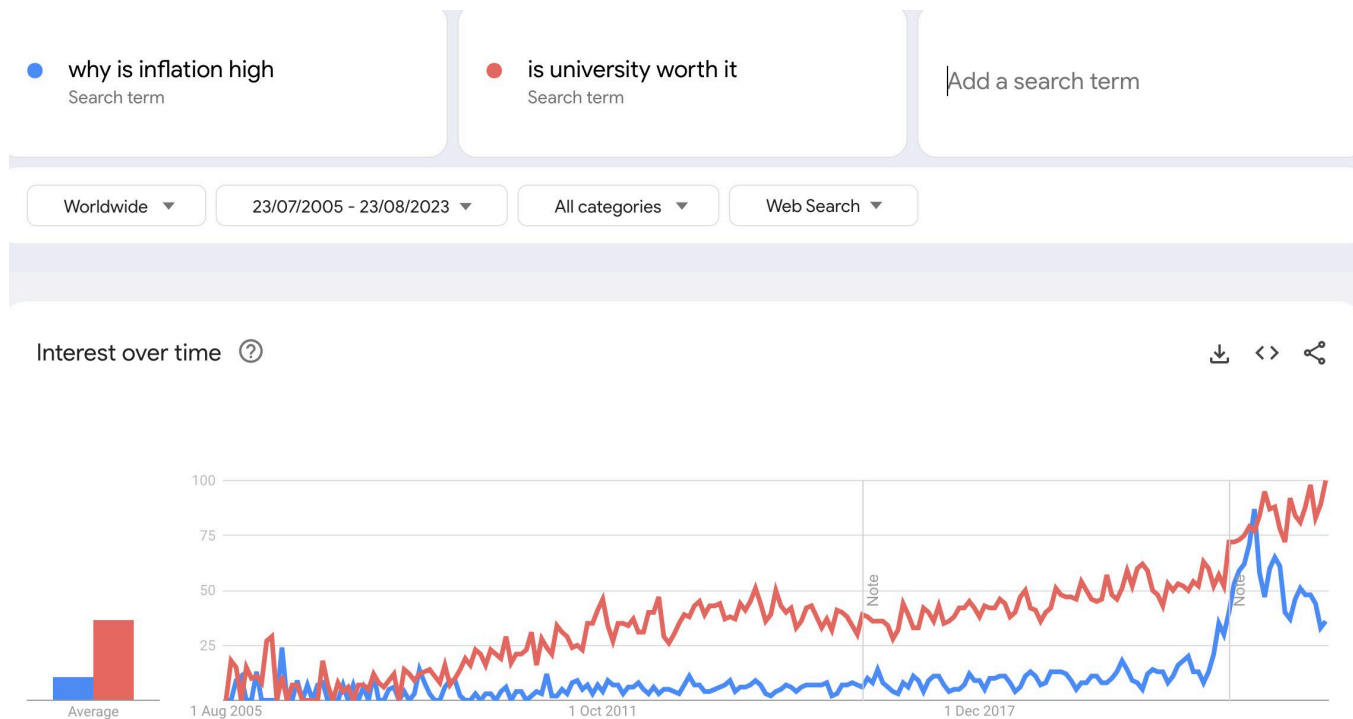


University of Waterloo
Department of Economics
Preliminary Course Outline
Fall 2023

Econ 322
Econometric Analysis I: Introduction to the Credibility Revolution



Course Description: Introduction to statistical analysis of causal effects. Econometrics is statistical analysis of choice-based behavior.

Course Introduction: Economists are highly valued in the labor market because of the profession's rigorous approach to statistical analysis of causal effects. In this course students have an opportunity to start learning these statistical methods.

Main Learning Objective: Learn to identify whether an estimated effect is a good estimate of the unknown true effect.

Instructor: Mikko Packalen, Associate Professor

Course Pre-requisites: Good command of probability theory, statistics and calculus.

Office Hours: Tuesdays 12:30pm-2pm, HH205, and by appointment (please email me).

Email: packalen@uwaterloo.ca; subject line should state "ECON 322" and come from your .uwaterloo account.

1. Course Materials

Lectures, Problem Sets, Textbook, ChatGPT/GPT4, Computer Software (e.g. R or Stata), Scientific Journal Articles, Policy Papers and Newspaper Articles.

2. Lectures

Tue/Thu 8:30-9:50am, AL 105.

3. Schedule

The numbers in parentheses refer to sections in the 3rd edition of the textbook. Other editions have similar sections but may be numbered slightly differently):

Part I: How to Get an Estimate of an Effect?

Week 1: What Do Economists Do?

- The Credibility Revolution
- Econometrics Vs. Machine Learning
- How Do Economists Benefit Society?
- Problem Set 1

Week 2: The Linear Regression Model

- Introduction (1-3)
- The Linear Regression Model (4.1)
- Problem Set 2

Week 3: The Least Squares Estimator

- The OLS Estimator (4.2, Appendix 4.2)
- Problem Set 3

Midterm Exam 1

Part II: When is an Estimate a Good Estimate?

Week 4: What is a Good Estimate?

- Consistency of the Least Squares Estimator (4.4, Appendix 4.3)
- Problem Set 4

Week 5: Omitted Variable Bias

- Omitted Variable Bias (6.1, Appendix 6.1)
- Problem Set 5

Midterm Exam 2

Part III: The Furious Five: How to (Maybe) Get a Better Estimate?

Week 6: Solution 1 to Omitted Variable Bias: Multiple Regression

- Linear Regression with Multiple Regressors (6.2-6.3, 6.5-6.7; 4.3, 6.4, 7.5; 5.4; 8)

- Tests of Joint Hypotheses in Multiple Regression (7.1-7.2, 7.4)
- Problem Set 6

Week 7: Hypothesis Testing

- The Sampling Distribution of the LS Estimator (4.5, Appendix 4.3)
- Hypothesis Testing (5.1-5.3)
- Problem Set 7

Week 8: Solution 2 to Omitted Variable Bias: Experiments

- Experiments
- Problem Set 8

Week 9: Solution 3 to Omitted Variable Bias: Fixed Effects

- Panel Data Analysis (10.1-10.2)
- Problem Set 9

Week 10: Further Threats to Analysis

- Measurement Error (9.1)
- Simultaneous Causality (9.2)
- Problem Set 10

Week 11: Solution 4 to Omitted Variable Bias: Instrumental Variables

- The IV Estimator (12.1)
- The Sampling Distribution of the IV Estimator (Appendix 12.2 - Appendix 12.4)
- Tests for Instrument Validity (12.3)
- Examples of IV Analyses (12.4-12.5)
- Problem Set 11

Week 12: Solution 5 to Omitted Variable Bias: Regression Discontinuity

- Regression Discontinuity Estimator
- Estimation of Treatment Effects in Experiments (13.1-13.3)
- Quasi-Experiments (13.5-13.6)
- Problem Set 12

Final Exam

4. Assignments

Weekly assignments are distributed through learn.uwaterloo.ca.

5. Tutorials

Thursdays 10:30-11:20am or 11:30am-12:20pm, PAS 1237.

6. ChatGPT/GPT4

Students are expected to use ChatGPT/GPT4 extensively during the course. No prior experience is necessary.

7. Expectations

Attending class is mandatory and (hopefully) fun. Class meetings are an introduction to each topic; attendance should represent less than 30% of the student's weekly effort for the class. The course material is cumulative both in terms of what is studied during the semester and what is studied in the prerequisite classes. Success in the course generally requires weekly effort from the student outside of class and a good understanding of the probability theory, statistics, and calculus covered in the prerequisite courses.

8. Software

R is free. Stata is available at a discounted rate for registered students.

9. Textbooks and Scientific Articles

Stock, J. H. and M. W. Watson, *Introduction to Econometrics*, any edition.

We will also use various **freely accessible** scientific journal articles and book chapters, including:

Angrist, J. D. and J.-S. Pischke (2017) Undergraduate Econometrics Instruction: Through Our Glasses, Darkly. *Journal of Economic Perspectives*, 31(2): 125-44. Available at: <https://pubs.aeaweb.org/doi/pdf/10.1257/jep.31.2.125>

Christopher, R. (2018) "Shackling the Identification Police," Manuscript. Available at (from campus only): <https://www.nber.org/papers/w25320>

Deaton, A. (2021) "Randomization in the tropics revisited: a theme and eleven variations," Manuscript. Available at: https://www.nber.org/system/files/working_papers/w27600/w27600.pdf

Pritchett, L. (2021) "Randomizing Development: Method or Madness," Manuscript. Available at: https://lantpritchett.org/wp-content/uploads/2019/12/RCTs-and-the-big-questions_10000words_june30.pdf

10. Assessments

Final grade components and weights:

Assignments	30%
In-Class Participation	20%
Midterm Exams (In-Class, TBA)	20%
Final Exam TBA	30%

In-class participation grade is determined by presence and quality of contributions to class discussions. Students receive a separate participation grade every 4 weeks.

11. Course Description (from the Course Calendar)

This course covers the core topics needed to estimate linear models using ordinary least squares and to interpret estimates for cross-sectional data. Students will learn to interpret the coefficients of linear models for continuous and discrete regressors, to conduct reliable inference for different specifications of the error term, and to determine which model is the most suitable among the class of linear models. Students will be introduced to a statistical software package and will be required to complete regular computer-based assignments throughout the course using economic data.

12. Additional Information

1. Missing a Problem Set Deadline or Quiz Due to Illness During Term
 - If a student misses a problem set deadline or quiz due to illness and has valid documentation (approval required), the weight of the missed problem set or quiz will be shifted to other problem sets. Without valid and timely submitted documentation, the student will receive zero for the missed problem set/quiz.
2. Fee-Arranged Issues

Students are responsible for administrative matters concerning their course registration including fee arrangements. No make-up work or remedies will be given for losses of access to LEARN and academic consequences arising from administrative issues with the Registrar's Office.
3. Classroom Protocols
 - Photographic devices are not permitted in class; this is a University regulation.

13. University Statements

[Economics Department Deferred Final Exam Policy](#)

Cross-listed course

Please note that a cross-listed course will count in all respective averages no matter under which rubric it has been taken. For example, a PHIL/PSCI cross-list will count in a Philosophy major average, even if the course was taken under the Political Science rubric.

Academic Integrity

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the [UWaterloo Academic Integrity](#) webpage and the [Arts Academic Integrity](#) webpage for more information.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to [Policy 71 - Student Discipline](#). For typical penalties check [Guidelines for the Assessment of Penalties](#).

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. [Read Policy 70 - Student Petitions and Grievances](#),

Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Appeals: A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72 - Student Appeals](#).

Accommodation for Students with Disabilities

Note for students with disabilities: [The AccessAbility Services office](#), located on the first floor of the Needles Hall extension (1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

Mental Health Support

All of us need a support system. The faculty and staff in Arts encourage students to seek out mental health supports if they are needed.

On Campus

- Counselling Services: counselling.services@uwaterloo.ca / 519-888-4567 ext 32655
- [MATES](#): one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services
- Health Services Emergency service: located across the creek from Student Life Centre

Off campus, 24/7

- [Good2Talk](#): Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-433 ext. 6880
- [Here 24/7](#): Mental Health and Crisis Service Team. Phone: 1-844-437-3247
- [OK2BME](#): set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online at the Faculty of ARTS [website](#)

Download [UWaterloo and regional mental health resources \(PDF\)](#)

Download the [WatSafe](#) app to your phone to quickly access mental health support information

Territorial Acknowledgement

We acknowledge that we are living and working on the traditional territory of the Attawandaron (also known as Neutral), Anishinaabeg and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes six miles on each side of the Grand River.