

# LECTURE 9

22 August 2024

## BASICS OF CAUSAL IDENTIFICATION

- Difference between **CAUSES** and **CORRELATION**
- A study of change in women's voting rights in the USA and its implications on child health programs.



- How to ensure the effects on child health programs are actually caused by women getting the right to vote.
- Child health program expenditure may have increased due to an increase in awareness about public expenditure and effectiveness in improving policy outcomes.
- How to differentiate between the causal relationship and correlation.

## POTENTIAL OUTCOME FRAMEWORK / THE EXPERIMENTAL IDEAL

- Suppose we are trying to answer the question ‘*Do hospitals make people healthier?*’
- First instinct would be to compare health status of those who have been to the hospital to the health of those who have not.
- USA’s National Health Interview Survey contains the data, where an individual can self-report their health status with 1= excellent health and a 5 = poor health

Group	Sample Size	Mean health status	Std. Error
Hospital	7774	2.79	0.014
No Hospital	90049	2.07	0.003

*Source: Mostly Harmless Econometric, Angrist & Pischke, 2008*

- The table above suggests that going to the hospital makes people sicker.

- Let hospital treatment for an individual  $i$  be described by a binary variable  $D_i = \{0,1\}$  i.e, 1 if hospitalized and 0 if not
- We are interested in the health outcome/status of individual which is represented as  $Y_i$
- We need to identify if  $Y_i$  is affected by hospitalization
- To answer this question accurately, we need to compare what '**might have happened**' to an individual who went to hospital if they had not gone and what '**might have happened**' to an individual who did not go to hospital if they had gone.
- So, for any individual there are two **POTENTIAL** health outcomes:

$$\text{potential outcome} = \begin{cases} Y_{1i} & \text{if } D_i = 1 \\ Y_{0i} & \text{if } D_i = 0 \end{cases} .$$

- $Y_{0i}$  is the health status if an individual had not gone to the hospital, irrespective of whether he actually went.
- $Y_{1i}$  is the individual's health status if he goes to the hospital.
- The difference between these two terms for an individual gives the effect of hospitalization on the health status of that particular individual.
- The health status of individual  $i$  is  $Y_i$  which can be written as

$$\begin{aligned}
 Y_i &= \begin{cases} Y_{1i} & \text{if } D_i = 1 \\ Y_{0i} & \text{if } D_i = 0 \end{cases} \\
 &= Y_{0i} + (Y_{1i} - Y_{0i})D_i.
 \end{aligned}$$

- The term in the bracket is the health effect of hospitalization we are interested in.