Marginal VaR equal

协方差法

$$MVaR_1 = \mathrm{Z} \times \frac{cov_{1p}}{\sigma_p} \text{ and } MVaR_1 = \mathrm{Z} \times \frac{cov_{1p}}{\sigma_p}$$

$$=> \mathrm{Cov}_{1\mathrm{p}} = Cov_{2p}$$

$$=> w_1\sigma_1^2 + w_2\rho_{12}\sigma_1\sigma_2 = w_2\sigma_2^2 + w_1\rho_{12}\sigma_1\sigma_2$$

$$=> \frac{w_1}{w_2} = \frac{\sigma_2^2 - \rho_{12}\sigma_1\sigma_2}{\sigma_1^2 - \rho_{12}\sigma_1\sigma_2}$$

$$=> \frac{w_1}{w_2} = \frac{\sigma_2^2}{\sigma_1^2} \text{ 如果 2 个资产是独立的}(\rho_{12} = 0)$$

矩阵法

$\mathrm{C} = \begin{bmatrix} \sigma_1^2 & \rho_{12}\sigma_1\sigma_2 \\ \rho_{12}\sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix}$是协方差矩阵，$\vec{w} = \begin{bmatrix} \mathrm{w}_1 \\ w_2 \end{bmatrix}$是权值向量，新向量 $\vec{c} = \mathrm{C} \times \vec{w}$ 的每个元素就是每个资产和组合的协方差

$$\vec{c} = \mathrm{C} \times \vec{w} = \begin{bmatrix} \sigma_1^2 & \rho_{12}\sigma_1\sigma_2 \\ \rho_{12}\sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix} \times \begin{bmatrix} \mathrm{w}_1 \\ w_2 \end{bmatrix} = \begin{bmatrix} w_1\sigma_1^2 + w_2\rho_{12}\sigma_1\sigma_2 \\ w_2\sigma_2^2 + w_1\rho_{12}\sigma_1\sigma_2 \end{bmatrix}$$

矩阵法适合多个资产，很灵活