The Simple Regression Model: Functional Form, Expected Values, and Variances

1. Functional Form
2. Expected Values of the OLS Estimators
3. Variances of the OLS Estimators
4. Final Thoughts

Functional Form

- Logarithm

# Expected Values of the OLS Estimators
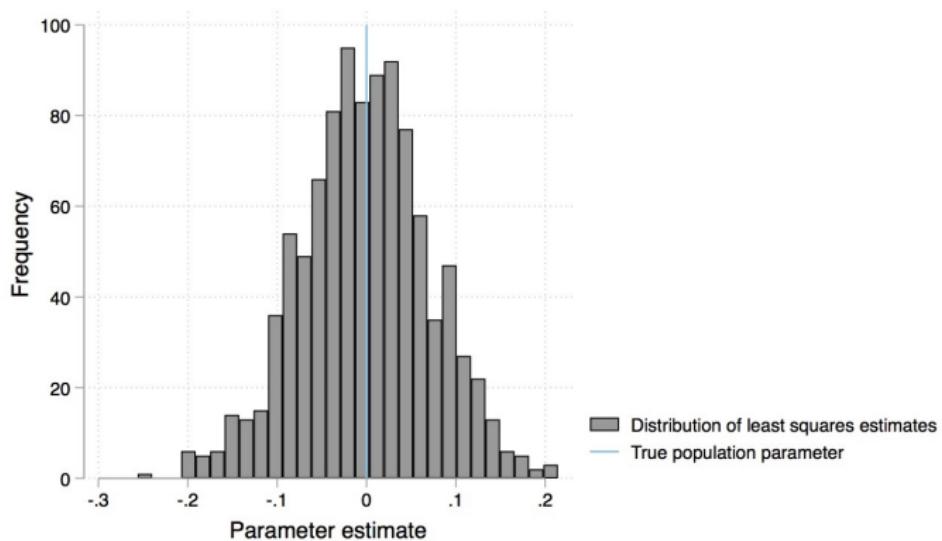
Causal Inference: The Mixtape

Variance of the OLS Estimators

Causal Inference: The Mixtape

Variance of the OLS Estimators (cont.)

$f(y|x)$

The variability of the unobserved influences does not depend on the value of the explanatory variable

x_1

x_2

x_3

$E(y|x) = \beta_0 + \beta_1 x$

x

y
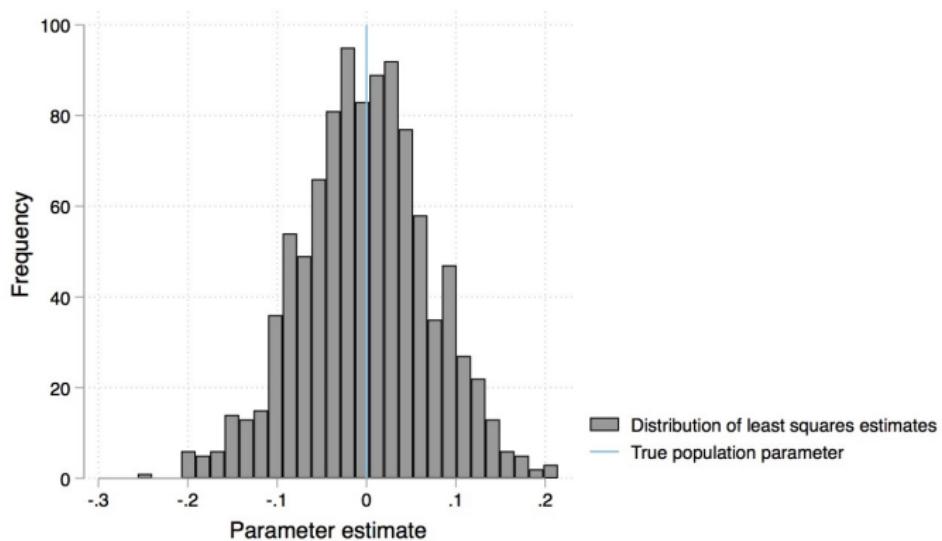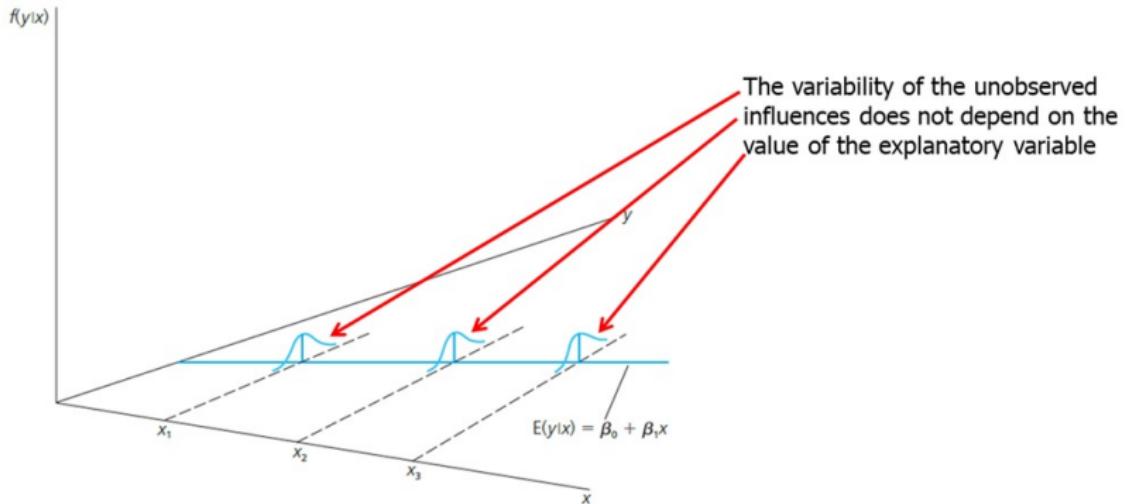
Variance of the OLS Estimators (cont.)
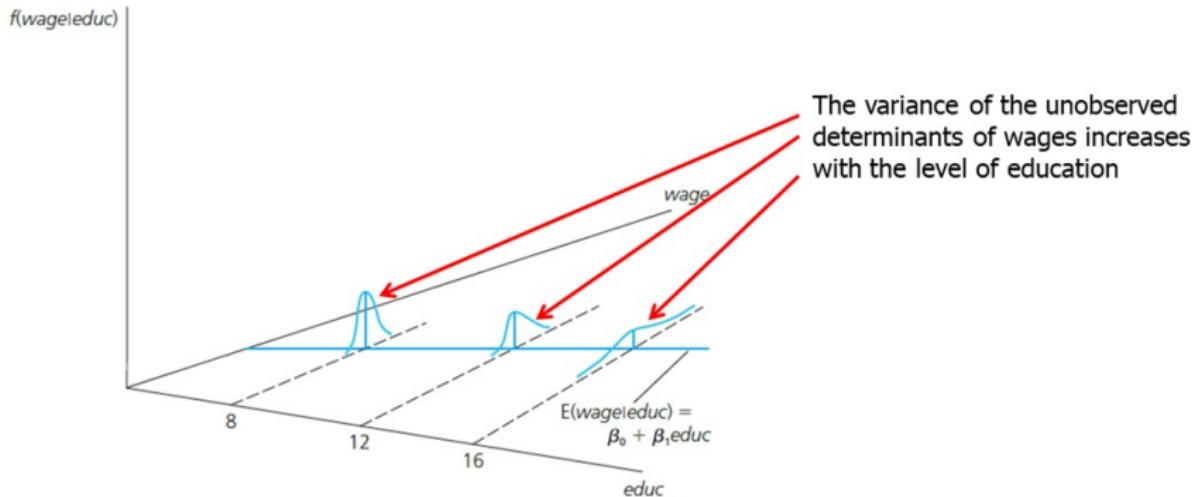
Variance of the OLS Estimators (cont.)

y (wage)	x (educ)	$\hat{y}$	$\hat{u}$	$\hat{u}^2$	$(x - \overline{x})^2$
3.1	11	4.498	-1.398	1.955	3.61
3.2	12	5.679	-2.439	5.950	0.81
3	11	4.498	-1.498	2.245	3.61
6	8	0.955	5.045	25.447	24.01
5.3	12	5.679	-0.379	0.144	0.81
8.8	16	10.403	-1.653	2.732	9.61
11	18	12.765	-1.515	2.294	26.01
5	12	5.679	-0.679	0.461	0.81
3.6	12	5.679	-2.079	4.323	0.81
18	17	11.584	6.596	43.510	16.81

$SST_x = 86.9$ $SSR = 89.061$

$\hat{\sigma} = 3.34$ $se(\hat{\beta}_1) = 0.358$

Final Thoughts

- Randomized trials
  - https://www.youtube.com/watch?v=eGRd8jBdNYg&list=PL-uRhZ_p-BM5ovNRg-G6hDib27OCvcyW8&index=4