Exercises – Week #37

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. (data, returns) Using the data from Week 36, Exercise 2:
   (a) Find the average return of XOM in annual terms using the returns
   (b) Find the average return of XOM in annual terms using the log-returns
   (c) How big is the difference using the two different methods

2. (data, returns) Using the data from Week 36, Exercise 3:
   (a) Find the average return of the three ETFs in annual terms using the returns
   (b) Find the standard deviation of the three ETFs in annual terms
   (c) Find the variance-covariance matrix in annual terms
   (d) Do we need to do anything with the correlation matrix to get it in annual terms? Why/why not?

3. (yields, cash flows, clean and dirty prices) Go to the Danish stock exchange's home page `http://www.nasdaqomxnordic.com/bonds/denmark`. Pick all the Danish government bullet loans ("stående obligationer") – exclude the ones from Faroe Islands and the SKBVs ("Skatkammerbeviser"). The correct price to use is the "Nasdaq CPH consolidated reference price". Don't forget to note down the date for which the price is given. (For simplicity you may assume that the maturity date for "7 St.I 24 GB" to be "2024-11-15")

   (a) Set up the cash flow for each bond

   (b) Calculate the yield to maturity (YtM) for each bond. Note: Use the correct price (clean/dirty) for calculating YtM.

   (c) Plot the bonds' yields for each maturity a function of time to maturity. Do they look as you would expect? Why/why not?

   Hint: In R, you may find uniroot() and difftime() useful. In Matlab, similar functions are called fzero() and yearfrac(). In Matlab, there are build-in functions to calculate YtM. Try to code it yourself and compare with results from "yldmat()" or "cfyield()". In R, there are similar functions if you add the right package.