Homework1

??

October 14, 2020

1 My Information

Student number: ?? // faculty of commerce 4th ho-class

2 OLS method

$$y_i = \alpha + \beta\ x_i + u \tag{1}$$

moving u to left side,

$$u = y_i - \alpha - \beta\ x_i \tag{2}$$

in OLS method, you can resolve α and β in following equation

$$u^2 = (y_i - \alpha - \beta\ x_i)^2 \tag{3}$$

you can find minimum value by using partial differential, these are answer

$$\alpha = y_i + \beta\ x_i \tag{4}$$

$$\beta = y_i - \alpha \tag{5}$$

3 ML method

$$y_i = \alpha + \beta\ x_i + u \tag{6}$$

because of u_i that follows a Normal distribution with mean0 and with some variance σ,

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} \exp[-\frac{(y_i - \alpha - \beta\ x_i)^2}{2\sigma^2}] \tag{7}$$

$$Log(\theta) = ln * \exp[-\frac{(y_i - \alpha - \beta\ x_i)^2}{2\sigma^2}] - ln * \frac{1}{2\ \pi\sigma^2} \tag{8}$$

$$Log(\theta) = -\frac{(y_i - \alpha - \beta \ x_i)^2}{2\sigma^2} - ln * \frac{1}{2 \ \pi \ \sigma^2} \tag{9}$$

$$Log(\theta) = -\frac{1}{2\sigma^2}((y_i - \alpha - \beta \ x_i)^2) + \frac{ln}{\pi} \tag{10}$$

you can find maximum value by using partial differential, these are answer

$$\alpha = y_i + \beta \ x_i \tag{11}$$

$$\beta = y_i - \alpha \tag{12}$$

4 Summary

OlS method's answer and ML method's answer are the same

so, the ML estimators are the same as OLS estimator.