

ECO 1450H1S

Methods for Empirical Microeconomics

University of Toronto

Department of Economics
Winter 2024

Course Description

This course is primarily designed for graduate students interested in econometric methods used in empirical research. The focus of the course will be on causal inference and will examine identification issues in empirical microeconomics, with an emphasis on sensible application of these methods to empirical problems.

The course objectives are threefold. First, to expose students to a wide range of empirical methods and how they are used in practice. Second, to clarify the terminology and jargon that is used in econometric methods so that it will be less intimidating. Third, to give students the skills so that they have a firm grasp of the types of research designs that can lead to convincing analysis and be comfortable working with large-scale data sets.

Instructor

Instructor: Kory Kroft
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Office: 150 St. George Street, #238

Office Hours: Wednesday, 3pm to 5pm

Teaching Assistant

TA: Steven Ryan
Email: steven.ryan@mail.utoronto.ca

Meetings

Lectures will be held on Tuesday, 9:10am to 11:00am, in RW 140.
Tutorials will be held on Friday, 10:10am to 11am, in RW 140.

Website

The course website will be hosted on Quercus.

I will post the slides from my lectures on the Quercus website. I tend to use Quercus extensively as a means of communication with the class, so I recommend you check the announcements regularly.

Evaluation

A solid understanding of the various empirical strategies, and how they are implemented in real research is a key objective of the course. As such, a detailed understanding of important/illustrative papers in the field is an excellent way to acquire this understanding. There are several components to the graded course work:

1. Two problem sets that will focus on the replication of an empirical study. Each problem set will be worth 20 percent.
2. One midterm examination worth 25 percent.
3. One final examination worth 35 percent.

Important Dates

February 13 – Problem Set #1 Due

February 27 – Midterm Test

April 2 – Problem Set #2 Due

Software

The course involves a significant amount of computing, and students must learn and use a sophisticated statistical software package. STATA is highly recommended and is the only package that will be supported by the instructor and TA.

Stata is available at reduced rates through the student pricing program, which allows U of T students to buy Stata software at low prices from StataCorp directly. The 6-month subscription to Stata/BE is sufficient for our needs: student page linked here (toggle to the 6-month tab for reduced pricing): <https://www.stata.com/order/new/edu/profplus/student-pricing/>. Stata is also available for free in the library computer lab: <https://mdl.library.utoronto.ca/technology/statistical-software>.

Familiarity with EXCEL is also useful.

Course Policies

1) Midterm Test

The midterm test will be held on Tuesday, February 27th during class time (9:10am – 11:00am) (location RW 140).

Questions will be in a similar format to the questions on the problem sets.

If you miss the midterm, you will be given a grade of 0 unless you make a declaration of absence via ACORN the day of the test and contact me before or on the day of the test to indicate that you will not be able to write the test. It is an academic offence to feign illness to avoid a test.

If a student has been excused from the mid-term, he or she will be permitted to write the make-up test. The make-up midterm will be given on Monday, March 11th, 12:10pm-2:00pm.

- It may not be the exact same format as the midterm test itself.
- Consistent with university policy, there is no “make-up” test for the make-up test. A grade of zero will be applied if a student fails to write the make-up test.

2) Problem Sets

The problem sets are due at the beginning of class on the assigned dates (February 13 and April 2). Late problem sets will receive a grade of zero, unless you make a declaration of absence via ACORN and contact me about your assignment.

All students must hand in their own problem sets but are welcome to help each other out. This means writing your own code and running your own output for empirical problem sets. Any evidence of copying/cutting/pasting from each other will be treated as plagiarism. Solutions must be typed and submitted as a PDF document.

3) Code of Behavior on Academic Matters

I have a zero-tolerance policy for any form of academic misconduct. Academic offenses, such as plagiarism or cheating during tests are serious academic offenses and could result in punishments ranging from failing the course to suspension or expulsion from the university.

Please read the University's [Code of Behaviour on Academic Matters](#). It applies to all your academic activities and courses. The Code prohibits all forms of academic dishonesty including, but not limited to, cheating, plagiarism, and the use of unauthorized aids. Violating the Code may lead to penalties up to and including suspension or expulsion from the University. You are expected to know the Code and inform yourself of acceptable academic practices – ignorance of the Code or the acceptable academic practices is not a valid defense if you are accused of a violation.

4) Appealing an exam

Appeals regarding the grading of a test must be submitted to me in writing, **within two weeks of your receipt of the graded work**. You must include the test with your written appeal. I shall re-grade the **entire exam** and this might result in a lower grade than the original.

5) Academic Accommodations

Occasionally students will need to apply for an academic accommodation due to disability, illness, religious observance, or personal emergency.

All requests for an academic accommodation due to disability are handled by the University of Toronto's Accessibility Services, not the instructor. For disability-related accommodations, [Accessibility Services](#) staff will determine suitable accommodations on a case-by-case basis based on recommendation from health providers and with student input.

Students who require consideration for missed academic work for **any non-disability related reason** (e.g., COVID, cold, flu and other illness or injury, family situation) may submit any one of four forms of documentation which includes both the Verification of Illness (VOI) form and student self-declaration (i.e., Absence Declaration) via ACORN. A student may only self-declare one absence (of up to seven consecutive days) per term (not per course).

If a non-disability related accommodation request is made, a resolution will be determined by the instructor. This may take the form of any alternate deliverable, deadline extension, reweighted course grade calculation, make-up test, or another solution deemed appropriate by the instructor. If an accommodation request is not made, the missed or late deliverable will be subject to an academic penalty. The extent of the penalty is at the discretion of the instructor.

6) Generative AI (e.g., ChatGPT)

Students can use Generative AI in certain instances or specific ways. Students may not use artificial intelligence tools for taking tests, creating computer code, or completing problem sets. However, these tools may be useful when gathering information from across sources and assimilating it for understanding. If you have any question about the use of AI applications for course work, please speak with the instructor.

7) Mental Health and Wellness

Feeling distressed? Are you in crisis? There's help. Call Good2Talk: 1-866-925-5454 (Ontario); text GOOD2TALK to 686868. Free, confidential helpline with professional counselling, information and referrals for mental health, addictions and well-being, 24/7/365. You can also contact [U of T Telus Health Student Support](#) 1-844-451-9700 (North America); 001-416-380-6575 (Outside of North America) or the [U of T Employee & Family Assistance Program \(EFAP\)](#) 1-800-663-1142 (toll-free); 1-866-398-9505 (TTY); 604-689-1717 (collect). Visit "[Feeling Distressed?](#)" for more resources.

Are you in immediate danger? For Personal Safety – Call 911, then Campus Community Police*
UTSG Police: 416-978-2222 | U of T Mississauga Police: 905-569-4333 | U of T Scarborough Police 416-978-2222 |

Centre for International Experience Safety Abroad 416-946-3929.

*24/7/365; Campus Community Police can direct your call to the right service.

Lecture Schedule – Winter 2024

1	January 9	Causal Models and the Evaluation of Economic Policy
2	January 16	Matching on Observables
3	January 23	Instrumental Variables in Choice Models Problem Set 1 Distributed
4	January 30	Instrumental Variables in Choice Models
5	February 6	Regression Discontinuity Problem Set 1 Due
6	February 13	Regression Discontinuity
7	February 27	Midterm Test
8	March 5	Panel Data and Difference-in-Differences Problem Set 2 Distributed
9	March 12	Panel Data and Difference-in-Differences
10	March 19	Shift-Share Designs
11	March 26	Marginal Treatment Effects Problem Set 2 Due
12	April 2	Topics in Inference

Reading Material

Most of the course material will consist of detailed lecture notes which will be posted on Quercus before the start of each class. Please do not post these notes in any public space or share them with anyone not in the class. The course material will emphasize some readings, which can be found below. Students can access most of the readings using JSTOR through the UofT library. Please note that it is NOT my expectation that you read all these articles. The lecture notes should mostly suffice. However,

if you want a deeper understanding of the material, I encourage you to read the articles. Additionally, some of the problem set questions might require you to dig deeper into the articles.

We will not explicitly follow any textbooks. The following textbooks and articles are useful as references to supplement the readings covered in class:

Angrist, Joshua D. and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009.

Angrist, J.D. and A. B. Krueger (2001), "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments," Journal of Economic Perspectives, 15(4): 69-85.

Cunningham, Scott, "Causal Inference: The Mixtape," <https://mixtape.scunning.com/>

Guido Imbens and Jeffrey Wooldridge (2009): "Recent Developments in the Econometrics of Program Evaluation," Journal of Economic Literature, 47:1, pages 5-86.

1. Causal Models and the Evaluation of Economic Policy (January 9)

Bitler, Marianne P, Jonah B. Gelbach and Hilary W. Hoynes (2006): "What Mean Impacts Miss: Distributional Effects of Welfare Reform Experiments," American Economic Review, 96(4), pp. 988-1012.

Heckman, James J. and Jeffrey A. Smith (1995): "Assessing the Case for Social Experiments," Journal of Economic Perspectives, 9(2), pp. 85-110.

Heckman, James J. and Edward J. Vytlacil (2007): "Chapter 70 Econometric Evaluation of Social Programs, Part I: Causal Models, Structural Models and Econometric Policy Evaluation," Handbook of Econometrics, Volume 6, Part B, pp. 4779-4874.

Heckman, James J. and Edward J. Vytlacil (2007): "Chapter 71 Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Econometric Estimators to Evaluate Social Programs, and to Forecast their Effects in New Environments," Handbook of Econometrics, Volume 6, Part B, 4875-5143.

2. Matching on Observables (January 16)

Angrist, Joshua D. (1998): "Estimating the Labor Market Impact of Voluntary Military Service Using Social Security Data on Military Applicants," Econometrica, 66(2): pp. 249-288.

Ashenfelter, Orley (1978): "Estimating the Effect of Training Programs on Earnings," The Review of Economics and Statistics, 60, pp. 47-57.

Ashenfelter, Orley, and David Card (1985): "Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs on Earnings," The Review of Economics and Statistics, 67, pp. 648-66.

Dehejia, Rajeev, and Sadek Wahba (1999): "Causal Effects in Nonexperimental Studies: Re-evaluating the Evaluation of Training Programs," JASA, 94.

Dehejia, Rajeev, and Sadek Wahba (2002): "Propensity Score-Matching Methods for Nonexperimental Causal Studies," The Review of Economics and Statistics, 84(1): 151-161.

Hirano, Keisuke, Guido W. Imbens, and Geert Ridder (2003): "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score," Econometrica, 71:4, 1161–1189.

LaLonde, Robert (1986): "Evaluating the Econometric Evaluations of Training Programs with Experimental Data," American Economic Review, 76, September, pp. 604-620.

3. Instrumental Variables in Choice Models (January 23)

Heckman, James J. and Edward J. Vytlacil (2005): "Structural Equations, Treatment Effects, and Econometric Policy Evaluation," Econometrica, 73(3), pp. 669-738.

Imbens, Guido W. and Joshua Angrist (1994): "Identification and Estimation of Local Average Treatment Effects," Econometrica, Vol. 62, No. 2, pp. 467-475.

Imbens, Guido W. and Donald B. Rubin (1997): "Estimating Outcome Distributions for Compliers in Instrumental Variables Models," The Review of Economic Studies, 64(4): pp. 555-574.

Ketel, Nadine, Edwin Leuven, Hessel Oosterbeek and Bas van der Klauuw (2016): "The Returns to Medical School: Evidence from Admission Lotteries," American Economic Journal: Applied Economics, 8(2): pp. 225-254.

Kitigawa, Toru (2015): "A Test for Instrument Validity," Econometrica, 83(5): pp. 2043-2063.

Mogstad, Magne, Alexander Torgovitsky and Christopher R. Walters (2021): "The Causal Interpretation of Two-Stage Least Squares with Multiple Instrumental Variables," American Economic Review, forthcoming.

4. Instrumental Variables in Choice Models (January 30)

Abadie, Alberto (2003). "Semiparametric Instrumental Variable Estimation of Treatment Response Models," Journal of Econometrics, 113, pp. 231–263.

Angrist, Joshua and William N. Evans (1998): "Children and Their Parents' Labor Supply: Evidence from Exogenous Variation in Family Size," American Economic Review, 88(3): pp. 450-477.

Angrist, Joshua and Guido W. Imbens (1995): "Two-Stage Least Squares Estimation of Average Causal Effects in Models with Variable Treatment Intensity," Journal of the American Statistical Association, 90(430), pp. 431-442.

Angrist, Joshua, and Alan Krueger (1991): "Does Compulsory Schooling Attendance Affect Schooling and Earnings?" Quarterly Journal of Economics, 106(4), pp. 979-1014.

Bound, John, David A. Jaeger and Regina M. Baker (1995): "Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak," Journal of the American Statistical Association, 90(430), pp. 443-450.

Kirkeboen, Lars J., Edwin Leuven and Magne Mogstad (2016): "Field of Study, Earnings, and Self-Section," Quarterly Journal of Economics, 131(3): pp. 1057-1111.

Løken, Katrine V., Magne Mogstad and Matthew Wiswall (2012): "What Linear Estimators Miss: The Effects of Family Income on Child Outcomes," American Economic Journal: Applied Economics, 4(2): pp. 1-35.

5. Regression Discontinuity (February 6)

Angrist, Joshua, and Victor Lavy (1999): "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement," Quarterly Journal of Economics, pp. 533-575.

Imbens, Guido W., and Karthik Kalyanaraman (2012). "Optimal Bandwidth Choice for the Regression Discontinuity Estimator." Review of Economic Studies, 79(3), 933-959.

Lee, David, and Thomas Lemieux (2010): "Regression Discontinuity Designs In Economics," Journal of Economic Literature, 48, pages 281-355.

6. Regression Discontinuity (February 13)

Kirkeboen, Lars J., Edwin Leuven and Magne Mogstad (2016): "Field of Study, Earnings, and Self-Section," Quarterly Journal of Economics, 131(3): pp. 1057-1111.

Kostol, Andreas and Magne Mogstad (2014): "How Financial Incentives Induce Disability Insurance Recipients to Return to Work," American Economic Review, 104(2), pp. 624-655.

7. Midterm Test (February 27)

8. Panel Data and Difference-in-Differences (March 5)

Athey, Susan and Guido W. Imbens (2006): "Identification and Inference in Nonlinear Difference-in-Differences Models," Econometrica, 74(2), pp. 431-497.

Bertrand, Marianne, Esther Duflo, Sendhil Mullainathan (2004). "How Much Should We Trust Difference-in-Difference Estimates?" Quarterly Journal of Economics, 119(1), 249-75.

Borusyak, Kirill, Xavier Jaravel and Jann Spiess (2021): "Revisiting Event Study Designs: Robust and Efficient Estimation," Working Paper.

Callaway, Brantly and Pedro H.C. Sant'Anna (2020): "Difference-in-Differences with Multiple Time Periods," Journal of Econometrics, forthcoming.

Card, David and Alan Krueger (1994): "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," American Economic Review, 84(4), pp. 772-793.

Card, David and Alan Krueger (2000): "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply," American Economic Review, 90(5), pp. 1397-1420.

de Chaisemartin, Clément and Xavier D'Haultfœuille (2020): "Two-Way Fixed Effects Estimators with Heterogeneous Treatment Effects," American Economic Review, 110(9), pp. 2964-2996.

Goodman-Bacon, Andrew (2021): "Difference-in-Differences with Variation in Treatment Timing," Journal of Econometrics, forthcoming.

Heckman, James J. and Jeffrey A. Smith (1999): "The Pre-Programme Earnings Dip and the Determinants of Participation in a Social Programme. Implications for Simple Programme Evaluation Strategies," Economic Journal, 109, pp. 1-36.

Meyer, Bruce D., W. Kip Viscusi and David L. Durbin (1995): "Workers' Compensation and Injury Duration: Evidence from a Natural Experiment," American Economic Review, 85(3), pp. 322-340.

Sun, Liyang and Sarah Abraham (2020): "Estimating dynamic treatment effects in event studies with heterogeneous treatment effects," Journal of Econometrics, forthcoming.

9. Panel Data and Difference-in-Differences (March 12)

Abadie, Alberto, and Javier Gardeazabal (2003): "The Economic Costs of Conflict: A Case Study of the Basque Country," American Economic Review, 93 (1): pp. 113–132.

Abadie, Alberto, Alexis Diamond, and Jens Hainmueller (2010): "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program," Journal of the American Statistical Association, 105(490): pp. 493–505.

Besley, Timothy and Robin Burgess (2004): "Can Labor Regulation Hinder Economic Performance? Evidence from India," Quarterly Journal of Economics, 119(1), pp. 91-134.

Golosov, Mikhail, Michael Grabner, Magne Mogstad and David Novgorodsky (2021): "How Americans Respond to Idiosyncratic and Exogenous Changes in Household Wealth and Unearned Income," Working paper.

Haan, Monique De, Edwin Leuven and Hessel Oosterbeek (2018): "School Consolidation and Student Achievement," Journal of Law, Economics and Organization, 32(4): pp. 816-839.

10. Shift-Share Designs (March 19)

Adao, Rodrigo, Michal Kolesar and Eduardo Morales (2019): "Shift-Share Designs: Theory and Inference," Quarterly Journal of Economics, 134(4): pp. 1949-2010.

Autor, David H., David Dorn and Gordon H. Hanson (2013): "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," American Economic Review, 103(6): pp. 2121-2168.

Borusyak, Kirill, Peter Hull and Xavier Jaravel (2020): “Quasi-Experimental Shift-Share Research Designs,” forthcoming at the Review of Economic Studies.

Borusyak, Kirill and Peter Hull (2021): “Non-Random Exposure to Exogenous Shocks: Theory and Applications,” Working Paper.

Card, David (2009): “Immigration and Inequality,” American Economic Review, 99(2): pp. 1-21.

Goldsmith-Pinkham, Paul, Isaac Sorkin and Henry Swift (2020): “Bartik Instruments: What, When, Why, and How,” American Economic Review, 110(8): pp. 2586-2624.

11. Marginal Treatment Effects (March 26)

Björklund, Anders, and Robert Moffitt. 1987. “The Estimation of Wage Gains and Welfare Gains in Self-Selection Models.” Review of Economics and Statistics 69(1): 42–49

Carneiro, Pedro, James J. Heckman, and Edward J. Vytlacil (2011). “Estimating Marginal Returns to Education.” American Economic Review 101(6): 2754–2781.

Heckman, James J, Sergio Urzua, and Edward Vytlacil. 2006. “Understanding Instrumental Variables in Models with Essential Heterogeneity.” Review of Economics and Statistics 88(3): 389–432.

Heckman, James J., and Edward J. Vytlacil. 2007. “Econometric Evaluation of Social Programs, Part II: Using the Marginal Treatment Effect to Organize Alternative Econometric Estimators to Evaluate Social Programs, and to Forecast their Effects in New Environments.” Chap. 71 in Handbook of Econometrics, ed. by James J. Heckman and Edward E. Leamer. Amsterdam: Elsevier

12. Topics in Inference (April 2)

Abadie, Alberto, Susan Athey, Guido W. Imbens, and Jeffrey Wooldridge (2017): “When Should You Adjust Standard Errors for Clustering?” NBER Working Paper 24003.

Bertrand, Marianne, Esther Duflo, Sendhil Mullainathan (2004). “How Much Should We Trust Difference-in-Difference Estimates?” Quarterly Journal of Economics, 119(1), 249-75.

Cameron, A. Colin, Jonah B. Gelbach and Douglas L. Miller (2008): “Bootstrap-Based Improvements for Inference with Clustered Errors”, Review of Economics and Statistics, 90, 414-427.

Cameron, A. Colin, Jonah B. Gelbach and Douglas L. Miller (2011). “Robust Inference with Multi-Way Clustering,” Journal of Business and Economic Statistics, 29(2), 238-249.

Cameron, A. Colin, and Douglas L. Miller (2015). “A Practitioner’s Guide to Cluster-Robust Inference,” Journal of Human Resources, 50(2), 317-73.

Imbens, Guido W., and Michal Kolesar (2016). "Robust Standard Errors in Small Samples: Some Practical Advice." Review of Economics and Statistics, 98(4): pp. 701-712.

Moulton, Brent (1986): "Random Group Effects and the Precision of Regression Estimates," Journal of Econometrics, 32, pp. 385-97.