

UNIVERSITY OF MISSOURI-ST. LOUIS  
Department of Political Science  
Winter 2009

**POLITICAL SCIENCE 6402**  
**INTERMEDIATE TECHNIQUES IN POLICY RESEARCH**  
**Monday and Wednesday 5:30-6:45 PM in 134 SSB**

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W 3-5, Th 7-9pm

Econ Lab 452 SSB

The linear regression model is the most commonly used statistical method in political science. One is likely to come across some type of regression analysis in just about any recent issue of a top political science journal. As a result, it is important for political scientists to understand the theory and practice of regression analysis.

This seminar is designed to introduce students to multivariate regression analysis. We will focus most of our energy on the interpretation and use of single equation, linear regression models. Toward the end of the semester, we will cover some more advanced topics (including common nonlinear models). We will cover some mathematical and statistical principles used in regression analysis. The seminar will prepare students to use regression analysis appropriately in original research, as well as understand and critically evaluate published research that relies on regression results. Though we begin with a review of basic regression, this course presumes that students are familiar with research design and basic statistics.

#### REQUIRED BOOKS

Berry, William D. 1993. *Understanding Regression Assumptions*. Newbury Park, CA: Sage.

Fox, John. 2008. *Applied Regression Analysis and Generalized Linear Models*. Los Angeles, CA: Sage.

There will be some journal articles included in the assigned readings (on MyGateway).

## RECOMMENDED READING

Hamilton, Lawrence. 2009. *Statistics with Stata (Updated for Version 10)*. Belmont, CA: Cengage.

We will use STATA (version 10) as the main software program for the course, for both class examples and homework problems. For those of you with earlier versions of Stata, this will pose a bit of a challenge. The commands are pretty much the same in Stata 10, but data files are sometimes not compatible between different versions of the program. The Hamilton book contains several chapters on commands used for regression analysis, as well as general tips for Stata users.

## SUPPLEMENTARY READINGS

For those who want to read more, the following books provide a basic introduction to several topics covered in the course. The Achen and Berry and Sanders monographs cover the OLS regression model, while the two Long books cover maximum likelihood models for limited dependent variables. The Wooldridge book is a popular econometrics text, somewhat similar to Fox. Gill's book covers many mathematical concepts in more detail.

Achen, Christopher. 1982. *Interpreting and Using Regression*. Newbury Park, CA: Sage.

Berry, William D., and Mitchell S. Sanders. 2000. *Understanding Multivariate Research*. Boulder, CO: Westview.

Wooldridge, Jeffrey M. 2006. *Introductory Econometrics: A Modern Approach, 3<sup>rd</sup> ed.* Mason, OH: South-Western.

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage.

Long, J. Scott, and Jeremy Freese. 2003. *Regression Models for Categorical Dependent Variables Using Stata, Revised Edition*. College Station, TX: Stata Press.

Namboodiri, Krishnan. *Matrix Algebra*. Newbury Park, CA: Sage.

Jeff Gill. 2006. *Essential Mathematics for Political and Social Research*. New York: Cambridge University Press.

## COURSE REQUIREMENTS

Class Performance: Scheduled class meetings will largely follow a lecture format. However, from time to time I will call on students for answers and explanations of topics in the assigned readings. I expect students to complete the required readings before class. I will make available data files I use for classroom examples, in case you want to reanalyze the data and practice statistical techniques on your own.

Problem Sets: Throughout the semester, I will distribute problem sets in class. Each assignment may involve explaining regression concepts, computation by calculator or spreadsheet, the use of a computer software program, or all of the above. The computer assignments can be completed using Stata, which is available on all classroom and lab computers on campus, as well as the Econ Lab (452 SSB).

Term Paper: Students are required to write a 15 page paper on a social science topic that involves estimating at least one regression model. You may use any data set and statistical software in completing the analysis. You should think of the paper as an expanded version of the methodology section in a typical article. In organizing the paper, you should:

1. Briefly introduce the substance of the topic
2. Justify the use of regression analysis
3. Describe your regression diagnostic efforts in detail
4. Interpret the results of your analysis
5. Discuss the generalizeability of the results

A one-page proposal for the paper is due at the beginning of class during the fifth week of the semester (**by Feb. 18**). Earlier proposals are strongly encouraged. Proposals related to on-going or previous original research (such as for another seminar or conference paper) are also encouraged. **The term paper is due Wednesday, May 6. You will present your completed research project to the class (a fifteen minute presentation) during the last week of classes.**

Midterm Exam: A 48-hour take-home midterm exam will be held during the 6<sup>th</sup> week of classes (February 23).

### Grade Distribution

Problem Sets: 40%

Term Paper: 30%

Presentation: 10%

Midterm Exam: 20%

## COURSE OUTLINE

### I. Introduction to OLS Regression

#### Week 1 (January 21)

Introduction

Review of Bivariate Regression

#### Read:

Fox, chapter 1 and Appendix A

Hamilton, chapter 1

#### Applications:

Inglehart, Ronald. 1988. "The Renaissance of Political Culture." *American Political Science Review* 82:1203-1230.

Erikson, Robert S. 1988. "The Puzzle of Midterm Loss." *Journal of Politics* 50:1011-1029.

Rohrschneider, Robert, and Stephen Whitefield. 2007. "Representation in New Democracies: Party Stances on European Integration in Post-Communist Eastern Europe." *Journal of Politics* 69:1133-1146.

Alexander Pacek and Benjamin Radcliff. 2008. "Assessing the Welfare State: The Politics of Happiness." *Perspectives on Politics* 6:267-277.

#### Week 2 (January 26-28)

Mathematics and Statistics Review

Ordinary Least Squares and Its Assumptions

Introduction to Stata

#### Read:

Fox, chapters 2 and 3, Appendix D pp. 65-73, Appendix B pp. 5-15 (on web)

Berry, chapters 2-4

Hamilton, chapters 1-2

Nagler, Jonathan. 1995. "Coding Style and Good Computing Practices." *The Political Methodologist* 6:2-8.

Week 3 (February 2 – 4)

Ordinary Least Squares, Statistical Inference, and Hypothesis Testing

Read:

Fox, chapters 5 and 6, and Appendix D pp. 89-91 (on web)  
Hamilton, chapter 6

Supplementary Readings:

Mock, Carol, and Herbert Weisberg. 1992. "Political Innumeracy: Encounters With Coincidence, Improbability, and Chance." *American Journal of Political Science* 36:1023-1046.

Gill, Jeff. 1999. "The Insignificance of Null Hypothesis Significance Testing." *Political Research Quarterly* 52(September):647-674.

Application:

Russett, Bruce. 1969. "Who Pays for Defense?" *American Political Science Review* 63:412-426.

## **II. Scalar Introduction to Multiple Regression**

Week 4 (February 9-11)

Estimation of Multiple Regression & Functional Form

Read:

Fox, chapters 4 and 5  
Berry, chapter 2-5

Applications:

Ballard, Chris. 2005. "Measure of Success." *Sports Illustrated* 103:60-63.

Ross, Michael L. 2008. "Oil, Islam, and Women." *American Political Science Review* 102:107-123.

Iyengar, Shanto, Helmut Norpoth, and Kyu S. Hahn. 2004. "Consumer Demand for Election News: The Horseshoe Sells." *Journal of Politics* 66: 157-175.  
(non-linear functional form)

Gibson, James L. 1998. "A Sober Second Thought: An Experiment in Persuading Russians to Tolerate." *American Journal of Political Science* 42:819-850.

Conybeare, John A. C. 1983. "Tariff Protection in Developed and Developing Countries: A Cross Sectional and Longitudinal Analysis." *International Organization* 37:441-467.

## **Paper proposal due Feb. 18**

Week 5 (February 16-18)

Multiple Regression and Statistical Inference

Read:

Fox, chapters 5 and 6

Ben Jann. 2007. "Making regression tables simplified." *Stata Journal* 7:227-244.

Supplementary Readings:

Articles by Green, King, and Lewis-Beck & Skalaban on the use of  $R^2$  in *The Political Methodologist*

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 C. 1991. "Abusus Non Tollit Usum: Standardized Coefficients, Correlations, and  $R^2$ s." *American Journal of Political Science* 35:1032-1046.

Leamer, Edward E. 1983. "Let's Take the Con Out of Econometrics." *American Economic Review* 73:31-43.

Applications

Stephens, John D. 1991. "Industrial Concentration, Country Size, and Trade Union Membership." *American Political Science Review* 85(September): 941-953. (Standardized coefficients)

Campbell, James E. 1997. "The Presidential Pulse and the 1994 Midterm Congressional Election." *Journal of Politics* 59:830-857. (Note the use of  $R^2$  in Figure 1)

Booth, John, and Patricia Bayer Richard. 1996. "Repression, Participation and Democratic Norms in Urban Central America." *American Journal of Political Science* 40:1205-1232.

Weldon, S. Laurel. 2002. "Beyond Bodies: Institutional Sources of Representation for Women in Democratic Policymaking." *Journal of Politics* 64:1153-1174.

**Monday, Feb. 23**

**Distribute take-home midterm exam (due in class Wednesday, Feb. 25)**

### **III. Matrix Introduction to Multiple Regression**

Week 6 (February 23-25)

The Linear Model in Matrix Form

Read:

Fox, chapter 9

### **IV. Dummy and Interaction Effects in OLS Regression**

Weeks 7 and 8 (March 2-11)

Dummy Variables, Interactions, and Presenting Results

Read:

Fox, chapter 7

Berry, pp. 60-67

Hamilton, pp. 192-202

Friedrich, Robert J. 1982. "In Defense of Multiplicative Terms in Multiple Regression Equations." *American Journal of Political Science* 26:797-833.

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

Applications:

Ansolabehere, Stephen, James M. Snyder, Jr., and Charles Stewart III. 2000. "Old Voters, New Voters, and the Personal Vote: Using Redistricting to Measure the Incumbency Advantage." *American Journal of Political Science* 44:17-34.

Mettler, Suzanne. 2002. "Bringing the State Back in to Civic Engagement: Policy Feedback Effects of the G.I. Bill for World War II Veterans." *American Political Science Review* 96:351-365.

Golder, Matt. 2003. "Electoral Institutions, Unemployment, and Extreme Right Parties: A Correction." *British Journal of Political Science* 33:525-534.

Lupia, Arthur, and Tasha A. Philpot. 2005. "Views from Inside the Net: How Websites Affect Young Adults' Political Interest." *Journal of Politics* 67:1122-1142.

Supplementary Reading:

Hardy, Melissa A. 1993. *Regression With Dummy Variables*. Newbury Park, CA: Sage.

Jaccard, James, and Robert Turrisi. 2003. *Interaction Effects in Multiple Regression*, 2<sup>nd</sup> ed. Newbury Park, CA: Sage.

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

## V. Regression Diagnostics: Finding and Treating Estimation Problems

### Week 9 (March 16-18)

Heteroskedasticity

#### Read:

Fox, chapter 12

Berry, pp. 67, 72-81

Hamilton, chapter 7 (pp. 209-214)

Downs, George W., and David M. Rocke. 1979. "Interpreting Heteroskedasticity." *American Journal of Political Science* 23:816-828.

#### Applications:

Jacoby, William G. 1988. "The Impact of Party Identification on Issue Attitudes." *American Journal of Political Science* 32:643-661.

Swank, Duane. 1996. "Culture, Institutions, and Economic Growth: Theory, Recent Evidence, and the Role of Communitarian Polities." *American Journal of Political Science* 40:660-679.

Voss, D. Stephen. 1996. "Beyond Racial Threat: Failure of an Old Hypothesis in the New South." *Journal of Politics* 58:1156-1170.

Gerring, John, and Strom C. Thacker. 2005. "Do Neoliberal Policies Deter Political Corruption?" *International Organization* 59:233-254.

### **No classes the week of March 23 (Spring Break)**

### Week 10 (March 30 – April 1)

Analyzing Residuals: Outliers, Leverage, Non-Linearity, and Non-Normality

#### Read:

Berry, pp. 81-82

Fox, chapter 11 and parts of chapter 12

Hamilton, chapter 7 (pp. 214-224), chapter 9, and pp. 141-145

Chatterjee, Sanjit, and Frederick Wiseman. 1983. "Use of Regression Diagnostics in Political Science Research." *American Journal of Political Science* 27:601-613.



Supplementary Reading:

Western, Bruce. 1995. "Concepts and Suggestions for Robust Regression Analysis." *American Journal of Political Science* 39:786-817.

Applications:

Swank, Duane. 1996. "Culture, Institutions, and Economic Growth: Theory, Recent Evidence, and the Role of Communitarian Polities." *American Journal of Political Science* 40:660-679.

Nicholson, Stephen P. 2003. "The Political Environment and Ballot Proposition Awareness." *American Journal of Political Science* 47:403-410.

Joshua Benton and Holly K. Hacker. 2004. "Cheating may be Pervasive." *Dallas Morning News*, December 18, 1A, 14A.

Smith, Richard L. 2002. "A Statistical Assessment of Buchanan's Vote in Palm Beach County." *Statistical Science* 17:441-457.

Cederman, Lars-Erik, and Luc Girardin. 2007. "Beyond Fractionalization: Mapping Ethnicity onto Nationalist Insurgencies." *American Political Science Review* 101:173-185.

Fearon, James D., Kimuli Kasara, and David D. Laitin. 2007. "Ethnic Minority Rule and Civil War Onset." *American Political Science Review* 101:187-193.

Week 11 (April 6 – 8)

Multicollinearity, Specification Error, and Measurement Error

Read:

Berry, pp. 24-27, 30-45, 49-60

Fox, chapter 13

Hamilton, pp. 224-228, chapter 12

Applications:

Putnam, Robert. 1967. "Toward Explaining Military Intervention in Latin American Politics." *World Politics* 20:83-110. (Collinearity)

Schlozman, Kay Lehman, Nancy Burns, and Sidney Verba. 1994. "Gender and Pathways to Participation: The Role of Resources." *Journal of Politics* 56: 963-990. (Importance of model specification)

Casper, Gretchen, and Claudiu Tufis. 2003. "Correlation Versus Interchangeability: The Limited Robustness of Empirical Findings on Democracy

Using Highly Correlated Data Sets.” *Political Analysis* 11:196-203. (Importance of measurement of the dependent variable)

Stephens, John D. 1991. “Industrial Concentration, Country Size, and Trade Union Membership.” *American Political Science Review* 85(September): 941-953. (Model specification and measurement)

#### Week 12 (April 13-15)

##### Time Series Data and Autocorrelation

##### Read:

Fox, chapter 16  
Berry, pp. 67-72, 78-81  
Hamilton, chapter 13

##### Applications:

Caporale, Tony, and Kevin Grier. 2005. “How Smart is my Dummy? Time Series Tests for the Influence of Politics.” *Political Analysis* 13:77-94.

Eisner, Marc Allen, and Kenneth J. Meier. 1990. “Presidential Control Versus Bureaucratic Power: Explaining the Reagan Revolution in Antitrust.” *American Journal of Political Science* 34:269-287.

Smith, Mark A. 1999. “Public Opinion, Elections, and Representation Within a Market Economy: Does the Structural Power of Business Undermine Popular Sovereignty?” *American Journal of Political Science* 43:842-863.

Epstein, Lee, Thomas Walker, and William Dixon. 1989. “The Supreme Court and Criminal Justice Disputes: A Neo-Institutionalist Perspective.” *American Journal of Political Science* 33:825-841.

Lewis-Beck, Michael, and John Alford. 1980. “Can Government Regulate Safety? The Coal Mine Example.” *American Political Science Review* 74: 745-756.

## **VI. Advanced Topics in Regression**

#### Week 13 (April 20-22)

##### Limited Dependent Variables and Maximum Likelihood Estimation: Basics

##### Read:

Fox, chapters 14 and 15

##### Applications:

Green, Donald P. 1991. “Maximum Likelihood for the Masses.” *The Political Methodologist* 4 (Fall 1991): 5-11.

Supplementary Reading:

Menard, Scott. 2002. *Applied Logistic Regression Analysis*, 2<sup>nd</sup> ed. Newbury Park, CA: Sage.

Week 14 (April 27-29)

Maximum Likelihood Estimation: Applications

Read:

Hamilton, chapter 10

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

Supplementary Reading:

Long, J. Scott, and Jeremy Freese. 2003. *Regression Models for Categorical Dependent Variables Using Stata, Revised Edition*. College Station, TX: Stata Press.

Applications:

Ostrom, Charles W. Jr., and Brian L. Job. 1986. "The President and the Political Use of Force." *American Political Science Review* 80:541-566.

Scheve, Kenneth, and Michael Tomz. 1999. "Electoral Surprise and the Midterm Loss in US Congressional Elections." *British Journal of Political Science* 29:507-521.

Hayes, Danny. 2005. "Candidate Qualities through a Partisan Lens: A Theory of Trait Ownership." *American Journal of Political Science* 49:908-923.

Week 15 (May 4-6)

Present Research Papers

Read:

Wooldridge, chapter 19