Sheet - 3

Asset and Liability Management

7. Consider daily returns of the S&P500, Exxon Mobil Corp., General Electric, AMD, AT&T Inc. and Goldman Sachs (symbols on Yahoo Finance: GSPC, XOM, GE, AMD, T, GS) from January, 1 2005 to January 1, 2007. Historical prices can be downloaded from `http://finance.yahoo.com`.

   - Estimate the expected return for all stocks (let be the vector μ) and the index (let be $\mu_{S\&P500}$).
   - Estimate the covariance matrix Σ for the stocks.
   - Construct your portfolio by solving the following optimization problem

   $$\begin{aligned} &\min_{w}\ w'\Sigma w \\ \text{subject to } &w'e = 1 \\ &w'\mu = \mu_{S\&P500}. \end{aligned}$$

     and try to find a solution for the following optimization problem

   $$\begin{aligned} &\min_{w}\ w'\Sigma w \\ \text{subject to } &w'e = 1 \\ &w'\mu \geq \mu_{S\&P500}. \end{aligned}$$

   - By looking at the time window from January, 2 2007 to January 1, 2008, compare the performance of your portfolio with the performance of the S&P500 index.

Remark See Chapter 8 of the book *Advanced Stochastic Models, Risk Assessment and Portfolio Optimization* by Svetlozar T. Rachev, Stoyan V. Stoyanov, Frank J. Fabozzi, Wiley, 2008.

For any problem or remark, do not hesitate to contact me,

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