UNIVERSITY OF AMSTERDAM

Part 0 – Open Stata, and make your own do-file

- Start Stata through the start menu button
- In de white command window type `doedit` to start de do-file editor. Place the Stata screen on the left and the do file editor on the right such that you can easily switch between the two.
- Save the empty do-file as a new do-file under an applicable name such as ectrcs_timeseries.do in a directory that you want to use for this course, for example H:\ectrcs
- In the first two lines of the do-file type

```
cls                                  //this clears the screen
clear all                            //this clears the memory
cd "H:/ectrcs"                       //this is your path
```

- If you want to use your own computer type instead:

```
cd "~/ectrcs"                  //this is your MAC path cd
"c:/ectrcs"                    //this is your PC path
```

Empirical exercise – Time series

On Canvas you will find the data file USMacro_Quarterly.dta, which contains quarterly data on several macroeconomic series for the United States from 1957:Q1 – 2013:Q4. All data series are from the Federal Reserve Economic Data (FRED) database maintained by the Federal Reserve Bank of St. Louis. The variables in de data set are described in the file USMacro_Description.pdf. The variable PCECTPI is the price index for personal consumption expenditures from the U.S. National Income and Product Accounts. In this computer exercise, you will construct forecasting models for the rate of inflation based on PCECTPI. For this analysis, we will use the sample period 1963:Q1–2012:Q4

1. Download the USMacro_Quarterly.dta from Canvas, and put it into your H:\ectrcs folder. Now open the data by typing use USMacro_Quarterly.dta. Next, we tell Stata that it is a time series data set and that the variable time indicates the time period. Type tsset time. Next type browse to see how the dataset looks like.
2. Compute the inflation rate by typing gen infl=400*(ln(PCECTPI)-ln(L1.PCECTPI)). What are the units of infl? Is infl measured in dollars, percentage points, percentage per quarter, percentage per year, or something else? Explain.
3. Plot the value of infl from 1963:Q1 through 2012:Q4. Type twoway (line infl time if tin(1963q1, 2012q4), sort). Based on the plot, do you think that infl has a stochastic trend? Explain.
4. You can make the plot look nicer by adding a number of options. Type twoway (line infl time if tin(1963q1, 2012q4), sort), ytitle(Inflation) ytitle(, size(large)) xtitle(, size(large)) ylabel(, angle(horizontal)) scheme(s2mono) graphregion(fcolor(white) lcolor(white) ifcolor(white) ilcolor(white)). For more options type help twoway_options.

5. Compute the first four autocorrelations of infl. Type corrgram infl if tin(1963q1,2012q4), noplot lags(4). Wat does it mean that the first four autocorrelations are all positive?
6. Compute the first four autocorrelations of Δinfl. You can use the same command line as in part 5. but instead of infl you type D.infl to tell stata that you want the autocorrelations of the change in the inflation rate.
7. Plot the value of Δinfl from 1963:Q1 through 2012:Q4. Use what you have learned in parts 4-6. The plot should look choppy or jagged. Explain why this behavior is consistent with the first autocorrelation that you computed in part 6.
8. Run an OLS regression of $\Delta infl_t$ on $\Delta infl_{t-1}$ by typing regress D.infl L1.D.infl if tin(1963q1, 2012q4), robust. Does knowing the change in inflation over the current quarter help predict the change in inflation over the next quarter? Explain.
9. Compute the BIC for the AR(1) model by typing gen BIC_1=ln(e(rss)/e(N))+e(rank)*(ln(e(N))/e(N)) if tin(1963q1, 2012q4). Next compute the AIC by typing gen AIC_1=ln(e(rss)/e(N))+e(rank)*(2/e(N)) if tin(1963q1, 2012q4).
10. Estimate an AR(2) model for Δinfl by adding L2.D.infl as regressor to the regression model you estimated in part 8. Is the AR(2) model better than an AR(1) model? Explain.
11. Compute the BIC for the AR(2) model by typing gen BIC_2=ln(e(rss)/e(N))+e(rank)*(ln(e(N))/e(N)) if tin(1963q1, 2012q4). Next compute the AIC by typing gen AIC_2=ln(e(rss)/e(N))+e(rank)*(2/e(N)) if tin(1963q1, 2012q4).
12. Estimate an AR(p) model for p = 3, …, 6. After each estimation of an AR(p) model compute the BIC and AIC for this AR(p) model. You can do this by repeating part 10 and part 11, but each time add one additional lag of Δinfl to the regression model (and change the names of the AIC and BIC variables).
13. Compare the AIC and BIC of the AR(p) models for p=1,2,…,6 by typing sum BIC_* AIC_*. What lag length is chosen by the BIC? What lag length is chosen by the AIC?
14. Use the ADF test for the regression in Equation (15.32) with two lags of ΔInfl (so that p = 3 in Equation (15.32) in S&W) to test for a stochastic trend in Infl. Type regress D.infl L1.infl L1.D.infl L2.D.infl if tin(1963q1, 2012q4). What do you conclude?
15. Is the ADF test without a linear trend (see Equation (15.32) in S&W) preferred to the test that includes a linear trend (see Equation (15.33) in S&W) when testing for a stochastic trend in Infl? Explain.
16. In part 14. you used two lags of ΔInfl. Should you use more or fewer lags? Explain.
17. Based on the test you carried out in (i), does the AR model for Infl contain a unit root? (Hint: Does the failure to reject a null hypothesis mean that the null hypothesis is true?)