

Financial Forecasting

M.Sc. in Finance – 2018/19 – 1st Semester

Solutions of selected exercises

Week 2:

1. Consider the following stochastic processes where $\varepsilon_t \sim \text{WN}(0, \sigma_\varepsilon^2)$, $\beta_1, \beta_2 \neq 0$:
 - i. stationary
 - ii. not stationary ($X_t - \beta_0 - \beta_1 t - \beta_2 t^2 = \varepsilon_t$ is stationary)
 - iii. not stationary ($\Delta X_t = X_t - X_{t-1} = \alpha + \varepsilon_t$ is stationary)

Week 3:

- 2- $r_{T|T-1} = 0.0002196$
- 5- a) $f_{t|t+1} = (1105 - 45.5 \times 1) \times 0.97 = 1027.715$
 $f_{t|t+2} = 1054.56$
 $f_{t|t+3} = 1009.24$
 $f_{t|t+4} = 876.8$
c) $\hat{a}_{t+1} = 6.91365$ $\hat{b}_{t+1} = -0.040135$

Week4:

6.
 - a. $\rho_1 = -\frac{0.12}{(1+0.12^2)} \rho_k = 0, k \geq 2$
 - b. MA processes are always stationary
 - c. Yes.
 - d. The PACF is statistically different from zero at least for first lags. Decays to zero .
8.
 - b. 1.000127; 0.2;

Week 5:

9.
 - a. Yes.
 - b. $E[Y_t] = \frac{20}{3}$

10.

b. $\widehat{E}[y_t] \approx 1.35$.

c.

i. 1.4

ii. 0.9

d.

i. 0.081225

ii. 0.16245

Week6:

11. $Y_t = c + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \theta_{12} \varepsilon_{t-12} + \theta_1 \theta_{12} \varepsilon_{t-13}$

12. $Y_t = c + \phi_1 Y_{t-1} + \phi_4 Y_{t-4} - \phi_4 \phi_1 Y_{t-5} + \varepsilon_t$

Week 7:

14.

a. stationary. Not invertible.

b. Not stationary. invertible.

c. stationary. invertible.

15. $Y_t = 2 + 0.8Y_{t-1} + 0.5\varepsilon_{t-1} + \varepsilon_t$

Week 8:

16.

i. MA(1)

ii. ARMA(1,2)

iii. ARMA(2,1)

iv. ARMA(1,3)

19.

- a. $Y_t = -0.740\varepsilon_{t-1} - 0.888\varepsilon_{t-12} + 0.888 \times 0.740\varepsilon_{t-13} + \varepsilon_t$
- c. No. The residuals present significant autocorrelations.

Week 9:

20. a. $f_{t|t+1} = 12.1$

$$f_{t|t+2} = 11.125$$

$$f_{t|t+3} = 10.844$$

b. $f_{t|t+h} = 2.5 \sum_{i=0}^h 0.7^i \xrightarrow{h \rightarrow \infty} \frac{2.5}{1-0.75}$

Week 11:

24. $f_{n|n+1} = 118$ $f_{n|n+2} = 134.2$

25. $f_{t|t+1} = 501$ $f_{t|t+2} = 502$ $f_{t|t+3} = 504$ $f_{t|t+2} = 508$

26.

- a. Spurious regression: it occurs when we regress variables that are not mean stationary.
- b. Apply the ADF test with a constant and a trend
- c. auxiliary regression: $\Delta \log(C_t) = c + \beta t + \pi \log(C_{t-1}) + \Delta \log(C_{t-1})$.

$$H_0: \pi = 0 \text{ (unit root) vs } H_1: \pi < 0 \text{ (trend stationary)}$$

$$t_{obs} = -0.616883 > t_{10\%}^* = -3.139292$$

do not reject H_0 -> no evidence to say that $\log(C_t)$ is trend stationary

Week 13:

28.

- a. False
- b. True
- c. False
- d. False
- e. False
- f. True