Practise Exercise

Consider the simple linear regression model, with a single regressor and an intercept:

$$y_i = \beta_1 + \beta_2 x_i + \varepsilon_i \quad ; \quad i = 1,2, \dots, n.$$

Suppose that *n* is an even number. Let $\bar{x}_1$, $\bar{x}_2$, $\bar{y}_1$ and $\bar{y}_2$ be the averages of the regressor and the dependent variable over the first (*n* / 2) and the last (*n* / 2) sample observations. Now, consider the following estimator of β_2:

$$\hat{\beta}_2 = \frac{(\bar{y}_2 - \bar{y}_1)}{(\bar{x}_2 - \bar{x}_1)}.$$

(a) Is this a linear estimator?

(b) Obtain $E(\hat{\beta}_2)$.

(c) Obtain $\text{var}(\hat{\beta}_2)$, and discuss the efficiency of this estimator, relative to the OLS estimator.