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Mean-Variance Investment Without Risk-Free Assets in PT Company Shares PT Ace Hardware (Aces.Jk), PT Mayora Indah (Myor.Jk), PT Bri (Bbri.Jk), PT Siloam Hospital (Silo.Jk), PT Eterindo Wahanatama (Etwa.Jk)

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Abstract

Portfolio is a form of strategy that investors often apply in risky investment conditions. The essence of portfolio construction is to allocate funds to various investment options to minimize investment risk. Therefore, the aim of this discussion is to construct an investment portfolio of several shares using an average variable portfolio optimization model without risk-free assets. To obtain an optimal portfolio, a mean-variance investment optimization model without risk-free assets or what is called the Basic Markowitz model is used. This involves investors measuring the risk of an asset using its "variance" and then comparing it to the asset's average. It is hoped that this discussion can help investors to obtain an optimal portfolio, especially from the five selected shares.

Keywords: Investment, risk-free assets, portfolio, basic Markowitz

1. Introduction

In modern times, investment is one of the activities that has the greatest interest in the business world (Frieden, 1991). Investing in financial assets is quite attractive for most investors, both institutional and individual investors (Renneboog, 2008). In investing, investors can choose to invest their funds either only in risk-free assets or only in risk-free assets, or a combination of the two assets (Lintner, 1975).

An investor's choice of assets to invest in depends on the extent of the investor's preference for risk. In determining the assets, it is used by determining risk-free assets, where these risk-free assets are assets whose future rate of return can be ascertained at this time, and is indicated by the return variance value equal to zero (Walia, 2009). Thus, this report was created with the aim of showing an analysis of the Mean-Variance portfolio optimization model without risk-free assets.

2. Material and Method

2.1 Material

Stock data used in this portfolio is obtained from a website that can be accessed via https://finance.yahoo.com. From several stock options available on the website, the shares that will be used as a portfolio in this report are selected, namely ACE Hardware shares (ACES.JK), Mayora Indah shares (MYOR.JK), BRI Bank shares (BBRI.JK), Shares Siloam Hospitals (SILO.JK), and Eterindo Wahanatama Shares (ETWA.JK).

2.1 Method

The steps for the selected portfolio optimization model begin with determining the stocks to be taken. In deciding which stock to take, you must look for a return on a financial asset. In calculating the return on assets using a one-year

time interval. After getting the shares to be selected, then calculate the estimated average value and stock return data using a deterministic approach, or a probabilistic approach, a time series approach.

The next step is how to select an efficient portfolio. In choosing an efficient portfolio, you must maximize the expected value μ_p of portfolio returns and minimizing portfolio risk, which is measured by σ_p^2 or σ_p. After finding an efficient portfolio, then calculating the ratio of the mean to variance and analyzing the most ideal ratio.

3. Result and Discussion

3.1 Stock Data Analysis

Stock data used in this portfolio is obtained from a website that can be accessed via https://finance.yahoo.com. From the several choices of stocks available on the website, the stocks that will be used as a portfolio in this report are selected, namely ACES.JK, MYOR.JK, BBRI.JK, SILO.JK, ETWA.JK. The stock data taken is data for the monthly period from 1 June 2018 - 1 June 2023. After the share data for the share value is obtained, then the average expected value will be sought using the following formula (McInish, 1990).

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}}$$

$$E(R_i) = \frac{\sum_1^n R_{it}}{n}$$

$R_{it} =$ Stock return i in period t
$P_{it} =$ Stock price i in period t
$P_{it-1} =$ Stock price i in period $t-1$
$n =$ The amount of data retrieved

The average expectation for each share is obtained as follows:

ACES.JK : - 0.0063
MYOR. JK : 0.0010
BBRI.JK : 0.0147
SILO.JK : 0.0244
ETWA.JK : 0.0336

Then look for the covariance value of the stock, then it is obtained as Table 1.

Table 1: Covariance Value

Sigma				
0.01053	0.00033	0.00181	-0.00155	-0.00655
0.00033	0.00546	0.00001	-0.00040	0.01409
0.00181	0.00001	0.00604	-0.00019	-00014
-0.00155	-0.00040	-0.00019	-0.2160	0.00221
-00655	0.00149	-0.00014	-0.0221	0.05865

The next step is to find the value of λ with the following formula (assumptions $\tau = 0.000$):

$$\lambda = \frac{1 - 2\tau\mu^{T-1}\sum e}{e^{T-1}\sum e}$$

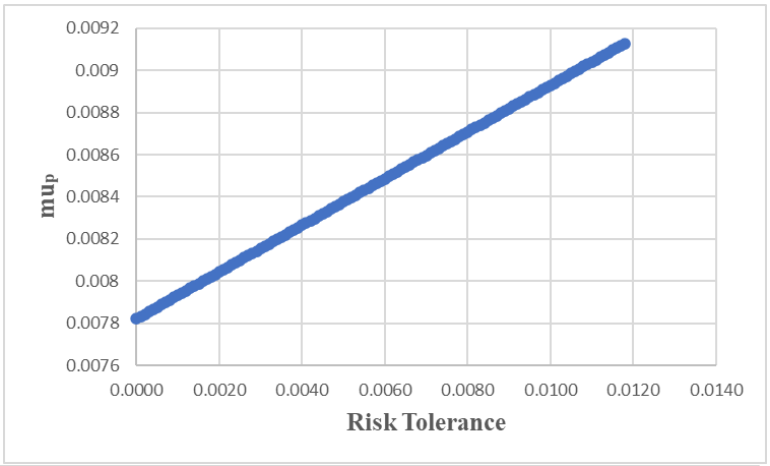
earned value $\lambda = 0.00209$

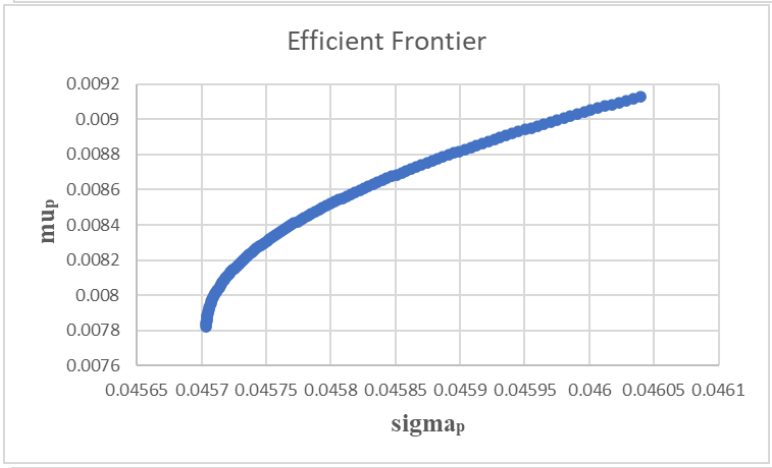
Then find the optimal weight value for each share, using the following formula:

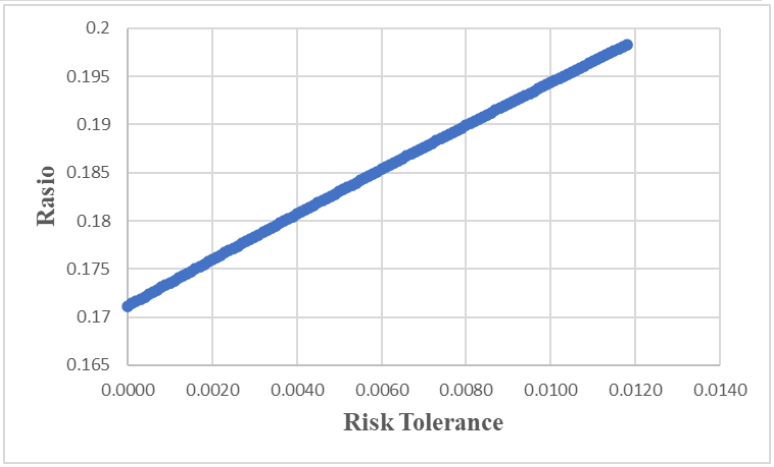
$$\mathbf{w} = \underset{s.t.\, w\ e\ =\ 1}{\Sigma^{-1}\ (2\tau\mu\ +\ \lambda e)}$$

The following covariance values are obtained:

Through the calculation results obtained graph as Figure 1.







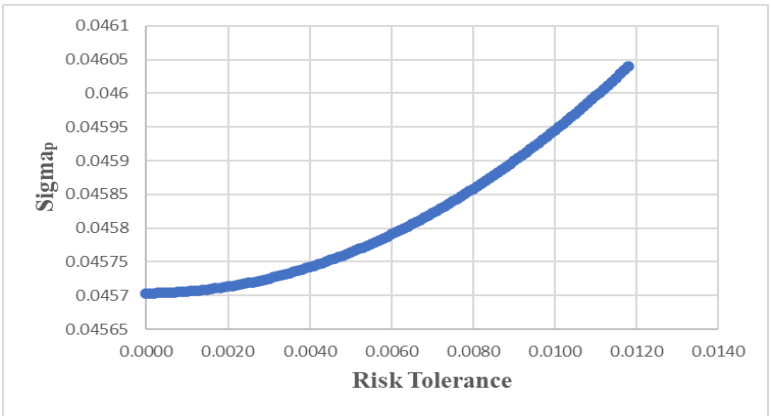


Figure 1: results obtained graph

4. Discussion

a. The risk tolerance for the Mean-Variance without risk-free assets on the five stocks is at the interval of $0.000 \leq \tau \leq 0.0118$.

b. The minimum portfolio for the Mean-Variance model without risk-free assets for the five stocks obtained an average return of 0.0078222 with a variance of 0.0457036.

c. The maximum portfolio for the Mean-Variance model without risk-free assets for the five stocks obtained an average return of 0.0091288 with a variance of 0.0460398.

d. The optimal portfolio for the Mean-Variance model without risk-free assets for the five stocks obtained an average return of 0.0088077 with a variance of 0.0458951.

e. Optimum portfolio weight for the Mean-Variance model without risk-free assets in the five proportions of ACES.JK shares = 0.156492583; MYOR.JK = 0.346140788; BBRI.JK = 0.3234613; SILO.JK = 0.1257437 and ETWA.JK = 0.0481617.

5. Conclusion

In determining the optimal allocation of investment portfolio weights to assets without being risk-free, the Mean-Variance investment portfolio optimization model, which is the basic model of Markowitz, can be used. This model is used by including risk-free assets in ACE Hardware shares (ACES.JK), Mayora Indah Shares (MYOR.JK), BRI Bank Shares (BBRI.JK), Siloam Hospital Shares (SILO.JK), and Eterindo Wahanatama Shares (ETWA. JK). So the optimum portfolio weight for the Mean-Variance model without risk-free assets for the five ACES.JK share proportions = 0.156492583; MYOR.JK = 0.346140788; BBRI.JK = 0.3234613; SILO.JK = 0.1257437 and ETWA.JK = 0.0481617.

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