

Additional problem for homework assignment #4

We consider the portfolio risk-return trade-off problem of page 185, with the following data:

$$\bar{p} = \begin{bmatrix} 0.12 \\ 0.10 \\ 0.07 \\ 0.03 \end{bmatrix}, \quad \Sigma = \begin{bmatrix} 0.0064 & 0.0008 & -0.0011 & 0 \\ 0.0008 & 0.0025 & 0 & 0 \\ -0.0011 & 0 & 0.0004 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}.$$

To plot the trade-off curve of $\bar{p}^T x$ versus $(x^T \Sigma x)^{1/2}$, generate a large number of positive values of μ (e.g., 100 values logarithmically spaced between 1 and 10^7) using the Matlab command `logspace`. For each value of μ , solve the QP

$$\begin{aligned} & \text{minimize} && -\bar{p}^T x + \mu x^T \Sigma x \\ & \text{subject to} && \mathbf{1}^T x = 1, \quad x \succeq 0, \end{aligned}$$

using the Matlab (or Mosek) command `quadprog`. Save the optimal portfolio vector x , and the corresponding values of expected return $\bar{p}^T x$ and standard deviation $(x^T \Sigma x)^{1/2}$. Then plot the trade-off curve and an area plot as in figure 4.17 (using the `plot` and `area` commands).