PREDICTIVE ANALYTICS ISM-E1003

Homework 3, due date 25.03. at 10:00

What is the correct answer? Correct answer 4 points, incorrect answer -1 point, no answer 0 point.

1. Consider the following model estimated for a time series

 *yt* = 0.3 + 0.5 *yt*-1 - 0.4 *εt-*1 + *εt*

where *εt* is a zero mean error process.

What is the (unconditional) mean of the series, *yt* ?

**(a) 0.6**

(b) 0.3

(c) 0.0

(d) 0.4.

1. Consider the following MA(3) process

 *yt* = 0.1 + 0.4*ut*-1 + 0.2*ut*-2 – 0.1*ut*-3 + *ut*

What is the optimal forecast for *yt*, 3 steps into the future (i.e., for time *t*+2 if all information until time *t*–1 is available), if you have the following data? *ut*-1 = 0.3; *ut*-2 = –0.6; *ut*-3 = –0.3

1. 0.4
2. 0.0
3. **0.07**
4. -0.1
5. Which of the following sets of characteristics would usually best describe an autoregressive process of order 3 (i.e., an AR(3))?

**(a) A slowly decaying acf, and a pacf with 3 significant spikes**

(b) A slowly decaying pacf and an acf with 3 significant spikes

(c) A slowly decaying acf and pacf

(d) An acf and a pacf with 3 significant spikes.

1. A process, *xt*, which has a constant mean and variance, and zero autocovariance for all non-zero lags is best described as

**(a) A white noise process**

(b) A covariance stationary process

(c) An autocorrelated process

(d) A moving average process.

1. Which of the following conditions must hold for the autoregressive part of an ARMA model to be stationary?

**(a) All roots of the characteristic equation must lie outside the unit circle**

(b) All roots of the characteristic equation must lie inside the unit circle

(c) All roots must be smaller than unity

(d) At least one of the roots must be bigger than one in absolute value.

1. Which of the following are characteristics of vector autoregressive (VAR) models?
2. They are typically a-theoretical and data driven
3. They can easily lead to overfitting
4. All variables on the right hand side of the equation are pre-determined

(iv) Their interpretation is often difficult from a theoretical perspective.

**(a) (i), (ii), (iii), and (iv)**

(b) (i), (ii), and (iv) only

(c) (i) and (ii) only

(d) (i) and (iv) only.

1. Which of the following could be viewed as a disadvantage of the vector autoregressive (VAR) approach to modelling?

(a) We do not need to specify which variables are endogenous and which are exogenous

(b) Standard form VARs can be estimated equation-by-equation using OLS

**(c) VARs often contain a large number of terms**

(d) VARs can be expressed using a very compact notation.

1. Consider the following bivariate VAR(2):



Which of the following coefficient significances are required to be able to say that *y*1 Granger-causes *y*2 but not the other way around?

1. *α*13 and *α*14 significant; *α*21 and *α*22 not significant
2. ***α*21 and *α*22 significant; *α*13 and *α*14 not significant**
3. *α*21 and *α*23 significant; *α*11 and *α*13 not significant
4. *α*11 and *α*13 significant; *α*21 and *α*23 not significant.
5. Comparing the information criteria approach with the likelihood ratio test approach to determining the optimal VAR lag length, which one of the following statements is true?
6. The choice of stiffness of penalty term will not affect the model choice
7. The validity of information criteria relies upon normal residuals
8. **Conducting a likelihood ratio test could lead to a sub-optimal model selection**
9. An application of the univariate information criteria to each equation will give identical results to the application of a multivariate version of the criteria to all of the equations jointly.
10. Which of these statements is true about vector autoregressive models?
11. They allow the value of a variable to depend on more than just its own lags
12. All variables are endogenous
13. The researcher does not need to specify which variables are endogenous or exogenous
14. All variables are exogenous

(a) I only

(b) I and II only

**(c) I, II, and III only**

(d) I, II, III, and IV.