

סעיף 7

$$H_0: (1 \ 0 \ 0) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = 0$$

1 (1)

$$t = \frac{4 - 0}{\sqrt{0.75 (1 \ 0 \ 0) \begin{pmatrix} 26.7 & 4.5 & -8 \\ 4.5 & 1 & -1.5 \\ -8 & -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}}} = 0.829$$

$$t_{5-3, 0.975} = 4.303 \quad H_0 \text{ נדחת}$$

$$H_0: (0 \ 1 \ -1) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = 0$$

2

$$t = \frac{(0 \ 1 \ -1) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} - 0}{\sqrt{0.75 (0 \ 1 \ -1) \begin{pmatrix} 26.7 & 4.5 & -8 \\ 4.5 & 1 & -1.5 \\ -8 & -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix}}} = 1.81$$

$SE(y) = b_2 x_2 + b_3 x_3 + e$  "השגיאה" מיוחסת למודל

$$H_0: (1 \ -1) \begin{pmatrix} \beta_2 \\ \beta_3 \end{pmatrix} = 0$$

$$t = \frac{(1 \ -1) \begin{pmatrix} 2.5 \\ -1.5 \end{pmatrix} - 0}{\sqrt{0.75 (1 \ -1) \begin{pmatrix} 1 & -1.5 \\ -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix}}} = 1.81$$

$H_0$  נדחת

$$H_0: (1 \ 1) \begin{pmatrix} \beta_2 \\ \beta_3 \end{pmatrix} = 1$$

3

$$t = \frac{(1 \ 1) \begin{pmatrix} 2.5 \\ -1.5 \end{pmatrix} - 1}{\sqrt{0.75 (1 \ 1) \begin{pmatrix} 1 & -1.5 \\ -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix}}} = 0$$

$H_0$  נדחת

$$H_0: (2 \ 5) \begin{pmatrix} \beta_1 \\ \beta_2 \end{pmatrix} = 10 \quad .4$$

$$t = \frac{(2 \ 5) \begin{pmatrix} 2.5 \\ -1.5 \end{pmatrix} - 10}{\sqrt{0.75 (2 \ 5) \begin{pmatrix} 1 & -1.5 \\ -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 2 \\ 5 \end{pmatrix}}} = -2.389$$

. H<sub>0</sub> पास कट

$$(1 \ 0 \ 0) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} \pm 4.303 \sqrt{0.75 (1 \ 0 \ 0) \begin{pmatrix} 267 & 4.5 & -8 \\ 4.5 & 1 & -1.5 \\ -8 & -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}} \quad .1 \quad (2)$$

$$(-15.26, 23.26)$$

$$(1 \ -1) \begin{pmatrix} 2.5 \\ -1.5 \end{pmatrix} \pm 4.303 \sqrt{0.75 (1 \ -1) \begin{pmatrix} 1 & -1.5 \\ -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ -1 \end{pmatrix}} \quad .2$$

$$(-5.5, 13.5)$$

$$(2 \ 5) \begin{pmatrix} 2.5 \\ -1.5 \end{pmatrix} \pm 4.303 \sqrt{0.75 (2 \ 5) \begin{pmatrix} 1 & -1.5 \\ -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 2 \\ 5 \end{pmatrix}} \quad .3$$

$$(-25.01, 20.01)$$

$$(1 \ 10 \ 9) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} \pm 4.303 \sqrt{0.75 (1 \ 10 \ 9) \begin{pmatrix} 267 & 4.5 & -8 \\ 4.5 & 1 & -1.5 \\ -8 & -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ 10 \\ 9 \end{pmatrix}} \quad (3)$$

$$(7, 24)$$

$$(1 \ 3 \ 5) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} \pm 4.303 \sqrt{0.75 [(1 \ 3 \ 5) \begin{pmatrix} 267 & \dots \\ \dots & \dots \\ \dots & \dots \end{pmatrix} \begin{pmatrix} 1 \\ 3 \\ 5 \end{pmatrix}]} \quad (4)$$

$$(-0.08, 8.08)$$

$$H_0: (1 \ 0 \ 0) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = 0$$

1 (5)

$$\frac{\left[ (1 \ 0 \ 0) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} - 0 \right]^2 \left[ (1 \ 0 \ 0) \begin{pmatrix} 26.7 & 4.5 & -8 \\ 4.5 & 1 & -1.5 \\ -8 & -1.5 & 2.5 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \right]^{-1} \left[ (1 \ 0 \ 0) \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} - 0 \right]^2 / 1}{1.5 / (5-3)}$$

$$= 0.799$$

$$F_{1,2,0.95} = 18.51 \quad H_0 \text{ is not rejected}$$

$$H_0: \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

2

$$F = \frac{\left[ \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \end{pmatrix} \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} - \begin{pmatrix} 0 \\ 0 \end{pmatrix} \right]^2 \left[ \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \end{pmatrix} \begin{pmatrix} 26.7 & & \\ & 1 & \\ & & -1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \\ 0 & -1 \end{pmatrix} \right]^{-1} \left[ \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & -1 \end{pmatrix} \begin{pmatrix} 4 \\ 2.5 \\ -1.5 \end{pmatrix} - \begin{pmatrix} 0 \\ 0 \end{pmatrix} \right]^2 / 2}{1.5 / (5-3)} = 5.06$$

$$F_{2,2,0.95} = 19 \quad H_0 \text{ is not rejected}$$

$$H_0: \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

3

$$F = 17.66 < F_{2,2,0.95} = 19$$

$$F = \frac{0.946429 / 2}{(1 - 0.946429) / (5-3)} = 17.66$$

(5 df numerator, 2 df denominator) (6)

reject H<sub>0</sub> at 5% level

$$X'X = \begin{pmatrix} \sum x_1^2 & \sum x_1 x_2 & \sum x_1 x_3 \\ \sum x_2 x_1 & \sum x_2^2 & \sum x_2 x_3 \\ \sum x_3 x_1 & \sum x_3 x_2 & \sum x_3^2 \end{pmatrix} = \begin{pmatrix} 10 & 10 & 5 \\ 10 & 30 & 15 \\ 5 & 15 & 20 \end{pmatrix}$$

$$(X'X)^{-1} = \begin{pmatrix} 0.15 & -0.05 & 0 \\ -0.05 & 0.07 & -0.04 \\ 0 & -0.04 & 0.08 \end{pmatrix}$$

$$X'y = \begin{pmatrix} \sum x_1 y \\ \sum x_2 y \\ \sum x_3 y \end{pmatrix} = \begin{pmatrix} 7 \\ -7 \\ -26 \end{pmatrix}$$

$$(X'X)^{-1} X'y = \begin{pmatrix} 1.4 \\ 0.2 \\ -1.8 \end{pmatrix}$$

$$e'e = y'y - b'X'y$$

$$= 60 - (1.4 \quad 0.2 \quad -1.8) \begin{pmatrix} 7 \\ -7 \\ -26 \end{pmatrix} = 4.8$$

$$S^2 = \frac{e'e}{n-k} = \frac{4.8}{24-4} = 0.24$$

$$R^2 = 1 - \frac{e'e}{y'y} = 0.92$$

$$1. H_0: \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix} \quad m=3$$

$\downarrow$  R  $\downarrow$  r

$$F = 15.55 > F_{3,20,0.95} = 3.10$$

. Ho p.N3

$$2. H_0: (1 \ 1 \ 1) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = (0)$$

$$F = 1.388 < F_{1,20,0.95} = 4.35$$

. Ho p.N3 kS

$$3. H_0: (1 \ 1 \ 1) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = (1)$$

$$F = 50 > F_{1,20,0.95} = 4.35$$

Ho p.N3

$$4. H_0: (1 \ 0 \ 0) \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = (0)$$

$$F = 54.4 > F_{1,20,0.95} = 4.35$$

Ho p.N3

$$5. H_0: \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$F = 89.16 > F_{2,20,0.95} = 3.49$$

Ho p.N3

$$6. H_0: \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \quad F = \frac{R^2/(k-1)}{(1-R^2)/(n-k)} = 76.66 > F_{3,20,0.95} = 3.10$$

. Ho p.N3