Course #: Quantitative Methods in International Relations

Johns Hopkins School of Advanced International Studies - Bologna

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Course Info:
Fall 2013
Days and Time
Room Number

Course Description

This is a quantitative reasoning course, designed for students currently pursuing a master's degree. The course is meant to provide students with a thorough introduction to the use of statistical methodology in the analysis of international relations data. We will begin by discussing basic statistical techniques, and will gradually move to more sophisticated methods of analysis, including linear regression and models for limited dependent variables. Along the way, we will address a number of important pitfalls that can plague quantitative research. We will do all of this within the context of international relations. This approach will allow us to develop a familiarity with commonly used IR datasets, as well as with some of the most important works in empirical international relations.

Although this is a quantitative course, it will focus more on the practicalities of IR data analysis than on the underlying mathematical concepts. While we will address the more abstract statistical foundations of data analysis, we will do so at a relatively basic level. For this reason, prior training in statistics—although helpful—is not required. During the course, students will acquire hands-on experience in data analysis, using the R statistical computing environment. Through homework assignments and a final research project, students will become familiar with the statistical analysis of IR data, and learn how to produce and communicate statistical results.

The objectives of the course are threefold. First, by the end of the semester, students will have become smart consumers of IR research. They will have the ability to choose an empirical international relations article and understand (and even critique) the empirical analysis. Second, the emphasis on practical implementation and the completion of a final research project will put students on the road to becoming producers of knowledge. They will acquire the capacity to conduct intelligent analyses of common IR data, in response to theoretical questions. Finally, students will become familiar with the basics of practical statistical analysis. This will be a useful foundation for future quantitative coursework.

Grading Policies

Evaluations of student performance will be based on small homework assignments, two exams, and an independent research project. Homework will be checked, but will be graded based on completion. Students are encouraged to work together on the homework (**not** on the exams or research project), but are expected to turn in their own, independent write-up. Final grades will be calculated in the following way:

- Homework: 10%
- Midterm: 30%
- Research Project: 30%
- Final Exam: 30%

Research Project

During the semester, all students are expected to complete a research project. This will be a short research paper (approximately 10 pages), in which students pose an empirical question about international relations, describe an appropriate research design, and finally, carry out and interpret an analysis. In addition to the research paper, students will be expected to turn in their data, as well as the code used to generate the analysis, to ensure replicability of the results. The project will be evaluated on the thoroughness of the research design and its appropriateness with respect to the question being investigated. We will discuss the research project in more detail during the course.

Students are welcome to formulate their own research questions or to replicate a published work. In the latter case, however, the student will be expected to add some value to the analysis. In either case, students are strongly encouraged to discuss their ideas with the instructor in advance, or to submit potential topics for feedback. A formal proposal is due on the day of the midterm, and the final paper is due on the last day of class. **Late work will not be accepted!**

Readings

Each week, we will have two types of readings. The first type will be a statistical reading from the textbook. It will introduce the material that we will cover for the week. The second type will consist of real IR research, to which the previous week's statistical lesson is relevant. While both sets of readings will be useful, the latter are especially important, as we will spend the first half of class discussing them. The assigned readings for each class will appear below the topic on the course outline. Students are expected to have done the

reading *before* coming to class.

The following book is required:

The R Statistical Computing Environment

In analyzing and examining data during this course, we will use make use of the R language. Using R for data analysis has a number of advantages. First and foremost, the software is free! Students can download their own copy of R for (Windows, OS X, or Linux) by going to `http://cran.r-project.org/mirrors.html` and selecting the appropriate version. Second, writing your own statistical code forces you to think carefully about the statistical assumptions that underlie your modeling decisions, in a way that using a point-and-click interface would not. Finally, if you find yourself needing to change software in the future, it is much easier to transition from R to more user-friendly statistical software (such as Stata or SPSS) than the other way around. We will talk more about R, its benefits, and its potential problems during the course.

I highly recommend taking a look at the official introduction to R and keeping it handy throughout the course. It is a useful reference guide. It can be found at `http://cran.r-project.org/doc/manuals/R-intro.pdf`. Another useful guide is Verzani's *Simple R — Using R for Introductory Statistics*, available at `http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf`.

Course Outline

Week 1

- Course Introduction
- Why Quantitative Methods?
- Intro to R and Common IR Datasets
  - Bueno de Mesquita, Bruce. 1985. "Toward a Scientific Understanding of International Conflict: A Personal View." *International Studies Quarterly* 29(2): 121–136.
  - Singer, J. David. 1972. "The 'Correlates of War' Project: Interim Report and Rationale." *World Politics* 24(2): 243–270.
  - Read at least one:
    - **International Trade:** Barbieri, Katherine, Omar M. G. Keshk, and Brian M. Pollins. 2009. "Trading Data: Evaluating our Assumptions and Coding Rules." *Conflict Management and Peace Science* 26(5): 471–491.

    - **International Conflict:** Ghosn, Faten, Glenn Palmer, and Stuart A. Bremer. 2004. "The MID3 Data Set, 1993–2001: Procedures, Coding Rules, and Description." *Conflict Management and Peace Science* 21(2): 133–154.
    - **Democracy:** Jaggers, Keith and Ted Robert Gurr. 1995. "Tracking Democracy's Third Wave with the Polity III Data." *Journal of Peace Research* 32(4): 469–482.
    - **Power:** Singer, J. David. 1988. "Reconstructing the correlates of war dataset on material capabilities of states, 1816–1985." *International Interaction* 14(2): 115–132.

Week 2

- Exploratory Data Analysis and Basic Probability Theory
    - Gujarati Appendix A

Week 3

- Basic Regression
    - Gujarati Ch. 1 and 2
    - Gujarati Appendix B.1–B.4 (optional)

Week 4

- Multiple Regression and the Assumptions and Properties of OLS
    - Gujarati Ch. 3 and 4

Week 5

- Hypothesis Testing with OLS
    - Gujarati Ch. 5

Week 6

- Binary Dependent Variables (LPM, Logit, and Probit)
    - Gujarati Ch. 15

Week 7

- Midterm Exam
- **Paper Topics Due**

Week 8

- Violations of Assumptions: Measurement and Specification Error
  - Gujarati Ch. 13

Week 9

- Violations of Assumptions: Heteroscedasticity
  - Gujarati Ch. 11

Week 10

- Violations of Assumptions: Autocorrelation
  - Gujarati Ch. 12

Week 11

- Analysis of Panel Data
  - Gujarati Ch. 16

Week 12

- Violations of Assumptions: Multicollinearity
- Course Wrap Up
- **Research Projects Due**
  - Gujarati Ch. 10