

HW 5

MFE 400: Investment

Professor Chernov

Group 6

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Step 1 – Calculate the returns

Using the data provided, we first calculated monthly returns and annual return from 1/3/1972 to 12/30/2017 and the 5-year return from 1/3/1972 to 12/30/2016. The returns were calculated as follows,

- Daily Returns (R_d) are given in column *vwretd*
- Monthly Returns (R_m) = sum of the return values (from column *vwretd*) that are from the same year and same month
- Annual returns (R_a) = sum of the return values (from column *vwretd*) that are from the same year
- 5-year returns (R_{5yr}) = take the sum of the return values (from column *vwretd*) every five years

Step 2 – Calculate the annualized mean of return

We calculated arithmetic and geometric mean of the daily, month, annual and 5-year returns by using the following formulas,

Arithmetic means

$$\text{Annualized } \bar{R}_{\text{Daily}} = \frac{\text{Sum of all daily returns}}{\text{Total number of days}} \times 252 = 0.1149613$$

$$\text{Annualized } \bar{R}_{\text{Monthly}} = \frac{\text{Sum of all monthly returns}}{\text{Total number of months}} \times 12 = 0.1150704$$

$$\text{Annualized } \bar{R}_{\text{annual}} = \frac{\text{Sum of all annual returns}}{\text{Total number of years}} = 0.1150704$$

$$\text{Annualized } \bar{R}_{5\text{-year}} = \frac{\text{Sum of all 5-year returns}}{\text{Total number of 5-years}} \times \frac{1}{5} = 0.1131569$$

Geometric Means

$$\text{Annualized } \bar{R}_{\text{Daily}}^G = \{[(1 + R_{d_1})(1 + R_{d_2}) \dots (1 + R_{d_{11603}})]^{\frac{1}{11603}}\}^{252} - 1 = 0.1059692$$

$$\text{Annualized } \bar{R}_{Monthly}^G = \{[(1 + R_{m_1})(1 + R_{m_2}) \dots (1 + R_{m_{552}})]^{\frac{1}{552}}\}^{12} - 1 = 0.1060749$$

$$\text{Annualized } \bar{R}_{annual}^G = [(1 + R_{a_1})(1 + R_{a_2}) \dots (1 + R_{a_{46}})]^{\frac{1}{46}} - 1 = 0.1060749$$

$$\text{Annualized } \bar{R}_{5-year}^G = \{[(1 + R_{5yr_1})(1 + R_{5yr_2}) \dots (1 + R_{5yr_9})]^{\frac{1}{9}}\}^{\frac{1}{5}} - 1 = 0.1036667$$