

**POLI 7963:
Seminar in Advanced Quantitative Analysis**

Spring 2015

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Introduction

The purpose of this course is to introduce graduate students to the theory, method, and practice of regression analysis and its many variants. Regression analysis is the principle method of empirical inquiry in the social sciences. It is a powerful tool for testing models of political and social phenomena and making inferences about the empirical world. Most other techniques can be understood in terms of how they relate to regression analysis. As such, it is important for advanced students in the social sciences to be well grounded in regression analysis, including its core assumptions, the implications of violations of those assumptions, and corrective actions that can be taken when regression assumptions are not met.

The seminar will proceed as follows. First, we will spend several weeks discussing the basic bivariate and multivariate regression model. Here we will focus on the general logic underlying regression analysis, as well as the assumptions upon which it is built. Second, we will discuss the implications of those assumptions for model estimation and the quality of inferences drawn from regression analyses. In particular, what problems arise when one or more regression assumptions are violated or relaxed? Third, we will spend the bulk of the semester on various techniques used to diagnose and correct for violations of regression assumptions. Finally, as time permits we will explore a range of specialized methods related to regression, including logit and probit models, time-series analysis, non-recursive models, factor analysis, and pooled cross-sectional time-series analysis.

Prerequisites

All students enrolled in this course should have completed (or be in the process of completing) an introductory statistics class such as POLI 7962 (or its equivalent). Any seminar on regression analysis must assume a working knowledge of elementary statistical concepts and techniques. We will conduct a *brief* review at the beginning of the course, but students should be familiar with such ideas as descriptive statistics, sampling distributions, statistical inference, and hypothesis testing.

Course Requirements and Evaluation

Each student will be evaluated on the basis of the following:

Midterm Examination	30%
Final Examination	30%
Research Paper	40%

1. **Midterm Examination.** A comprehensive midterm examination covering all material from the first half of the course will be required for all students. Information pertaining to the format of the midterm examination will be provided to all students prior to the exam.
2. **Final Examination.** A comprehensive final examination covering all material from the second half of the course will be required for all students. Information pertaining to the format of the final examination will be provided to all students prior to the exam.
3. **Research Paper.** In addition to the midterm and final exams, each student will be required to write a research paper that utilizes one of the statistical techniques discussed during the semester. More detailed information about the paper will be provided later in the semester.

Required Reading

There is no required text for this course. There will be some required and recommended reading during the course, primarily scholarly journal articles or other research papers. In addition, I will provide a full set of class notes and course assignments. Course readings, class notes, course assignments, and other materials will be made available through Moodle and/or by email.

If you are interested in an excellent regression text to follow along as we are covering various topics over the course of the semester, I suggest the following as a recommended text:

Damodar N. Gujarati and Dawn C. Porter, *Basic Econometrics* (5th edition) (ISBN 0-07-337577-2)

This is the text that I have used in this course in the past, and I find it to be one of the best texts on the market. Indeed, in the class outline (see below) I include chapter assignments from this text under the "recommended" heading for each week. I should note, however, that this book is not required reading for the class.

Computer Statistics Package

There are numerous statistics programs that can be used to conduct statistical analysis with a mainframe or personal computer. In this course we will use Stata 13.0, a commonly-used (and easy-to-use) statistics program. I should also note that if you have a copy of Stata 11.0 or Stata 12.0 that will work for most of what we are going to do. If you are serious about doing quantitative research, I would encourage you to purchase a copy of Stata. Other programs (such as SPSS or SAS) are fine, but Stata is easy to learn and use, and I find that it is much more powerful and flexible for most applications than other programs.

This is particularly the case for regression, which will be the focus of this class. Stata will be the only program supported during this class, and computer assignments will be conducted using Stata.

Stata is expensive, but fortunately the Stata Corporation provides educational discounts. Stata can be purchased at the following web site:

<http://www.stata.com/order/new/edu/gradplans/student-pricing/>

Notice that there are multiple options. First, if you are going to purchase Stata, at the very least you should purchase Intercooled Stata 13.0 with the one-year license (\$98). Second, a mid-range (and recommended) option is Intercooled Stata 13.0 with a perpetual license (\$189). Finally, if you (1) will be doing a lot of statistical analysis in your research in the future, particularly with larger data sets, and (2) can at all possibly afford it, I encourage you to purchase Stata SE 13.0, which is the most powerful version of Stata but is somewhat pricey (\$395). Do not purchase the Small Stata 13.0, which is really for very small data sets and will not accommodate some of the data sets that we will use this semester.

Stata Resources

Because many of you have not had experience with Stata, there are several Stata resources that I recommend. First, I will make available to you a .pdf introduction to Stata:

Tobias Pfaff, *A Brief Introduction to Stata with 50+ Basic Commands*

Even though this manual is designed for Stata 10.0 rather than Stata 13.0, the differences in the two versions are sufficiently small that Pfaff's manual will be very helpful to you.

There is also a lengthy (but informative) introduction to Stata that is a Powerpoint presentation converted to a .pdf format:

Christopher Baum, *Introduction to Stata*

In addition, I would like to direct you to the following web sites that are designed to assist Stata users. These are very useful web sites that provide detailed information about Stata commands. You should bookmark these web sites and refer to them often.

The first is a broad-based Stata web site housed at UCLA. One can find a wide range of information about Stata on this web site. I would encourage you to take a look at the links on this web site and familiarize yourself with what this site has to offer:

<http://www.ats.ucla.edu/stat/stata/>

This is the Stata "starter kit" for new users, also available on the UCLA web site:

<http://www.ats.ucla.edu/stat/stata/sk/>

Here is another UCLA site that has basic “learning models” for Stata procedures.

<http://www.ats.ucla.edu/stat/stata/modules/default.htm>

Another introductory web site is found on the University of North Carolina web site:

http://www.cpc.unc.edu/research/tools/data_analysis/statatutorial

Here is a web page at Princeton that provides a basic introduction to Stata:

<http://data.princeton.edu/stata/default.html>

This UCLA site has information on estimating models with categorical dependent variables in Stata. This is a very good resource for information about estimating such models:

http://www.ats.ucla.edu/stat/stata/topics/logistic_regression.htm

Finally, this is a Princeton web site that has a series of downloadable chapters about how to estimate a variety of models in Stata, including models with categorical dependent variables.

<http://data.princeton.edu/wws509/stata/>

Office Hours

Garand: Monday morning, 9:00 – 11:00
Other hours by appointment

Graduate Assistants

I have two graduate assistants who can serve as statistics or Stata consultants over the course of the semester. Both of these assistants have been students in my regression class in the past and have taken other statistics courses with me as well. The two assistants will not hold office hours *per se*, but they can be available for appointments if you need any assistance:

Angela McCarthy (afariz2@lsu.edu)
Laura Kaehler (lkaehl1@lsu.edu)

Academic Misconduct Statement

Academic misconduct is defined by the Code of Student Conduct. You are encouraged to familiarize yourself with the LSU policy on academic misconduct, particularly regarding plagiarism. The LSU Code of Student Conduct can be found on the web site for the LSU Dean of Students:

http://saa.lsu.edu/sites/saa.lsu.edu/files/attachments/Code%20of%20Student%20Conduct%20August%2009_0.pdf

Academic misconduct is a serious violation of university policy, but more importantly it is a significant scholarly violation for political scientists. Plagiarism and other forms of academic misconduct will not be tolerated in this course. Charges of academic misconduct will be turned over to the Dean of Students for appropriate disciplinary action.

I am serious about this.

About the Instructor

James C. Garand (Ph.D., University of Kentucky, 1984) is the Emogene Pliner Distinguished Professor of Political Science at Louisiana State University.

Professor Garand has teaching and research interests in the fields of legislative politics, electoral politics, public opinion, public policy, state politics, racial and ethnic politics, domestic political economy, and research methodology and statistics. His research on a wide range of topics in American politics has been published in numerous journals, including the *American Political Science Review*, *American Journal of Political Science*, *Journal of Politics*, *British Journal of Political Science*, *Political Research Quarterly*, *Western Political Quarterly*, *Comparative Political Studies*, *Legislative Studies Quarterly*, *PS: Political Science and Politics*, *American Politics Research*, *American Politics Quarterly*, *Public Choice*, *Social Science Quarterly*, and *Electoral Studies*, among others. His coedited book, *Before the Vote: Forecasting American National Elections*, was published by Sage Publications in 2000. His current research agenda includes numerous projects relating to the study of American politics.

Professor Garand received the 2006 LSU Distinguished Research Master Award in recognition of outstanding faculty accomplishments in research and scholarship. In 2009 he was recognized as an LSU "Rainmaker," an award given by the LSU Office of Research and Economic Development (ORED) for national and international recognition "for innovative research and creative scholarship." He served as President of the Southern Political Science Association in 2004, and he is also former president of the State Politics Section of the American Political Science Association. He served as Vice-President and Program Chair in 2001 for the Southern Political Science Association. Professor Garand is former editor of the *American Politics Quarterly*, one of the leading subfield journals in American politics. He currently serves on the editorial boards of the *American Politics Research*, *Journal of Political Marketing*, and *Ralph Bunche Journal of Public Affairs*, and he is a former member of the editorial boards of the *American Journal of Political Science*, *Journal of Politics*, *State Politics and Policy*, and *Legislative Studies Quarterly*. He also serves as a member of the International Advisory Board of the *Online Portal for Social Science Education in Methodology* (OPOSSEM).

Professor Garand has received numerous faculty awards. In 1997 Professor Garand received the LSU Alumni Association Distinguished Faculty Award in recognition of sustained excellence in teaching, research, and service. In 2012 he received the Tiger Athletic Foundation Undergraduate Teaching Award recognizing excellence in teaching in the LSU Honors College. In 2001 he received the LSU Foundation Distinguished Faculty Award in recognition of his excellence in graduate teaching, and he is the 1990 recipient of the university-wide Student Government Association Teaching Excellence Award for undergraduate teaching. He is also a recipient of the Alpha Lambda Delta Freshman Honor Society certificate of recognition for superior instruction of freshman students during the Fall 2000 semester.

Class Outline:

The following is a tentative outline of topics for the semester. The instructor reserves the right to make adjustments in the schedule of topics and readings as necessary and with reasonable advanced notice.

January 19 MLK Holiday (no class meeting)

January 26 Introduction / Statistics review

Recommended:

Agresti and Finlay, *Statistical Methods for the Social Sciences*, chapters 1-7.
Knoke, Bohrnstedt, and Mee, *Statistics for Social Data Analysis*, chapters 1-4.

January 26 Bivariate regression models / Introduction to Stata

Recommended:

Gujarati and Porter, *Basic Econometrics*, chapters 1-6.
Knoke, Bohrnstedt, and Mee, *Statistics for Social Data Analysis*, chapters 6.
Lewis-Beck, *Applied Regression: An Introduction*.
Pfaff, *A Brief Introduction to Stata with 50+ Basic Commands*

February 2 Bivariate regression models (continued)

February 9 Multiple regression models

Required:

Garand and Graddy, "Ranking Political Science Departments: Do Publications Matter?" *PS: Political Science and Politics* (March 1999: 113-16).
Bar and Zussman, "Partisan Grading," *American Economic Journal* (2009: 1-25).
Holbrook and Garand, "Homo Economist? Economic Information and Economic Voting," *Political Research Quarterly* (June 1996: 351-76).
Garand, Guynan, and Fournet, "The Gender Gap and Political Knowledge: Men and Women in National and State Politics," unpublished paper, 2004.

Recommended:

Gujarati and Porter, *Basic Econometrics*, chapters 7-9.
Berry and Sanders, *Understanding Multivariate Research*.
Rubinfeld, *Reference Guide on Multiple Regression*.
Sykes, *An Introduction to Regression Analysis*. Chicago Working Papers in Law and Economics.

February 16 Mardi Gras (no class meeting)

Class Outline (continued):

February	23	Multiple regression models (continued)
		<p>Recommended: Lewis-Beck and Skalaban, "The R-Squared: Some Straight Talk," <i>Political Analysis</i> (1991: 153-72). King, "Stochastic Variation: A Comment on Lewis-Beck and Skalaban's 'The R-Square,'" <i>Political Analysis</i> (1991: 185-200). Achen, "What Does 'Explained Variance' Explain? Reply," <i>Political Analysis</i> (1991: 173-84). King, "How Not to Lie with Statistics: Avoiding Common Mistakes in Quantitative Political Science," <i>American Journal of Political Science</i> (August 1986: 666-87). Luskin, "Abusus Non Tollit Usum: Standardized Coefficients, Correlations, and R^2s," <i>American Journal of Political Science</i> (November 1991: 1032-46). King, "'Truth' is Stranger than Prediction, More Questionable than Causal Inference," <i>American Journal of Political Science</i> (November 1991: 1047-54).</p>
March	2	Multiple regression models (continued) / Midterm exam week
March	9	Regression assumptions: Overview / Model misspecification
		<p>Required: Brambor, Clark, and Golder, "Understanding Interaction Models: Improving Empirical Analyses," <i>Political Analysis</i> (2005: 1-20). Garand, "Income Inequality, Party Polarization, and Roll-Call Voting in the U.S. Senate," <i>Journal of Politics</i> (October 2010: 1109-28).</p> <p>Recommended: Gujarati and Porter, <i>Basic Econometrics</i>, chapters 10-13. Berry, <i>Understanding Regression Assumptions</i>. Berry and Feldman, <i>Multiple Regression in Practice</i>. Fox, <i>Regression Diagnostics</i>.</p>
March	16	Regression assumptions: Model misspecification
March	23	Regression assumptions: Multicollinearity and micronumerosity
March	30	Regression assumptions: Heteroskedasticity
April	6	Spring Break (no class meeting)
April	13	Regression assumptions: Autocorrelated errors

April 20 Discrete dependent variables

Required:

Corey and Garand, "Are Government Employees More Likely to Vote? An Analysis of Turnout in the 1996 U.S. National Election," *Public Choice* (April 2002: 259-83).

Wink, Livingston, and Garand, "Dispositions, Constituencies, and Cross-Pressures: Modeling Roll-Call Voting on the North American Free Trade Agreement in the U.S. House," *Political Research Quarterly* (December 1996: 749-70).

Frey, Savage, and Torgler, "Behavior Under Extreme Conditions: The Titanic Disaster," *Journal of Economic Perspectives* (Winter 2011: 209-22).

N. Susan Gaines and James C. Garand, "Morality, Locality, or Equality: Analyzing Determinants in Support for Same-Sex Marriage," *Political Research Quarterly* (September 2010: 553-67).

Recommended:

Gujarati and Porter, *Basic Econometrics*, chapter 15.

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

Hanushek and Jackson, *Statistical Methods for Social Scientists*, chapter 7.

Knoke, Bohrnstedt, and Mee, *Statistics for Social Data Analysis*, chapter 9.

April 27 Discrete dependent variables (continued)