

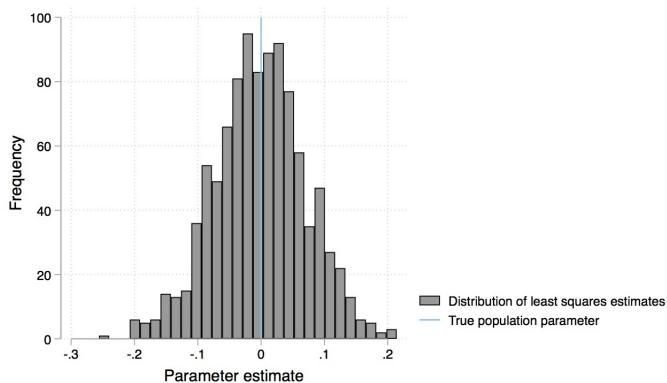
# The Simple Regression Model: Functional Form, Expected Values, and Variances

- 1 Functional Form
- 2 Expected Values of the OLS Estimators
- 3 Variances of the OLS Estimators
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# Functional Form

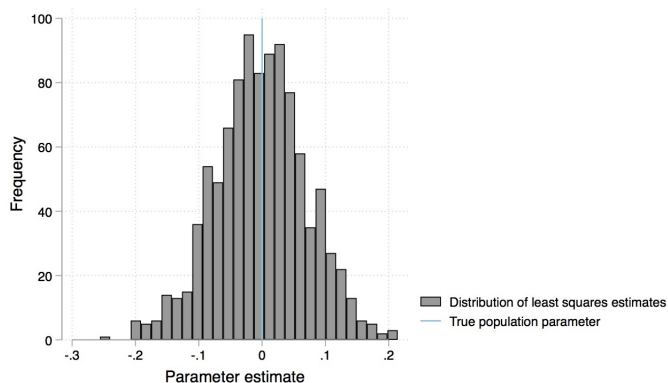
- Logarithm

# Expected Values of the OLS Estimators



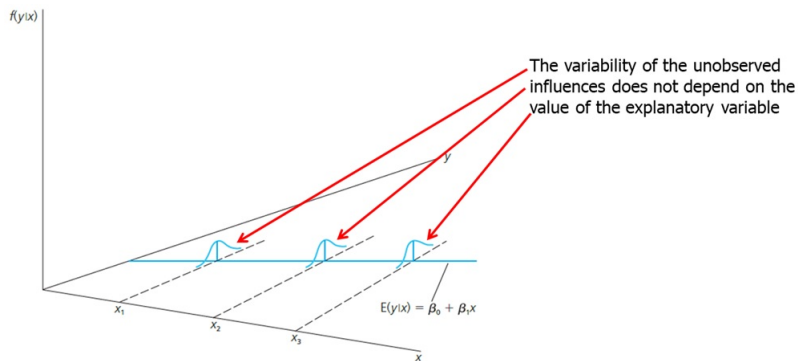
*Causal Inference: The Mixtape*

# Variance of the OLS Estimators

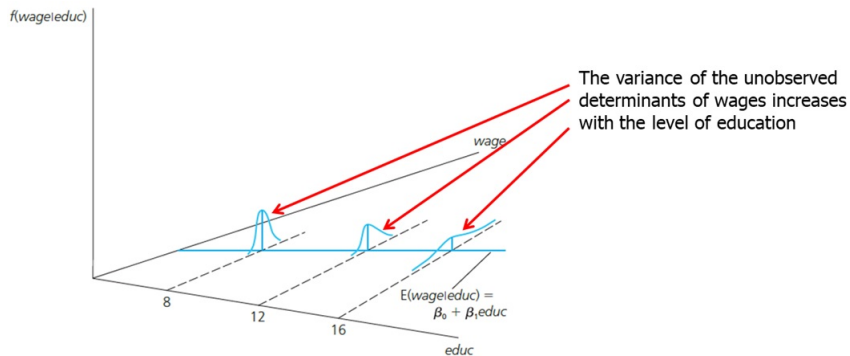


*Causal Inference: The Mixtape*

## Variance of the OLS Estimators (cont.)



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## Variance of the OLS Estimators (cont.)

$y$ (wage)	$x$ (educ)	$\hat{y}$	$\hat{u}$	$\hat{u}^2$	$(x - \bar{x})^2$
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

$$SST_x = 86.9 \quad SSR = 89.061$$

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

# Final Thoughts

- Randomized trials

- ▶ [https://www.youtube.com/watch?v=eGRd8jBdNYg&list=PL-uRhZ\\_p-BM5ovNRg-G6hDib270CvcyW8&index=4](https://www.youtube.com/watch?v=eGRd8jBdNYg&list=PL-uRhZ_p-BM5ovNRg-G6hDib270CvcyW8&index=4)