Staying in the simple case,

$$\hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$$

$$\hat{\beta}_1 = \frac{\sum_{i=1}^{n} (X_i - \bar{X})(Y_i - \bar{Y})}{\sum_{i=1}^{n} (X_i - \bar{X})^2}$$

under what conditions do we "like" these estimators?

THE FOUR ASSUMPTIONS

First, what are assumptions? They are beliefs we posit about the true world/ the true/POPULATION model.

1) $E[u_i | X_{i1} = x_1, X_{i2} = x_2, \ldots] = 0$

$\Rightarrow$ $Corr(u_i, X_{i1}) = 0$

$\not\Leftarrow$ $Corr(u_i, X_{i2}) = 0$

2) $(Y_i, X_{1,i}, \ldots, X_{k,i})$ are i.i.d

3) Outliers are not common

$E[X_{j,i}^4] < \infty$, $E[Y_i^4] < \infty$ ...

4) No Perfect multicolinearity

UNDER 1) → OVB, Wrong Functional Form? Errors-in-Vars, Sample-Selection bias, Simultaneous Causality.