

Computational Finance and FinTech – Problem Set 4

Use the data in `dax_and_spx.csv` in the following exercises. This data set contains one year of daily DAX and S&P500 index values.

Exercise 1. The goal of this exercise is to analyse the linear relationship between the DAX and the S&P 500.

Load the data set into a **DataFrame** and add columns with the log returns and create a scatter plot. Perform a linear regression of the DAX log-returns on the S&P log-returns. Comment on the ability of the model to forecast DAX returns. Is the model statistically significant?

Exercise 2. The goal of this exercise is to fit a GARCH model to the DAX and forecast DAX volatilities.

Load the data set into a **DataFrame** and add columns with the log returns and create a scatter plot. Fit a GARCH model on the DAX returns. What do the parameters of the GARCH model tell you about the variability in the DAX volatility? Next, forecast daily volatilities for 100 days and produce a plot of both the historical and the forecasted volatility. It should look similar to this:

