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$$\begin{array}{lll}
 \Sigma q = 0 & \Sigma p = 0 & \Sigma z = 0 \\
 \Sigma q^2 = 556,962 & \Sigma p^2 = 70 & \Sigma z^2 = 598,500 \\
 \Sigma qp = -5753 & & \Sigma pz = -690 \\
 \Sigma qz = 252,690 & &
 \end{array}$$

$$b_{01.2} = \frac{\Sigma qp \Sigma z^2 - \Sigma qz \Sigma pz}{\Sigma p^2 \Sigma z^2 - (\Sigma pz)^2} = -78.92$$

$$b_{01.2} = \frac{\Sigma qz \Sigma p^2 - \Sigma qp \Sigma pz}{\Sigma p^2 \Sigma z^2 - (\Sigma pz)^2} = 0.3312$$

$$a = \frac{14,000}{20} - (-78.92) \frac{100}{20} - 0.3312 \frac{8,000}{20} = 962.12$$

$$\hat{Q} = 962.12 - 78.92P + 0.3312Z \quad :$$

$$R^2 = \frac{\Sigma \hat{y}_i^2}{\Sigma y_i^2} = \frac{b_{01.2} \Sigma qp + b_{02.1} \Sigma qz}{\Sigma y_i^2} = 0.965465 \quad :$$

$$S^2 = \frac{\Sigma e_i^2}{n-k-1} = \frac{(1-R^2) \Sigma y_i^2}{n-k-1} = \frac{19,234}{20-2-1} = 1,131$$

$$S_{b_{01.2}} = \sqrt{\frac{S^2}{(1-r_{12}^2) \Sigma p_i^2}} = 4.04263$$

$$S_{b_{02.1}} = \sqrt{\frac{S^2}{(1-r_{12}^2) \Sigma z_i^2}} = 0.04372$$

$$S_{b_{01.2}, b_{02.1}} = \frac{-S^2 r_{12}^2}{(1-r_{12}^2) \Sigma p_i z_i} = 0.018841$$

$$H_0 : S_{01.2} \geq 0$$

$$H_1 : S_{02.1} < 0$$

$$- H_0 \quad t - stat = \frac{-78.92 - 0}{4.04263} = -19.5$$

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$$y_{QP} = \frac{\partial Q}{\partial P} / \frac{Q}{P} = -78.92 / \frac{700}{5} = -0.56$$

$$0.3312 \pm 2.11 \cdot 0.04372$$

$$H_0 : S_{01.2} + 100S_{02.1} = 0$$

$$H_1 : S_{01.2} + 100S_{02.1} \neq 0$$

$$t - stat = \frac{-78.92 + 100 \cdot 0.3312}{\sqrt{4.04263^2 + 100^2 \cdot 0.04372^2 + 2 \cdot 100 \cdot 0.018841}} = -7.3$$

. H_0

$$R = \sqrt{0.965465} = 0.9826$$

$$\hat{Q} = 962.117 - 78.92 \cdot 5 + 0.3312 \cdot 300 = 666.7$$

$$H_0 : \dots^2 = 0$$

$$H_1 : \dots^2 > 0$$

$$F - stat = \frac{0.965465 / 2}{(1 - 0.965465) / (20 - 2 - 1)} = 238 > F_{2,20-2-1,0.05} = 3.555$$

. H_0

2

$$\ln Q = \ln A + r \ln L + s \ln K + u$$

.4- 8 $t - value$

$$S_L^2 = S_K^2$$

$$H_0 : r + s = 1$$

$$H_1 : r + s \neq 1$$

$$t - stat = \frac{(0.8 + 0.4) - 1}{\sqrt{0.1^2 + 0.1^2 + 2 \cdot (-0.002)}} = 1.58 < t_{100-2-1,0.025} = 1.96$$

. H_0

$$S_{b_{01.2}, b_{02.1}} = -r_{12} \cdot S_{b_{01.2}} \cdot S_{b_{02.1}} = -0.2 \cdot 0.1 \cdot 0.1 = -0.002$$

$$b_{KL} = 0.2 \quad \text{Ln K} = 1.8 + 0.2 \text{Ln L} + e' \quad : r_{12}$$

$$r_{12} = b_{KL} \frac{S_L}{S_K} = 0.2 \cdot 1 = 0.2 \quad , r = b \frac{S_X}{S_Y} :$$

$$.0.3975-$$

$$, R^2 = 0.3975$$

$$H_0 : \dots^2 = 0$$

$$H_1 : \dots^2 > 0$$

$$F - stat = \frac{0.3975 / 2}{(1 - 0.3975) / (100 - 2 - 1)} = 32 > F_{2, 100-2-1, 0.05} = 3.087$$

3

TC -

$$\hat{Y} = 502 - 10.857 X + 1.2143 X^2$$

$$MC = -10.857 + 2.4286 X$$

$$MC = P \quad \rightarrow \quad MC = 60 \quad \rightarrow \quad X = 29$$

$$(29 \cdot 60) - (502 - 10.857 \cdot 29 + 1.214 \cdot 29^2) = 531 :$$

$$\min_x \{ AC = \frac{502}{X} - 10.857 + 1.2143 X \} \rightarrow X = 20.30$$

$$P = 38.44$$