

Assessment - Statistical Methods - jianbham.maple.cn/modules/unproctoredTest/QuestionSheet

mobius

Statistical Methods in Economics 2021 - MAM & ICS - Summative assessment 4

Summative assessment 4

题自 2

15 分钟

Consider the following model  $y_t = 0.5y_{t-1} + x_t + v_{1t}$  and  $x_t = 0.5x_{t-1} + v_{2t}$ , where both  $v_{1t} \sim N(0, 1)$  and  $v_{2t} \sim N(0, 1)$  follow normal distributions.

1. If  $y_t = 1$  and  $x_t = 2$ , what is the value of  $E(y_{t+1} | y_t, x_t)$ ?

1.5

2. If  $y_t = 1$ ,  $x_t = 2$ ,  $v_{1t} = 1$ , and  $v_{2t} = 1$ , what is the value of  $E(y_{t+1} | y_t, x_t)$ ?

2.5

$$E(y_{t+1} | y_t, x_t) = E(0.5y_t + 0.5x_t + v_{1t} + v_{2t} | y_t, x_t)$$

$$= 0.5y_t + 0.5x_t + E(v_{1t}) + E(v_{2t})$$

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题自 3

15 分钟

Suppose that a time series process  $y_t$  is generated by  $y_t = z + \varepsilon_t$ , for all  $t = 1, 2, \dots$ , where  $\varepsilon_t$  is an IID sequence with mean 0 and variance  $a$ . The random error  $z$  does not change over time, and it has mean 0 and variance  $b$ . Assume that each  $\varepsilon_t$  is uncorrelated with  $z$ .

1. Find the expected value of  $y_t$ .

0

2. Find the variance of  $y_t$ .

a+b

3. Find  $\text{Cov}(y_t, y_{t+h})$  for any  $t$  and  $h > 0$ .

b

$E(y_t) = E(z) + E(\varepsilon_t) = 0$

$\text{Var}(y_t) = \text{Var}(z) + \text{Var}(\varepsilon_t) = a + b$

由于  $z$  与  $\varepsilon_t$  不相关

$\text{Cov}(y_t, y_{t+h}) = E(y_t y_{t+h}) - E(y_t) \cdot E(y_{t+h})$

$= E(z^2) + E(z(\varepsilon_t + \varepsilon_{t+h})) + E(\varepsilon_t \varepsilon_{t+h})$

$= b + E(z)E(\varepsilon_t + \varepsilon_{t+h}) + E(\varepsilon_t \varepsilon_{t+h}) = b$

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Summative assessment 4

問題時間: 03:21:28

問題 4

10 分

Consider the following model  $y_t = 0.5y_{t-1} + x_t + p_{1t}$  and  $x_t = 0.5x_{t-1} + p_{2t}$ , where both  $p_{1t} \sim N(0,1)$  and  $p_{2t} \sim N(0,1)$  follow normal distributions. If  $y_t = 1$  and  $x_t = 1$ , what is the upper bound for the 95% conditional one-step ahead confidence interval for  $y_t$  (two decimals)?

3.77

$y_{t+1} = 0.5y_t + 25x_t + \eta_t + V_{2|t+1}$   
 $= 1 + V_{1t} + V_{2|t+1}$   
 $V_{1t} + V_{2|t+1} \sim N(0, 2)$   
 $\Rightarrow$  95% CI 上界 约为 3.7739

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問題時間: 03:21:23

問題 5

10 分

Suppose that  $y_t$  and  $x_t$  are  $I(1)$  series, but  $y_t - \beta x_t = I(0)$  for some  $\beta \neq 0$ . What is the order of integration of  $y_t - \delta x_t$  for any  $\delta \neq \beta$ ?

1

$y_t - \delta x_t = y_t - \beta x_t + (\beta - \delta)x_t$   
 $\hookrightarrow y_t - \delta x_t \text{ is } I(1)$