

Brian M. Pollins

Spring, 2000

2008 Derby Hall **and 204B Mershon**
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Regression Analysis

Course Objectives:

The main body of this course focuses on "intermediate" level single-equation regression techniques. Though we begin with a review of bivariate regression, this course presumes that students have mastered basic statistics and regression.

Student Responsibilities:

Four major problem sets will be distributed during the course, and these constitute the bulk of student responsibilities. Occasional, less challenging work sheets will also be handed out. These will help illustrate particular estimation procedures, and should help students gain hands-on experience with key ideas as well as with SPSS for Windows, our class estimation package. Each assignment may involve computation by hand, or use of computer packages, or both. Information on available data sets will be provided. Non-heroic mid-term and final examinations will be given. Unlike typical in-class examinations, the purpose of these tests will simply allow me to determine whether the student has a basic grasp of the most fundamental points regarding regression analysis.

Course Sequence:

- I. Review of Bivariate Regression and Correlation.
- II. Scalar Introduction to Multiple Regression.
- III. A Matrix Introduction to Multiple Regression. The General Linear Model.
- IV. Regression Diagnostics: Finding and Treating Estimation Problems.
- V. Topics in Regression (As time and class interest allow): Introduction to Maximum Likelihood Estimation, Discrete Dependent Variables.

Readings:

Main Course Texts:

Damodar N. Gujarati (1995) *Basic Econometrics* (3rd ed.) New York: McGraw Hill.

John Fox (1992) *Regression Diagnostics*. A good Sage Series monograph that treats many key estimation problems. Good diagnosis is essential for proper treatment, and Fox describes several diagnostic techniques with admirable clarity.

Peter Kennedy (1992) *A Guide to Econometrics* (3rd ed.) (Cambridge: M.I.T. Press). A great reference for the everyday practitioner. Basic concepts and formulae are found easily and explained clearly and concisely.

Regression Analysis Readings. This copier package will contain selected articles, course assignments and hand-outs. A bargain at twice the price.

At Your Discretion:

To keep course material within reach of all students, several Sage monographs have been ordered, and these will serve as more intuitive introductions to all major topics treated in this course. These monographs are listed as recommended for purchase, and students are free to select those which cover topics of greatest interest, or in which they feel they need the most help (see descriptions below). Supplemental monographs to consider for purchase (listed in order of their use in this course) :

- 1) Achen, Christopher H. (1982) *Interpreting and Using Regression* Sage Series no. 29. This monograph considers "how and under what circumstances regression analysis is actually put to good use in the social sciences." It is a very good question to ask, and Achen provides nice answers while considering important issues of inference and interpretation. This is sort of a "thinking human's" introduction to regression.
- 2) Liao, Tim Futing (1994) *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models* Sage Series no. 101. A good, clear introduction to the world of discrete dependent variables, both categorical and ordinal.
- 3) King, Gary (1989) *Unifying Political Methodology: The Likelihood Theory of Statistical Inference*. This serves well as an introduction to more advanced estimation problems where linear techniques perform poorly, if at all (event count models, discrete, censored, or truncated dependent variables, etc.)

SYLLABUS

I. Review of Bivariate Regression and Correlation

Required Reading:

Gujarati, Chapters 1-6.

King, Gary (1986) "How Not to Lie with Statistics: Avoiding Common Mistakes in Quantitative Political Science," *American Journal of Political Science*, v.30, pp.666-687.

Suggested Reading:

Achen, Christopher H. (1982) *Interpreting and Using Regression* Sage Series no. 29.

Applications:

Ada W. Finifter and Ellen Mickiewicz (1992) "Redefining the Political System of the USSR: Mass Support for Political Change," *American Political Science Review*. 86: 857-74.

Clive Bean and Anthony Mughan (1989) "Leadership Effects in Parliamentary Elections in Australia and Britain." *American Political Science Review*. 83: 1165-80.

Robert W. Jackman (1987) "Political Institutions and Voter Turnout in the Industrial Democracies" *American Political Science Review*. 81: 405-23.

Doran, Charles F. and Wes Parsons (1980) "War and the Cycle of Relative Power," *American Political Science Review*, v. 74, no. 4. (Dec.), pp. 947-965.

II. Scalar Introduction to Multiple Regression and Analysis of Variance

Required Reading:

Gujarati, chapters 7 and 8.

Applications:

Pollins, Brian M. (1989) "Conflict, Cooperation and Commerce: The Effect of International Political Interactions on Bilateral Trade Flows" *American Journal of Political Science* 33(3): 737-61.

Jackman, Robert W. (1987) "Political Institutions and Voter Turnout in the Industrial Democracies" *American Political Science Review* v.81, no.2, (June) pp. 405-423.

Goldsmith, Arthur A. (1986) "Democracy, Political Stability, and Economic Growth in Developing Countries: Some Evidence on Olson's Theory of Distributional Coalitions" *Comparative Political Studies* v.18, pp.517-531.

McAdams, John C., and John R. Johannes (1987) "Determinants of Spending by House Challengers, 1974-84" *American Journal of Political Science* v. 31, no. 3 (August) pp. 457-483.

Conybeare, John A. C. (1983) "Tariff Protection in Developed and Developing Countries: A Cross Sectional and Longitudinal Analysis," *International Organization*, v. 37, no. 3 (Summer), pp. 441-467.

III. A Matrix Introduction to Multiple Regression Analysis

Required Reading:

Gujarati, Chapter 9.

IV. Regression Diagnostics: Finding and Treating Estimation Problems in Multiple Regression Analysis

A. Heteroscedasticity, Autocorrelation

Required Reading:

Gujarati, Chapters 11 and 12.

Downs, George W. and David M. Rocke (1979) "Interpreting Heteroscedasticity," *American Journal of Political Science*, v.23, no.4 (November) pp.816-828.

Suggested Reading:

Hibbs, Douglas A. (1974) "Problems of Statistical Estimation and Causal Inference in Time-Series Regression Models," *Sociological Methodology*, pp. 252-308.

Lemieux, Peter (1976) "Heteroscedasticity and Causal Inference in Political Research" *Political Methodology* 3: 287-316.

Applications:

Fair, Ray (1987) "The Effect of Economic Events on Vote for President: 1984 Update" *Political Behavior* 10:168-79. Also in the National Bureau for Economic Research Working papers, no.2222.

Muller, Frank G., and Klaus Zimmermann (1986) "The Determinants of Structural Changes in Public Budgets: A Theoretical and Empirical Analysis for the Federal Republic of Germany" *European Journal of Political Research* v.14, pp.481-498.

Kamlet, Mark S., and David C. Mowery (1987) "Influences on Executive and Congressional Budgetary Priorities, 1955-1981" *American Political Science Review* v. 81, no. 1 (March) pp. 155-178.

Beck, Nathaniel (1987) "Elections and the Fed: Is There a Political Monetary Cycle?" *American Journal of Political Science* v. 31, no. 1 (February) pp. 194-216.

Rasler, Karen (1986) "War, Accommodation, and Violence in the United States, 1890-1970" *American Political Science Review* v. 80, no. 3 (September) pp. 921-945.

Norpoth, Helmut (1987) "Guns and Butter and Government Popularity in Britain" *American Political Science Review* v. 81, no. 3 (September) pp. 949-959.

Stewart, Charles (1987) "Does Structure Matter?: The Effects of Structural Change on Spending Decisions in the House, 1871- 1922" *American Journal of Political Science* v. 31, no. 3 (August) pp. 584-605.

B. Collinearity, Specification Error, Measurement Error**Required Reading:**

Gujarati, Chapters 10 and 13.

Fox, John (1992) *Regression Diagnostics* Section 3, Appx. 3.1, 3.2.

C. The Analysis of Residuals. Outliers, Leverage, Non-Linearity, Non-Normality.**Required Reading:**

Fox, John (1992) *Regression Diagnostics* Sections 4, 5 and 7 and Appx.4.1-4.4, 6.1.

Chatterjee, Sanjit and Frederick Wiseman (1983) "Use of Regression Diagnostics in Political Science Research," *American Journal of Political Science*, v.27, no.(3) pp.601-613.

V. Topics in Regression: Dichotomous Variables, Pooled Time-Series, Introduction to Maximum Likelihood

A. Dichotomous Independent Variables (a.k.a. "Dummy" Variables).

Gujarati, Chapter 15.

B. Pooled Cross-Section Time-Series Analysis: Confronting a Variety of Estimation Problems All at Once

Theory:

Stimson, James A. (1985) "Regression in Space and Time: A Statistical Essay" *American Journal of Political Science* v.29, pp.914-947.

Kim, Taehyun (1988) "A Note on Pooled Cross Section Time-Series Regression Analysis", Unpublished Research Paper, Ohio State University.

Applications:

Smith, Ronald P. (1980) "Military Expenditure and Investment in OECD Countries, 1954-1973" *Journal of Comparative Economics* v.4, pp.19-32.

Weede, Erich (1986) "Sectoral Reallocation, Distributional Coalitions, and the Welfare State as Determinants of Growth Rates in Industrial Democracies" *European Journal of Political Research* v.14, pp.501- 519.

Pollins, Brian M. (1989) "Does Trade Still Follow the Flag?: A Model of International Diplomacy and Commerce" *The American Political Science Review* v.83, no.2 pp.465-480.

Clarke, Harold D. and Nitish Dutt (1991) "Measuring Value Change in Western Industrialized Democracies: The Impact of Unemployment" *The American Political Science Review*. 85: 905.23.

Radcliff, Benjamin (1992) " The Welfare State, Turnout and the Economy: A Comparative Analysis" *The American Political Science Review* 86: 444-54.

C. A Basic Intro to Maximum Likelihood Estimation and Some of its Uses

King, Gary (1989) *Unifying Political Methodology: The Likelihood Theory of Statistical Inference* Cambridge: Cambridge University Press. Chapters 1,2, 3 (skim) and 4.

Greene, William H. *Econometric Analysis* (2nd ed.) Chapter 13, sections 1-4.

I) Discrete Dependent Variables: Logit and Probit Techniques

Gujarati, Chapter 16.

King, Gary (1989) *Unifying Political Methodology: The Likelihood Theory of Statistical Inference* Cambridge: Cambridge University Press. Chapter 5, sections 1-6.

Greene, William H. *Econometric Analysis* (2nd ed.) Chapter 21, sections 1-4.

Applications:

Ostrom, Charles W. Jr. and Brian L. Job (1986) "The President and the Political Use of Force," *The American Political Science Review* v.80, no.2 pp.541-566.

Beck, Paul A., Lawrence Baum, Aage Clausen and Charles Smith (1992) "Patterns and Sources of Ticket Splitting in Subpresidential Voting." *The American Political Science Review*. 86: 916-28.

Leighley, Jan E. and Jonathan Nagler. (1992) "Socioeconomic Bias in Turnout, 1964-1988: The Voters Remain the Same" *The American Political Science Review*. 86: 916-28.

ii) Event Count Models and Poisson Regression

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* v.32, no.3 (August) pp.838-863.

King, Gary (1989) "Event Count Models for International Relations: Generalizations and Applications," *International Studies Quarterly*, v.33, no.2 (June) pp.123-147.

Application:

Pollins, Brian M. (1996) "Global Political Order, Economic Change and Armed Conflict: Co-evolving Systems and the Use of Force" *American Political Science Review*. 40: 103-117.

Two Important Considerations (inserted here at request of OSU lawyers):

Academic Honesty. All of the work you do in this course is expected to be your own. Absolutely no cheating or plagiarism (using someone else's words or ideas without proper citation) will be tolerated. Any cases of cheating or plagiarism will be reported to the university committee on academic misconduct and handled according to university policy.

Disability. Students with disabilities are responsible for making their needs known to the instructor, and seeking available assistance, in a timely manner. Course materials are available in alternative formats upon request. For such materials please contact Mr. Wayne DeYoung, 2140 Derby Hall, 154 North Oval Mall, 292-2880.

And a Special Note for 686. The above wording is a statement of official OSU policy. You should be aware that I do allow students to work *together while they progress* through each assignment. But each student must work ***alone as they write up*** their own final copy for submission. This means that all work you submit must be yours alone. Each student should *show all work* progressing toward the solution, and I ask you to *highlight your final answer* to each problem.