

Statistical Method in Finance (5261)

HomeWork 2

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Exercise One

$$(a) \begin{cases} \mu_1 = 2.3\% \\ \mu_2 = 4.5\% \end{cases} \quad \begin{cases} \sigma_1 = \sqrt{6}\% \\ \sigma_2 = \sqrt{11}\% \end{cases} \quad \rho_{12} = 0.17$$

$$E(R_p) = w\mu_1 + (1-w)\mu_2$$

Since we want to achieve 3% rate of expected return:

$$3\% = w \times 2.3\% + (1-w) \times 4.5\%$$

$$\Rightarrow w = 68.18182\%$$

Δ we put 68.18182% portfolio to the first risky asset
31.81818% portfolio to the second risky asset.

$$(b) \sigma_p^2 = w^2 \sigma_1^2 + (1-w)^2 \sigma_2^2 + 2w(1-w) \rho_{12} \sigma_1 \sigma_2$$

$$\text{Here, we get: } (\sqrt{6}\%)^2 = w^2 (\sqrt{6}\%)^2 + (1-w)^2 (\sqrt{11}\%)^2 + 2w(1-w) 0.17 \times \sqrt{6}\% \times \sqrt{11}\%$$

$$\Rightarrow \begin{cases} w_1 = 0.9404 \\ w_2 = 0.4108 \end{cases} \quad \text{there are two possible solution.}$$

Δ Solution one: $\begin{cases} 94.04\% \text{ portfolio should be given to first risky asset} \\ 5.96\% \text{ portfolio should be given to second risky asset.} \end{cases}$

Δ Solution two: $\begin{cases} 41.08\% \text{ portfolio should be given to first risky asset.} \\ 58.92\% \text{ portfolio should be given to second risky asset.} \end{cases}$

To find the Largest expect return:

$$\text{for solution one: } E(R_p^1) = 94.04\% \times 2.3\% + 5.96\% \times 4.5\% = 2.43\%$$

$$\text{for second solution: } E(R_p^2) = 41.08\% \times 2.3\% + 58.92\% \times 4.5\% = 3.596\%$$

Δ Solution Two has Largest expect return (3.596%)

$$\text{portfolio is } \begin{cases} w = 41.08\% \rightarrow \text{first risky asset} \\ 1-w = 58.92\% \rightarrow \text{second risky asset} \end{cases}$$

Exercise Two

$$\begin{cases} \sigma_{RT} = 5\% \\ \sigma_T = 7\% \end{cases} \quad \begin{cases} \mu_f = 1.5\% \\ \sigma_f = 0 \end{cases} \quad \sigma_{Rp} = w \sigma_T$$

Since we want the standard deviation of our return to be 5%

$$\Rightarrow \sigma_{Rp} = 5\% = w \times \sigma_T = w \times 7\% \Rightarrow w = \frac{5\%}{7\%} = 71.43\%$$

Thus: $\begin{cases} 71.43\% \text{ proportion of my capital should put in to risky asset} \\ \quad \text{where } \begin{cases} 71.43\% \times 65\% = 46.43\% \text{ should be given to C} \\ 71.43\% \times 35\% = 25\% \text{ should be given to D.} \end{cases} \\ 28.57\% \text{ proportion of my capital should put into risk-free asset} \end{cases}$