

Minimum variance portfolio

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Minimum Variance Portfolio

Variance refers to the rate of inconsistency in various related variables. In the context of this paper, portfolio refers to a group of stock that is possessed by an individual or firm. Therefore, minimum variance portfolio (MVP) refers to the least possible level of inconsistency in the rates of stock possessed in a stock market by an individual or firm. Minimum variance portfolio is important for the purpose of valuation and prediction of variables, such as stock.

For the purpose of this paper, the Microsoft Excel file attached will be the basis of our minimum variance portfolio. It shows the rates of stock for a year running. This MVP analysis was preceded by the calculation of correlation matrix of the stocks as well as their standard deviation variance. Both these values are indicated on the Microsoft Excel attachment.

Maple Syntax Test

During the calculation of the correlation matrix and the standard deviation variance, Maple concepts were used. This section of the paper is going to test and prove the validity of the procedures and statements used in order to ascertain that no syntax errors were committed during the process. This can be proven as follows:

Use of the colon and comma: in Maple, statements must end with a colon and arguments separated with a comma (Monagan, Geddes et al., 14). For instance, during the development of correlation, for example in Standard Life stock, we use the formula = CORREL(N3: JF3, N3: JF3). The comma shows the distinction of the two arguments while the colon relates one variable to the other.

Use and match of parentheses: a Maple can only be executed if the

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arguments are enclosed in parentheses. The opening parenthesis must be similar to the closing one (Monagan, Geddes et al., 19). In the attached case, all the maps have the parentheses () matching in all stocks.

Division and multiplication signs: a back stroke (/) is used for division while asterisk (*) is used for multiplication (Monagan, Geddes et al., 18).

Creation of Matrices, MVP and Portfolio

The syntax provided is an M X M square matrix of stocks, as shown in the attachment. The correlation coefficient between i and j (for example between Standard Life and Resolution) is given by the (ij)th element. All diagonal elements are 1.0000 since this is correlation of variables with themselves (Monagan, Geddes et al., 59).

The total risk is a function of all five components of the stock:

$$W = \sum_j M_j$$

Total Risk(Diag Matrix) = Tot risk * Diag matrix.

Minimize $W = \text{Corr}(5; \text{Standard life, Petrofac, Glencore Xstrata, Resolution, Vodafone Group})$

In calculation of MVP, we must use the standard deviation and correlation of the stocks provided. Standard deviation can be calculated following the following steps:

Divide the value of each stock with its preceding one and subtract one from the result; which in our instance we are going to take Standard Life as an example. The standard deviation presented on 1/1/2013 is determined as the value of the stock on 1/1/2013 divide by the value on 31/12/2012 and subtract one from the result. Mathematically, this is:

$(332.1/334.6) - 1$ to get -0.0075 . We do the same for the standard deviation of all stocks for each day, and this has been done on the red

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coloured parts of the Excel attachment that extends from cell N3 to cell JG3.

Once this has been determined, we calculate correlation as follows:

Get the risk value of one stock and divide it by the standard deviation

obtained for the other four stocks. This can be expressed as, correlation = risk/(SD of stock one)(SD of stock two)(SD of stock three)(SD of stock four).

In the Excel attachment file, this correlation is found in the region extending from G3 to H3. To get MVP, then we proceed as follows:

$$W(\text{stock 1}) = (\text{SD stock 1}) / ((\text{SD stock 2}) + (\text{SD stock 3}) + (\text{SD stock 4}) + (\text{SD stock 5})).$$

From the valuation, the portfolio would consist of 0. 246928 of STANDARD LIFE, 0. 336753 of PETROFAC, 0. 296969 of GLENCORE XSTRATA, 0. 18714 of RESOLUTION and 0. 195374 of VODAFONE GROUP.

Conclusion

The portfolio calculated is from the MVP of each of the five stocks. Valuation at the rates will give the minimum variance possible of the stocks value.

Works Cited

Monagan, B., Geddes, K. et al. Maple: Introductory Programming Guide. Canada: Waterloo Maple Inc, 2009.