New York University
Wilf Family Department of Politics
Fall 2013

Quantitative Research in Political Science I

(POL-GA.1250)
Professor Patrick Egan

This class is the first step in your training for a lifetime of research and scholarship using quantitative analysis. The goal of this class is to provide you with a thorough grounding in the basic tools of quantitative analysis as used by political scientists so that you can begin to (1) properly conduct your own research; (2) read and evaluate research performed by other political scientists; and (3) prepare for the additional training you will need in order to answer questions about politics you find interesting and worthwhile.

Logistics

Class meetings. We will meet on Mondays and Wednesdays from 10 a.m. to noon in Room 217. Attendance is mandatory. There is also a mandatory computer lab session held on Fridays from at 10 a.m. in the 3rd-floor computer lab (Room 335).

Contact information. Email is best way to reach me: `patrick.egan@nyu.edu`. Phone sometimes works, too: (212) 992-8078. Office hours are Tuesdays from 4 to 6 p.m., and by appointment. I'm in Room 327.

Teaching assistant. Andrew Peterson (`ajp502@nyu.edu`) is our teaching assistant. He will handle problem sets and is your resource for understanding what we cover together in class. He will also conduct the computer lab sessions held on Fridays and is your resource for learning Stata, the statistical software program on which we will be training you this semester. He will be holding weekly office hours at a time T.B.A.

Course website. Assignments, resources and datasets will be posted on the Quant I site on NYU Classes, accessible through NYU Home at `https://home.nyu.edu/academics`.

Course requirements and grading

Your grade is determined as follows:

Problem sets	40%
Midterm exam	25%
Final exam	35%

You are encouraged to work on problem sets together, but you must write up each problem set on your own and perform any analyses yourself. Handwritten assignments will be accepted through the midterm examination. After that, problem sets must be submitted in some word-processed format (preferably LaTeX, but Microsoft Word using Equation Editor is acceptable, too). Problem sets will typically be distributed on Thursdays and due Mondays. The first will be due on Monday, September 30. Late problem sets will not be accepted. They will be assigned a score of zero.

Books

All required and optional texts are available at the NYU Bookstore, 726 Broadway.

Required texts

- Wackerly, Mendenhall, and Scheaffer. *Mathematical Statistics with Applications*, 7th edition. Thompson. [WMS]
- Wooldridge. *Introductory Econometrics*, 5th edition. Cengage.

Previous editions of these texts are nearly identical, much less expensive, and therefore acceptable; note however that problem sets will be keyed to the latest editions. If you purchase a previous version, it is your responsibility to ensure that you are working on the correct problems.

Optional texts

- Cameron & Trivedi, *Microeconomics Using Stata.* Revised Edition. (Stata Press, 2010). An excellent resource whose only drawback is that it can at times presume too much about your knowledge of econometrics. The original edition is also fine. If you find this book rough going, try: (1) any of the various editions of Acock, *A Gentle Introduction to Stata*; (2) any edition of Kohler and Kreuter, *Data Analysis Using Stata* or (3) any recent edition of Hamilton, *Statistics with Stata.*
- Mitchell. *A Visual Guide to Stata Graphics*. 3rd edition. Stata Press. A beautiful, incredibly useful book on the graphics capabilities of Stata. The 2nd edition, available used at a lower price, is almost as good.
- Lamport. *LaTeX: A Document Preparation System.* 2nd edition. Addison-Wesley. Although we will point you to lots of good LaTeX resources available on the Web, it can be helpful to have an actual reference book at your fingertips when working through a LaTeX document. This one's pretty good and relatively affordable. (More thorough—and more expensive—is *Guide to LaTeX,* 4th ed. by Kopka and Daly, Addison-Wesley.)

Schedule of topics and readings (subject to change)

How to think about the readings: consider the readings supplementary, not primary. Your primary source of information will be class lectures, which will not always adhere to either the order or presentation of the texts. It is often helpful to read more than one presentation of an idea before you truly absorb it, so be ecumenical. If the texts are not working for you, I can recommend others at lower or higher levels that may be more appropriate.

- **Part I. Description and Inference Regarding *One* Variable**
  - Week 1 (Sept. 23-Sept. 27). *Introduction to Data Analysis. Summarizing and Displaying Univariate Data. Probability Basics.*
    - WMS, Chapters 1 and 2.
    - Lab: LaTeX basics.

- Week 2 (Sept. 30-Oct. 4). *The Math of Expectations. Discrete and Continuous Probability Distributions.*
  - WMS, Chapters 3 and 4.
  - Lab: Stata basics. Getting started, logs, good practice. (See Nagler, "Coding Style and Good Computing Practices").

- Week 3 (Oct. 7-11). *The Notion of Independence. Linear Combinations of Random Variables. The Central Limit Theorem.*
  - WMS, Chapter 5 (part), Chapter 7.
  - Lab: Generating and visualizing random variables.

- Week 4 (Oct. 16-18). *Estimation.*
  - No class Oct. 14 (University holiday).
  - WMS, Chapter 8.
  - Lab: The Central Limit Theorem. Loops.

- Week 5 (Oct. 21-25). *Properties of Point Estimators. Hypothesis Testing.*
  - WMS, Chapters 9 and 10.
  - Lab: Hypothesis testing.

MIDTERM EXAMINATION COVERING PART I OF COURSE: NOVEMBER 1

- **Part II. Description and Inference Regarding Relationships *Among* Variables**

- Week 6 (Sept. 28-Nov. 1). *Covariance and Correlation. Visualizing Relationships. The Regression Line. The Normal Equations.*
  - No lab this week (Midterm examination).

- Week 7 (Nov. 4-8). *The Linear Model: Bivariate Case. Properties of Least Squares. Statistical Inference. The Gauss-Markov Assumptions.*
  - Wooldrige, Ch. 2.
  - Lab: Bivariate regression.

- Week 8 (Nov. 11-15). *The Linear Model: Multivariate Case. OLS in Matrix Form.*
  - Wooldridge, Chs. 3 and 4.
  - Lab: Multivariate regression I.

- Week 9 (Nov. 18-22). *The Linear Model: Further Topics I: Goodness of fit. Variable transformations, quadratics.*
  - Wooldridge, Chs. 5 and 6.
  - Lab: Multivariate regression II.

- Week 10 (Nov. 25-27). *The Linear Model: Further Topics II: Interaction terms. Indicator variables. Heteroskedasticity.*
  - Wooldridge, Chs 7 and 8 (selections).
  - No lab this week (Thanksgiving).

- Week 11 (Dec. 2-6). *The Linear Model: Further Topics III: The Linear Probability Model. Measurement error. The threats of selection bias and endogeneity. Outliers.*
  - Wooldridge, Ch 9 (selections).
  - Lab: Multivariate regression III.

- Week 12 (Dec. 9-13). *Finale.*
  - What's next (12/9): Wooldridge Ch. 17 (selections)
  - Review (12/11)
  - 5-hour final exam (12/13, 10 am - 3 pm).