Introduction to Econometrics

October 12

Let’s start with a first round of introductions

- Name
- Year
- Major (intended)
- Why did you choose this cohort?
- What do you hope to learn in this cohort?

The Goal of this Cohort

- Understand what is econometrics and why is it important for understanding economics (and the world)
- Understand the intuition and basic theory behind common econometric models (linear regression, IV, panel)
- Gets hands on experience running simple econometric models
- Learn to interpret results of econometric models in literature
- Replicate a paper that use a basic econometric model (Spring Quarter)

Overview

Link to schedule

Recommended Resources

Causal Inference, The Mixtape, by Scott Cunningham

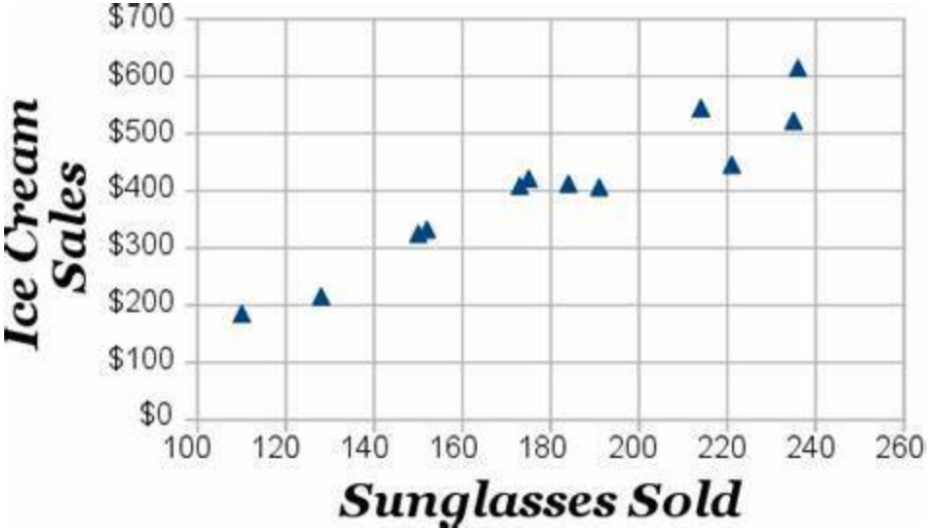
The Effect: An Introduction to Research Design and Causality, by Nick Huntington-Klein

Mastering Metrics, by Joshua Angrist

*Mostly Harmless Econome*trics, by Joshua Angrist

We often say “cause” and “because” loosely. In economics, we use it precisely.

What is a causation?

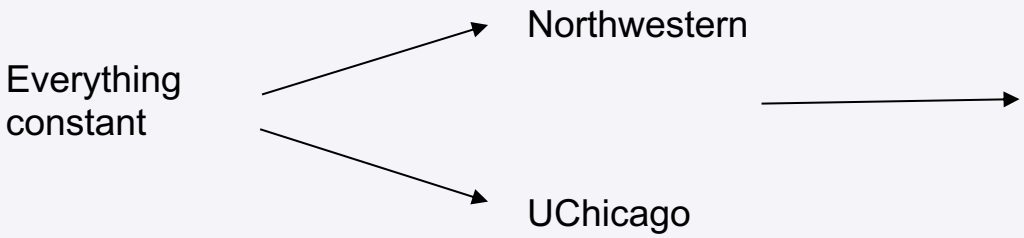


Is this causation ?

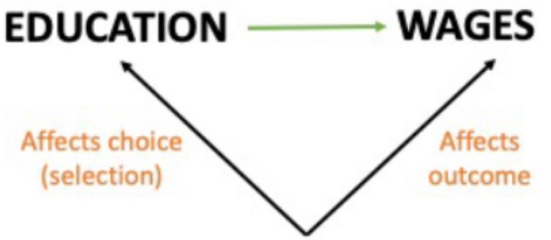
Outcomes

Everything else constant

The Big IF



What is a causation?



COMMON INFLUENCES

- Ability
- Parental Income
- Unobserved Characteristics (e.g. effort or grit)

Definition of Causation

We can say that *X causes Y* if, were we to intervene and change the value of X, then the *distribution of Y* would also change as a result, keeping everything else constant

Example

Countries with higher minimum wages have less poverty (Not causation statement)

If we raise the minimum wage by x units in country A, then poverty level will change by y units.

What is causation ?

Fatima earned higher wages because she finished secondary school implies there are two potential Fatimas, one where she finishes school, one where she does not and the outcome where she does go to school Y is higher than where she does not.

What is this difficult ?

What is this difficult ?

Scientific experiments : effect of adding penicillin on petri dish on bacterial population

RCTs : Randomly assign people to “treatment” and “control” groups

vs.

Observational data : relationship between the demographics of US population and the housing price

Most Economic Models cannot be tested in a lab

- Ethics restrictions: Milgram's Shocking Obedience Experiments
- Scale restrictions
- Physical restrictions (you cannot assign the gender of child at birth)
- Other restrictions

Problems with Observational Data

- They maybe correlated with (possibly unknown) covariates
- There might be reverse causation
- Etc
-
- This does not mean they are not identifiable!

What is identification ?

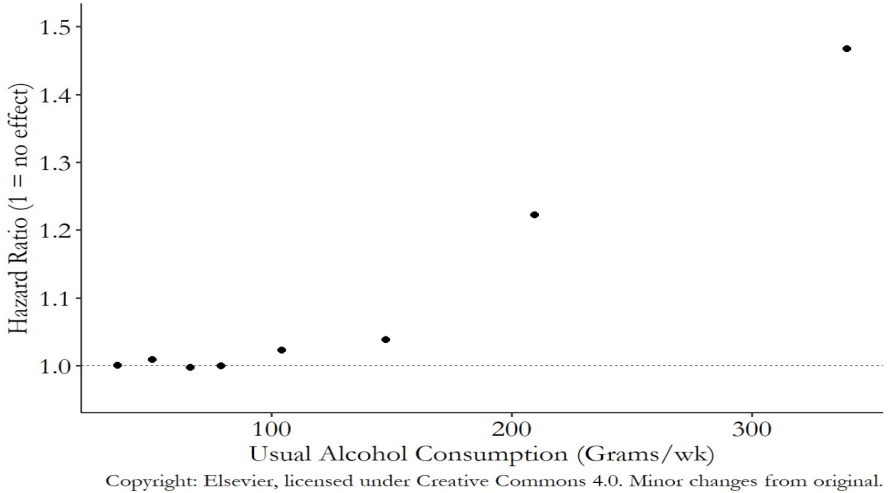
- Identification is the process of finding the true causation effect assuming we know everything about the population (econometrics)
- Note: this is different from estimating information about the population based on samples (statistics)

What is identification ?

- If a research question states that X causes Y, X must be a part of what generates our observations of Y
- Identification is the process of figuring out the variation in our data that answers our research question

What is identification ? (Example)

- The research question: does alcohol consumption increase mortality ?
- Data:



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Process of Empirical Research

1. Research Question
2. Data
3. Describing Variables
4. Describing Relationships between variables
5. Identification
6. Designing research model to answer the causal question
7. Result

Next:

Statistics and Probability Review