Exercises – Week #36

Introduction to Financial Engineering

Note: You may choose to work in R or Matlab. Sometimes solutions will be available in one language, sometimes in both.

1. (software) Install R and/or Matlab

   (a) Get R from www.r-project.org and RStudio from www.rstudio.com

   (b) Matlab is available from DTU, also for home installation on own computer `http://downloads.cc.dtu.dk`

2. (data, returns) Get weekly historical prices for Exxon Mobil (symbol 'XOM') ranging from Feb 20, 1995 until today `www.finance.yahoo.com` and load the data into your chosen software. For R, it might be convenient to familiarize yourself with the package "quantmod", but Yahoo etc. have in periods blocked users from fetching data using these kind of packages. For Matlab, you can go to the file exchange and download scripts by other users suck as `hist_stock_data`. I recommend that you actually get to working with the data and not getting stuck in automatising the download for now. You can always manually download the data and make the below analysis and then go back and modify your code to include automatic fetching.

   (a) Plot the adjusted closing price and the closing price in the same graph (Read about adjusted closing prices and price calculations here:
   `https://blog.quandl.com/guide-to-stock-price-calculation`)

   (b) Calculate weekly returns (using adjusted prices)

   (c) Calculate the weekly average return (Note: Remember the difference between arithmetic and geometric averages!)

   (d) Calculate the standard deviation of returns

(e) Calculate log returns and the weekly average log return and compare with the "real" weekly returns

3. (data, returns) Get daily historical prices for the following three financial securities

   - SPDR S&P 500 ETF (symbol: "SPY")
   - Financial Select Sector SPDR Fund (symbol: "XLF")
   - iShares MSCI Emerging Markets ETF (symbol: "EEM")

ranging from Jan 1, 2005 until today from `www.finance.yahoo.com` and load the data into your chosen software.

(a) Plot the adjusted closing prices in the same graph. Does it make sense to plot them in the same graph or should any adjustment be made?

(b) Calculate the daily returns, average daily returns, and standard deviation for each of the three securities

(c) Calculate the variance-covariance matrix of the securities' daily returns

(d) Calculate the correlation of the securities' daily returns