POLI 6003: METHODS OF POLITICAL RESEARCH II

MAXIMUM LIKELIHOOD ESTIMATION

FALL 2012

Time: Th 6-8:45pm
Classroom: MH 259
Office Hours: M/W/Th 3-5pm
and by appointment

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Version: 08.21.12

Course description

This seminar is a survey of maximum likelihood (ML) methods and their applications to empirical political questions. The course focuses on understanding the conditions when the assumptions of ordinary least squares (OLS) regression are violated, the principles of maximum likelihood estimation, and what models are appropriate given observed data. This seminar centers on the use and interpretation of ML and on linking theory to statistical models.

The models covered in this course are widely used in political science today. To engage with other researchers' quantitative empirical work it is necessary to be able to understand and evaluate it. This course covers a number of different models—some of which will be more of use to you than to others. This course enables students to explore models suited to the nature of their data in detail and use these models to replicate and extend current research.

Class meetings

This class meets Thursdays from 6pm to 8:45pm. Reading the assigned readings prior to class is essential as is attendance, attentiveness, and finishing assignments on time.

Student learning objectives

After successfully completing this course, students will be able to understand the principles of maximum likelihood estimation including its assumptions and various models appropriate to different types of observed data. Further, students will be able to use ML in their own work and interpret and evaluate the works of others.

Course requirements

Participation is essential to a successful seminar as is an engagement with the material. Your course grade will be determined by three components:

20%	Discussion and participation
20%	Homework
30%	Class notes (2 sets, each worth 15%)
30%	Replication paper (15-25 pages)

Discussion and participation

To do well in this class (like any graduate-level class) it is necessary to actively participate in class discussion. It should go without saying that attendance is a necessary condition for participation. Attendance is mandatory.

Homework
Over the course of the semester, I will hand out several homework assignments that complement the course material. While I focus in class on the intuition and math behind a specific model, actually getting your hands dirty and trying your hand at the math and running models is the best way to make the knowledge your own and tie what we have learned in class to your own research.

Assignments must be turned in at the beginning of class the week after they are given out. I have no specific requirements for the format of your answers, but completeness and legibility are essential. I do recommend that you learn how to use a statistical software package. These are useful skills necessary to do your own research and submit your writing for publication. The sooner you learn how to use statistical software the easier it will be to create presentable research reports.

I will use Stata in my presentations and in creating the handouts. R is another (free) alternative. Since I am much more conversant in Stata I will be using it to teach this course. It is available in the political science computer lab, and I have signed up this class for a Course GradPlan, which allows us a discounted price for a personal copy of Stata.

Class notes
You will also be required to pair up with another student to write <u>two</u> sets of class notes over the course of the semester. Your notes should address the model's theory, the math behind it, and then apply this model to an empirical application of interest to you. They should also include your interpretation of the empirical results. In the first two weeks of class, you will be asked to choose the weeks you would like to write on and the partner you will work on a particular set of notes with.

Replication paper
Your final assignment is a replication paper. By week 9 you will chose an article (or book chapter) in political science that has been published in the last few years to replicate. The finished replication paper is due on the last day of class. The goal is to familiarize you with the numerous (often-unstated) assumptions researchers make and allow you to critique them and run additional models loosening these restrictions. Indeed, a number of graduate students have turned replication papers into published journal articles.

<u>Academic Integrity</u>

Academic integrity is fundamental to the process of learning and evaluating academic performance. Academic dishonesty will not be tolerated. Academic dishonesty includes, but is not limited to, the following: cheating, plagiarism, tampering with academic records and examinations, falsifying identity, and being an accessory to acts of academic dishonesty. Refer to the UNO Judicial Code for further information.

The Code is available online at: http://studentaffairs.uno.edu/pdfs/AcademicDishonestyPolicy.pdf.

You will submit a digital copy of your replication paper to Turnitin software, which traces whether sentences originate in other works. If there is evidence of plagiarism, it will be punished to the fullest extent possible. Neither ignorance of what constitutes plagiarism nor a lack of intent to plagiarize are not acceptable defenses.

<u>Moodle</u>

Moodle is a useful tool that will be used extensively for this course for announcements and posting grades. During the course I will make readings, homework, and data available in the *Documents* section. I also have a number of links to useful resources for research and writing on my website: http://richardwfrank.com.

Accommodations for Students with Disabilities

Students who qualify for services will receive the academic modifications for which they are legally entitled. It is the responsibility of the student to register with the Office of Disability Services (UC260) each semester and follow their procedures for obtaining assistance.

Assigned Readings

There are five assigned books available from the UNO Bookstore or from online booksellers. Online stores are usually significantly cheaper, but you need to plan ahead so as to receive them in time to read them and discuss them in class. These books are important for this class, but they will also serve as useful reference books for your future research.

In addition to these books, I have assigned a number of scholarly journal articles. All articles are available through Moodle, the library's website, or through Google Scholar. If you have any questions about accessing e-journals, please let me know.

Required

1. Box-Steffensmeier, Janet, and Brad Jones. 2004. *Event History Modeling*. New York: Cambridge. ISBN:0521546737

2. Cameron, A. Colin, and Trivedi, Pravin K.1998. *Regression Analysis of Count Data*. New York: Cambridge. ISBN: 0521635675

3. King, Gary. 1998. *Unifying Political Methodology*. Ann Arbor: University of Michigan Press. ISBN: 0472085549

4. Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: Sage Publications Inc. ISBN: 0803973748

5. Long, J. Scott, and Jeremy Freese. 2006. *Regression Models for Categorical Dependent Variables Using Stata*. Second Edition. College Station, TX: Stata Press. ISBN: 1597180114

Recommended but optional

The following books are also reference works that you will find useful, but that are not required for this course.

1. William Greene. 2012. *Econometric Analysis*. Seventh Edition. Prentice Hall. ISBN: 0135132452

2. Eliason, Scott R. 1993. *Maximum Likelihood Estimation: Logic and Practice*. Thousand Oaks, CA: Sage. ISBN: 9780803941076

3. Long, J. Scott. 2009. *The Workflow of Data Analysis Using Stata*. College Station, TX: Stata Press. ISBN: 1597180475

READING SCHEDULE

This reading list is subject to change. Updates to this syllabus will be posted on Moodle. All readings listed below are required readings and must be completed before the start of class.

Week 1 Aug. 23 Introduction/Review
- Achen, Christopher H, 1983. "Towards Theories of Data: The State of Political Methodology." In Ada W. Finifter, ed. *Political Science: The State of the Discipline*. Washington. American Political Science Association.
- King, Gary. 1991. "On Political Methodology." *Political Analysis* 2: 1-29.
- Beck, Nathaniel L. 2000. "Political Methodology: A Welcoming Discipline." *Journal of the American Statistical Association* 95(450): 651-654.

Week 2 August 30 No Class—APSA

Week 3 Sept. 6 OLS, Time Series Review/Intro to Likelihood Inference
- King 1998: Ch. 1-2
- Long 1997: Ch. 1-2
- Kennedy, Peter. 2003. *A Guide to Econometrics*. Fifth Edition. Cambridge, MA: MIT Press. Ch. 17-18 (Moodle).

Week 4 Sept. 13 Introduction to Likelihood Inference
- King 1998: Ch. 3-4
- Pampel, Fred C. 2000. *Logistic Regression: A Primer*. Thousand Oaks, CA: Sage: 1-18 (Moodle).
- Altman, Micah, and Michael P. McDonald. 2003. "Replication with Attention to Numerical Accuracy." *Political Analysis* 11(3): 302–307.
- Eliason 1993: Ch. 1-2 (optional)

Week 5 Sept 20 Binary Dependent Variables I: Intro
- Long 1997: Ch. 3
- Nagler, Jonathan. 1994. "Scobit: An Alternative Estimator to Logit and Probit." *American Journal of Political Science* 38(1): 230–255.
- Greene 2012: 511-552 (optional)

Week 6 Sept 27 Binary DVs II: Interpretation, Heterskedastic models
- Long 1997: Ch. 4
- King 1998: Ch. 5.1-5.3; Ch. 6
- Alvarez, R. Michael and John Brehm. 1995. "American Ambivalence Towards Abortion Policy: Development of a Heteroscedastic Probit Model of Competing Values." *American Journal of Political Science* 39(4): 1055–1082.
- Berry, William D., Jaqueline H. R. DeMerritt, and Justin Esarey. 2010. "Testing for Interaction in Binary Logit and Probit Models: Is a Product Term Essential?" *American Journal of Political Science* 54(1): 248-266.
- Blimes, Randall J. 2006. "The Indirect Effect of Ethnic Heterogeneity on the Likelihood of Civil War Onset." *Journal of Conflict Resolution* 50(4): 536-547.

Week 7 Oct. 4 Ordered Dependent Variables
- Long 1997: Ch. 5
- King 1998: Ch. 5.4
- Cingranelli, David, and Mikhail Filippov. 2010. "Electoral Rules and Incentives to Protect Human Rights." *Journal of Politics* 72(1): 243-257.

- Greene 2012: 784-802 (optional)

Week 8 Oct. 11 no class—Mid-semester break

Week 9 Oct. 18 Unordered/Choice
- Long 1997: Ch. 6
- Alvarez, R. Michael, and Jonathan Nagler. 1998. "When Politics and Models Collide: Estimating Models of Multiparty Elections." *American Journal of Political Science* 42(1): 55–96.
- Zorn, Christopher J. W. 1996. "Choice Models in Theory and Practice: Independence of Irrelevant alternatives and the decision to litigate." unpublished manuscript, Emory University.
- Greene 2012: 760-784 (optional)

Week 10 Oct. 25 Event Count I: Poisson
- King 1998: Ch. 5.7-5.10; Ch. 9
- Long 1997: Ch. 8
- King, Gary. 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.
- Gowa, Joanne. 1998. "Politics at the Water's Edge: Parties, Voters and the Use of Force Abroad." *International Organization* 52(2): 307–325.
- Gary King. 1989. "Variance Specification in Event Count Models: From Restrictive Assumptions to a Generalized Estimator." *American Journal of Political Science* 33(3): 762–784.
- Greene 2012: 802-821 (optional)

Week 11 Nov. 1 Event Count II: Negative binomial, Zero-altered
- Cameron and Trivedi 1998: Ch. 4-6
- Long 1997: Ch. 8.3-8.7
- Gary King. 1989. "Event Count Models for International Relations: Generalizations and Applications." *International Studies Quarterly* 33(2): 123–147.
- Shellman, Stephen. 2004. "Time Series Intervals and Statistical Inference: The Effects of Temporal Aggregation on Event Data Analysis." *Political Analysis* 12(1): 97-104.
- Zorn. Christopher J. W. 1998. "An Analytic and Empirical Examination of Zero-inflated and Hurdle Poisson Specifications." *Sociological Methods and Research* 26(3): 368–400.
- Hegre, Håvard, Gudrun Østby, and Clionadh Raleigh. 2009. "Poverty and Civil War Events: A Disaggregated Study of Liberia." *Journal of Conflict Resolution* 53(4): 598-623.
- Greene 2012: 821-829 (Optional)

Week 12 Nov. 8 Hazard Models I: Discrete/continuous time, Semi-parametric
- Box-Steffensmeier and Jones 2004: Ch. 1-5
- Berry, Frances Stokes, and William Berry. 1990. "State Lottery Adoptions as Policy Innovations: An Event History Analysis." *American Political Science Review* 84(2): 395–415.
- Box-Steffensmeier, Janet M., and Bradford S. Jones. 1997. "Time Is of the Essence: Event History Models in Political Science." *American Journal of Political Science* 41(4): 336–383.
- Box-Steffensmeier, Janet M., Laura W. Arnold, and Christopher J.W. Zorn. 1997. "The Strategic Timing of Position Taking in Congress: A Study of the North American Free Trade Agreement." *American Political Science Review* 91(2): 324–338.
- Greene 2012: 861-872 (optional)

Week 13 Nov. 15 Hazard Models II: Parametric, special topics
- Box-Steffensmeier and Jones 2004: Ch. 6-11
- Zorn. Christopher J.W. 2000. "Modeling Duration Dependence." *Political Analysis* 8(4): 367–380.

- Box-Steffensmeier, Janet, Dan Reiter, and Christopher J. W. Zorn. "Nonproportional Hazards and Event History Analysis in International Relations." *Journal of Conflict Resolution* 47(1): 33–53.
- Aydin, Aysegul. 2010. "Where Do States Go? Strategy in Civil War Intervention." *Conflict Management and Peace Science* 27(1): 47-66.

Week 14 Nov. 22 no class—Thanksgiving

Week 15 Nov. 29 Censored/Truncated Variables
- Long 1997: Ch. 7
- King 1998: Ch. 9
- Reed, William, and David H. Clark. 2000. "War Initiators and War Winners: The Consequences of Linking Theories of Democratic War Success." *Journal of Conflict Resolution* 44(3): 378–395.
- Greene 2012: 833-861 (optional)

Week 16 Dec. 6 Multiple Equations
- Clark, David H. and William Reed. 2005. "The Strategic Sources of Foreign Policy Substitution." *American Journal of Political Science* 49(3): 609–624.
- Reuveny, Rafael, and Quan Li. 2003. "The Joint Democracy-Dyadic Conflict Nexus: A Simultaneous Equations Model." *International Studies Quarterly* 47(3): 325-346.
- Greene 2012: 314-336 (optional)