
First homework assignment

PhD in Business Economics

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You can work individually or in pairs.

Course: Econometrics III

Due date: January 31th, 2020.

Problem 1: The following is taken from Ender's (1995) page 66¹:

To illustrate a typical moving average process, supposed you win \$1 if a fair coin shows a head and lose \$1 if it shows a tail. Denote the outcome of the toss t by ϵ_t (i.e., for toss t , ϵ_t is either +\$1 or -\$1). If you wish to keep track of your "hot streaks", you might want to calculate your average winnings on the last four tosses. For each coin toss t , your average winnings of the last four tosses are $x_t = 1/4\epsilon_t + 1/4\epsilon_{t-1} + 1/4\epsilon_{t-2} + 1/4\epsilon_{t-3}$. Although the $\{\epsilon_t\}$ sequence is a white-noise process, the construct $\{x_t\}$ sequence will not be a white-noise noise.

A. Find the expected value of x_t . Find the expected value given that $\epsilon_{t-3} = \epsilon_{t-2} = 0$.

B. Find $var(x_t)$. Find $var(x_t)$ conditional on $\epsilon_{t-3} = \epsilon_{t-2} = 1$.

C. Find

i. $cov(x_t, x_{t-1})$

ii. $cov(x_t, x_{t-2})$

iii. $cov(x_t, x_{t-5})$

Problems 2-6: Exercises 1.1 to 1.5 (pages 25 to 28) of Tsay (2010)

Problems 7-9: Exercises 2.1, 2.2 and 2.4 (pages 104 to 105) of Tsay (2010)

Problem 10: Exercise 2.15 (pages 107) of Tsay (2010)

¹Enders (1995) *Applied Econometric Time Series*, Wiley.