ECON 251 Discussion

Causal Inference + Gains to Migration

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Economic models make positive predictions

- Statements true in model (by definition), what about real life?
- We study basic methods to answer causal (what if) questions

  ⇒ EX today: what are the wage gains to migrating?

- **Causal Inference** = process to decide if one thing causes another using <u>data</u> on both things + <u>assumptions</u>

Potential Outcomes + Treatment Effects

- Let $w_i \geq 0$ denote hourly wages of individual i (aka outcome)
- Let $M_i \in \{0,1\}$ denote whether migrant or not
- We can write wages as a function of migrant status: $w_i(1)$ and $w_i(0)$

- Possible research questions
  1. For each person, what is the value of treatment effect $\tau_i := w_i(1) - w_i(0)$?

  2. (More realistic) What is the value of the **Average Treatment Effect** (ATE)

$$ATE := E[\tau_i] = E[w_i(1) - w_i(0)]$$

Estimating the ATE

- Research question: what is the average effect of migrating on wages?

$$E[\tau_i] = E[w_i(1) - w_i(0)]$$

- How can we learn about this value?
  - More specifically, <u>what</u> do we learn about $E[\tau_i]$ by comparing the wages of people who migrated versus those who did not?
  - What <u>assumptions</u> must hold for this comparison to be a good guess?

Observed wages in terms of Potential wages

- If we know migrant status then

$$w_i = M_i w_i(1) + (1 - M_i)w_i(0)$$

so that $w_i = w_i(1)$ if $M_i = 1$ and vice versa

- Nice since it shows us what we're trying to estimate!

$$w_i = M_i w_i(1) + w_i(0) - M_i w_i(0)$$
$$= w_i(0) + M_i[w_i(1) - w_i(0)]$$
$$= w_i(0) + M_i \cdot \boldsymbol{\tau_i}$$

Identification

- What happens when we compare migrant vs. non-migrant wages?

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

Identification

- Let's see what this comparison <u>identifies</u> for us

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

$$= E[w_i(1)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= E[w_i(1)|M_i = 1] - E[w_i(0)|M_i = 0] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 1]$$

$$= E[w_i(1) - w_i(0)|M_i = 1] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= ATT + SB$$

Independence Assumption

- Simple comparison = some real effect + confounding selection bias
- Big lesson: without assumptions, we don't learn anything

- <u>Experimental ideal</u>: those who do/do not migrate are **randomly assigned**

- Mathematically, this design implies

$$M_i \perp w(1), w_i(0) \qquad \forall i$$

Estimating the ATE with independence

- Since potential outcomes don't depend on M_i we can write

$$E[w_i|M_i = 1] - E[w_i|M_i = 0]$$

$$= ATT + SB$$

$$= E[w_i(1) - w_i(0)|M_i = 1] + E[w_i(0)|M_i = 1] - E[w_i(0)|M_i = 0]$$

$$= E[w_i(1) - w_i(0)] + E[w_i(0)] - E[w_i(0)] = ATE$$

Causal inference = study of causal relationships

- How to estimate them using data from the real world?

- Ubiquitous estimation strategy: simple comparisons!!

- Today's lesson: simple comparisons = true causal effects + confounding

- Issue when people chose treatment values by optimizing according to their potential outcomes ⇒ fundamental prob of causal inference

- Experiments solve this problem, but difficult to find in real world

- "Credibility revolution" in econ says look for *natural experiments…*

Clemens (2011) and barriers to migration

↑ world GDP due to open borders $\in (67\%, 147\%)$!!!

Questions regarding these <u>estimates</u>

1. What are the external effects of (skilled) emigrants' departure on the productivity of non-emigrants back home?

2. What is elasticity of labor demand in origin + destination countries?

3. What are the relative contributions of inherent <u>traits vs location</u> in the observed gap in wages between rich and poor country workers?

4. What future levels of emigration are feasible, given current world?

3. Wage Gaps: Who or Where?

- How productive (relative to natives) will migrants be when they arrive? Unlikely to be 100%, especially early on…

- One answer: compare wages of migrants to observationally equivalent non-migrants at origin
  - Huge gap in earnings between them: 1000% in CMP (2008)
  - Could be due to a <u>location effect</u> (aka ATE) or <u>traits/selection bias</u> (SB)!
  - Need a research design which allows us to assume independence…

3. Wage Gaps: Who or Where?

McKenzie, Gibson, and Stillman (2010): Tonga to New Zealand

- Study a naturally randomized visa lottery

- Gains from emigrating are only somewhat lower than the simple wage difference for observably identical workers inside and outside Tonga

- Implies selection bias must be small

Clemens (2010): Indian emigration, also randomized visa lottery

- Similar findings that selection bias must be small

- Takeaway ⇒ it's mostly place, and not "inherent" traits!