

Ch. 4 (cont.)

Test statistic based on comparing model fit across the 2 models.

restricted * unrestricted

Follows F - distribution

$$F_{\text{test}} = \frac{(SSR_r - SSR_{ur})/q}{SSR_{ur}/(n-k-1)}$$

$SSR_{\text{res.}} \geq SSR_{\text{unres.}}$

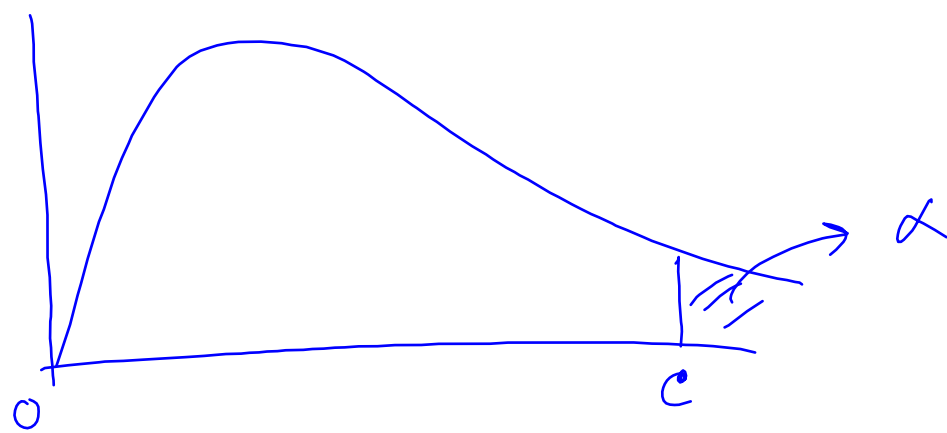
q : numerator df (# β 's tested)

$n-k-1$: denominator df

$$F_{\text{test}} \sim F_{q, n-k-1}$$

Reject H_0

if $F_{\text{test}} > c$



critical values: Tables G.3a, G.3b, & G.3c

For H_0 involving single β

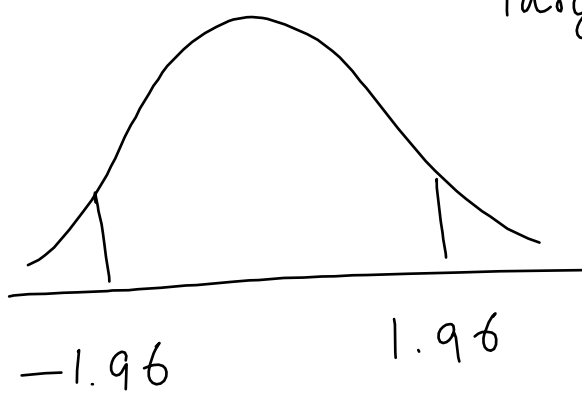
$$H_0: \beta_j = 0$$

$$H_1: \beta_j \neq 0$$

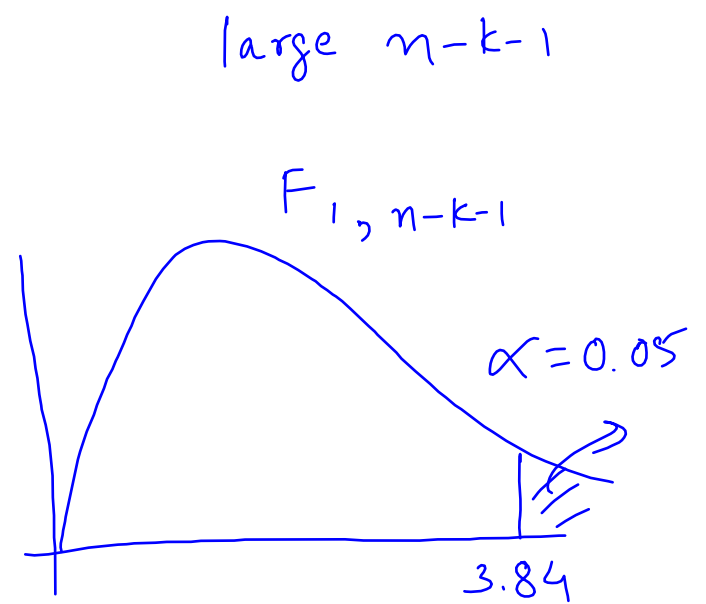
$$t_{n-k-1}^2 = F_{1, n-k-1}$$

$$H_0 : \beta_j = 0$$

$$H_1 : \beta_j \neq 0$$



large $n-k-1$
 $\alpha = 0.05$



$$F_{\text{test}} = \frac{(R_{ur}^2 - R_r^2) / q}{(1 - R_{ur}^2) / (n - k - 1)}$$

NBASAL

$$\text{wage} = \beta_0 + \beta_1 \text{points} + \beta_2 \text{rebounds} + \beta_3 \text{assists} + u$$

$$H_0 : \beta_1 = 0, \beta_2 = 0$$

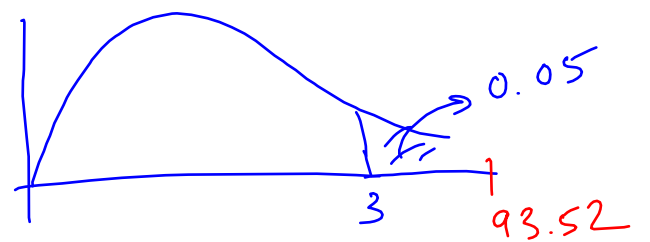
$$H_1 : \text{not } H_0$$

$$F_{\text{test}} = 93.52$$

$$F_{2, 265} = 3$$

Reject H_0 .

$\alpha = 0.05$



$$R_{ur}^2 = 0.475$$

$$R_r^2 = 0.105$$

SSR_{ur} ↓
 140512078

239682605 → SSR_r

$$F_{\text{test}} = \frac{(0.475 - 0.105) / 2}{(1 - 0.475) / 265} = 93.52$$

Special case : overall significance of a regression

k indep. vars.

$$H_0 : \beta_1 = 0, \beta_2 = 0, \dots, \beta_k = 0$$

$$H_1 : \text{at least one of } \beta_1, \dots, \beta_k \neq 0$$

$$R^2_{res.} = 0 \quad R^2_{ur} = \text{usual } R^2$$
$$q = k$$

$$F_{test} = \frac{R^2 / k}{(1 - R^2) / (n - k - 1)}$$

$$\text{NBASAL : } H_0 : \beta_1 = 0, \beta_2 = 0, \beta_3 = 0$$

$$H_1 : \text{not } H_0$$

$$F_{test} = 80.07$$

$$\text{Use } R^2 = 0.475$$

$$F_{test} = \frac{0.475 / 3}{(1 - 0.475) / 265}$$

c for $F_{3,265}$ at $\alpha = 0.01$

Reject H_0 .

