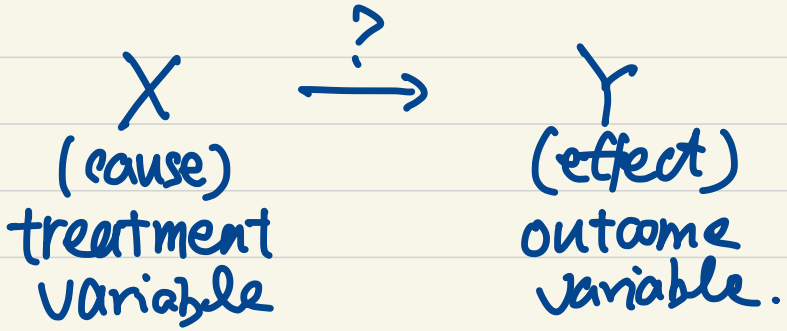
Econometrics 2022.6.10

Causal Inference

- Causal questions.

  Does X cause Y?
  How large is the effect of X on Y?



Examples:

	treatment	effect
	minimum wage	employment
	education	income

Treatment: an action with binary values.

$$A = \begin{cases} 1 & \text{the action is taken (treated)} \\ 0 & \text{" not taken (untreated/control)} \end{cases}$$

Outcome $Y = \begin{cases} Y^1 & \text{if treated} \\ Y^0 & \text{if not treated.} \end{cases}$

Causal effect $= Y^1 - Y^0$ ← potential outcomes.

$=$ (the outcome if treated)

$-$ (the outcome if not treated).

Individual causal effect:

$Y_i^1 - Y_i^0$ we can only observe one of Y_i^1 and Y_i^0.

Average causal effect: (ATE)

$$ATE = E[Y_i^1 - Y_i^0] = E[Y_i^1] - E[Y_i^0].$$