Topics in Advanced Methodology:
Computing Techniques for Data Analysis and Presentation
Political Science 306
Spring 2008

Class Time: Wednesday 3:30-6:20
Classroom: 21 Schaeffer
Instructor: Fred Boehmke
Office: 361 Schaeffer
Office Hours: Tuesday 1:30-2:30pm & Wednesday 2-3pm, or by appointment.
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Course description

This class will stress computing techniques as they relate to data management, analysis and presentation. Rather than learning new estimators, we will focus on improving your ability to use statistical software – Stata, mostly – to generate, understand, and convey statistical results. The majority of class time will therefore be devoted to interactive computing labs, with prepared examples and specific tasks to implement. I will assume that you are familiar with a variety of statistical estimators, including linear regression, standard discrete choice models, duration analysis and event count models.

We will cover a variety of topics, but a significant portion of our time will be devoted to the following: generating quantities of interest and using them to highlight empirical results of interest; graphical techniques for presenting data and quantities of interest; and maximum likelihood estimation.

Grades will be based on three parts: homework assignments (60%), in-class presentations (15%) and a final project (25%).

Course Requirements

1. Homework.

   The best way to learn this material is to work on it at the computer. I will assign homework on a weekly to bi-weekly basis. When you turn in the homework, I want you to upload an electronic copy of your Stata program file and an appropriate textual, graphical, or tabular representation of the results to ICON. Homework assignments will be due at the beginning of class. Late homework will lose ten percent of the total value per week unless prior arrangements are made.
2. Final Project
   a. Paper.

Over the course of the semester, you will apply one or more of the techniques covered in this class to improve an existing paper or incorporate them into a new research paper. You may apply any technique, but you must do so in an appropriate and sophisticated manner. Focusing on a particular technique does not exempt other parts of the paper from applying appropriate methods, of course.

b. Replication Materials.
You will submit a complete set of replication materials through ICON at the end of the semester. These files must allow anyone to replicate your results without consulting you and should run on any computer with a recent version Stata installed. You should use comments liberally to help users follow your code. At a minimum, your replication materials should include:
    i. Your lab book that you prepare over the course of the semester documenting important data, coding, and statistical decisions that you make.
    ii. The Stata do-file that you used to construct your data set so that others can see your coding decisions.
    iii. Your final data set (you do not need to supply the original, raw data set(s)).
    iv. A Stata do-file to replicate all the results presented in your paper.

Books

There are two books assigned for the class. You may be able to get by without buying them, but you will be expected to read the assigned parts.

Franzese, Robert J. and Cindy Kam. 2007. *Modeling and Interpreting Interactive Hypotheses in Regression Analysis*. Ann Arbor: University of Michigan Press.

Hendry, David F. and Bent Nielsen. 2007. *Econometric Modeling: A Likelihood Approach.* Princeton University Press.

The following books are also good to have around for reference and will be useful for topics covered in the class.

Gould, William and William Sribney. 2005. *Maximum Likelihood Estimation With Stata, 3rd Edition*. College Station, TX: Stata Press.

King, Gary. 1998. *Unifying Political Methodology: The Likelihood Theory of Statistical Inference.* Ann Arbor: The University of Michigan Press.

Long, J. Scott and Jeremy Freese. 2005. *Regression Models for Categorical Dependent Variables Using Stata, 2nd Edition*. College Station, Texas: Stata Press.

Mitchell, Michael N. 2008. *A Visual Guide to Stata Graphics, 2nd Edition.* College Station, TX: Stata Press.

Mooney, Christopher. 1997. *Monte Carlo Simulation.* Thousand Oaks, CA: Sage Publications.

Newton, H. Joseph and N. J. Cox. 2006. *Thirty-three Stata Tips.* College Station, TX: Stata Press.

The final set of books may be useful for some background on the estimators that come up during the course of the semester.

Cameron, A. Colin and Pravin K. Trivedi. 1998. *Regression Analysis of Count Data*. Oxford: Oxford University Press.

Long, J. Scott. Regression Models for Categorical and Limited Dependent Variables. United States of America: Sage Publications.

Maddala, G.S. 1983. *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Topics

Introduction: Good Computing Practices

Nagler, Jonathan. 1995. "Coding Style and Good Computing Practices" (in Verification/Replication). *PS: Political Science and Politics* 28 (3): 488-492.

King, Gary. 1991. "On Political Methodology." *Political Analysis* 2: 1-29.

King, Gary. 1986. "How Not To Lie With Statistics: Avoiding Common Mistakes in Quantitative Political Science." *American Journal of Political Science* 30: 666-687.

Luskin, Robert. 1991. "Abusus Non Tollit Usum: Standardized Coefficients, Correlations, and R2s." *AJPS* 35: 1032-1046.

Mooney, Christopher. 1997. *Monte Carlo Simulation.* Thousand Oaks, CA: Sage Publications.

Generating Quantities of Interest in Stata

King, Gary; Tomz, Michael and Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *AJPS* 44:347-361.

Watch the presentation at http://psweb.sbs.ohio-state.edu/methods_videos/index.html

Herron, Michael C. 1999. "Postestimation Uncertainty in Limited Dependent Variable Models." *Political Analysis* 8: 83-98.

Generating Quantities of Interest using CLARIFY and SPOST

Long, J. Scott and Jeremy Freese. 2005. *Regression Models for Categorical Dependent Variables Using Stata, 2nd Edition*. College Station, Texas: Stata Press.

CLARIFY documentation: http://gking.harvard.edu/clarify/clarify.pdf.

Interpreting Interaction Effects

Franzese, Robert J. and Cindy Kam. 2007. *Modeling and Interpreting Interactive Hypotheses in Regression Analysis*. Ann Arbor: University of Michigan Press.

Brambor Thomas; William Clark; Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14: 63-82.

Graphical Display of Data and Results: Presenting Data

Klass, Gary. 2006. "JPDA: Just Plain Data Analysis." Paper presented at the APSA Teaching and Learning Conference.

Cleveland, William S. 1993. *Visualizing Data*. Hobart Press.

Mitchell, Michael. 2008. *A Visual Guide to Stata Graphics.*

Graphical Display of Data and Results: Presenting Results

Gelman, Andrew; Cristian Pasarica; Rahul Dodhia. 2002. "Let's Practice What We Preach: Turning Tables into Graphs." *The American Statistician* 56 (2): 121-130.

Kastellec, Jonathan P. and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science." *Perspectives on Politics* 5 (4): 755-771.

Graphical Display of Data: Maps

Graphical Display of Data: Student Presentations

Maximum Likelihood Estimation: Means and Linear Regression

Gould, William; Jeffrey Pitblado; and William Sribney. *Maximum Likelihood Estimation with Stata, 3rd Edition.*

Hendry, David F. and Bent Nielsen. *Econometric Modeling: A Likelihood Approach.*

Maximum Likelihood Estimation: Discrete Choice

Maximum Likelihood Estimation: Advanced Estimators

Dealing With Data: Multiple Imputation

Honaker, James; Anne Joseph, Gary King and Kenneth Scheve. 1999. Amelia: A Program for Missing Data (Windows Version). Cambridge, MA: Harvard University, http://GKing.harvard.edu.

Read the documentation at http://gking.harvard.edu/amelia/.

King, Gary; James Honaker, Anne Joseph, and Kenneth Scheve.2001. "Analyzing Incomplete Political Science Data: An Alternative Algorithm for Multiple Imputation." *APSR*: 95:49-69.

Watch the presentation at http://psweb.sbs.ohio-state.edu/methods_videos/index.html

Little, Roderick J. A. and Donald B. Rubin. 1987. *Statistical Analysis with Missing Data*. John Wiley & Sons.

Franklin, Charles H. 1989. "Estimation Across Data Sets: Two-Stage Auxiliary Instrumental Variables Estimation (2SAIV)." *Political Analysis* 1:1-23

Dealing With Data: Manipulation

Newton, H. Joseph and N. J. Cox. 2006. *Thirty-three Stata Tips.* College Station, TX: Stata Press.

The Political Science Department, The University of Iowa, Professor Tom W. Rice, Chair, 341 Schaeffer Hall, 335-2358

STUDENTS WITH DISABILITIES Website: http://www.uiowa.edu/~sds/ Instructors will make reasonable accommodations for students with physical, mental or learning disabilities. Students with disabilities which may require some modification of seating, testing, or other class requirements are to inform the instructor (after class or during the instructor's office hours) so that appropriate arrangements may be made. It is the student's responsibility to contact Student Disability Services, 133 Burge Hall (335-1462) and obtain a Student Academic Accommodation Request form (SAAR). The form will specify what course accommodations are judged reasonable for that student. An instructor who cannot provide the accommodations specified, or has concerns about the accommodations, must contact the Student Disability Services counselor who signed the request form within 48 hours of receiving the form from the student.

DEPARTMENTAL/COLLEGIATE COMPLAINT PROCEDURES Website: http://www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5 (See "Student Complaints") A student who has a complaint against any member of the college's teaching staff is responsible for following the procedures described in the Student Academic Handbook, which is available on the web site of the College of Liberal Arts and Sciences: http://www.clas.uiowa.edu/students/academic.handbook/ix.shtml/ The student should attempt to resolve the issue with the faculty member or teaching assistant involved. Lacking a satisfactory outcome, the student can turn to the department chair, whose name is listed above along with contact information. (If the complaint concerns a teaching assistant, the student should contact the supervising faculty member first.) If a satisfactory outcome still is not obtained, the student can turn to the College of Liberal Arts and Sciences. Complaints may concern inappropriate faculty conduct (including inappropriate course materials), incompetence in oral communication, inequities in assignments, scheduling of examinations at other than authorized and published times, failure to provide disability accommodations, or grading grievances. In complaints involving the assignment of grades, it is college policy that grades cannot be changed without the permission of the department concerned.

PLAGIARISM AND CHEATING See Academic Fraud at http://www.clas.uiowa.edu/students/academic_handbook/ix.shtml for the complete policy. You are expected to be honest and honorable in your fulfillment of assignments and in test-taking situations. Plagiarism and cheating are serious forms of academic misconduct. Examples of them are given in the Student Academic Handbook: www.clas.uiowa.edu/students/academic_handbook//ix.shtml/ The Department of Political Science works with individual instructors to detect plagiarism and cheating and to ensure that appropriately serious punishments are applied. An instructor who suspects a student of plagiarism or cheating must inform the student (preferably in writing) as soon as possible after the incident has been observed or discovered. Instructors who detect cheating or plagiarism may decide, in consultation with the departmental executive officer, to reduce the student's grade on the assignment or the course, even to assign an F. The instructor writes an account of the chronology of the plagiarism or cheating incident for the departmental executive officer who sends an endorsement of the written report of the case to Associate Dean of the College of Liberal Arts and Sciences. A copy of the report will be sent to the student.

SEXUAL HARASSMENT You should familiarize yourself with the following web site link from the College of Liberal Arts: http://www.sexualharassment.uiowa.edu/policy.php

YOUR RESPONSIBILTIES Your responsibilities to this class-and to your education as a whole-include attendance and participation. This syllabus details specific expectations the instructor may have about attendance and participation. You have a responsibility to help create a classroom environment where all may learn. At the most basic level, this means you will respect the other members of the class and the instructor and treat them with the courtesy you hope to receive in return.

ENROLLED COURSES OUTSIDE YOUR COLLEGE Taking a course outside the College of Liberal Arts and Sciences means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College where the course resides. Students wishing to add or drop this course after the official deadline must receive the approval of the Dean of that College. Details of the University policy of cross enrollments may be found at: http://www.uiowa.edu/~provost/deos/crossenroll.doc/ Deadlines: See Registrar's Office web site: http://www.registrar.uiowa.edu/

PLUS-MINUS GRADING All the department's instructors can append plus or minus grades to the letter grades they assign for the course. If the instructor does not specifically indicate in the syllabus that he or she will not assign plusses or minuses, students should assume that this form of grading will be used.

HOMEWORK EXPECTATION For each semester hour of credit that a Political Science course carries, students should expect to spend approximately two hours per week outside of class preparing for class sessions. That is, in a three-credit-hour course, instructors design course assignments on the assumption that students will spend six hours per week in out-of-class preparation.

REACTING SAFELY TO SEVERE WEATHER The University of Iowa Operations Manual section 16.14 outlines appropriate responses to a tornado (1) or to a similar crisis. If a tornado or other severe weather is indicated by the UI outdoor warning system, members of the class should seek shelter in rooms and corridors in the innermost part of a building at the lowest level, staying clear of windows, or large free-standing expanses such as auditoriums and cafeterias. The class will resume, if possible, after the UI outdoor warning system announces that the severe weather threat has ended. Web site:
http://www.clas.uiowa..edu/faculty/teaching/new_policytemplate.shtml.

Please visit the Political Science Department's web site: http://www.polisci.uiowa.edu/. It is frequently updated with new events and procedures in our department, changes in the Schedule of Courses, plus TA and faculty office hours when available. You also may find current information on pre-advising and registration. Our Vernon Van Dyke Computing Facility (Political Science ITC) is located in room 21 Schaeffer Hall. Available hours are listed at our web site and also posted outside room 21 SH.