

Review of Statistics: Statistical Bias

Dr. Patrick Toche

Textbook:

James H. Stock and Mark W. Watson, *Introduction to Econometrics*, 4th Edition, Pearson.

Other references:

Joshua D. Angrist and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, 1st Edition, Princeton University Press.

Jeffrey M. Wooldridge, *Introductory Econometrics: A Modern Approach*, 7th Edition, Cengage Learning.

The textbook comes with online resources and study guides. Other references will be given from time to time.

Bias in a Telephone Survey

In a given population, 11% of the likely voters are African American. A survey using a simple random sample of 600 landline telephone numbers finds 8% African Americans. Is there evidence that the survey is biased? Explain.

The null hypothesis for a two-sided test is

$$H_0: p = 0.11$$

$$H_1: p \neq 0.11$$

with sample size $n = 600$. The t -statistic is

$$\begin{aligned}\hat{t} &= \frac{\hat{p} - p_0}{\text{SE}(\hat{p})} = \frac{\hat{p} - p_0}{\sqrt{\hat{p}(1 - \hat{p})/n}} \\ &= \frac{0.08 - 0.11}{0.08(1 - 0.08)/600} \approx \frac{-0.03}{0.011} \approx -2.709\end{aligned}$$

On the basis of this sample, the two-sided null hypothesis can be rejected at the 0.01 significance level.