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ECON 664: Applied Cross-Sectional Methods

Class Time: Tuesdays and Thursdays, 4:05-5:25pm at Sherbrooke 688 Building - Room 495. Individual office hours can be scheduled through e-mail.

Communication: E-mails should be sent from your official McGill e-mail address and include [ECON 641] in the subject line. I aim to reply to e-mails within 24 hours, except on weekends.

Prerequisite: The course is suitable for both M.A. and Ph.D. students.

Course Overview: This syllabus covers a course in applied cross-sectional methods.

With limited public resources, determining which programs, reforms, policies are beneficial, and at what cost, is crucial, and allows public policy to be driven by evidence. However, evaluating programs is made difficult by the “counterfactual problem”: one cannot observe the outcomes or behavior of a participant, had (s)he not participated. This course will describe the standard OLS model, its limitations, and an improvement (panel data models). This course will then present the state-of-the-art empirical techniques used by economists to address the counterfactual issue, including randomized experiments, matching techniques, instrumental variables, regression discontinuity designs and difference-in-differences, among others. For each of these approaches, we will give the basic intuition, discuss the necessary assumptions, present the strengths and weaknesses, and analyze applications drawn from the literature. Moreover, each technique will be implemented by the students in hands-on Stata sessions.

This course presumes that students have successfully completed coursework in econometrics and a course in intermediate microeconomics.

Textbook: The main textbook used in the class will be Mostly Harmless Econometrics by Joshua D. Angrist and Jorn-Steffen Pischke.

For the differences-in-differences section, the course will also draw on Causal Inference: The Mixtape by Scott Cunningham. This material can be accessed directly at the following link provided by the author: [https://mixtape.scunning.com/09-difference in differences](https://mixtape.scunning.com/09-difference-in-differences)

The course will also draw on research papers, and students will be expected to read the papers assigned in each section. Additional papers may be added to each section during the semester.

Evaluation: Your grade in this course will depend on your performance on four problem sets and a final exam. The grade is determined as follows:

Problem Sets (60 %): Problem sets encompass material covered in the class lectures and require reading additional papers. Each problem set will also include empirical exercises aimed at helping you become familiar with implementing the various empirical techniques taught in the course. The problem sets will also include a number of questions on assigned papers that are relevant to helping your understanding of the different empirical approaches covered in the course. Problem

sets will be distributed two weeks in advance of their due date. Each problem set accounts for 15% of the final grade.

Tentative Problem Set Dates

1. Due Sunday 2/5.
2. Due Sunday 3/5.
3. Due Sunday 3/26.
4. Due Sunday 4/16.

Final Exam (40%): The final exam will be held on April 11 in-person from 4-7pm. It will include theoretical and empirical questions encompassing all the topics covered in class.

McGill Policy Statements

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).

Language of Submission: 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.

Copyright of Lectures Statement: All slides, video recordings, problem sets and lecture notes remain the instructor's intellectual property. You may use these only for purposes of your own learning, but you are not permitted to disseminate or share these materials. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

Extraordinary Circumstances Statement: In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

Accessibility and Policy: As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Students with Disabilities, 514-398-6009.

Course Outline

Part I: The ordinary least squares (OLS) model, matching and its limitations (6 lectures)

Topics Covered

- Rubin Causal Framework
 - o Randomized Experiments
- Regression Framework
 - o Saturated Models
- Regression and Causality
 - o Selection on Observables:
 - o Omitted Variable Bias
 - o Measurement Error
 - o Heterogeneous Treatment Effects
 - o Bad Controls
- Matching

Assigned Readings

Mostly Harmless Econometrics, Chapter 3

Angrist, Joshua (1998): Estimating the Labor Market Impact on Voluntary Military Service Using Social Security Data on Military Applicants, *Econometrica*, 66, 249-288.

Krueger, Alan B. (1999): Experimental Estimates of Education Production Functions, *Quarterly Journal of Economics*, 114, 497-532.

Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P. Newhouse, Heidi Allen, Katherine Baicker, and Oregon Health Study Group. "The Oregon health insurance experiment: evidence from the first year." *The Quarterly Journal of Economics* 127, no. 3 (2012): 1057-1106.

Feigenberg, Benjamin, and Conrad Miller. "Racial divisions and criminal justice: Evidence from southern state courts." *American Economic Journal: Economic Policy* 13, no. 2 (2021): 207-40.

Part II: Instrumental Variables (6 lectures)

Topics Covered

- Instrumental Variables Set-Up
 - o Two-Stage Least Squares
 - o Wald Estimator
 - o Weak Instruments
- IV with Heterogeneous Potential Outcomes
 - o Local Average Treatment Effect
 - o Compliers
- Instrumental Variables in RCTs

- Multivalued Instruments
- Variable Treatment Intensity
- Covariates in Instrumental Variables
- Judge Leniency IV

Assigned Readings

Mostly Harmless Econometrics, Chapter 4

Angrist, Joshua (1990). Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records, *American Economic Review*, 80, 313-335.

J. Angrist and A. Krueger, "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, CVI(4), 1991, pp. 979-1014.

Card, D. (1995). Using geographic variation in college proximity to estimate the return to schooling. NBER Working Paper.

Burde, D., & Linden, L. L. (2013). Bringing education to Afghan girls: A randomized controlled trial of village-based schools. *American Economic Journal: Applied Economics*, 5(3), 27-40.

Mueller-Smith, M. (2015). The criminal and labor market impacts of incarceration. Unpublished working paper, 18.

Part III: Regression Discontinuity Design (6 Lectures)

Topics Covered

- Regression Discontinuity Design Set-Up
 - o Implementation Challenges
 - o Sharp and Fuzzy Regression Discontinuity

Assigned Readings

Hoekstra, M. (2009). The effect of attending the flagship state university on earnings: A discontinuity-based approach. *The Review of Economics and Statistics*, 91(4), 717-724.

S. Zimmerman. (2013) "The Returns to College Admission for Academically Marginal Students," *Journal of Labor Economics*. October 2014, pp. 711-754

Solis, A. (2017). Credit access and college enrollment. *Journal of Political Economy*, 125(2), 562-622.

Zimmerman, S. D. (2019). Elite colleges and upward mobility to top jobs and top incomes. *American Economic Review*, 109(1), 1-47.

Bleemer, Z., & Mehta, A. (2022). Will studying economics make you rich? A regression discontinuity analysis of the returns to college major. *American Economic Journal: Applied Economics*, 14(2), 1-22.

Kaplan, E., Saltiel, F., & Urzúa, S. S. (2022). Voting for Democracy: Chile's *Plebiscito* and the Electoral Participation of a Generation. *American Economic Journal: Economic Policy*. Forthcoming.

Part IV: Differences-in-Differences (6 Lectures)

Topics Covered

- Differences-in-Differences Design Setup
- Parallel Trends and Event Studies
- Variation in Treatment Timing
- Differences in Discontinuities

Assigned Readings

Causal Inference: The Mixtape, Chapter 9

Card, D., & Krueger, A. B. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *The American Economic Review*, 84(4), 772–793.

Heckman, J. J., Humphries, J. E., LaFontaine, P. A., & Rodriguez, P. L. (2012). Taking the easy way out: How the GED testing program induces students to drop out. *Journal of Labor Economics*, 30(3), 495-520.

Goodman, J. (2019). The labor of division: Returns to compulsory high school math coursework. *Journal of Labor Economics*, 37(4), 1141-1182.

Bertrand, M., Mogstad, M., & Mountjoy, J. (2021). Improving educational pathways to social mobility: evidence from Norway's reform 94. *Journal of Labor Economics*, 39(4), 965-1010.

Miller, S., Johnson, N., & Wherry, L. R. (2021). Medicaid and mortality: new evidence from linked survey and administrative data. *The Quarterly Journal of Economics*, 136(3), 1783-1829.