

Economic Forecasting

Exercise Sheet 3

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- (a) Create a new *Eviews* workfile with 50 observations of undated data and in this workfile create a normally distributed pseudo-random variable U with variance 0.1 using the *Genr* command:

$$U = \text{SQR}(0.1) * \text{NRND}$$

Hint: To create a new *EViews* workfile, click on the *File* menu at the top of the main *EViews* window and then choose *New* and *Workfile*. In the window that opens, select frequency as *Integer date* and set the start and end dates to 1 and 50. Note that **NRND** is a built-in *EViews* function that defines a normally distributed pseudo-random variable and **SQR** is the square root function.

- (b) Generate a damped cosine function with damping factor 0.9 and period 4 using the *Genr* command

$$DC = 0.9^{\wedge}@\text{TREND} * \text{COS}(3.141592654/2*@\text{TREND})$$

- (c) Generate a deterministic $AR(2)$ process

$$y_t = -0.81y_{t-2}$$

Hint: first initialise the new variable as a copy of DC using the *Genr* command:

$$\text{DAR2} = \text{DC}$$

then generate the deterministic $AR(2)$ process recursively for observations 3-50 using the equation

$$\text{DAR2} = -0.81 * \text{DAR2}(-2)$$

- (d) Graph the variables DC and DAR together and verify that they are identical.

- (e) Now create stochastic versions of the variables DC and DAR adding the stochastic variable U.

Hint: The stochastic version of the damped cosine function can be generated simply as

$$SC = DC + U$$

but the stochastic version of the $AR(2)$ process needs to be generated recursively. First, initialise the variable using

$$SAR2 = SC$$

then generate the stochastic $AR(2)$ process recursively for observations 3-50 using the equation

$$SAR2 = -0.81 * SAR2(-2) + U$$

- (f) Graph SC and SAR2 and compare the differences between them.
- (g) Compare the correlograms of variables DC and SC and variables DAR2 and SAR2. How does the presence of a stochastic component obscure the pattern in the simple and partial correlograms?

Hint: The correlogram of any EViews variable is a view available on the *View* tab in the series window. Select *Level* and allow the program to choose the number of lags to include. The columns AC and PAC show the simple and partial autocorrelations respectively. The column *Q-Stat* reports a joint test of the null hypothesis that there is no autocorrelation up to the specified order and *Prob* reports the *p-value* of the test statistic.