2.3 Understanding Coefficient Variance

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

$$\begin{bmatrix} \widehat{Var}(\hat{\beta}_1) & & \\ & \widehat{Var}(\hat{\beta}_2) & \\ & & \widehat{Var}(\hat{\beta}_n) \end{bmatrix}$$

$\widehat{Var}(\hat{\beta}_j) = s^2 / [(1-\hat{R}_j)SST_j]$ → assumes homoscedasticity

↳ $s^2 = [\sum_i r_i^2] / [N-k-1]$

↳ $\hat{R}_j$ = regress x_j on all other x_i $(i \neq j)$ to get r^2

↳ $SST_j = \sum_i (x_j - \bar{x}_j)^2$ → total variability in x_j

$1/(1-\hat{R}_j^2)$ → variance inflation factor