

Instructions for computer exercise 2

Purpose The purpose is to evaluate the VaR and ES forecasts we constructed in exercise 1. To make sure that everyone has the same data to start with I'll provide my VaR and ES forecasts in the datafile. So use the supplied VaR and ES forecasts and not the ones you did yourself in exercise 1.

Data The data are in the Excel file DataLab2.xlsx in Canvas. The first column is the Date of the observation. The second column is the same Profit/Loss data as in Computer Exercise 1 from La Caixa. Columns 3-11 are the VaR and ES estimates from exercise 1. These are only available from observation 501 since we used the first 500 observations for estimation. In the spirit of the Basel rules we will do backtesting on one year of data at the time. The overall aim is to investigate how well the models perform by using various so called backtests.

Backtesting VaR For all VaR estimates (columns 3-7) conduct the Kupiec, the Basel Traffic light and the Christoffersen independence tests for each year. So in total you do $5 \times 3 \times 2 = 30$ tests.

Backtesting Expected Shortfall Perform the Acerbi-Szekely (2015) test for underestimation (regulator's perspective) on the ES estimates for all models and both years. The test equation is

$$Z = -\frac{1}{M(1-\alpha)} \sum_{t=1}^{t=M} \frac{L(t)I(t)}{\text{ES}_{\alpha}(t)} + 1,$$

where (of course) the realized/actual values of $L(t)I(t)/\text{ES}_{\alpha}(t)$ should be used in the calculation. Note that $I(t)$ is an indicator variable that takes the value 1 when there is a VaR violation.

Answer the following short questions directly in the notebook

- a. Do the same methods perform well (or not so well) for the different sample years, 2007/2008?
- b. Which model would you pick for VaR and which would you pick for ES? Please motivate your choices.

Good luck!