Efficient Frontier

`Industry_Portfolios.xlsx` contains monthly nominal (net) returns for ten industry portfolios, expressed in percent. These returns cover the ten-year period from Jan 2004 through Dec 2013.

→ Estimate the vector of mean returns and the covariance matrix of returns for the ten industry portfolios.

→ Create a table showing the mean returns and standard deviation of returns for the ten industry portfolios.

→ Plot the minimum-variance frontier (without the riskless asset) generated by the ten industry portfolios, with expected return on the vertical axis and standard deviation of return on the horizontal axis. This plot should cover the range from 0% to 2%, in increments of 0.1% (or less), on the vertical axis.

→ Briefly explain the economic significance and relevance of the minimum-variance frontier to an investor.

Now suppose that the risk-free rate is 0.13% per month.

→ Plot the efficient frontier (with the riskless asset) on the same plot as the minimum-variance frontier generated by the ten industry portfolios.

→ Briefly explain the economic significance and relevance of the efficient frontier to an investor.

The two frontiers will intersect at single point: the tangency portfolio.

→ Calculate the Sharpe ratio for the tangency portfolio, and also the tangency portfolio weights for the ten industry portfolios.

→ Briefly explain the economic significance and relevance of the tangency portfolio to an investor.

Please compile your results (including graphs and qualitative discussion of economic significance) and programming code into an Adobe PDF or Microsoft Word file. Please submit this file (without compression) to the submission folder for Homework 1 before the start of the lecture on TBA.