Pols 707—Spring 2005

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Course Purposes.

- Learn R
- Learn Statistics
- Learn LaTeX document preparation.

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:

Work 10-20 hours per week.

The final paper will be a "real article". Throughout the semester, there will be several writing assignments that build up to that final paper. 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 the final paper (20%).

About Readings:
Here's the easy to read, friendly book:
Dadomar N. Gujarati, *Basic Econometrics*, 4th ed. (New York: McGraw Hill, 2003).
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, ONLINE 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.

Weekly Schedule

1 Introduction to R.

R has a huge volunteer workforce and a big homepage too: http://www.r-project.org. 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. There is an encyclopaedia of R online stuff here: http://www.vanderbilt.edu/quantmetheval/r.htm. 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.

2 Learn R; Review of statistics.

1. Learn about R. In R, run help.start() and read through the book "Introduction to R." Gaze through any exciting looking packages. There are many books available that will give you a leg-up on R, including Crawley's Statistics and Dalgaard's Introduction to Statistics with R.

   Spend 10 hours using R. You should visit http://www.r-project.org and my tip sheet: http://www.ku.edu/~pauljohn/R/Rtips.htm
   Do things like

   (a) Import data from SPSS, Stata, or others. Find out if variables are "factors" or not.

   (b) recode variables

      i. re-calculate continuous variables (logs, etc)

      ii. cut a continuous variable into ranges, convert into factor

      iii. re-group levels of a factor variable

   (c) make plots (scatter, histograms, etc.). Save plots to files

   (d) estimate models, summarize, plot results

   (e) create samples from statistical distributions & plot them; illustrate the central limit theorem.

2. Things I expect you know already:

   (a) population (aka sample space)

   (b) random variable

   (c) parameter

   (d) variance

   (e) probability density function (pdf)

   (f) cumulative distribution function (cdf)

   (g) Expected Value (the first moment)
   It is vital to understand things like this:

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

   (h) Variance
   Make sure you get this:

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

   (i) correlation coefficient

   Suggested Reading: Gujarati, Appendix A, pp. 869-883,886-895.

3 Using R to plot functions and do matrix algebra.

3.1 Statistical distributions

These are used to describe i) things in the world and ii) estimators you calculate. Note: All of these have "parameters" that determine their shapes.

1. The Normal Distribution is the most familiar (both for observations and estimates of parameters). Recall the central limit theorem
2. Commonly used for parameter estimators
   (a) χ^2 (Chi-Square) distribution
   (b) Student's t distribution
   (c) F distribution
3. Used to describe observations
   (a) Binomial distribution
   (b) Poisson
   (c) Uniform
   (d) Beta
   (e) Negative Binomial
   (f) Exponential
   (g) Weibull
   (h) Gamma

Readings: In the course web site, you might find handouts like BetaDistribution or GammaDistribution.

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

"Regress+" a 100 page document with statistical distributions. http://www.geocities.com/~mikemclaughlin/math_stat/Dists/Compe

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.

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.

Exercises: We can use R to make plots of many distributions. I have sample R programs that will demonstrate plots of distributions as well as the central limit theorem.

3.2 Create formulae & plot them

Incorporate publication quality graphics into LaTeX documents

3.3 Vectors, matrices, etc.

My lecture notes are available online, "Vectors". See also Gujarati's Appendix B, pp. 913-925.

4 Statistical properties of regression estimates

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"*
>
> Key terms that everybody should have memorized. (See Gujarati, pp. 895-912.)

1. estimator (or "statistic")
2. sampling distribution
3. standard error of the estimator.
$$se(\hat{\theta}) = \sqrt{Var(\hat{\theta})}$$
4. confidence interval
5. level of significance
6. Unbiased estimator
7. Efficient estimator
8. Linear estimator
9. Consistent estimator
10. Test of significance approach to hypothesis testing (to me, this is more intuitive than the confidence interval approach) 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.

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

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

5.3 Maximum Likelihood

Gujarati, Appendix 4A, pp. 114-118

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:

1. 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:
$$\sum (y_i - \hat{y}_i)^2$$
2. 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 $y's$.

5.4 Nonlinear least squares

Look in any stats book you have handy. Generally, the idea is that you can specify any function for the predicted value of y, say $\hat{y} = f(x, b)$. Here, x is a variable across cases and b is a parameter vector. Then the nonlinear sum of squares is

$$\sum (y_i - f(x_i, b))^2$$

Choose $\hat{b}$ to make the sum of squares as small as possible.

5.5 Loess and "kernel smoothing"

Here's a very nice introductory essay linked to the "locfit" package for S/R. On the web, One easily will find a postscript file that includes an essay by Clive loader called "Locfit: an introduction". One of the many places I found this was at the Bell labs research site: http://cm.bell-labs.com/cm/ms/departments/sia/doc/meth.html.

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 regresion, 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.

6.3 General Introduction on Dummy Variables

Reading:
Gujarati, Chapter 9, pp. 297-324

Examples

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

6.4 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.

6.5 Generalized Additive Models: extending the smoothers into a multivariate framework

7 Regression problems 1: Choosing Variables

7.1 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.

7.2 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.

7.3 R-Square and Standardized Coefficients (betas)

Reading:
My notes are called “MultipleRegression3-betas”

IMPORTANT King, "How Not To Lie With Statistics," AJPS, Aug 1986

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

8 Regression problems III: Heteroskedasticity and Autoregression.

Required Reading:

Gujarati, Chapters 11 & 12.

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 heteroskedstasticity, 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.

9 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 Qualititative Choice", pp. 298-318.

And I think this is prett 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 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.

10 More general development of Logit and Probit models.

10.1 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.

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

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

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.

10.3 Compare a & b.

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.

10.4 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 qualitiative variables in econometrics. (Cambridge U. Press, 1984)

11 Applications & Interpretation of qualitative models.

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

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

11.2 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.

11.3 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.

11.4 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 Justicies:..." 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.

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

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

12 Count Models

There is a very fine book dedicated to a survey of models for count data. Any count-model-users should check it out:

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

12.1 Poisson Regression

Reading:

Gujarati, Ch 15.12, pp. 620-622.

Gary King. 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, 32(3):838-863.

12.2 Negative Binomial and other extensions

Long, Chapter 3 (There's a chapter on Poisson, Negative Binomial, and "zero inflated" models).

See this WebPage:

Hun Myoung Park, "Regression Models for Event Count Data Using SAS, STATA, and LIMDEP" http://www.indiana.edu/~statm

13 Pooled Cross-Sectional Time Series (Panel Data)

Reading:

Gujarati, Ch. 16

I have prepared many handouts on this topic. A key starting point is "Generalized Least Squares." After that, you can move on to consider the special variations to deal with CX-TS data.

This article brought the methodological issues (actually, the entire field of "political methodology," to the forefront).

Neil Beck and Jonathan N. Katz. 1995. What to Do (and What Not to Do) with Time-Series Cross-Section Data. *American Political Science Review*, Vol. 89, No. 3 (September): 634-647.

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 qualititative endogenous variables. Examples of TWO STAGE PROBIT:

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

Mark Peffley, et al. Economic Conditions and Party Competance: Processes of Belief Revision. JOP, Feb. 1987, pp. 100-122.

Charles Franklin and John Jackson. The Dynamics of Party Identification. 1983. APSR, 77: 957-973.

Charles Franklin and John Jackson. Article in Weisberg's Political Science: The Science of Politics (1986).

Harold Clarke and Marianne Stewart, "Dealignment of Degree: Partisan Change in Britain, 1974-83," JOP, vol. 46, pp. 689-719

2. LISREL: structural equation modelling with "unobservable" variables–the marriage of factor analysis with systems of regression equations.

David A. Aaker and Richard P. Bagozzi, "Unobservable Variable in Structural Equation Models with an Application in Industrial Selling," JMR 16 (May 1979), 147-58.

Karl G. Joreskog and Dag Sorbom, "Recent Developments in Structural Equation Modeling," JMR, 19 (Nov 1982), pp. 404-16. Complicated and demanding reading for advanced students.

Applications of Lisrel:

Robert F. Lusch and Ray R. Serpkenci, "Personal Differences, Job Tension, Job Outcomes, and Store Performance: A Study of Retail Store Managers," JOM 54 (Jan 1990): 85-101.

John L. Graham, "Cross-cultural Marketing Negotiations: A Laboratory Experiment," Marketing Science 4 (Spring 1985): 130-146.

Daniel McQuiston, "Novelty, Complexity, and Importance as Causal Determinants of Individual Buyer Behavior," JOM 53 (April 1986), pp. 66-79. Interesting explanation of significance tests.

Gilbert A. Churchill, Jr. and Anthony Pecotich, "A Structural Equation Investigation of the Pay Satisfaction-Valence Relationship Among Salespeople," JOM, 46 (Fall 1982): 114-124.