***EViews* Exercises for Chapter 11**

**EXAMPLE 11.1: Is the $/£ exchange rate bilinear?**

This example uses the workfile dollar.wf1. First generate the differences and squared differences of dollar

genr x = d(dollar)

genr xsq = x^2

and investigate their correlograms in the usual way. The LM test for bilinearity is constructed from the regression

ls x x(-1) xsq(-1)

The ARCH-adjusted test uses the residuals from fitting a GARCH(1,1) model to x.

**EXAMPLE 11.2: A SETAR model for sunspots**

This example uses the workfile sunspots.wf1. The restricted AR(9) process previously fitted to the series sunspot may be estimated with the command

ls sunspot c sunspot(-1) sunspot(-2) sunspot(-9)

To estimate a SETAR(3:9, 2) model, click ***Estimate/THRESHOLD – Threshold regression*** and enter 1 9 in the ‘Threshold Variable Specification’ box. This sets the range over which the delay parameter is searched over. Details of the threshold specification tests and model selection can be obtained by clicking ***View/Threshold Specification*** and ***View/Model Selection Summary***.

To obtain the limit cycle in Figure 11.1, first extend the sample range to 2050. Next, in the equation view click ***Proc/Make Model*** and then, in the Model window, click ***Solve*** and ‘OK’. The limit cycle is given by the series sunspot\_0.

**EXAMPLE 11.3: An ESTAR model for long interest rates**

This example uses the workfile interest\_rates.wf1. First generate the long interest rate differences:

genr x = d(r20)

A linear AR(2) specification is estimated with

ls x x(-1) x(-2)

The ESTAR(2,2) model is then estimated by clicking, as in the previous example, ***Estimate/THRESHOLD – Threshold regression*** but now entering ‘2’ in the ‘Threshold Variable Specification’ box and checking ‘Smooth’ for ‘Threshold type’. Next, click ***Options***and change ‘Threshold Type’ to ‘Exponential’. Note that the coefficient on x(-2) in the linear part of the model is insignificantly different from zero. This may be set to zero by restricting x(-2) to only enter non-linearly. To do this, change the equation specification to

x x(-1) @alt(x(-2))

and reestimate to give the model reported in the example. The threshold transition shown in Figure 11.3 is then obtained with ***View/Threshold Smoothing Weights…*** and amending the resulting graph appropriately.

**EXAMPLE 11.4: A Markov switching model for the $/£ exchange rate**

Open the workfile dollar.wf1, click ***Quick/Estimate Equation…*** and in the Equation Specification box enter

dollar c ar(1)

Change Method to ***SWITCHREG-Switching Regression*** and check ‘Regime specific error variances’, change ‘Switching Type’ to ‘Markov’ and OK. On the appearance of the results window, click ***View/Regime Results/Transition Results*** to obtain the transition probabilities and expected durations. To compute the probabilities shown in Figure 11.4, click ***Proc/Make Regime Results/Make Regime Probability Group…***  and check ‘Smoothed’. The probabilities used in the Figure are obtained with the command

genr p = 0\*(prob2<0.5) + 1\*(prob2>0.5)

**EXAMPLE 11.5: Non-linearity tests for the long interest rate**

Open the file interest\_rates.wf1 and generate x = d(r20) as in Example 11.3. Run the AR(2) regression

ls x x(-1) x(-2)

and store the residuals as the series e with the command

genr e = resid

(or in the equation view click ***Proc/Make Residual Series…*** and change the name of the series to e).The RESET test may be obtained in the equation view by clicking ***View/Stability Diagnostics…/Ramsey RESET Test…*** and the portmanteau test on the squared residuals by clicking ***View/Residual Diagnostics/Correlogram Squared Residuals…***. Tsay’s test is obtained by clicking ***View/Coefficient Diagnostics/Omitted Variables Test – Likelihood ratio…***  and entering

x(-1)^2 x(-2)^2 x(-1)\*x(-2)

in the box.

The LSTAR and ESTAR tests may be obtained automatically by changing the estimation method to ***THRESHOLD – Threshold regression*** but now entering ‘1 4’ (say) in the ‘Threshold Variable Specification’ box and checking ‘Smooth’ for ‘Threshold type’. On the appearance of the estimates, click ***View/Stability Diagnostics/Linearity Test*** and the sequence of auxiliary regressions and test statistics will be displayed.

To obtain the BDS statistics, open the series e and click ***View/BDS Independence Test…***and OK. The *TR* statistics may be computed using the program tr\_stat.prg:

for !3 = 1 to 2

genr f1\_{!3} = e\*(e(-!3)^2)

genr f2\_{!3} = e\*(e(-!3)^2)

scalar b\_12\_{!3} = @mean(f1\_{!3})

scalar b\_12\_{!3} = @mean(f2\_{!3})

next

for !1 = 2 to 4

genr e\_{!1} = e^!1

scalar u\_{!1} = @mean(e\_{!1})

next

for !2 = 1 to 2

scalar tr\_{!2} = b\_21\_{!2} - b\_12\_{!2}

scalar v\_tr\_{!2} = 2\*(u\_4\*u\_2 - u\_3)/(@obs(e) - !2) - 2\*(u\_2^3)\*(@obs(e) - 2\*!2)/((@obs(e) -!2)^2)

scalar tr\_stat\_{!2} = tr\_{!2}/@sqrt(v\_tr\_{!2})

next