ECON42720 Causal Inference and Policy Evaluation

0 Housekeeping

Ben Elsner (UCD)

Causal questions are everywhere

Does a higher income tax rate reduce inequality?

Does a new drug improve health outcomes?

Does a new training program improve employment outcomes?

Does raising interest rates reduce inflation?

Does going to the gym make you healthier?

Answering causal questions

The "hard" sciences answer causal questions by conducting experiments

But experiments are not always possible

- Ethical concerns
- Practical concerns
- Financial constraints
- etc

This module: causal inference without experiments

We will learn how to answer causal questions using observational data

What we need for that:

- knowledge of statistics
- theory of causal inference
- understanding of best practices in the social sciences
- programming skills to implement methods

This module: causal inference without experiments

What we will cover

- Introduction to causal inference
- The most important causal research designs
- Applications of causal inference methods

What we will NOT cover

- Causal machine learning (but: references available on request)
- Causal discovery and other alchemy

Course Page & Brightspace

All materials and the syllabus are available on the **Course Page**

Brightspace will be used for

- Announcements
- Answering questions in the Forum

Topics Covered in this Course

1. Foundations of Causality: DAGs
2. Econometrics Recap
3. Randomised experiments and potential outcomes
4. Matching and inverse probability weighting
5. Instrumental variables
6. Regression Discontinuity
7. Difference-in-differences
8. Synthetic control

Two Main Textbooks

Cunningham, Scott. Causal Inference: The Mixtape. Yale University Press, 2021. Free html version at https://mixtape.scunning.com/

Huntington-Klein, N. (2021). The Effect: An Introduction to Research Design and Causality (1st ed.). Chapman and Hall/CRC. Free html version at https://theeffectbook.net/.

Other Textbooks

The classic: Angrist, J. and J.-S. Pischke (2009). *Mostly Harmless Econometrics*. Princeton University Press.

Simple intro: Angrist, J. and J.-S. Pischke (2014). *Mastering 'Metrics*. Princeton University Press.

For the cool kids: Huber, M. (2023). *Causal Analysis: Impact Evaluation and Causal Machine Learning with Applications in R*. MIT Press. Free e-book version available online at https://mitpress.ublish.com/ebook/causal-analysis-impact-evaluation-and-causal-machine-learning-with-applications-in-r-preview/12759/Cover

Intro to data analysis: Békés, G. and G. Kézdi (2021). *Data Analysis for Business, Economics, and Policy*. Cambridge University Press.

Prerequisites

(Frequentist) Statistics: estimation and inference (undergrad level)

Econometrics: multivariate regressions and panel regressions

Programming: you must be able to write code in R

That's it really! More important: curiosity and willingness to learn new things

Sessions

We meet every Thursday, 9-11am, D201

Sessions will be a mix of

- theory lectures
- "lab" sessions (with laptops)

I will tell you before when to bring laptops

Software

Please install the following software on your computer:

- Programming: R and R Studio
- Word processing: Quarto (optional)
- Version control: Github desktop or alternative

Asking Questions

Questions that have no confidential content can be asked in the **Brightspace Forum**

- This concerns 90% of questions about material or logistics
- I will answer questions in the forum
- You can email me and I will post on the forum without mentioning your name

Questions with confidential content should be asked via **email**

- These are questions that are specific to you
- Examples: accommodation of disability, illness, personal circumstances

Assessment

Final exam: 60% of final grade

Assignments: 40% of final grade

- First assignment given in week 4
- Second assignment around week 9

Details about assignments will be given closer to the time

AI Policy

You can use AI for the assignments

ChatGPT and Github Co-pilot work well for R. Github Co-pilot is free for students.

But use it with caution

If you use AI, add a statement that explains briefly how you used it

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