Financial Data Analysis: Suggested Solution of Exercise 1

1. Quarterly data from 82Q1 to 07Q2. Note that in the excel file there are missing values for the period of 07Q3 and 07Q4. Hence, it is a good practice to have a look at the spread sheet before importing the data into Eview.

2. An intercept is consistent with the null hypothesis (unit root with drift) and alternative hypothesis (mean stationary) in the unit root test. Since there is no quadratic trend in the series, a trend is quite unlikely. The data is the rate of change, it is not possible to take the logarithm of negative values.

3. Under normality, the test statistic of the Jargue-Bera test follows a chi-square distribution. We obtain JB = 2.2455. The null hypothesis of normality is thus not rejected at 5% significant level.

4. The specification with intercept and trend (with lags of three) has the lowest value of AIC. We test on the model with intercept and trend with h=3, the null hypothesis of unit root is not rejected at 5% significance level. However, for macro data it is always advisable to use Philips-Perron test as well. In our example, the Philips-Perron test (without trend) rejects the null hypothesis of unit root. As a further check, we could also run the ADF test using automatic selections. With specification of intercept only, the null hypothesis using Schwarz criteria is rejected, but it not rejected using AIC. Here we have two contradicting results. There is no strong argument against each others. We could fit the ARIMA model for these two specifications and make further comparisons.

5. For the first specification that the variable has at least an unit root, we take the first difference and the null hypothesis of unit root for the resulting variable is rejected for all tests. We conclude that the variable is I(1). Look at the spread sheet, we find no obvious indications for seasonal patterns. Using the Box-Jenkins approach, there is a weak evidence for an AR(3) process. After fitting a AR(3) model with intercept, the LB-test statistic for the residuals at lag 4, 8 and 12 are not significantly different from zero at 5% significant level.

For the second specification that the variable is I(0), the Box-Jenkins approach suggests that it is a AR(4) process. The LB-test statistic for the residuals at lag 4, 8 and 12 are not significantly different from zero at 5% significant level. We drop the insignificant coefficients sequentially and find a model with intercept and the lagged terms at 4 only. The null hypothesis of white noise in the residual is not rejected at 5% significant level. (See the Eview workfile.)
We compare these two models by the AIC. The second specification has a lower value. We choose the second one as the optimal model. However, if our aims is to make a better forecast, we can also compare the two models by its forecasting ability.

6. Try to make a one-year forecast. In Eview the Theil inequality coefficient is reported. It measures the inequality between the forecast values and the actual values. A smaller coefficient means a better forecast. The Theil inequality coefficient of the first model is 0.47, and the that of second model is 0.57. Comparing the graphs, it is visible that the first model performs better forecasting. For further discussion on the Theil inequality, please see the help file of Eview.