

Politics 571
Quantitative Methods I
Spring 2007
Prof. Josh Clinton
clinton@princeton.edu
OH: F 11am-12pm (or by appt.)

The use of quantitative methodology for characterizing the political environment and testing theoretically derived hypotheses is pervasive in political science. This course aims to prepare students to:

- Model the political environment using econometric/statistical models.
- Understand the theoretical foundations of commonly used methods.
- Understand the trade-offs and assumptions inherent in econometric/ statistical models.
- Be able to learn methods not explicitly covered in class.
- Take Politics 572.

Broadly speaking, the class can be divided up into three segments. Lectures 1-9 (excepting Lecture 5) use the mathematical knowledge acquired in POL 505 to define a set of concepts that can be used to assess relationships between variables. Lectures 10-16 impose a specific structure on observable phenomena to derive the statistical workhorse known as linear regression. We first investigate the properties for the simple case (one explanatory variable) before moving to the case of multiple explanatory variables. We show how the estimator can be derived using least squares, maximum-likelihood and the general method of moments. Lectures 17-22 break the elegant results we derive and shows the consequences of violating assumptions and available “remedies.” We end the course by focusing on the estimation of dichotomous dependent variables in lectures 23 and 24.

There are many available books, none of which are particularly exceptional for the purposes of political science. The books for this class are:

Ashenfelter, Levine & Zimmerman. 2003. *Statistics & Econometrics*.¹
Achen. 1982. *Interpreting and Using Regression*.
Fox. 2002. *An R and S-Plus Companion to Applied Regression*.

For those interested in building a personal library, additional readings, which will be provided, are drawn from:

Hayashi. 2000. *Econometrics*.
Tuft. 1974. *Data Analysis for Politics and Policy*.

If you are new to the empirical study of politics, Wooldridge’s *Introductory Econometrics: A Modern Approach* and Stock and Watson *Introduction to Econometrics* are very good and contain more discussion of most of the concepts covered in class. Kennedy’s *A Guide to Econometrics* is a set of potentially useful crib-notes that some have found helpful. If you are really new to statistics, the aptly named *Statistics* by Freedman, Pisani and Purves is actually quite an engaging book and a worthwhile read.

For the computing assignments, you will have to be able to work from first principles. Consequently, programs like SPSS will not be useful. R will be the “supported software” and I encourage you to use it, although which program you use should not affect the estimates you get. Sometimes we may use STATA to see how to implement off-the-shelf commands. R is freely available for Windows, Linux or OS X [here](#).

For writing up your homework assignments, I recommend L^AT_EX, a free formatting program that handles mathematical notation with ease. Sadists are welcome to try to use Microsoft Word with equation editor. To use L^AT_EX, you need to install a version of L^AT_EX (MikTeX works well for the PC) and a text editor (WinEdt is a nice and gentle editor).² For OS X users, I have found TeXShop to be a nice installation.

¹ALZ is on the lower bound of the technical content of the class (e.g., everything is in scalar notation) and it will be will be supplemented as we progress by material from more advanced treatments (e.g., Hayashi *Econometrics*).

²WinEdt can also be configured to serve as an editor for R. Instructions for configuring WinEdt to work with R are located [here](#).

Although you will undoubtedly find using L^AT_EX painful in the beginning, it is a useful tool to have and one that will serve you well in your many years ahead if you plan to use notation in your work. Scientific Workplace is a GUI based version of L^AT_EX that is less flexible but more accessible. Several good books are available for teaching yourself L^AT_EX (in particular those by Leslie Lamport), and the internet contains many examples.

Grading:

- 20 % Midterm
- 40 % Problem Sets
- 40 % Final

You are encouraged to work together on the computing assignments, although you must write up the analysis individually.

Here is a preliminary schedule for what we are going to cover and when. Things will assuredly change once we get underway. To access the embedded hyperlinks, right-click on the link and "Open Weblink in Browser." Note that you need to access from a Princeton computer or a computer with an active Princeton VPN connection to access the sites.

Scholarly applications of the material and denoted with [A]. I hope to be able to set aside time in the denoted lecture to discuss each article (discussion questions will be provided ahead of time), but the semesters at Princeton are very short and we have a lot to get through.

Grades Don't Matter, Sources Say

Palo Alto, CA (AP) - Documents obtained by the Associated Press indicate that grades achieved in post-graduate classes have no effect on future prospects for students enrolled in academic institutions.

According to interviews with several current and past graduate students, "grades don't count," said former grad student and now billionaire Jerry Yang, co-founder of Yahoo! Inc. "I got mostly B's in grad school, which at Stanford was really bad."

A poll conducted by the Los Angeles Times showed that over 85% of first year grads believe getting high marks "is worth the effort" and "a valuable way to spend my time". Fewer than 10% of fifth year students felt the same way.

In reality, neither employers nor your parents appear to care if you get an A or a B in your advanced Nonlinear Optimization class. "I'm just glad I don't have to pay for tuition any more," said a mother who wished to remain anonymous.

Reaction among graduate TA's was mixed, with some expressing shock that their late hours grading amount to nothing, while others showed visible relief that losing a student's final exam will not really ruin their life.

Sources close to academic faculty reveal that this fact is well known among professors. "Of course grades don't matter," said Prof. Smith, "we only care about the lab work." Grades only serve to "feed the ego of the smart students, and break the spirit of the mediocre ones."



NOW you tell me?? A grad student expresses frustration over the revelation

Continued on page A23

copyright 2004 Jorge Cham
www.phdcomics.com

Lecture	Topic
1 2/6	Introduction, random variables and distributions ALZ: ch 1 (all), 2.1, 2.2,2.3, 2.4, 3 (all), A.1, A.2 [A] Mayhew: "Congressional Elections: The Case of the Vanishing Marginals"
2 2/8	Expectations and higher moments ALZ: ch 4 (all), A.3
3 2/13	Bivariate relationships: covariance, correlation and independence ALZ: ch 5 (all), 2.5, 2.6, 2.7, A.8 Tuftte: ch 1 [A] Alford, Funk and Hibbing "Are Political Orientations Genetically Transmitted"
4 2/15	Samples, populations & fun with normals ALZ: 6.1 - 6.7
5 2/20	Computing fun: reading data, visualizing, writing functions and sampling Nagler "Coding Style" <i>An Introduction to R</i>
6 2/22	Introduction to estimators ALZ: 7 (all)
7 2/27	Finding & evaluating estimators: ML, GMM, Least Squares ALZ: 7 (all)
8 3/1	Best predictor and best linear predictor [A] Lewis-Beck & Rice "Forecasting Presidential Elections"
9 3/6	Comparing samples: introduction to inference ALZ: 8(all), 6.8-6.10, A.5-A.7 Tuftte: ch 2 [A] Krehbiel "Are Congressional Committees Composed of Preference Outliers"
10 3/8	Simple linear regression (derived via: ML, GMM, least squares) ALZ: 9 (all)
11 3/13	Simple linear regression (mathematical and statistical properties) ALZ: 9 (10.1-10.3, 10.7)
12 3/15	Simple linear regression (fit & statistical inference) ALZ: 9 (10.4-10.6) Tuftte: ch 3
	MIDTERM (Take-Home)

Lecture	Topic
13 3/27	Classical multiple regression model: assumptions & derivation ALZ: 11 (all) Hayashi: Ch 1 - 1.2, 1.5 (?)
14 3/29	Continued: ML and GMM
15 4/3	Classical multiple regression model: fit, diagnostics and large sample theory ALZ: 11.5 Hayashi: Ch 1.3
16 4/3	Specification issues: accounting for nonlinearities, indicator variables & Classical multiple regression model: hypothesis testing, interpretation and prediction ALZ: 11.6, 12.3 Hayashi: Ch 1.4 Achen: All Freedman “Statistical Models and Shoe Leather” King “How Not to Lie with Statistics” [A] Donohue & Levitt “The Impact of Legalized Abortion on Crime”
4/5	<i>Controversy:</i> [A] Lange & Garrett “The Politics of Growth” [A] Jackman “Leftist Strength or North Sea Oil” [A] Lange & Garrett “The Politics of Growth Reconsidered”
	Specification issues: variable selection and measurement error ALZ: 13 (all) Achen “Social Psychology, Demographic Variables, and Linear Regression”
4/10	Heteroscedasticity & Serial Correlation: effects, tests, and (some) corrections ALZ: 14 (all) Hayashi: Ch 1.6 <i>Controversy:</i> [A] Mueller “Presidential Popularity from Truman to Johnson” [A] Kernell “Explaining Presidential Popularity”
20 4/17	Correlation between X and ϵ : instrumental variable estimation ALZ: 15 (all) [A] Acemoglu, Johnson & Robinson “The Colonial Origins of Comparative Development” <i>Controversy:</i> [A] Jacobson “The Effects of Campaign Spending in Congressional Elections” [A] Green & Krasno “Salvation for the Spendthrift Incumbent” [A] Jacobson “New Evidence for Old Arguments” [A] Green & Krasno “Rebuttal to Jacobson”
21 4/19	Panel data: fixed and random effects ALZ: 18 (all) Green, Kim and Yoon “Dirty Pool” [A] Foote & Goetz “Testing Economic Hypotheses with State-Level Data”
22 4/24	Panel data: fixed and random effects (cont’d), Hausman test
23 5/1	Dichotomous dependent variable: linear probability model, & logit ALZ: 16 (all)
24 4/26	Probit, fit and inference