

11.1 Temporal Dependence

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Spurious correlation & persistence

$$\widehat{\text{var}}(\hat{\beta}) = (X^T X)^{-1} X^T \hat{\Sigma} X (X^T X)^{-1}$$

$$\hat{\sigma}_i^2 \text{ est } E(\hat{\sigma}_i^2) = \sigma_i^2$$

$$\Sigma = \begin{bmatrix} E(\epsilon_1 \epsilon_1) & E(\epsilon_1 \epsilon_2) & E(\epsilon_1 \epsilon_n) \\ \vdots & & \\ \vdots & & \end{bmatrix}$$

Random walk

$$y_t = y_{t-1} + \epsilon_t$$

↳ white noise

"highly persistent time series"

$$\hookrightarrow y_t = (y_{t-2} + \epsilon_{t-1}) + \epsilon_t \rightarrow y_t = (y_{t-3} + \epsilon_{t-2}) + \epsilon_{t-1} + \epsilon_t \rightarrow \dots$$