GOVT 391-02 Quantitative Methods

Fall 2011 (CRN 15282)

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Course Meetings: MWF 1:00-1:50am, 1 Morton Hall
Office Hours: T 10:00-11:30am, F 2:00-3:30pm, and by appointment

1. Course description

This course introduces students to basic statistical theory and advanced quantitative methods. The core of the class focuses on statistical inference using multiple regression analysis. We will address ordinary least squares regression and limited dependent variable models, including those for binary, categorical, ordered, and count dependent variables. Examples will come from subfields across political science. Students will develop a firm grounding in quantitative methods and have opportunities to explore statistical models using real data.

Prerequisites are GOVT 301 or GOVT 307 or instructor permission, provided there is evidence that the student has had some introduction to research design, statistical analysis, and statistical computing.

2. Course materials

2.1 Readings

These required books are available for purchase on-line and at the college bookstore.

- Michael S. Lewis-Beck. 1980. *Applied Regression: An Introduction*. Newberry Park, CA: SAGE. ISBN: 9780803914940. http://www.sagepub.com/booksProdDesc.nav?prodId=Book443.
- J. Scott Long and Jeremy Freese. 2006. *Regression Models for Categorical Dependent Variables Using Stata, 2nd Edition.* College Station, TX: Stata Press. ISBN 9781597180115. http://www.stata.com/bookstore/regmodcdvs.html

Other required readings are posted to the course Blackboard site.

2.2 Software

We will use the Stata in this course. The program is available in the William & Mary computer labs, and at the public machines in Swem library.

If you are interested in conducting independent research or taking additional statistics courses beyond this class I would encourage you to purchase Stata. Fortunately it is available at a discounted rate ($179.00) through William & Mary, which is a member of the Stata GradPlan. Let me know if you are interested in this option and I can show you how to purchase it.

3. Assignments and grading

3.1 Grading

I will calculate course grades based on the following items. You need to complete all items to receive course credit. Students not completing all items will receive an Incomplete.

Percent	Item
20	Homework assignments (4 @ 5% each)
25	Exam 1
25	Exam 2
30	Exam 3 or final paper

I will base final course grades on the following scale, with partial-percents typically rounded to the nearest full percent: A 93-100, A– 90-92, B+ 88-89, B 83-87, B– 80-82, C+ 78-79, C 73-77, C– 70-72, D+ 68-69, D 63-67, D– 60-62, F <60.

Finally, because errors sometimes creep into grade calculations—and on rare occasions papers become lost as they are handed in—please keep a copy of all work you submit until I have processed final grades.

3.2 Homework assignments

The only way to learn statistics is to do statistics. In order to put that principle into practice you will complete four homework assignments. The assignments will provide you with opportunities to experiment with a variety of methods using real data. Grading will stress two things: (1) the degree to which you have made a strong effort to complete all parts of each assignment; and (2) the extent to which your work, especially the statistical computing component, is polished and professionally done.

3.3 Exams

Everyone will take two take-home exams. Both will ask you to perform calculations and will emphasize interpreting results. You will have a choice between taking a third exam or completing a final paper. All three exams will be open-book and open-note.

3.4 Final Paper

This assignment is for students who do not take the third exam. The course's capstone paper will provide you an opportunity to use your quantitative skills on a topic that you choose. I will make some data sets available but you may also use data from another source. More details about the paper's requirements will be forthcoming.

3.5 Academic misconduct

I begin by assuming academic misconduct will not become an issue in this class. If it does, for any questions about policies regarding cheating, plagiarism, or other types of academic dishonesty please see the William & Mary Honor Council's web site and the discussion of the Honor Code in the Student Handbook. If I discover a student cheating I will initiate an Honor Council proceeding and, at a bare minimum, recommend that the student receive an F for the course.

4. Schedule of topics, readings, and assignments

We will adjust this schedule as needed.
BB = Reading is linked as a .pdf file on Blackboard.

4.1 Preliminaries

W 8/24	Class introduction
F 8/26	Stata fundamentals • Long and Freese, Ch 2. "Introduction to Stata." Skim the entire chapter; don't get lost in the details. After skimming the whole chapter, then read . . . • Long and Freese, Ch 2. "Introduction to Stata," pp. 16-19 (section 2.1), 20-22 (section 2.3), and 22-24 (section 2.6)
M 8/29	Stata fundamentals (cont.) • Long and Freese, Ch 2. "Introduction to Stata," pp. 26-33 (sections 2.9 and 2.10) NOTE: Section 2.10 is one of the most important in the book. • Long and Freese, Ch 2. "Introduction to Stata," pp. 33-52 (sections 2.11 thru 2.14)
W, Lab 8/31	Stata fundamentals – Lab exercise – Meet in Morton 244 • Bring your Long and Freese book with you to the lab
F 9/2	No class. Prof. Manna at APSA conference.
M 9/5	Probability fundamentals • Online Statistics, http://onlinestatbook.com/chapter5/basic.html
W 9/7	Probability fundamentals (cont.) / Sampling distributions • Peter Kennedy, *A Guide to Econometrics (4e)*, pp. 313-316. BB • Online Statistics, http://onlinestatbook.com/chapter7/intro_samp_dist.html • Online Statistics, http://onlinestatbook.com/chapter7/samp_dist_mean.html
F 9/9	Sampling distributions (cont.) ****HOMEWORK #1 DUE BY 5PM**** **(8/24-9/7: Stata and probability fundamentals)**

4.2 Method of ordinary least squares (OLS) regression

M 9/12	Scatterplots and correlation • Online Statistics, http://onlinestatbook.com/chapter4/intro.html
W 9/14	Drawing a regression line • Lewis-Beck, pp. 9-16
F 9/16	Drawing a regression line (cont.)
M 9/19	Interpreting bivariate OLS • Lewis-Beck, pp. 17-25
W 9/21	Interpreting bivariate OLS (cont.) / Hypothesis testing & confidence intervals • Lewis-Beck, pp. 30-38
F 9/23	Hypothesis testing & confidence intervals (cont.)
M 9/26	Interpreting multivariate OLS • Lewis-Beck, pp. 47-54

W 9/28	Using dummy independent variables and interaction terms • Lewis-Beck, pp. 66-71
F 9/30	Using dummy independent variables and interaction terms (cont.) • Lewis-Beck, pp. 54-56 ****HOMEWORK #2 DUE BY 5PM**** **(9/7-9/26: Sampling dist.; OLS theory and interpretation)**

4.3 Unpacking OLS assumptions

M 10/3	Model specification • Lewis-Beck, pp. 26-27
W 10/5	Measurement • Lewis-Beck, pp. 26-27
F 10/7	Residuals • Lewis-Beck, pp. 38-42
M 10/10	No class. Fall break.
W 10/12	Error term • Lewis-Beck, pp. 26-30
F 10/14	Error term (cont.) ****TAKE HOME EXAM #1 DUE BY 5PM**** **(8/24 – 9/30: Preliminaries, Method of OLS)**
M 10/17	Multicollinearity • Lewis-Beck, pp. 58-63
W 10/19	OLS diagnostics
F, Lab 10/21	OLS diagnostics – Lab exercise – Meet in Morton 244

4.4 Models for limited dependent variables

M 10/24	Method of maximum likelihood estimation (MLE) • Peter Kennedy, *A Guide to Econometrics (4e)*, pp. 21-22. BB • Long and Freese, pp. 75-78
W 10/26	Method of maximum likelihood estimation (MLE) (cont.)
F 10/28	Binary dependent variables – Theory • Long and Freese, Ch 4. "Models for binary outcomes," pp. 131-135 ****HOMEWORK #3 DUE BY 5PM**** **(10/3 – 10/21: OLS diagnostics)**
M 10/31	Binary dependent variables – Interpretation • Long and Freese, Ch 4. "Models for binary outcomes," pp. 136-140 and 157-177
W, Lab 11/2	Binary dependent variables – Lab exercise – Meet in Morton 244 • Bring your Long and Freese book to the lab

F 11/4	Count dependent variables – Theory • Long and Freese, Ch 8. "Models for count outcomes," pp. 349-350 and 356-357 (on Poisson regression) and 372-373 (on negative binomial regression)
M 11/7	Count dependent variables – Interpretation • Long and Freese, Ch 8. "Models for count outcomes," pp. 357-372 (on Poisson regression) and 374-381 (on negative binomial regression). NOTE: Pay close attention to section 8.3.3 on testing for overdispersion (pp. 376-377)
W 11/9	No class. Prof. Manna on field trip with GOVT 455.
F, Lab 11/11	Count dependent variables – Lab exercise – Meet in Morton 244 • Bring your Long and Freese book to the lab ****TAKE HOME EXAM #2 DUE BY 5PM**** **(10/3 – 11/2: OLS diagnostics; MLE; Binary DVs)**
M 11/14	Ordered dependent variables – Theory • Long and Freese, Ch 5. "Models for ordinal outcomes," pp. 183-187
W 11/16	Ordered dependent variables – Interpretation • Long and Freese, Ch 5. "Models for ordinal outcomes," pp. 188-193 and 202-217
F, Lab 11/18	Ordered dependent variables – Lab exercise – Meet in Morton 244
M 11/21	Nominal dependent variables – Theory • Long and Freese, Ch 6. "Models for nominal outcomes with case-specific data," pp. 223-228 (on multinomial logit), 243-246 (on testing the IIA assumption), and 272-276 (on multinomial probit) ****HOMEWORK #4 DUE BEFORE YOU LEAVE FOR THANKSGIVING**** **(11/4 – 11/18: Count DV; Ordered DV)**
W 11/23	No class. Thanksgiving break.
F 11/25	No class. Thanksgiving break.
M 11/28	Nominal dependent variables – Interpretation • Long and Freese, Ch 6. "Models for nominal outcomes with case-specific data," pp. 228-235, reread 243-246 (on testing the IIA assumption), and 246-260
W, Lab 11/30	Nominal dependent variables – Lab exercise – Meet in Morton 244 • Bring your Long and Freese book to the lab
F 12/2	Class wrap up

****Wednesday, Dec. 14 – FINAL PAPER OR TAKE-HOME EXAM #3 DUE BY 5PM****