Final

Do any 5

1. Consider the time series given by $y_t = \delta + y_{t-1} + \varepsilon_t + \theta\varepsilon_{t-1}$. ε_t is independent white noise.

A. Show that the series is not stationary.

B. Compute the forecast $\hat{y}_{t+s|t}$ for s = 1,2, and 3.

C. Compute the MSE of the forecasts shown in part B.

D. How can we transform y_t so as to achieve stationarity?

#1 answer

2. Consider the time series given by $y_t = \alpha + \delta t + \psi_1 \varepsilon_{t-1} + \psi_2 \varepsilon_{t-2} + \varepsilon_t$. ε_t is independent white noise.

A. Compute the mean of y_t. $E(y_t)$

B. Compute the variance of y_t. $E[y_t - E(y_t)]^2$

C. Compute the first three autocovariances for y_t. ($E[(y_t - E(y_t))(y_{t-i} - E(y_{t-i}))]$ i=1,2,3).

D. Is y_t stationary? Why or why not?

E. How can we transform y_t so as to achieve stationarity?

#2 answer

3. The following table contains two years of data

Year 1		Year 2	
Q1	242	Q1	224
Q2	250	Q2	247
Q3	247	Q3	262
Q4	262	Q4	285

A. Prepare a series of exponential forecasts for the years included. Let $\alpha = .1$

B. Prepare a series of exponential forecasts for the years included. Let $\alpha = .5$

C. Compute the MSE for both of the in-sample forecasts. Which value of α gives the lower MSE?

D. Numerically, how could you find the optimal α

#3 answer

4. Consider the time series $y_t = \mu + u_t$ where $u_t = \sqrt{h_t} v_t$ and $v_t \sim N(0, 1)$.

A. Write h_t as an ARCH(m) process.

B. Write h_t as a GARCH(m,n) process.

C. How would you determine m and n?

D. How would you test for ARCH effects?

E. What is the unconditional variance of y_t if h_t follows an ARCH(1) process.

#4 answer

5. If Monetary policy actually works, an increase in the money growth should increase income growth and a decrease in the money growth should decrease growth.

A. Construct a VAR model for money growth and income growth?

B. Suppose we have quarterly data, how would you determine the number of lags to be used in the VAR?

C. What is your null hypothesis for this test?

D. What is your alternative hypothesis for this test?

E. According to the supplied results, what is your conclusion?

F. Does Granger Causality necessarily imply causality?

G. Suppose it turns out that money and income are cointegrated with a cointegrating vector (1 -1). How would you modify your model from part A to adjust for this?

Null Hypothesis: Sample: 1960:1 1996:4 Lags: 4	Obs	F-Statistic	Probability
money growth does not Granger Cause income growth	144	4.6000	0.00163
income growth does not Granger Cause money growth		0.13870	0.96764

#5 answer

6. Suppose that e_t and v_t are independent white noise terms with variance σ_e^2 and σ_v^2, respectively and $0 < \theta < 1$. Consider the system

$$y_t = \alpha + \theta x_{t-1} + e_t$$
$$x_t = \beta + x_{t-1} + v_t$$

A. Show that y_t and x_t are I(1).

B. Show that y_t and x_t are cointegrated. What is the cointegrating vector?

C. Write the system as a vector error correction model.

D. In practice, describe two ways to test for cointegration.

#6 answer