Day 15

Tuesday, January 9, 2024 8:02 AM

$y_i = b_0 + b_1 x_i + u_i$: oLS regression

oLS estimator

b_1: the effect of a unit Δ in X on y

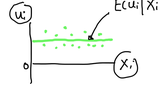


Z_i: $\begin{cases} Corr(Z_i, X_i) \neq 0 \\ Corr(Z_i, y_i) \neq 0 \\ \text{-OR-} \ Z_i \text{ is in } u_i \end{cases}$

$y_i = b_0 + b_1 X_i + u_i$

$E(y_i|X_i) = b_0 + b_1 X_i + E(u_i|X_i)$

$E(u_i|X_i) = \text{Constant}$ ✓



if X_i < 0 : M, 1 : F : b_0 : $E(y_i|X_i=0)$

b_1 : $E(y_i|X_i=1) - E(y_i|X_i=0)$

LSA for Causal inference:

Assuming b_1 is the causal effect:

- LSA #1: $Corr(X_i, u_i)=0$ -OR- $E(u_i|X_i)=0$ (class size, I.C) ≠ 0
- LSA #2: $\{x_i, y_i\}$ and $\{x_j, y_j\}$ are i.i.d. — identically distributed, independently
- LSA #3: No outliers

b_1 is an unbiased estimator of β_1

$E(b_1) = \beta_1$

Randomized controlled trial

Simple random sample

