

Geography 512

Advanced quantitative methods for social field research (3 credits)

Fall 2014

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Summary

How does one collect data to quantitatively assess research questions in the social sciences, and what methods are available to analyze those data? This course introduces students to advanced statistical techniques commonly confronted in empirical social science literature, particularly those used to analyze primary field data. The course is divided into four major topics:

- designing field research for social inquiry
- methods for causal inference
- analyzing time-series data
- controlling for and measuring spatial interactions

Students are encouraged to come with their own research ideas in mind. Ideally, students will take this course just before going to the field to conduct primary research and data collection. For a final project, students will have the option to develop a rigorous data analysis plan around those interests. If a student already has an appropriate dataset in hand, s/he is encouraged to use it to explore the methods we learn in the course. For students that simply want to bolster their statistical toolkit (but no appropriate research project in mind), I will have several public datasets that any student can use to practice the methods we explore to develop a short analytical report.

Learning objectives

After completing this course you will be able to:

1. critique the literature that uses the techniques covered in this course
2. apply quantitative tools to estimate and control for local heterogeneity, including geographic factors, and
3. design data collection and an accompanying statistical analysis plan.

In the course we will highlight (a) the major assumptions that underlie the methods we investigate, (b) how field data collection relates to each analytical method, and (c) how these techniques do or do not account for geographic factors that may influence outcomes of interest.

We will use journal articles, book chapters and case studies to deepen our understanding of research design and analytical techniques. Readings will draw from a range of disciplines, but most will focus on analysis of socio-economic and environmental systems. Some of the topical questions might include:

- How do we know if an aid or development project is achieving its desired results?
- Does participation in afforestation programs have a positive effect on poor households?
- Does neighborhood choice affect residents' health?
- How does the spatial pattern of road development affect tropical deforestation?
- Where should conservation efforts be located?

Course prerequisite

My goal is for this to be a practical course that helps new researchers design good field studies, and field studies that answer research questions to the best of our ability with current techniques. Certainly we

cannot cover all the possible content that one could use in these cases, but I hope these methods help open students up to the range of techniques available. We will use multiple regression as our starting point. Thus students must have a prior course in applied multiple regression such as GEOG 351, SOCI 504, SOCI 505, ECON 337, or equivalent experience with permission of instructor.

Assessment (detailed descriptions of each will be given prior to the assignment)

40% *Exercises ["Ex" on schedule below] (4 exercises worth 10% each)*

Students will work individually or in small teams (depending on the assignment) to practice the methods we review in class. For data analysis, students may use a variety of software packages, but I am best able to field questions pertaining to STATA.

15% *In-class presentation of a method OR preparation of data exercise*

Students (or teams of students, depending on size of the class) will select a method from the course outline to teach to the class, or around which to develop a data exercise.

40% *Final project (Data analysis plan or Research paper) (10% outline, 30% final report)*

Students have a choice to either design their own research methods & data analysis plan, or to use data (their own data, secondary data, or a public dataset) to develop an independent research paper. The target word count for assignments is 3000 words. The topic of the assignment is the student's choice, but data analysis should be related to topics covered in the course.

5% *Class participation*

Participation is evaluated based on evidence that students have read assigned readings and prepared for class, and given regular, thoughtful contribution to weekly discussions. Quality of contribution is preferred over quantity. Preparation, participation and performance in student-led discussion will be taken into account.

For information on university and department policies for student assessment, please go to <http://www.mcgill.ca/geography/studentassessment>

Readings

Readings draw from foundational journal articles, textbook treatments of methodologies, or case studies that demonstrate methodologies. Several chapters will come from these two books (abbreviations are referenced in the *Schedule* below):

M&W. Morgan, SL and Winship C. 2007. Counterfactuals and causal inference. (New York, NY: Cambridge University Press).

W. Wooldridge, JM. 2010. Econometric analysis of cross section and panel data. (Cambridge, MA: The MIT press).

Other book-level treatments that may be of interest:

Bradley HE and Collier D. 2004. *Rethinking Social Inquiry: Diverse tools, Shared Standards*. (Lanham, MD: Roman and Littlefield).

Deaton A. 1997. *The Analysis of Household Surveys*. (Washington, DC: John Hopkins University). Press.

Luker K. 2008. *Salsa Dancing into the Social Sciences*. (Cambridge, MA: Harvard Univ Press).

Pearl, J. 2009. *Causality*. 2nd Ed. (New York, NY: Cambridge University Press).

Schedule

Wk	Description	Readings: theory & methods	Readings: application	Exercise
9/8	a. Introduction & overview of the research process b. Experimental design for social sciences	De Vaus, D. A. 2001. <u>Research design in social research</u> . London: SAGE. Ch 1. * Luker K. 2008. Ch 1. * Bradley & Collier 2004. Ch 1, 2 & 7 * Blaikie: Designing Social Research		Ex: Create a survey
<i>Research design</i>				
9/15	a. Sampling b. Field (hh) survey design	Rea & Parker, 2004. Designing and conducting survey research Section 2. * Deaton 1997, Ch 1.1-1.3		WB LSMS tutorial (on your own)
9/22	a. Measurement & attenuation bias b. Field logistics (tech., enumerators, ethics, etc)	Attenuation bias (handout) Angelson et al. Ch. 7, 9, 10 <i>Measuring Livelihoods</i> . * Rea & Parker. Ch 1.3 Administering questionnaires		Ex: measuring welfare
<i>Evaluating impacts of policies & programs</i>				
9/29	Causality & randomized controlled trials	Duflo, Glennerster, et al. 2007. Ravallion 2009. Should the Randomistas Rule?	Duflo et al 2012. Ch 1 Poor Econ. [Ashraf, Jack, et al. 2012. Info & Subsidies. JEBO.]	
10/6	Matching	M&W Ch 4 * W. Ch 21.3	Joppa, et al 2010. <i>Reassessing the forest impacts of protection</i> . Annals of NY Acad of Sci. Andam, 2008. <i>Measuring effectiveness of protected areas in reducing deforestation</i> . PNAS.	Ex: matching
10/20	Difference-in-difference	M&W Ch 7. W. Ch 21.4. Romero, et al 2008. W. Ch 10.6. W. Ch. 21.5	Deaton 2010. <i>Instruments, Randomization, and Learning about Development</i> . Zheng, Robinson 2013. PNAS. (DID + Matching) Keele, 2013. <i>Geographic boundaries as regression discontinuities</i> . (Working ppr)	
<i>Temporal considerations</i>				
10/27	Fixed intercepts & random intercept models	Rabe-Hesketh 2012, Ch. 3 W. Ch 10	Glewwe & Jacoby, Chapter 23. Designing Household Survey Questionnaires for Developing Countries. Cole. 2005. <i>Re-examining the pollution-income relationship</i> .	Ex: panel methods

11/3	Multilevel modeling cases (guest lecture)	Rabe-Hesketh 2012, Chapter 4.	Aslam 2012. <i>The geography of well-being</i> . Econ Geog. Larsen 2005. <i>App Assessment of neighborhood effects on ind health</i> . Am Epi. Wendland, 2011 <i>Deforestation and governance in Russia</i> . GEC. Holland 2013. <i>Land tenure & defor in Ecuador</i> . WD	
<i>Space and scale</i>				
11/10	Review: spatial autocorr and spatial lag, MAUP	Anselin. 2001. <i>Spatial Econometrics</i> . Fotheringham & Wong. 1991. <i>The modifiable areal unit problem in multivariate statistical analysis</i> . EPA.	Espindola 2012. <i>Agricultural land use dynamics in the Brazilian Amazon based on RS and census data</i> . App Geog. Taylor 2003. <i>The modifiable areal unit problem: Segregation between schools and levels of analysis</i> . EPA.	Ex: spatial methods
11/17	Spatial interactions: neighborhood effects	Dietz. 2002. <i>The estimation of neighborhood effects in the social sciences: An interdisciplinary approach</i> . Soc Sci Research. Durlauf. 2002. <i>Neighborhood Effects</i> .	Ross et al. 2005. <i>BMI in Urban Canada</i> . AJPH Zhou et al. 2011. <i>Poverty, biomass, air pollution in Accra, Ghana</i> . PNAS.	
11/24	Land use & geographically weighted regression (guest lecture)	Lewis & Plantinga. 2007. <i>Policies for Habitat Fragmentation: Combining Econometrics with GIS-Landscape Simulations</i> . Land Econ. Charlton & Fotheringham. 2009. <i>Geographically Weighted Regression</i> . LeSage. 2004. <i>A Family of Geographically Weighted Regression Models</i> .	Polasky et al. 2008. <i>Where to put things</i> . Biol Cons. Huang & Leung. 2002. <i>Industrial growth in Jiangxi</i> .	
12/1	Scale		Polsky & Easterling. 2001. <i>Adaptation to climate variability and change</i> .	
<i>Wrap-up</i>				
12/8	Review & wrap up		Fotheringham, Brunsdon. 1999. <i>Local forms of spatial analysis</i> . Paez, Scott. 2004. <i>Spatial Stats for Urban Analysis</i> .	

Final projects will be due the last week of finals.

* Optional reading.

Language of Assignments

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. (*approved by McGill Senate on 21 January 2009 - see also the section in this document on Assignments and evaluation.*)

Conformément à la Charte des droits de l'étudiant de l'Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté (sauf dans le cas des cours dont l'un des objets est la maîtrise d'une langue).

Academic integrity

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information). (*approved by Senate on 29 January 2003*)

To help ensure students follow proper citation and attribution practices, I reserve the right to use text-matching software to flag potential problems. If you have questions about how to properly reference work, please see me in office hours.

Late work

Late assignments are accepted, but will result in a 10% reduction in the otherwise earned grade on that assignment for work that is 5 min – 1 day late. Work from 1 day – 1 week late will result in a 30% reduction in the otherwise earned grade. Work more than one week late will not be accepted. Please see me for special circumstances.

Course modifications

We, as a class, may feel we need to alter aspects of the course outline as given above. We will revisit the expectations of the class as we go along and may find it agreeable to speed up or slow down portions of the process. Any alterations to the course will be an open and transparent discussion among the class. Further, in the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change. If you have thoughts or concerns about our trajectory during the semester, please let me know.