Econ 4223: Econometric Analysis

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Today's plan

1. What is Econometrics?
2. Why is it useful?
3. How the class will be set up
4. How to use `RStudio`

What is Econometrics?

Econometrics is ...

- a **set of data analysis tools used by economists**/social scientists
- the OG data science
- separate from statistics
  - focuses on data generated from interactions of individuals/firms
  - these economic agents act *strategically*
  - hence, we need economic theory to fully understand

We can use econometrics to ...

- estimate economic relationships
- test economic theories
- evaluate government and business policy

Example: school spending

- Someone asks you: **Does school spending affect student performance?**
- Given a dataset on school spending and test scores, how can you answer the question?
- What's a potential problem with simply computing the correlation between school spending and test scores?

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- What's a potential problem with simply computing the correlation between school spending and test scores?
    - On average, richer schools likely also have more capable students.

Causality

- The concept of **causality** is key in econometrics
- How can we know that more spending *causes* better student performance (on average)?
- How can we know another year of education *causes* an increase in wages (on average)?
- Finding correlations in data might be suggestive but is rarely conclusive.

Ceteris paribus

- Crucial to establishing causality is the notion of **ceteris paribus**: “all (relevant) factors equal”

- If we succeed – via statistical methods – in “holding fixed” other relevant factors, then we can say that *X causes Y*

Why Study Econometrics?

Why study econometrics?

- Important to be able to apply economic theory to **real world data**
- Want to know the effect of some policy change:
  - Did tax cuts actually stimulate the economy?
  - Will restructuring student loan repayment reduce default?
  - Do new sports stadiums attract new businesses?
- Forecasting economic variables (inflation, interest rates, housing starts, and so on) is important, too

This class will provide you with...

- a formal understanding of how causality is different from correlation
- an understanding of what you can and can't conclude from econometric models
- experience manipulating data sets
- experience writing computer code in the R programming language
- experience researching a real-life empirical question of your choosing

Class setup

Structure of the class

- This will be a **flipped** class
- There will be a reading assignment and online quiz due before every class period (due by 12 noon)
- Class time will be spent on:
  - Reviewing the readings / answering questions
  - Practical exercises in R
  - Discussion that connects theory and practice
- You will also complete 6 out-of-class problem sets throughout the semester

Empirical project

- You will turn in a final project where you use econometrics on a data set to answer a question of your choosing

- 4 components:

    1. Turn in a rough draft
    2. Provide thoughtful comments on a classmate's rough draft
    3. Present your econometric findings to the class
    4. Turn in the final draft

- More details to come

Course materials

- Textbook: Wooldridge's *Introductory Econometrics* from Cengage MindTap
- Purchase **Cengage Unlimited** ($120) from OU Bookstore or from `cengage.com`
- Reading quizzes will be administered through the Cengage MindTap platform, also accessible through Canvas
- You can rent a print copy of the textbook for $8 for the semester
- You can purchase a looseleaf version of the textbook for $40

Accessing MindTap

You can access MindTap in three ways:

1. Sign in at `cengage.com/mindtap`
2. Access it from our course's Canvas page
3. MindTap mobile app

MindTap features

- Desktop version (accessible online) features:
  - Read the book in a Kindle-like interface and have it read to you by Siri/Alexa
  - I can annotate the book; you can see my annotations
- Mobile app:
  - Most of the features of the desktop version
  - Tracking of when assignments are due
  - Can’t see my annotations to the book
- **Reading quizzes need to be taken on a computer**

Other textbooks

- We will also be using textbooks related to R:
- *R for Data Science*, by Grolemund and Wickham
  - Available for free as an e-book at `r4ds.had.co.nz`
  - Can purchase a hard copy for $18 on Amazon
- *Using R for Introductory Econometrics*, by Heiss
  - Available for free as an e-book at `http://urfie.net`
  - Can purchase a hard copy for $27 on Amazon

Installing R and RStudio

What is R?

- a really fancy calculator for analyzing data
- versatile—you can use it for every step of a data analysis project:
  - Importing and cleaning data
  - Visualizing data
  - Estimating econometric models
  - Writing research reports
  - Much, much more
- open-source, which means it is completely free to use

How to install R on your personal machine

- Go to `https://cloud.r-project.org/`
- Click on the link for your system (Mac OS or Windows)
  - Mac OS: click on the link on the left-middle of the page (**`R-3.5.1.pkg`**)
  - Windows: click on **`install R for the first time`**, then **`Download R 3.5.1 for Windows`**
- If you don't have a computer, the lab upstairs has R installed
- In-class activities will make use of laptops; you can share with your group if you don't have one

What is RStudio?

- RStudio is a user-friendly interface for R (kind of like an internet browser)
- It should be installed *after* R has been installed
- We will be using RStudio throughout the semester

How to install RStudio on your personal machine

- Go to `rstudio.com`
- Click **Download RStudio**
- Click on the far-left green button (under “RStudio Desktop”)
- Click on the version for your machine (either Windows or Mac OS)

Assign groups