

## Exercise 2

Consider the dataset STOCKINT\_2010.XLS and perform the following tasks:

1. Import in MATLAB all data contained in the dataset.
2. Perform all data transformation in the file *datatran\_int.m*.
3. Given the estimation of an AR(1) for *us\_dy* over the sample 1973Q1:2009Q4, forecast the same variable over the sample 2010Q1:2020Q4. Generate a graph with point forecasts and 95 per cent confidence interval around them.
4. Compare the results you have obtained in (3) with the forecasts based on a model which differs from the first one only because the autoregressive coefficient is set to 1.00 (rather than 0.979671).
5. Over the sample 1973Q1:2009Q4 generate the two following artificial series:

$$\begin{aligned}x_{1t} &= \beta_0 + \beta_1 x_{1t-1} + u_t \\x_{2t} &= \beta_0 + \beta_1 x_{2t-1} + e_t\end{aligned}\tag{1}$$

where  $\beta_0$ ,  $\beta_1$  and  $u_t$  are respectively the coefficients and the residuals of the equation estimated in (3) while  $e_t$  are the residuals obtained by drawing with replacement from an urn that contains  $u_t$ .

6. For the sample 1973Q1:2009Q4 generate the following artificial series:

$$\begin{aligned}x_t &= \beta_0 + \beta_1 x_{t-1} + u_{1t} \\ \Delta y_t &= -0.1(y_{t-1} - x_{t-1}) + u_{2t}\end{aligned}\tag{2}$$

$$\Delta y_t = u_{3t}\tag{3}$$

Where  $u_{1t}$ ,  $u_{2t}$  and  $u_{3t}$  are independent random normal variables with mean zero and the same variance with  $u_t$ . Plot a graph of the three time series and indicate which of them seem to co-move and what is the form of their long-run relation.

7. How are the results in point (6) affected by changing the coefficient in the second equation from -0.1 to -0.8?