$y = \beta_1^{o} x + \varepsilon$ $\quad$ $y = \beta_0 + \beta_1 x + \varepsilon$ $\quad$ $\varepsilon \sim N(0, \sigma^2)$

SUBMODEL $\quad$ FULL MODEL

$SSD_0 = \sum(\hat{\beta}_1^{o} x_i - (x_i + \alpha))^2$ $\quad$ $SSD = \sum(\hat{\beta}_1 x_i + \hat{\beta}_0 - (x_i + \alpha))^2$

$x_1, \dots, x_n$ $\quad$ $SSD_0 \approx SSD$

$$\boxed{y_i = x_i + \alpha + \varepsilon_i}$$

* * *

$\cancel{\mathrm{cov}(\hat{\beta}_1, \hat{\beta}_1^{o})}$ in general

$\mathrm{cov}(\hat{\beta}_1 - \hat{\beta}_1^{o}, \hat{\beta}_1) = 0$ or $\mathrm{cov}(\hat{\beta}_1 - \hat{\beta}_1^{o}, \hat{\beta}_1^{o}) = 0$

$\hat{\beta}_1^{o}$ is unbiased for β_1^{o}.

$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t$ $\quad$ (x_t) (y_t) time series

$\Delta y_t = \beta_1 \Delta x_t + \Delta \varepsilon_t$ $\quad$ $\mathrm{cov}(\Delta\varepsilon_t, \Delta\varepsilon_{t-1}) \neq 0$

variable y in change form
