

Homework 6 (due Tuesday 10/30)

Consider a portfolio consisting of stock 1 (Exxon Mobil), stock 2 (Microsoft) and stock 3 (Wal-Mart). Here are some notation and formulas:

- the average daily return: μ_1, μ_2, μ_3
- the standard deviation of daily return: $\sigma_1, \sigma_2, \sigma_3$
- the correlation between daily returns of two stocks: $\rho_{12}, \rho_{13}, \rho_{23}$
- the proportion of each stock in the portfolio: c_1, c_2, c_3
- the average daily return of the portfolio: $\mu = c_1 \mu_1 + c_2 \mu_2 + c_3 \mu_3$
- the variance (risk) of the portfolio:

$$\sigma^2 = c_1^2 \sigma_1^2 + c_2^2 \sigma_2^2 + c_3^2 \sigma_3^2 + 2 c_1 c_2 \rho_{12} \sigma_1 \sigma_2 + 2 c_1 c_3 \rho_{13} \sigma_1 \sigma_3 + 2 c_2 c_3 \rho_{23} \sigma_2 \sigma_3$$

Do the following problems:

- (1) Download the data (daily closing prices) of the three stocks for the time period 8/7/07 – 10/9/07 into an Excel file, and calculate the values of $\mu_1, \mu_2, \mu_3, \sigma_1, \sigma_2, \sigma_3, \rho_{12}, \rho_{13}, \rho_{23}$.
- (2) Consider portfolio 1 with $c_1 = 0.4, c_2 = 0.4, c_3 = 0.2$. Calculate its average return and risk.
- (3) Consider portfolio 2 with $c_1 = 0.1$. Determine c_2 and c_3 such that portfolio 2 has the same average return as portfolio 1.
- (4) Calculate the risk of portfolio 2.