POLI 30 D: Political Inquiry

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(Based on DSS Materials)

Lecture 12 | Causal Inference with Observational Data III

Before we start

Announcements:

- Quizzes and Participation: On Canvas.
- GitHub page: https://github.com/umbertomig/POLI30Dpublic
- Piazza forum: Not sure what the link is. Ask your TA!
- Note to self: Turn on the mic!

Before we start

Recap: We learned:

- The definitions of theory, scientific theory, and hypotheses.
- Data, datasets, variables, and how to compute means.
- Causal effect, treatments, outcomes, and randomization.
- Sampling, descriptive statistics, and correlation.
- Prediction of a binary and a non-binary variable.
- ATE using differences-in-means, simple linear regression, and multiple linear regression.

Great job!

- Do you have any questions about these contents?

Plan for Today

- Causal Studies
- Internal Validity vs. External Validity
- Randomized Experiments vs. Observational Studies
- The Role of Randomization

Causal Studies

- So far, we have learned how to estimate the average change in the outcome caused by the treatment:
- **Experimental data:** difference-in-means estimator directly or by fitting a simple linear regression
- **Observational data:** controlling for all confounding variables using a multiple linear regression
- There are more issues we must consider when conducting or evaluating a scientific causal study:
  - **Internal** and **external validity** of the study

Internal Validity

- Refers to the extent to which the causal assumptions are satisfied
- It asks, **is the estimated causal effect valid for the sample of observations in the study?**
- The answer depends on whether treatment and control groups are comparable, that is, on whether we have:

a. Eliminated all confounding variables (randomized experiment) OR

b. Controlled for all potentially confounding variables (observational data).

External Validity

- Refers to the **extent to which the conclusions can be generalized**.
- It asks, **is the estimated causal effect valid beyond this particular study?**
- The answer depends on the following:

a. Whether the sample of observations in the study is representative of the population to which we want to generalize the results AND

b. Whether the treatment used in the study is representative of the treatment for which we want to generalize the results

External Validity

- Randomized experiments tend to have **strong internal validity** but relatively **weak external validity**:
  - Random treatment assignment eliminates confounding variables, BUT
  - Sample may not represent the population, or treatment may be unrealistic.

External Validity

- Observational studies tend to have **stronger external validity** but relatively **weak internal validity**:
  - Sample is usually representative of the population, and treatment is usually realistic, BUT
  - Possibility of confounding cannot be ruled out.

External Validity

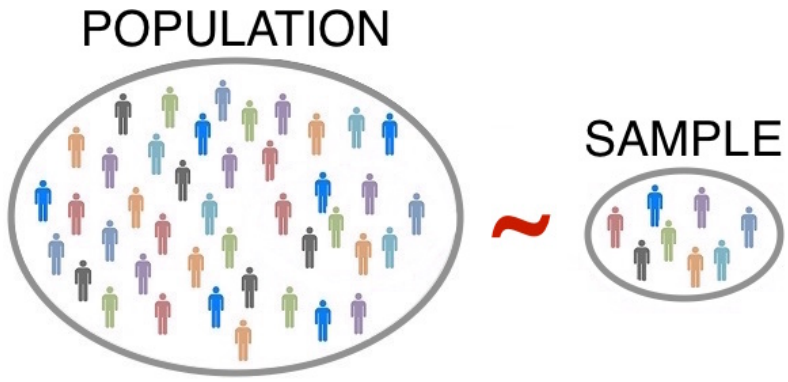
- This dynamic explains why scholars and policymakers use both types of studies to estimate causal effects:
  - Complementary strengths
- Nonetheless:
  - Some studies based on experimental data have strong external validity, and
  - Some studies based on observational data have strong internal validity.
- **We should consider the study details when evaluating them**.

Randomization Gives Us Super Powers

The Role of Randomization

1. When selecting observations from the population into the sample, **random sampling**

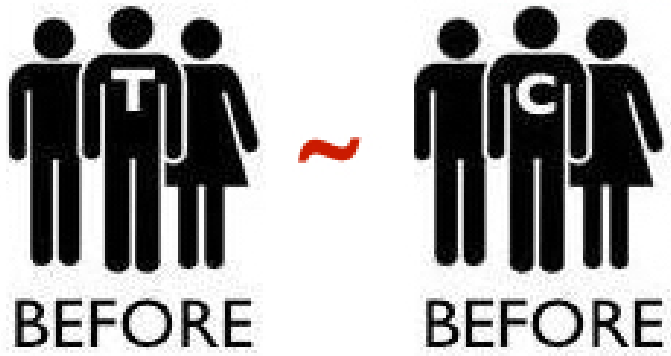
- Ensures sample is **representative** of target population
- Ensures strong **external validity** (assuming the treatment is realistic)



The Role of Randomization

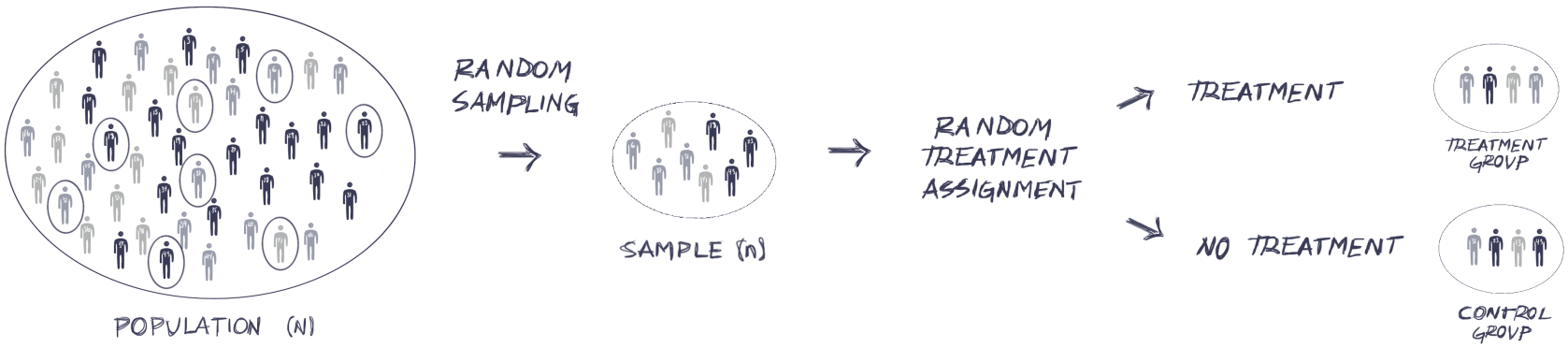
2. When deciding who receives the treatment and who does not, **random treatment assignment**

- Eliminates **confounders**, making treatment and control groups **comparable**
- Ensures strong **internal validity**



The Role of Randomization

The Role of Randomization



- Let us evaluate the causal studies we have seen thus far!

Does Social Pressure Affect Turnout?

(Based on Gerber, Green, and Larimer. 2008. "Social Pressure and Voter Turnout: Evidence from a Large-Scale Field Experiment." *American Political Science Review*, 102 (1): 33-48.)

Does Social Pressure Affect Turnout?

- Experiment conducted in Michigan, where postcards with get-out-to-vote messages were randomly sent to registered voters
- Internal validity: Strong
  - Why?
    - Random treatment assignment should have eliminated all confounding variables.
    - Registered voters who received the postcard should be comparable to registered voters who did not.

Does Social Pressure Affect Turnout?

- External validity: Depends on population and treatment, we want to generalize the results to:
- Could we generalize the results to receiving the same treatment in Michigan?
  - Yes, if the sample of registered voters used is representative of all registered voters in Michigan.
- Could we generalize the results to receiving the same postcard type in Massachusetts?
  - Depends on how different registered voters in Massachusetts are from those in Michigan.

Do Women Promote Different Policies than Men?

(Based on Chattopadhyay and Duflo. 2004. "Women as Policy Makers: Evidence from a Randomized Policy Experiment in India." *Econometrica*, 72 (5): 1409–43.)

Do Women Promote Different Policies than Men?

- Experiment conducted in India, where female politicians were randomly assigned to rural villages
- Internal validity: Strong
  - Why?
    - Random treatment assignment should have eliminated all confounding variables.
    - Villages assigned to have a female politician should be comparable to villages that were not.

Do Women Promote Different Policies than Men?

- External validity: Depending on population and treatment, we want to generalize the results to.
- Could we generalize the results to having a female politician in the whole of India?
  - Not really, probably only in rural areas.
- Could we generalize the results to having a female politician in U.S. towns?
  - Absolutely not. Rural villages in India are not representative of U.S. towns.
- But, it is still relevant to see that women and men promote different policies in this context.

Does the Death of the Leader Increase the Level of Democracy?

(Based on Jones and Olken. 2009. "Hit or Miss? The Effect of Assassinations on Institutions and War." *AEJ: Macroeconomics*, 1 (2): 55-87.)

Does the Death of the Leader Increase the Level of Democracy?

- Observational data from assassination attempts of leaders around the world.
- Internal validity of study without controls: Weak
  - Why?
    - NOT a randomized experiment: Potential confounding variables (e.g., *politybefore*).
    - Countries where the leader died, were more democratic, to begin with, than countries where the leader did not die.
- Internal validity of study with controls: Improved
  - Why? Controlling for *politybefore* should help make countries more comparable.

Does the Death of the Leader Increase the Level of Democracy?

- External validity: Depends on the population and treatment we want to generalize the results to.
- Could we generalize the results to leaders' deaths in all countries? *Probably not.*
- We may be able to generalize to countries with assassination attempts (which tend to be less democratic, to begin with).

Summary

- **Today's Class:**
  - Internal vs. External Validity.

- **Next class**:
  - More Causality with Observational Data:
    - Internal versus External Validity.

Questions?

See you in the next class!