A10

Saturday, 26. October 2019 15:11

$$Y = a_i \cdot X + a_0 + \varepsilon$$

$$Y \sim N(\mu_Y, \sigma_Y)$$

$$\mu_Y = a_i \cdot \mu_x + a_0 + \mu_\varepsilon$$

$$\sigma_Y = a_i \cdot \sigma_x + \sigma_\varepsilon$$

$$\text{prop}_{yx} = \frac{VAR_x}{VAR_y} = \frac{a_i^2 \cdot \sigma_x^2}{(a_i \cdot \sigma_x + \sigma_\varepsilon)^2}$$

assumption: $\sigma_x = \sigma_\varepsilon / 2$

$$0.8 = \frac{a_i^2 \cdot \frac{1}{4} \cdot \sigma_\varepsilon^2}{(a_i \frac{1}{2} + 1) \cdot \sigma_\varepsilon^2} = \frac{\frac{1}{4} a^2}{\frac{1}{4} a_i^2 + a_i + 1}$$

$$-0.05 a_i^2 + 0.8 a_i + 0.8 = 0$$

$$a_{i1} = 14.928$$

$$a_{i2} = 1.072$$

Test

$$14.928 \approx 0.778$$