Advanced Quantitative Analysis
Spring 2016 - PSC 794

Wed, 3:45-6:20pm,
Maxwell Hall 315

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This syllabus is subject to change. Check electronic version for updates (here).

Prerequisite(s): PSC 693 or equivalent.

Course Description: This course has several goals. First, to provide you with the ability to understand, utilize, and evaluate the classical linear regression model in an informed manner. Second, to explore alternative specifications and modeling approaches that better conform to the nature of your data and your questions. Third, to think carefully about the interpretations you draw from statistical analysis and to improve inference by design. Finally, this class will introduce you to some advanced empirical methods that increasing in prominence across the field. You will not become an expert in any of these methods as a consequence of this class, but you will be familiar with what they are and have some foundation for pursuing them in the future. By nature of the material, this course is difficult. There will be times when you feel that you are just not getting it, and this is normal. Know this ahead of time and don't lose confidence. I am on your side and committed to getting you through this.

Course Learning Outcomes: At the completion of this course, students will be able to:

- Use regression for statistical analysis.
- Explore different estimation techniques.
- Think carefully about inference and research design.
- Get familiar with advanced empirical methods.

Course Reading: We rely on the following books for most of our core methodology.

- Wooldridge, J. 2012. *Introductory Econometrics: A Modern Approach*, 5th Edition. Cengage Learning - "Wooldridge"

- Angrist, J., and Pischke, J. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton University Press "Harmless Econometrics"

Older editions of Woolridge should work fine since we will not be following it too strictly. It is important to stress that no single text will work well for all students nor are there any texts that cover everything we explore in the course. There are many other great texts which we will borrow from and others you can search out on your own. Some examples listed below:

General Research Methods

- Trochim and Donnelly ? Trochim, W and Donnelly, J. 2007. *The Research Methods Knowledge Base*, 3rd Edition. Cincinnati, OH, Atomic Dog Publishing

- Dunning, T. 2012. *Natural Experiments in the Social Sciences: A Design-Based Approach.* Cambridge: Cambridge University Press.

- King, Gary, and Robert O. Keohane, and Sidney Verba. 1994. *Designing Social Inquiry: Scientific Inference in Qualitative Research Princeton*: Princeton University Press.

Statistical Research Methods

- Richard A. Berk, Regression Analysis: A Constructive Critique, (Sage: 2004).

- William H. Greene, Econometric Analysis, 7th edition, (Prentice Hall: 2012).

- Peter Kennedy, A Guide to Econometrics, 6th edition, (Wiley-Blackwell: 2008).

- J. Scott Long, Regression Models for Categorical and Limited Dependent Variables, (Sage: 1997).

In general, I will try to make all readings that are not easy to get (such as book chapters in our non-core books) available on BlackBoard. If I forget, do remind me!

Assignments and Grading: You will learn the material best when you use it. Three problem sets will be assigned on a regular basis, accounting for 30% of the course grade. Group work on problem sets is permitted, and I encourage you to help each other.

The second portion of the course grade, accounting for 10%, comes from participation. Specifically, each of you lead discussion for one reading at least once this semester

The third portion of the course grade will come from two take-home exams worth 15% each. You are expected to work alone on these exams, with the aid of your notes and texts. The first exam will cover weeks 1-8 of the course, and it will be due the week before Spring Break. The second exam will cover weeks 11-15, and it will be due by May 11th.

The fourth portion of the course grade, accounting for 30%, comes from a paper that makes use of the statistical methods learned during the term. You have two options:

- First, you may write a "replication/extension"paper, in which you take a published work that interests you, attempt to replicate its statistical findings, and then extend the analysis in some way.

- Second, you may write a research paper that involves an original statistical analysis. Ideally, this paper will be something that is useful for your research agenda.

The written assignment is due on May 15th, you will present on your progress on May 4th.

Software: Stata or R are strongly encouraged. Both are powerful and well-maintained. Learning a new software package is very time intensive and the learning curve is quite steep at first. I suggest diving right in and not looking for shortcuts. With time, it gets much easier and actually quite fun. You should think carefully about where to start, since there is some path dependency once you become proficient in one package. Stata is an excellent program that is great for good documentation and user friendly, with both command line and menu options. I learned Stata first, and it is still what I use most. On the downside, Stata is expensive, and there a new version each year that requires more money if you want to stay up to date. Stata is available on campus lab machines, or you can purchase a GradPlan version at http://www.stata.com/order/new/edu/gradplans/campus-gradplan/. Note that there are different versions with different capabilities. For this course, Stata/IC should be fine. The Blackboard site has links to several Stata resources.

If you are new statistical packages, you should probably invest in learning R, which is open-source and downloadable at http://www.r-project.org. The use of R in political science has grown rapidly during the past decade, and it has become the statistical language of choice for many methodologists in the discipline. New packages are contributed by users regularly. The advantages are that it is free and very flexible. The disadvantages are that the learning curve is steeper, browsing and manipulating data is more difficult than in Stata, and the documentation is not as user-friendly as Stata's. Also, I won't be able to help you as much as with Stata, but I can't work with you to figure out most problems. The supplemental RStudio application, adds some features such as the ability to browse data more easily (http://www.rstudio.com/ide/). Here are some resources that may help you learn R:

- The R Manuals available online at http://www.r-project.org.

- User-contributed manuals available at http://cran.r-project.org/other-docs.html.

- Alain Zuur, Elena N. Ieno, and Erik Meesters, A Beginner's Guide to R, (Springer: 2009).

- John Fox, An R and S-Plus Companion to Applied Regression, (Sage: 2002).

When it comes to writing that uses math, such as your problem sets, learning LaTeX is clearly the best long-term option. LaTeX is an open-source typesetting program in which markup language that you enter into a text editor is compiled by a typesetting engine into a nicely-rendered pdf or postscript file. For those of you who are willing to invest time in learning LaTeX I will gladly help you by supplying a template that you can use for your problem sets. Please see the documentation posted on the course Blackboard site.

- Windows users should start herehttp://miktex.org

- Mac users should start here http://tug.org/mactex/

Academic Integrity: The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams and assignments as well as the veracity of

signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. In particular, although I encourage you to work together on problem sets, the exams are a different story. I expect that you will not communicate with each other, or with any other individuals, about how to solve the problems on the exams. For more information and the complete policy, see http://academicintegrity.syr.edu.

Disability-Related Accommodations: If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu, located in Room 309 of 804 University Avenue, or call (315) 443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible. You are also welcome to contact me privately to discuss your academic needs, although I cannot arrange for disability-related accommodations.

Religious holidays: Syracuse University's religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. Students have access to an online notification form they can use to notify their instructors, available at: https://myslice.syr.edu.

Tentative Course Outline:
Coverage and content might change depending on class progress. Check for updates (here).

- • Required

- o Optional (choose from these for leading discussion)

Week 1 - Introduction / Stats Refresh (Jan 20th)

- • Wooldridge, Chapter 1, Appendix A-B and D.

Week 2 - Linear Regression Practice (Jan 27th)

- • Wooldridge, Chapter 2.

- • Chapter 3 - "Making Regression Make Sense" (part 1). in *Mostly Harmless Econometrics*, 27-67

Week 3 - Multiple Regression, Inference Interactions (Feb 3rd)

- • Wooldridge, Chapters 3-4.

- • Brambor, T., W.R. Clark, and Golder, M. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14 (1): 63 - 82

- o Achen, C.H. 2005. "Let's Put Garbage-Can Regressions and Garbage-Can Probits Where They Belong."*Conflict Management and Peace Science* 22 (4): 327 - 339

- o King, G., 1986. How not to lie with statistics: Avoiding common mistakes in quantitative political science. *American Journal of Political Science*, pp.666-687.

Week 4 - Variables, Data, and Error (Feb 10th)

- • Wooldridge, Chapter 7 and 9.

- • Chapter 3 - "Making Regression Make Sense" (part 2). in *Mostly Harmless Econometrics*, 68-91.

- o Peter Kennedy. 1998. "Violating Assumption Five: Multicollinearity." In *A Guide to Econometrics*, 4 ed., chapter 11.

- o Clarke, K.A. 2005. "The Phantom Menace: Omitted Variable Bias in Econometric Research."*Conflict Management and Peace Science* 22 (4): 341 - 352

- o Treisman, D., 2007. What have we learned about the causes of corruption from ten years of cross-national empirical research?. *Annu. Rev. Polit. Sci.*, 10, pp.211-244.

Week 5 - Panel, Time Series, and Fixed Effects (Feb 17th)

- • Wooldridge, Chapters 13-14.

- • Chapter 5 - "Parallel Words: Fixed Effects, Difference-in-Difference and Panel Data." in *Mostly Harmless Econometrics*, 221-246.

o Pevehouse, J. and Brozek, J. 2008. "Time-Series Analysis." In The Oxford Handbook of Political Methodology, chapter 19.

o Beck, N. and Katz, J. 2011. "Modeling Dynamics in Time-Series-Cross-Section Political Economy Data." *Annual Review of Political Science* 14: 331?52.

o Thurman, W. and M. Fisher. (1988). Chickens, eggs, and causality, or which came first. *American Journal of Agricultural Economics*, 70(2), 237-238.

o Malesky, E.J., Nguyen, C.V. and Tran, A., 2014. The impact of recentralization on public services: a difference-in-differences analysis of the abolition of elected councils in Vietnam. *American Political Science Review*, 108(01), pp.144-168.

Week 6 - Maximum Likelihood Estimation (Feb 24th)

• Wooldridge, Appendix C.4

• Myung, I.J. 2003. "Tutorial on Maximum Likelihood Estimation." *Journal of Mathematical Psychology* 47 (1): 90-100.

• King, Gary, and Langche Zeng. "Logistic regression in rare events data." *Political analysis* 9.2 (2001): 137-163.

o King, Gary, Michael Tomz, and Jason Wittenberg. "Making the most of statistical analyses: Improving interpretation and presentation." *American Journal of Political Science* (2000): 347-361.

o Alvarez, R.M. and Nagler, J., 1998. When politics and models collide: Estimating models of multiparty elections. *American Journal of Political Science*, pp.55-96.

o Collier, Paul, and Anke Hoeffler. "Greed and grievance in civil war." *Oxford economic papers* 56.4 (2004): 563-595.

Week 7 - Selection Models, Count Models, Duration Models (Mar 2nd)

• Wooldridge, Chapter 17.3-17.5.

• Long. J. 1997. "Binary Outcomes: The Linear Probability, Probit, and Logit Models" In Regression Models for Categorical and Limited Dependent Variables, chapter 3

• Box-Steffensmeier, J.M. and Zorn, C.J., 2001. Duration models and proportional hazards in political science. *American Journal of Political Science*, pp.972-988.

o Heckman, J.J. 1979. "Sample Selection Bias as a Specification Error."*Econometrica* 47 (1): 153-161

o King, G., Honaker, J., Joseph, A. and Scheve, K., 2001, March. Analyzing incomplete political science data: An alternative algorithm for multiple imputation. *American Political Science Review*, 95(1):49?69, March 2001.

o Przeworski, A. and Limongi, F., 1993. Political regimes and economic growth. *The journal of economic perspectives*, pp.51-69.

o Carrubba, C.J., Gabel, M., Murrah, L., Clough, R., Montgomery, E. and Schambach, R., 2006. Off the record: unrecorded legislative votes, selection bias and roll-call vote analysis. *British Journal of Political Science*, 36(04), pp.691-704.

Week 8 - Latent Variables (Mar 9th)

- Trochim and Donnelly. Ch 5: "Scales and Indexes."

- Bollen, K.A., 2002. Latent variables in psychology and the social sciences. *Annual Review of Psychology*, 53(1), pp.605-634.

o Poole, Keith T. and Howard Rosenthal. 1991. "Patterns of Congressional Voting." *American Journal of Political Science* 35(1):228-278.

o Treier, S. and Jackman, S., 2008. Democracy as a latent variable. *American Journal of Political Science*, 52(1), pp.201-217.

o Fariss, C. J. (2014). Respect for human rights has improved over time: Modeling the changing standard of accountability. *American Political Science Review*, 108(02), 297-318.

o Pan, J. and Xu, Y., 2015. China?s Ideological Spectrum.

o Jackman, S., 2004. What do we learn from graduate admissions committees? A multiple rater, latent variable model, with incomplete discrete and continuous indicators. *Political Analysis*, 12(4), pp.400-424.

Week 9 - **Spring Break**

Week 10 - **NO CLASS**

Week 11 - Experiments (Mar 30th)

- "Chapter 2 - The Experimental Idea." in Mostly Harmless Econometrics, 11-22

- Trochim and Donnelly. Ch 9: "Experimental Design." & Ch 10: "Quasi-Experimental Design."

o Olken, B.A., 2010. Direct democracy and local public goods: Evidence from a field experiment in Indonesia.

o Bond, R.M., Fariss, C.J., Jones, J.J., Kramer, A.D., Marlow, C., Settle, J.E. and Fowler, J.H., 2012. A 61-million-person experiment in social influence and political mobilization. *Nature*, 489(7415), pp.295-298.*American Political Science Review*, 104(02), pp.243-267.

o Hainmueller, J., & D. Hangartner. 2013. Who gets a Swiss passport? A natural experiment in immigrant discrimination. American Political Science Review, 107(01), 159-187.

o Cantú, F., 2014. Identifying Irregularities in Mexican Local Elections. *American Journal of Political Science*, 58(4), pp.936-951.

Week 12 - Instrumental Variables (Apr 6th)

- Wooldridge, Chapter 15.

- "Chapter 4 - Instrumental Variables in Action." in *Mostly Harmless Econometrics*, 113-215

o Sovey, A., and D. Green. 2010. "Instrumental Variables Estimation in Political Science: A Readers Guide." *American Journal of Political Science* 55(1):188-200.

o Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91(5):1369-1401.

o Jablonski, R. and S. Oliver. 2013. "The political economy of plunder economic opportunity and modern piracy." *Journal of Conflict Resolution* 57.4: 682-708.

Week 13 - Regression Discontinuity (Apr 13th)

- "Chapter 6 - Getting a Little Jumpy: Regression Discontinuity." in *Mostly Harmless Econometrics*, 249-259

- Imbens, Guido and Thomas Lemieux. 2008. "Regression Discontinuity Designs: A Guide to Practice." *Journal of Econometrics* 142:615-635.

- Campbell, Donald T. "Reforms as experiments." *American psychologist* 24.4 (1969): 409.

o Fowler, J. 2008. "The Colbert Bump in Campaign Donations: More Truthful Than Truthy." *PS: Political Science Politics* 41(3):533-539.

o Ghanem, D., and J. Zhang. "'Effortless Perfection:' Do Chinese cities manipulate air pollution data?." Journal of Environmental Economics and Management 68.2 (2014): 203-225.

o Hidalgo, F.D., 2010. Digital Democratization: Suffrage Expansion and the Decline of Political Machines in Brazil. *Unpublished Manuscript*, Department of Political Science, University of California at Berkeley.

Week 14 - Surveys, Sampling, and Bias (Apr 20th)

- Trochim and Donnelly. Ch 2: "Sampling." and Ch 4: "Survey Research."

- King, G., et al. 2004. "Enhancing the Validity and Cross- cultural Comparability of Measurement in Survey Research." *American Political Science Review* 98: 191-207.

o Coutts, Elizabeth, and Ben Jann. 2011. Sensitive Questions in Online Surveys: Experimental Results for the Randomized Response Technique (RRT) and the Unmatched Count Technique (UCT). *Sociological Methods & Research* 40 (1):169-193

o Holbrook, A. L., and Krosnick, J. 2010. "Social desirability bias in voter turnout reports tests using the item count technique." *Public Opinion Quarterly* 74.1: 37-67.

- o Berinsky, A., G. Huber, and G. Lenz. 2012. "Evaluating Online Labor Markets for Experimental Research: Amazon.com?s Mechanical Turk." *Political Analysis* 20(3): 351-368.

- o Malesky, E., D. Gueorguiev, and N. Jensen. "Monopoly Money: Foreign Investment and Bribery in Vietnam, a Survey Experiment." *American Journal of Political Science* 59.2 (2015): 419-439.

Week 15 - Text and Spatial Analysis (Apr 27th)

- • Grimmer, Justin and Brandon M. Stewart. Forthcoming. "Text as Data: The Promise and Pitfalls of Automatic Content Analysis Methods for Political Texts." *Political Analysis* 21(3):267-297.

- • Ward, M.D., Stovel, K. and Sacks, A., 2011. Network analysis and political science. *Annual Review of Political Science*, 14, pp.245-264.

- o Grimmer, J., 2013. Appropriators not position takers: The distorting effects of electoral incentives on congressional representation. *American Journal of Political Science*, 57(3), pp.624-642.

- o Fowler, J.H., Grofman, B. and Masuoka, N., 2007. Social networks in political science: Hiring and placement of Ph.Ds, 1960?2002. PS: *Political Science & Politics*, 40(04), pp.729-739.

- o Ward, Michael D., et al. "Learning from the past and stepping into the future: Toward a new generation of conflict prediction." *International Studies Review* 15.4 (2013): 473-490.

- o Lei, Y.H. and Michaels, G., 2014. "Do giant oilfield discoveries fuel internal armed conflicts?" *Journal of Development Economics*, 110, pp.139-157.

- o Mebane, W. and Wall, J. 2015 "Election Frauds, Postelection Legal Challenges and Geography in Mexico" working paper

Week 16 - Presentations (May 4th)