COMPUTER ASSIGNMENT 2

The Minimum-Variance and the Beta Portfolio

Data

You need the development of five stocks and an index which is relevant for the stocks. If you use US stocks you can choose DJIA, the Dow Jones Index, or S&P 500, the Standard and Poor 500 index. The development the last 7 years for these can be downloaded from http://dynamic.nasdaq.com/dynamic/nasdaq100_activity.stm.

If you use Swedish stocks you can use OMXS30, OMX Stockholm 30 Index. This can be downloaded from the same site as the stocks.

Choose a period that covers different market conditions, and choose stocks of different kinds, not more than one bank, not more than one pharmaceutical stock and so on.

1 It is very important that dates of the prices for the different assets match. Otherwise the estimated covariances will be far from the real ones and the assignment will make no sense. It is not important if a few days are missing for all assets.

Remove days where data is missing for some of the assets.

2 In order to see the importance of the above: Consider a vector consisting of, say, the daily growths of one of the stock. Remove the first and the last observation, respectively, in this vector. You have created two vectors where the data is translated one day. Calculate the correlation coefficient between these vectors.

3 Calculate the weights of the Minimum-Variance and the Beta Portfolio, respectively. Use the formula

$$\hat{\sigma}_{i,j} = \frac{\sum_{k=1}^{n}(g_{i,k} - \bar{g}_i)(g_{j,k} - \bar{g}_j)}{n\partial t}$$

to estimate the covariances. Here $g_{i,1}, ..., g_{i,n}$ are the growths of asset i.

4 Plot the developments of these two portfolios and the index during a period with varying market conditions (ups and downs). Norm the index so that all three plots start at the same value.

5 The weights may change with time. What are the actual weights in the two portfolios at the end of the period?