

Pols 707—Spring 2004

24th August 2004

Class Sessions: MS 107 12:30-3:20
Professor: Paul E. Johnson
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<http://lark.cc.ku.edu/~pauljohn/ps707>
Office Hours: TR:1:30-4:00 and by appt.

Course Purposes.

- Develop a strong foundation in research methods and computing in an open and free environment wherever possible, and
- Teach the basics of statistical model-building from "regression oriented" point of view. Reading material is chosen selectively and carefully to focus attention on the most important principles. The aim is to teach the following:
 - OLS regression in depth, especially concerning model fitting questions, such as functional form and use of dummy/interaction models.
 - Principles, but not details, of methods beyond OLS, such as NLS and ML.
 - Qualitative variable models and other models that fall within the "generalized linear model" framework.

The Social Contract

I owe you something every week. You owe me something every week! I will provide handouts or online material or example programs every week.

Every week you owe me either

1) a response to a specific assignment,

or, if I do not make an assignment,

2) a printout, a computer program, or some other "show and tell" item that you can discuss with the class.

Student Obligations:

There will be exercises and assignments. Exercises are required, but not graded. In case I ever forget to assign an exercise or writing assignment, just jot down notes in your journal showing what you worked on that week and I'll look it over.

The writing assignments, which are graded, will be brief (5-10 page) project write-ups. I hope you will do your best to turn these in when they are due, but I will not penalize your grades unless they are handed in more than one week late.

Avoid plagiarism or the appearance thereof.

Grading:

Grades will be based on the writing assignments (80%) and a take-home final exam (20%) that will review the methods discussed in the course.

About Readings:

This year I'm trying the old-fashioned strategy of picking a big-fat stats book and using it almost exclusively. If you talk to last year's students, you will know it is a change. Don't worry.

Here's the easy to read, friendly book:

Dadomar N. Gujarati, *Basic Econometrics*, 4th ed. (New York: McGraw Hill, 2003).

That book is well written and comprehensive.

In case you need other insights, you can find them in many many books. I have ordered some at the bookstore, just to make sure you have access.

(K) Peter Kennedy, *A Guide to Econometrics*, 4th ed. This is a "Cliff's notes" for statistics.

(G) William Green, *Econometric Analysis*, 4th edition. This is the most respected, general purpose econometrics book. It is more difficult than Gujarati.

Other books that I find useful are

(PR) Pindyck and Rubinfeld, *Econometric Models and Economic Forecasts*. Until 2003, this was the main text for this class.

(VR) Venables and Ripley, *Modern Applied Statistics with S+* (I put a photocopy of that on reserve)

and a simpler introduction to regression book:

(CHP) Samprit Chatterjee, Ali Hadi, and Bertram Price, *Regression Analysis by Example, 3rd ed.* (I put a copy of that on reserve too).

(Faraway) *Practical Regression and Anova using R* This is a FREE, ONLINE book from a U. Michigan professor. I have a copy on reserve, you can copy that, or download your own pdf: <http://www.stat.lsa.umich.edu/~faraway/book/>

(Maindonald) JH Maindonald, *Using R for Data Analysis and Graphics: An Introduction*. This is a FREE, ON-LINE book. I have a copy on reserve, you can copy that, or download your own pdf. Find a current link on the R site (see links below)

Scott Long, *Regression Models for Limited and Categorical Dependent Variables*. Beverly Hills: Sage. This is an extremely fine introduction to probit, logit, and count models.

My Montessori statement:

I realize students are "starting out" at different places and will learn in their own ways. I respect the "Montessori school" philosophy and want you to make an assessment of where you are and what you can do. If the readings that I assign are too difficult, find something more suitable. As long as you are investing 10 to 20 hours per week, you are working hard enough.

Weekly Schedule

1 Introduction.

I'll pass out some Math Refresher exercises.

I'll present a little lecture about curves and slopes. My handout called "curves.pdf" is available online.

2 Review of statistics.

Readings:

1. Gujarati, Appendix A, pp. 869-883,886-895. We need to make sure you are familiar (in a "on the tip of your tongue" sense) with terms like:

- (a) population (aka sample space)
- (b) random variable
- (c) discrete variable
- (d) continuous variable
- (e) parameter
- (f) probability density function (pdf)
- (g) cumulative distribution function (cdf)
- (h) marginal probability density function
- (i) conditional probability density function
- (j) Expected Value (the first moment)

It is vital to understand things like this:

$$E \left[\sum_{i=1}^{10} a \cdot x_i \right] = a \sum_{i=1}^{10} E[x_i]$$

- (k) Variance

Make sure you get this:

$$V[a \cdot X_i + b \cdot Y_i] = a^2 V[X_i] + b^2 V[Y_i] + 2a \cdot b \cdot Cov(X_i, Y_i)$$

- (l) correlation coefficient
- (m) Be familiar with the "shape" of these densities
 - i. Normal Distribution
 - ii. Central Limit Theorem
 - iii. χ^2 (Chi-Square) distribution
 - iv. Student's t distribution
 - v. F distribution
 - vi. Bernoulli distribution
 - vii. Binomial distribution
 - viii. Poisson

2. Some distributions are not discussed in Gujarati. There are hundreds of them, and there are many books that offer catalogues. Here are the names of a few worth looking up:

- (a) Uniform

- (b) Beta
- (c) Negative Binomial
- (d) Exponential
- (e) Weibull
- (f) Gamma

Sometimes I've used small SAS or R programs to illustrate these. In the web site, you might find handouts like BetaDistribution or GammaDistribution.

You should keep a collection of reference materials on these distributions. I have a photocopy of this that I always keep close by my side:

Law and Kelton, "Ch. 4. Basic Review of Probability and Statistics," Simulation Modeling and Analysis, pp. 137-218.

I also keep a copy of this big file that is downloadable. It is called "Regress+" which is a 100 page document with a detailed discussion of all different kinds of statistical distributions. http://www.geocities.com/~mikemclaughlin/math_stat/

See also: Jerry Banks, John Carson,II, Barry Nelson, and David Nichol "Ch. 5, Statistical Models in Simulation" *Discrete-Event System Simulation* pp. 153-203.

3. Statistical Inference. Gujarati, pp. 895-912. Make sure you know these terms:

- (a) estimator (or "statistic")
- (b) sampling distribution
- (c) It seems to me everybody needs to know this: standard error of the estimator, even though Gujarati does not make such a big deal of it.

$$se(\hat{\theta}) = \sqrt{Var(\hat{\theta})}$$

- (d) confidence interval
- (e) level of significance
- (f) methods of estimation: don't stress over details, but be aware one might choose a best estimate of θ by different methods, the 2 most widely used being:
 - i. least squares: given an estimate $\hat{\theta}$, calculate an estimate for each case i , \hat{y}_i , then choose the final estimate that minimizes the sum of squared errors:

$$\sum (y_i - \hat{y}_i)^2$$

- ii. maximum likelihood: for an estimate $\hat{\theta}$, figure out how likely each possible value of y_i is. Adjust $\hat{\theta}$ back and forth, looking for an estimate that maximizes the chance that your model could produce the sample of observed y 's.

- (g) Unbiased estimator
- (h) Variance of estimator
- (i) Efficient estimator
- (j) Linear estimator
- (k) Minimum mean square estimator
- (l) Asymptotically unbiased estimator
- (m) Consistent estimator
- (n) Null hypothesis
- (o) Alternative hypothesis
- (p) Confidence interval approach to hypothesis testing

- (q) type I error
- (r) type II error
- (s) level of significance
- (t) Test of significance approach to hypothesis testing (to me, this is more intuitive) This is the approach I describe in my lecture notes on this web page:

<http://lark.cc.ku.edu/~pauljohn/ps707/SamplingDistributionEssays>

These essays were prepared for classes in the early 1990s, but I still think they are pretty good! In particular, consider "Sampling Distribution of the Normal Mean," and "The Central Limit Theorem With Illustrations."

I make the undergrads in POLS 306 read this: Bowen & Weisberg, *Introduction to Data Analysis*, Ch. 10 "Statistical Inference" because it is very clear.

4. There are web sites where you can get online and create some distributions:

I think this is the most fun:

<http://ic.net/~jnbohr/java/CdfDemoArgs.html>

then you can type in parameters and it makes graphs for you!

There is an "on-line gallery of distributions here:

<http://www.itl.nist.gov/div898/handbook/eda/section3/eda366.htm>

This one often has interesting things: http://www.ruf.rice.edu/~lane/stat_sim.

We can use the statistical program R to make plots of many distributions, and perhaps your time is better spent learning how that can be done. I'll make some example programs available (after I write them).

3 A little More Math and Computing background.

3.1 Discuss "Math Exercises".

3.2 Little lecture about vectors, matrices, etc.

In case you want to read a bit and prepare yourself for my lecture, please review Gujarati's Appendix B, pp. 913-925. My lecture notes are available online, "Vectors".

3.3 Statistical Programs: What are you looking for?

I have a handout on this: "SoftwareConsidered".

3.4 What stat programs will you actually use?

1. Consider using R. R is a free, open-source program that is increasingly widely used in social science. <http://www.r-project.org>. There is much free documentation for R. The book *An Introduction to R* is available in print and also for free online. R has a monstrosously huge homepage and I have cobbled together may tips for R users: <http://www.ku.edu/~pauljohn/R/Rtips.html>. Look those over.
2. Limdep is good, and especially in case you are following along with Greene's Econometrics book, Limdep is the right thing to use because Greene wrote it.
3. Please don't use SPSS
4. The old standby is SAS. If you want to learn SAS, consider consulting Lora Delwiche and Susan Slaughter, *The Little SAS Book, 2ed*. I think, if I were you—totally freaked out and afraid of what to do—I'd read Chapter 1. Then I'd start picking and choosing sections to find out specifics, like sections 2.2,2.3, 2.8,3.1-3.6, 4.3,4.4,4.9,4.11,7.1-7.6. (copy in reading room). I have an online guide for SAS that you can find under <http://www.ku.edu/pauljohn/> <http://www.ku.edu/~pauljohn/>

Don't forget SAS comes with a huge amount of documentation, and it is online on lark <http://lark.cc.ku.edu/~sas82/sasdoc/sashtm>. That lists all their books, there is a searchable index under the link main.htm. Particularly important books in their list are:

(ets) econometrics and time series

(stat) statistics—general regression, anova, and so forth.

(lref) basic language reference

3.5 A brief talk about R

I will make a 30-45 minute presentation on the R statistical program.

4 Bivariate Regression review

Readings:

Gujarati, Chapters 1-5. You should have seen all this before.

Focus Points:

Chapter 1: 1.1-1.3 (skim rest)

Chapter 2: key terms:

slope

intercept

regression equation,

“linearity in the variables”

“linearity in the parameters”

stochastic disturbance term

residual

Chapter 3: key terms:

ordinary least squares,

sum of squared errors,

point estimators,

fixed values of X,

zero-mean disturbance,

homoskedasticity (note I spell it the old fashioned way),

autocorrelation,

specification,

variance of estimators (standard error of estimator is the square root of the variance)

standard error of the estimate (a slightly confusing terminology, see p. 78)

Gauss Markov Theorem

goodness of fit

residual sum of squares

R^2 .

Chapter 4: hard to see anything surprising in this one, mostly a repeat of 3, except with an emphasis of the properties that obtain if the error happens to be Normal.

Chapter 5: key terms:

t-test

critical region

level of significance

null hypothesis

type I error

type II error

F-test

mean prediction versus individual prediction.

Although the χ^2 test for $\hat{\sigma}^2$ (p. 133) might be handy someday, it is low priority now.

My notes, which I will hand out, are available online in a file called “BivariateRegression”.

I will discuss this essay I wrote 10 years ago:

Paul Johnson, "Simulation of Bivariate Regression." That's online in the SamplingDistributionEssays directory.

If you find yourself fumbling about in ignorance, seek out other things to read.

For a simple introduction, consult Chatterjee, et al, Ch. 2

If Chatterjee is too hard, consult the "little green book" by Michael S. Lewis-Beck, *Data Analysis: An Introduction*, "Ch. 6: Simple Regression"

5 Bivariate Regression Extensions

5.1 Everybody needs to bring some sample printout of a bivariate regression (along with a scatterplot)

5.2 Linearity Questions

Gujarati, Chapter 6. Focus on part 6.4-10. Look for:

log-linear

log-log models

reciprocal models

We need to talk about quadratic models as well, such as

$$y_i = \beta_0 + \beta_1 x_i + \beta_2 x_i^2 + e_i$$

5.3 Maximum Likelihood

Gujarati, Appendix 4A, pp. 114-118.

I have a handout called "MaximumLikelihood1". "MaximumLikelihood2" is a handout for a more advanced regression class.

5.4 Try to use R!

Spend 5 hours or so playing with R. Run their demo programs. Then run some programs of our own. I will post example commands that I want you to try. R is installed in our lab machines in Blake. It is freely available on the internet, you can install it in your own computers as well.

In case you are really excited to learn more about R, here's what to do. After you look at their online Introduction manual (remember `help.start()`), for free there's Maindonald's *Using R for Data Analysis and Graphics: An Introduction*. There is also a free step-by-step R tutorial by Mark Myatt that he calls "Open Source Solutions-R". There's Faraway's book, also free. These are available on reserve as well as online. R has a huge volunteer workforce and a big homepage too: <http://www.r-project.org>. There is an encyclopedia of R online stuff here: <http://www.vanderbilt.edu/quantmetheval/>. I should mention that the VR book, which is on reserve, is the bible for S+/R and you can learn a lot from it too.

6 Transition to Multiple Regression

6.1 Survey

Reading:

Gujarati, Chapters 7 & 8.

My notes are online, called "MultipleRegression1".

For other readings, consult:

PR, Ch. 4, pp. 85-95, Ch. 5.2-5.4, pp. 122-140.

Long is succinct: pp. 11-20

There is a general survey in Kennedy, Ch. 3
There is a general survey in Chatterjee, Ch. 4 &5.
Faraway gives the matrix algebra treatment of multiple regression, Ch. 2&3

If all of these are too hard to understand, fall back to the simplest, clearest explanation of all of this I have ever seen:
Michael S. Lewis-Beck, *Data Analysis: An Introduction*, "Ch. 7: Multiple Regression"

6.2 Examples.

Everybody has to pick an article from a modern political science journal. Bring a "summary sheet" that you prepare; make copies for each member class. A summary sheet has the article's title, a succinct description of the model's variables, and a table presenting one of the models estimated. Here are some articles that I'm pretty sure you can handle. If you find some other article, let me know ahead of time so I can review it.

Timothy B. Krebs, "The Determinants of Candidates' Vote Share and the Advantages of Incumbency in City Council Elections," *AJPS* 42 (July, 1998): 921-935

Sally Coleman Selden, Jeffrey Brudney, J Edward Kellough, "Bureaucracy as a Representative Institution" *AJPS* 42 (July 1998): 717-744.

Robert Erikson, "Economic Conditions and the Presidential Vote," *APSR*, 83 (June 1989): 568-573.

7 Dummy variables, curve fitting.

7.1 General Introduction on Dummy Variables

Reading:

Gujarati, Chapter 9, pp. 297-324.

7.2 Everybody has to look at one of these articles and report back:

Wendy Rahn, John Aldrich, and Eugene Borgida, Individual and Contextual Variations in Political Candidate Appraisal. *APSR*, (March 1994) 88:193-199

M. Lewis-Beck and J. Alford, "Can Government Regulate Safety...?" *APSR*, 1980, pp. 745-756. That's a piecewise linear model

7.3 Presentation on "curve fitting", loess and kernel smoothing

7.4 Intrinsically Linear and Nonlinear models

Reading:

Gujarati, Chapter 14, pp. 563-579.

Check any other regression book you want and look for nonlinear models.

Long introduces Maximum Likelihood, pp. 25-33, and more complete is PR, Ch 10

Here are some examples of intrinsically linear models from social science:

1. Double log of multiplicative models, aka translog (Remember the B's are elasticities!)

James Morrow, Randolph Siverson, Tressa Tabares, "The Political Determinants of International Trade: The Major Powers, 1907-90" *APSR* 92: 649-661.

Brian Pollins, "Does Trade Still Follow the Flag," *APSR*, 83 (June 1989): 465-480. Note p. 469

Steven Finkel, et al., "Personal Influence, Collective Rationality, and Mass Political Action," *APSR* 83 (Sept 1989): 885-903. (see p. 895)

2. Log on the right

Aehra F. Arat, "Democracy and Economic Development: Modernization Theory Revisited," *Comparative Politics*, 21 (October 1988):21-36.

Robert W. Jackman, "On the Relation of Economic Development to Democratic Performance," *AJPS*, 17 (Aug 1973), 611-621.

3. Multiplicative Interaction

John R. Hibbing, "The Media's Role in Public Negativity Toward Congress," *AJPS* 42 (April 1998):475-498.

Diana Evans, "Oil PACs and Aggressive Contribution Strategies," *JOP*, 50 (November 1988): 1047-1056

Edward Muller and Michell Seligson, "Inequality and Insurgency," *APSR*, 81 (June 1987): 425-451.

4. Polynomial model

John Strate, et al., "Life Span, Civic Development and Voting Participation," *APSR*, 83 (June 1989):443-463.

Pretty interesting adaptation of simple nonlinearity. Clearly presented, worth studying

5. Log on the left

Robert J. Thornton and Jon T. Innes, "Interpreting Semilogarithmic Regression Coefficients in Labor Research," *Journal of Labor Research*, 10 (Fall 1989).

Stephen J. Huxley, "Predicting Response Speed in Mail Surveys," *JMR* (Feb. 1980): 63-68.

8 Regression problems 1: Choosing Variables

8.1 Everybody has to bring regression printout that shows estimates of a model that has a dummy variable and also the interaction of that dummy with a continuous variable.

8.2 Required Reading on Multicollinearity:

Reading:

Gujarati, Chapter 10, pp. 341-375

My notes are called "MultipleRegression2-mc"

If that is not understandable to you, consult :

Kennedy, Ch. 11

Chatterjee, Ch. 9, 10.

Greene discusses MC on p. 255-259. I never want to forget his advice, "Suggested 'remedies' for multicollinearity might well amount to attempts to force the theory on the data."(p. 259)

Or Faraway, Chapter 9. That goes into "principal components" and "ridge regression," two approaches to multicollinearity that I've not used, but admire and respect and want to learn.

8.3 R-Square and Standardized Coefficients (betas)

Reading:

My notes are called "MultipleRegression3-betas"

King, "How Not To Lie With Statistics," *AJPS*, Aug 1986 ** This is a famous one, you should read it.

Luskin, "R-Square Encore," in *Political Methodologist*, Sp. 1991, pp. 21-23.

9 Regression problems III: Heteroskedasticity and Autoregression.

Required Reading:

Gujarati, Chapters 11 & 12.

Handouts will available, "Heteroskedasticity" and "TimeSeries1".

Other good treatents you might consult: PR, Ch. 6

Simpler survey is here Kennedy, Ch. 8, 9

Pretty good treatment here Chatterjee, Ch. 7, 8

Very advanced treatment in Greene, Ch. 11-13

Here we discuss of two common statistical problems. If the error term in regression does not follow the assumptions of OLS, corrections need to be made. I try to look at this as a modelling opportunity rather than a smudge on OLS models. In the case of heteroskedasticity, we say "give the observations that have error terms with higher variance less weight." This class will focus on detection and treatment of AR(1) processes in practice—Cochrane-Orcutt procedure and variants of it.

1. EXAMPLE: WLS to adjust for "group means" type dependent variable data.
C. Neal Tate and Pany Sittiwong, "Decision Making in the Canadian Supreme Court: Extending the Personal Attributes Model Across Nations," JOP, 51 (November 1989): 900-916 (esp. p. 908, fn. 7)
2. EXAMPLE: AR(1)
AR(1) in practice: The Cochrane-Orcutt procedure.
Michael S. Lewis-Beck, "Economic Conditions and Executive Popularity: The French Experience," AJPS 24 (May 1980): 306-323.

10 Qualitative Variables I:

This material is complicated and will require some repetition. Chapter 11 in Pindyck and Rubinfeld covers most of the material that will be discussed for the next several classes, as does Aldrich and Nelson's book, *Linear Probability, Logit, and Probit Models*. Perhaps one should try to read all the way through one of these one day and the other the next.

The required readings are in
Gujarati, Chapter 15, pp. 580-616
Long: Ch. 3, Binary Outcomes.
Others:

I still love this chapter: PR, Ch. 11.1 "Models of Qualitative Choice" , pp. 298-318.

And I think this is pretty good too: Aldrich and Nelson, *Linear Probability, Logit and Probit Models*, pp. ch 1.0-1.3 (pp. 9-22), 1.5 (pp. 24-30). CH. 2.0-2.2 (pp. 30-35).

Maybe this will help: Kennedy, Ch. 15.

Or this: Chatterjee, Ch. 12.

There are chapters on these things in most regression books. My personal favorite is Hanushek and Jackson, Chpt. 7 "Models With Discrete Dependent Variables." in *Statistical Models in the Social Sciences*. For a unified survey of methods of dealing with qualitative or noncardinal data, see Gary King, *Unifying Political Methodology: The Likelihood Theory of Statistical Inference* (Cambridge: Cambridge U. Press, 1989). For a survey of methods developed in psychology and sociology that I do not plan to discuss, see Leo Goodman, *Analyzing Qualitative/Categorical Data*.

11 More general development of Logit and Probit models.

11.1 Maximum likelihood (individual level) approach

Long, Ch. 4

Aldrich and Nelson, *Linear Probability, Logit and Probit Models*, Ch. 2.3, pp. 35-37, Ch. 3, pp. 48-66

Others:

To more deeply understand why these models work, one should look into the theory of Maximum Likelihood estimation. Chapter 10 in PR does a pretty good job. Other descriptions of ML can be found in many texts, including Maddala's *Econometrics*, 1977; Bornstadt and Knoke, *Statistics For Social Data Analysts*, 1987; King's *Unifying Political Methodology*.

When in doubt on the technical issues, I consult a great text by Ed Greenberg and Charles Webster, *Advanced Econometrics: A Bridge to the Literature*, New York: Wiley, 1983.

11.2 Grouped Data (so-called minimum chi square methods)

Aldrich and Nelson, *Linear Probability, Logit and Probit Models*, Ch. 4.0-4.1

Required Reading: David Flath and E.W. Leonard, "A Comparison of Two Logit Models in the Analysis of Qualitative Marketing Data," *JMR* 16 (Nov. 1979), pp. 533-538.

Others:

Charyl L. Maranto, "Corporate Characteristics and Union Organizing," *Industrial Relations*, 27 (Fall, 1988). A stock application of minimum chi square logit analysis to grouped data.

11.3 Multicategory dependent variables (ordered and unordered).

Long Ch. 5- 6

PR, Ch. 11.2

Aldrich and Nelson, *Linear Probability, Logit and Probit Models*, 1.4, 2.4, 4.2

Others:

An authoritative source on all variations of the qualitative variables problem is G.S. Maddala, *Limited-dependent and qualitative variables in econometrics*. (Cambridge U. Press, 1984)

12 Applications & Interpretation of qualitative models.

What kinds of diagnostic information do these models provide? How are the results interpreted?

12.1 Everybody has to bring printout of a logit model that we can discuss.

12.2 How to interpret these models:

Long covers this in his chapters. Look that over.

Required: Gary King, *Unifying Political Methodology*. Ch. 5.1-5.2, pp. 98-110 (Photocopy)

See also: Aldrich and Nelson, *Linear Probability, Logit and Probit Models*, 2.5-2.5.2 pp. 40-44.

12.3 Examples: LOGISTIC regression. (Look at the tables and statistical report)

Lori Hausegger and Lawrence Baum, "Inviting Congressional Action: A Study of Supreme Court Motivation in Statutory Interpretation," *AJPS* 43 (January, 1999): 162-185

Lonna R. Atkeson and Randall W. Partin, "Economic and Referendum Voting: A Comparison of Gubernatorial and Senatorial Elections," *APSR*, 89 (March 1995): 99-106

Other Optional Items:

Larry Bartels, "Candidate Choice and the Dynamics of the Presidential Nominating Process," *AJPS*, Feb. 1987, excerpt pp. 1-18. See p. 16 and the use of an interaction term in a logit model. Ask yourself, why does he use ordinary regression sometimes and logit in others.

Donald Kinder, et al, "Economics and Politics in the 1984 American Presidential Election," *AJPS* (May 89): 491-515.

R. Robert Huckfeldt, "Political Loyalties and Social Class Ties," *AJPS*, vol. 28, May 1984, pp. 399-417.

Jack Wright, "PACs, Contributions, and Roll Calls: An Organizational Perspective," *APSR*, (June 1985) 79: 400-414.

John Zipp, "Perceived Representativeness and Voting: An Assessment of the impact of 'choices' vs. 'echoes'," *APSR*, 79 (March 1985): 50-62.

12.4 Examples: PROBIT regression (look at any of these):

Carole Kennedy Cahney and Grace Hall Saltzstein, "Democratic Control and Bureaucratic Responsiveness: The Police and Domestic Violence," *AJPS* 42 (July, 1998): 745-768.

Dean Lacy and Philip Paolino, "Downsian Voting and the Separation of Powers," *AJPS* 42 (October 1998): 1180-1199

Timothy Johnson and Andrew Martin, "The Public's Conditional Response to Supreme Court Decisions," *APSR* 92 (June 1988): 299-309. (uses LR tests!)

Richard L. Hall and Robert P. VanHouweling, "Avarice and Ambition in Congress" *APSR* 89: 121-136.

Charles H. Franklin and Liane Kosaki, "Republican Schoolmaster: The U.S. Supreme Court, Public Opinion, and Abortion," *APSR* 83 (Sept. 1989): 751-771. (Photocopy) Includes a test of a "cross equation constraint." Very clear explanation of the McKelvey-Zaviona model.

Optional others:

John Aldrich, John Sullivan, Eugene Borgida, "Foreign Affairs and Issue Voting: Do Presidential Candidates 'Waltz Before a Blind Audience,'" *APSR*, 83 (March 1989): 124-141

Robert Luskin, John McIver, and Edward Carmines, "Issues and the Transmission of Partisanship," *AJPS* (May 1989) 33: 440-458

Charles Ostrom, Jr. and Brian Job. 1986. The President and the Political Use of Force. *APSR* 80: 541-566. Pretty Good description of the model.

Jeffrey Segal, "Senate Confirmation of Supreme Court Justices:..." *Journal of Politics*, v. 49, Nov. 1987, pp. 998-1016.

Paul Abramson, et al. "Progressive Ambition among United States Senators: 1972- 1988," *JOP*, v. 49, Feb. 1987, pp. 3-35.

Paul Brace, "Progressive Ambition in the House: A Probabilistic Approach," *JOP*, v. 46, May 1984, pp. 556-546.

Eric Uslaner and M. Conway. 1985. The Responsive Congressional Electorate: Watergate, the Economy, and Vote Choice in 1974. *APSR*, 79: 788-803.

12.5 (OPTIONAL TOPIC): Multi-category unordered response models. (multinomial logit)

Patrick Sellers, "Strategy and Background in Congressional Campaigns," APSR 92 (March, 1998): 159-171

13 Additional Topics

13.1 Count Models.

Reading:

Gujarati, Ch 15.12, pp. 620-622.

13.2 Pooled Cross-Sectional Time Series (Panel Data)

Reading:

Gujarati, Ch. 16

14 Multi-equation systems.

What's Wrong with OLS? Simple "walk-through" of 2SLS and instrumental variables, kinds of multi-equation systems.

Reading:

Gujarati, Ch. 18-20.

I'm afraid none of the stats books are very clear and helpful on this. You find about the same level of treatment in PR, Ch 12, pp. 287-305. or Kennedy, Ch. 10

Examples:

Alan Gerber, "Estimating the Effect of Campaign Spending on Senate Election Outcomes Using Instrumental Variables," APSR 92 (June 1998): 401-411

Richard B. Freeman and Morris M. Kleiner, "Employer Behavior in the Face of Union Organizing Drives," Industrial and Labor Relations Review 43 (April 1990): 351-365.

Class time is limited, but your future work should probably touch on these two additional methods.

1. There are systems methods for models with qualitative endogenous variables. Examples of TWO STAGE PROBIT:

Gregory Caldeira and John Wright, Lobbying for Justice," AJPS 42 (April 1988): 499-523

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