Heteroscedasticity

Part II

WLS. $y_i = \alpha + \beta \cdot x_i + \varepsilon_i \quad | : \sqrt{h(x_i)} = x_i$

$\varepsilon_i \sim N(0, \sigma_\varepsilon^2 \cdot x_i^2)$

$\sigma_\varepsilon^2 \cdot h(x_i)$

$\hat{\beta} = (X'X)^{-1} X'y$

$Var(\hat{\beta}) = \sigma^2 (X'X)^{-1}$

$\hat{Var}(\hat{\beta}) = \hat{\sigma}^2 (x'x)^{-1}$ ↑ biased and inconsistent

Robust or HC s.e. (White)

$\rightarrow \hat{se}(\hat{\beta}) = \frac{\hat{\sigma}_\varepsilon}{\sqrt{(x - \bar{x})^2}} = \frac{\frac{1}{n-2} \sum \hat{\varepsilon}_i^2}{\sqrt{(x-\bar{x})^2}}$

$\rightarrow \hat{se}_{HC}(\hat{\beta}) = \sqrt{\frac{\frac{1}{n} \cdot \frac{\frac{1}{n-2} \cdot \sum (x_i - \bar{x})^2 \cdot \hat{\varepsilon}_i^2}{\hat{Var}(x)^2}}{}}$

Problem 1.

$F = \frac{RSS_2 / 30 - 2}{RSS_1 / 20 - 2} = 7,84 \qquad F^{crit}_{1\%}(28, 18) = 2,98$

H_0: homosced. error is rejected