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FM 431: Econometrics of Financial Markets

Fall 2009

PROBLEM SHEET # 8

Problem 1: This problem is about an analysis of a time series of monthly pepper prices in USD from Oct 1973 through Apr 1996. It requires the installation of two R packages: **tseries** and **AER**. The latter accompanies the book *Applied Econometrics with R* (Kleiber and Zeileis, Springer, 2008); it contains the pepper price series.

a) Load the packages **tseries**, **AER**, and the dataset `PepperPrice`.

b) Read the description of `PepperPrice`. (Enter `?PepperPrice` in the R console.)

c) Define the series of black pepper prices and the series of its log returns.

d) Plot both series.

e) Test both series for the presence of unit roots. (Use the ADF test.) What are your conclusions?

f) Plot the acf and the pacf of the series of log returns. What are your conclusions?

g) Fit an AR(1) model to the series of log returns. What is your estimated model? Is it meaningful?

h) Fit an MA(1) model to the series of log returns. What is your estimated model? Is it meaningful?

i) Which model is better: AR(1) or MA(1)? Or is there no reason to prefer either model?

Problem 2: Consider the following processes:

$$\begin{aligned} x_t &= 1 + 0.2t + \epsilon_t + 0.5\epsilon_{t-1} + 0.3\epsilon_{t-2}, \\ y_t &= 1.7y_{t-1} - 0.7y_{t-2} + \epsilon_t, \\ z_t &= 0.3z_{t-1} + \epsilon_t - 0.7\epsilon_{t-1}. \end{aligned}$$

Is there a process among (x_t), (y_t), (z_t) which is

i) a unit-root process?

ii) trend-stationary?

iii) stationary?

Give reasons for your answer.