen students knowledge about quantitative research methods. In particular, students in this course will learn both theoretical and practical information about regression and other statistical models commonly used in political science. Upon completion of the course, students should...

- Feel comfortable using linear regression
- Know how to identify and address violations of linear regression
- Understand maximum likelihood estimation
- Know how to use regression analysis for non-linear dependent variables
- Be aware of newly developed quantitative methods in political science
- Be proficient in applying the appropriate quantitative method to a given research question
- Gain skills necessary to read and critique quantitative work in social science journals

To accomplish these goals, the course will be divided into three sections. In the first section of the course, students will learn about linear regression and how to identify and address problems with these models. The second part of the course will focus on how to estimate models with non-linear dependent variables and introduce students to maximum likelihood estimation. The final portion of the course will introduce students with newly developed methods in political science.

3 Course Structure

The course meets once a week for 150 minutes (2.5 hours). As the course is split between learning about statistics and applying these lessons to analyze data, the course will usually be divided into roughly two halves. The first half of the course will focus on describing and explaining statistical methods and research design. The second half of the course will be more hands on, where students will analyze data using Stata. While statistic courses may not be as conducive to discussion as other courses, students are strongly encouraged to participate in class and ask questions as often as needed.

4 Stata

The program that we will use in this course to analyze quantitative data is Stata. Stata is a useful program for analyzing statistics because it can perform a wide variety of statistical functions. Stata is also one of the most commonly used statistical programs in political science. Students can purchase a Stata IC six month license from <http://www.stata.com/coursegp> for \$69 (use the code CS300 in Student ID field for special pricing). While the purchase of Stata is not required, it is strongly recommended. You will be required to use Stata for both final projects and for all homework assignments. Unfortunately, stata is only available in the political science lab which is not always accessible.

5 Books

- Required

- Cameron, Colin and Pravin Trivedi. 2009. *Microeconometrics Using Stata* College Station: Stata Press. ISBN 1-59718-048-3
- Kennedy, Peter. 2008. *A Guide to Econometrics 6th ed.* Cambridge: MIT Press. ISBN 978-1-4051-8257-7.

- Recommended

- Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables* Sage.

6 Assessment

Problem Sets (40%)

After almost every class, there will be a problem set. Most problems sets will focus on the application of methods using STATA. Each problem set is weighted equally.

Research Poster (20%)

Each student will conduct independent, original research using statistical methods covered in the course. The results of this research will be presented as a poster at the end of the semester. We will hold an open poster session May 5th.

Research Paper (30%)

One of the primary goals of this course is to train students to apply quantitative methods to important research questions in their sub-fields. To assess students progress in this area, students will be required to write a 15-20 page paper on a topic of their choosing. The paper should include at least one method learned in this course that is appropriate for the student's research question. This method would preferably be one other than OLS regression.

Exam (10%)

An open-book, take-home exam will be given. The exam will be administered online and will be a timed exam (two hours). The questions for the exam will be similar to those found on a methodology preliminary exam.

7 Course Schedule

All readings should be completed *prior* to the class and then reviewed after the class. Readings marked with a † are (highly) recommended, but not required.

January 13 Introduction and Stata Review

- *NO READING*

January 20 Martin Luther King Jr. Holiday

- *NO READING*

January 27 Linear Regression Model

- Kennedy Chapter 3
- <http://www.clockbackward.com/2009/06/18/ordinary-least-squares-linear-regression-flaws-problems-and-pitfalls/> (Posted on D2L)
- Cameron and Trivedi Chapter 3 *pg 79-90*
- Long Ch. 2 †

February 3 Inferences Using Linear Regression Model

- Kennedy 4
- Mitchell, M. N. (2012). *Interpreting and visualizing regression models using Stata*. Stata Press books. Chapter 2
- King, Gary, Michael Tomz, and Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44(2):347-361.
- Kastellec, Jonathan P., and Eduardo Leoni. 2007. "Using Graphs Instead of Tables to Improve the Presentation of Empirical Results in Political Science." *Perspectives on Politics* 5(4):755-771.

February 10 Multiplicative and Nonlinear Equations

- Kennedy 6, 14
- Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis* 14(1):63-82.

- Seidman, David. 1976. “On Choosing Between Linear and Log-Linear Models” *Journal of Politics* 38(2): 461-466.
- Braumoeller, Bear. 2004. “Hypothesis Testing and Multiplicative Interaction Terms.” *International Organization* 58(4): 807-820.[†]
- Miodownik, Dan and Britt Catrite. 2010. “Does Political Decentralization Exacerbate or Ameliorate Ethnopolitical Mobilization? A Test of Contesting Propositions” *Political Research Quarterly* 63(4): 731-746. [†]

February 17 Assumptions of and Diagnostics for Linear Regression Models

- Kennedy 3, 7, 8, 11
- King, Gary, and Roberts, Margaret. 2012. “How Robust Standard Errors Expose Methodological Problems They Do Not Fix” Working Paper.

February 24 Model Specification

- Kennedy 5
- Clarke, Kevin. 2005. “The Phantom Menace: Omitted Variable Bias in Econometric Research.” *Conflict Management & Peace Science* 22(4): 341-352.
- Achen, Christopher. 2002. “Toward a New Political Methodology: Microfoundations and ART.” *Annual Review of Political Science* 5: 423-450. Read only 423-425, 438-450.
- Leamer, Edward E.. 1983. “Lets Take the Con Out of Econometrics.” *American Economic Review* 73(1): 3143.
- Imai, Kosuke and Dustin Tingley. 2012. “A Statistical Method for Empirical Testing of Competing Theories” *American Journal of Political Science* 56(1): 218-236.
- Angrist, Joshua D. and Jörn-Steffen Pischke. 2010. “The Credibility Revolution in Empirical Economics: How Better Research Design Is Taking the Con out of Econometrics” *Journal of Economic Perspectives* 24 (2): 3-30.[†]
- Leamer, Edward E.. 2010. “Tantalus on the Road to Asymptopia” *Journal of Economic Perspectives* 24 (2): 31-46.[†]
- Keane, Michael P. 2010. “A Structural Perspective on the Experimentalist School” *Journal of Economic Perspectives* 24 (2): 47-58.[†]
- Stock, James H. 2010. “The Other Transformation in Econometric Practice: Robust Tools for Inference” *Journal of Economic Perspectives* 24 (2): 83-94.
- Bartels, Larry M. 1997. “Specification Uncertainty and Model Averaging” *American Journal of Political Science* 41(2): 641-674.[†]
- Granato, Jim, Melody Lo, M.C. Sunny Wong. 2010. “A Framework for Unifying Formal and Empirical Analysis” *American Journal of Political Science* 54(3): 783-797.[†]

March 3 Panel Data

- Kennedy 17
- Beck, Nathaniel and Jonathan Katz. 1995. “What To Do (and Not To Do) with Time-Series Cross-Section Data” *American Political Science Review* 89: 634-647.
- Rabe-Hesketh, Sophia and Anders Skrondal. 2009. “Multilevel and Longitudinal Modeling Using Stata” Chapter 5
- Honaker, James and Gary King. 2010. “What to Do about Missing Values in Time-Series Cross-Section Data” *American Journal of Political Science* 54(2): 561-581. Cameron and Trivedi Chapter 8[†]

March 10 Spring Break

March 17 Time Series Models

- Kennedy 18
- De Boef, Suzanna and Luke Keele. 2008. “Taking Time Seriously” *American Journal of Political Science* 52(1): 184-200.
- Wood, B. Dan. 2000. “Weak Theories and Parameter Instability: Using Flexible Least Squares to Take Time Varying Relationships Seriously” *American Journal of Political Science* 44(3): 603-618.[†]

March 24 Modeling Dichotomous Outcomes

- Long Ch. 3-4 (Posted on D2L)
- Cameron and Trivedi Chapter 14 *pg 445-465*
- DeMaris, Alfred (1995). A Tutorial in Logistic Regression. *Journal of Marriage and the Family* 57(4):956-968
- Hammer, Michael J., Kerem Ozan Kalkan. 2013. “Behind the Curve: Clarifying the Best Approach to Calculating Predicted Probabilities and Marginal Effects from Limited Dependent Variable Models” *American Journal of Political Science* 57(1): 263-277.

March 31 Modeling Ordinal and Nominal Outcomes

- Kennedy 15
- Cameron and Trivedi Chapter 15 *pg 477-489, 511-514*
- Jones, Bradford S. and Michael E. Sobel. 2000. “Modeling Direction and Intensity in Semantically Balanced Ordinal Scales: An Assessment of Congressional Incumbent Approval” *American Journal of Political Science* 44(1): 174-185.
- Alvarez, R. Michael and Jonathan Nagler. 1998. “When Politics and Models Collide: Estimating Models of Multiparty Elections” *American Journal of Political Science* 42(1): 55-96.

- Lacy, Dean and Barry C. Burden. 1999. “The Vote-Stealing and Turnout Effects of Ross Perot in the 1992 U.S. Presidential Election” *American Journal of Political Science* 43(1): 233-255.

April 7 Modeling Censored and Truncated Outcomes

- Kennedy 16
- Box-Steffensmeier, Janet M. and Bradford S. Jones. 1997. “Time is of the Essence: Event History Models in Political Science” *American Journal of Political Science* 41(4): 1414-1461.
- Beck, Nathaniel, Jonathan N. Katz, and Richard Tucker. 1998. “Taking Time Seriously: Time-Series-Cross-Section Analysis with a Binary Dependent Variable.” *American Journal of Political Science* 42(4): 1260-1288.

April 14 Modeling Count Data

- Long 8
- Cameron and Trivedi Chapter 17 *pg 553-567, 585-590*
- King, Gary. 1988. “Statistical Models for Political Science Event Counts: Bias in Conventional Procedures and Evidence for the Exponential Poisson Regression Model” *American Journal of Political Science* 32(3): 838-863.
- Wallis, W. Allen. 1936. “The Poisson Distribution and the Supreme Court” *Journal of the American Statistical Association* 31(June): 376-380.[†]
- Ulmer, S. Sidney. 1982. “Supreme Court Appointments as a Poisson Distribution” *American Journal of Political Science* 26(1): 113-116.
- Brandt, Patrick T., John T. Williams, Benjamin O. Fordham, and Brian Pollins. 2000. “Dynamic Modeling for Persistent Event-Count Time Series” *American Journal of Political Science* 44(4): 823-843.[†]
- Hayes, Andrew F., Dietram A. Scheufele, and Michael E. Huges. 2006. “Nonparticipation as Self-Censorship: Publicly Observable Political Activity in a Polarized Opinion Climate” *Political Behavior* 28(3): 259-283.[†]

April 21 Statistical Matching

- Sekhon, Jasjeet S. “Opiates for the matches: Matching Methods for Causal Inference.” *Annual Review of Political Science* 12(1): 487-508.
- Iacus, Stefano M., Gary King, and Giuseppe Porro. 2012 “Causal Inference Without Balance Checking: Coarsened Exact Matching.” *Political Analysis* 20(1): 1-24.
- Dehejia, Rajeev H., and Sadek Wahba. 2002 “Propensity Score-Matching Methods for Non-experimental Causal Studies.” *Review of Economics and Statistics* 84(1): 151-161.
- Blackwell, Matthew, Stefano M. Iacus, Gary King, and Giuseppe Porro. 2009. “CEM: Coarsened Exact Matching in Stata.” *Stata Journal* 9(4): 524-546.

- Diamond, Alexis, and Jasjeet S. Sekhon. 2005 "Genetic Matching for Estimating Causal Effects: A General Multivariate Matching Method for Achieving Balance in Observational Studies." *Review of Economics and Statistics* 95(3): 932-945[†]
- Mayer, Alexander K. 2011 "Does Education Increase Political Participation?." *The Journal of Politics* 73(3): 633-645.[†]
- Kam, Cindy D., and Carl L. Palmer. 2008 "Reconsidering the Effects of Education on Political Participation." *Journal of Politics* 70(3): 612-31.[†]

April 28 Mediation Analysis

- Baron, Reuben M., and David A. Kenny. 1986 "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 51(6): 1173-1182
- MacKinnon, D. (2007). *Introduction to Statistical Mediation Analysis*. CRC Press. Chapter 2
- Imai, Kosuke, Luke Keele, Dustin Tingley and Teppei Yamamoto. 2011. "Unpacking the Black Box of Causality: Learning About Causal Mechanisms from Experimental and Observational Studies." *American Political Science Review*, 105(4), 765-789.
- Hicks, Raymond, and Dustin Tingley. 2011 "Causal Mediation Analysis." *Stata Journal* 11(4): 605-619

May 6 FINAL EXAM 5:50 - 07:50 p.m.