

An Empirical Study on the Return Distribution of the Mobile Network Companies in Malaysia Stock Market

Lam Weng Siew*, Lam Weng Hoe

Centre for Business and Management, Department of Physical and Mathematical Science, Faculty of Science, Universiti Tunku Abdul Rahman, Kampar Campus, Perak, Malaysia

Abstract

Mobile network sector is one of the important sectors in Malaysia which provides the network communication services to the users. The investors can get the return through the investment of the mobile network companies which are listed in Malaysia stock market. However, the investors will be exposed to the risk of loss in the investment. The mean-absolute deviation model is a portfolio optimization model that has been applied in the past studies to construct the optimal portfolio which can achieve the positive return at minimum risk of loss. The objective of this paper is to study and determine the characteristic of the return distribution of the mobile network companies that listed in Malaysia stock market. Furthermore, an optimal portfolio that consists of the mobile network stocks is constructed by using the mean-absolute deviation model. The results of this study show that the return of the mobile network companies exhibits skewness and kurtosis. The return distribution for the mobile network companies are different in terms of mean, standard deviation, skewness and kurtosis. The constructed optimal portfolio is able to achieve positive return at minimum risk. This study is significant because it will benefit the investors to obtain the positive return at minimum risk through the investment of these mobile network companies in Malaysia.

Keywords

Investment, Mean, Standard Deviation, Mobile Network, Mean-Absolute Deviation Model

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1. Introduction

The mobile network companies play an important role in Malaysia by providing the network communication services to the users. The mobile network issues have been studied by the past researchers in different countries [1-7]. Investors can generate the return through the investment in the mobile network companies that listed in Malaysia stock market. In stock market investment, the investors wish to minimize the investment risk and obtain the target rate of return. Risk is a chance that an actual return of the investment will be different from the expected return [8]. Portfolio optimization is an investment strategy that has been used to minimize the investment risk by constructing an optimal portfolio [9].

Konno and Yamazaki [10] have proposed the mean-absolute deviation model in portfolio optimization in order to minimize the risk and can achieve the investors target rate of return. The objective function of this model is to minimize the portfolio risk which is represented by the portfolio absolute deviation. The expected return from the investment is represented by the portfolio mean return. The mean-absolute deviation model has been studied in portfolio optimization by the past researchers [11-13]. In Malaysia, there are three main mobile network companies which are listed on Malaysia stock market. The objective of this paper is to study and determine the characteristic of the return distribution of the mobile network companies that listed in Malaysia stock market. An optimal portfolio is constructed

* Corresponding author

E-mail address: lamws@utar.edu.my (L. W. Siew), whlam@utar.edu.my (L. W. Hoe)

from these mobile network companies by using the mean-absolute deviation model. The rest of the paper is organized as follows. The next section presents the materials and methods applied in this study. Section 3 discusses about the mean-absolute deviation model in constructing the optimal portfolio for the investment in mobile network companies. Section 4 shows the empirical results of this study. Finally, section 5 concludes the paper.

2. Materials and Methods

The data of this study consists of weekly return of the main mobile network companies which are listed in Malaysia stock market. The mobile network companies are Axiata Holdings (AXIATA), Maxis Berhad (MAXIS) and Telekom Malaysia Berhad (TM). The period of this study covers from January 2011 until December 2014. The characteristic of the return distribution of these three mobile network companies are studied in this paper which are mean, standard deviation, skewness and kurtosis. Mean is the average of the group of data observed [14]. Standard deviation is a measure of the dispersion of a set of data from its mean [15]. Skewness is a measure of the asymmetry of the probability distribution of a random variable about its mean [16]. Kurtosis is a measure of the peakedness of the probability distribution of a random variable [17]. The histogram for the return of these three mobile network companies are also presented in this study. The histogram is a graph that displays the data by using vertical bars of various heights to represent the frequencies of the classes [18]. The optimal portfolio is then constructed from these mobile network companies using the mean-absolute deviation model. In this study, the optimal portfolio composition, portfolio mean return and portfolio risk are computed by using the mean-absolute deviation model.

3. Mean-Absolute Deviation Model

Optimization model is a mathematical model which applies the scientific approach in decision making. It is a mathematical representation of an actual situation or problem that may be used to make better decisions. The optimization model consists of three components, which are the decision variables, constraints and objective function. The decision variables are the random variables which are determined in the decision process [19]. Constraints represents the problem or situation which must be satisfied by the decision variables [20]. Objective function is the goal that need to be achieved in solving the problem [21]. The model actually seeks to find

values of the decision variables that optimize an objective function among the set of all values for the decision variables that satisfy the given constraints [22]. In portfolio management, the portfolio is constructed by determining all the decision variables through optimization model. Different optimization models have been studied by the past researchers in Malaysia stock market to construct an optimal portfolio [23-27]. The mean-absolute deviation model is one of the optimization models which is introduced by Konno and Yamazaki [10]. The mean-absolute deviation model is formulated as follow.

$$\text{Minimize } w(x) = E\left[\sum_{j=1}^n R_j x_j - E\left[\sum_{j=1}^n R_j x_j\right]\right] \quad (1)$$

$$\text{subject to } \sum_{j=1}^n E[R_j] x_j \geq \rho \quad (2)$$

$$\sum_{j=1}^n x_j = 1 \quad (3)$$

$$x_j \geq 0, j = 1, \dots, n \quad (4)$$

x_j is the weight invested in stock j ,

R_j is the return of stock j ,

n is the number of stocks,

$E[R_j]$ is the mean return of stock j ,

ρ is a parameter representing the target rate of return required by an investor.

Equation (1) is the objective function of the mean-absolute deviation model which minimizes the risk of the portfolio. Constraint (2) ensures the portfolio achieves the investor's target rate of return. Constraint (3) ensures that total weights of stocks invested in the portfolio equal to one. Constraint (4) ensures that the weight invested in stock j is positive.

4. Empirical Results

Table 1 presents the summary statistics for the three mobile network companies which are AXIATA, MAXIS and TM that listed in Malaysia stock market. The mean, standard deviation, skewness and kurtosis for the three mobile network companies are the summary statistics that reported in Table 1.

Table 1. Summary Statistics for the Mobile Network Companies.

Company Name	Mean Return	Standard Deviation	Skewness	Kurtosis
AXIATA	0.0019	0.0201	0.1551	5.3338
MAXIS	0.0013	0.0146	-0.2480	4.4718
TM	0.0032	0.0218	-0.4644	5.4544

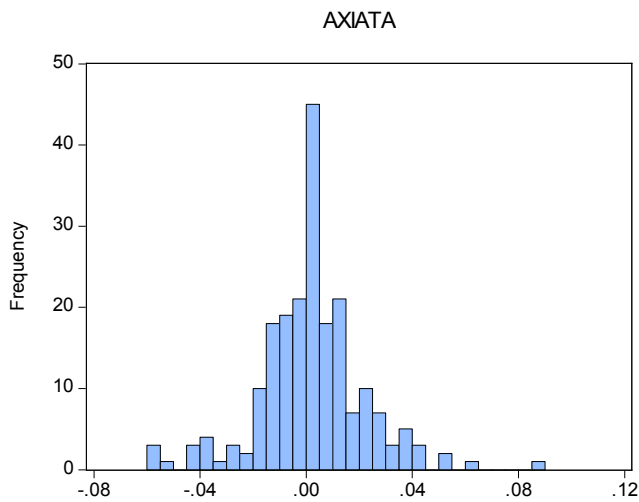


Figure 1. Histogram for the Return of AXIATA Company.

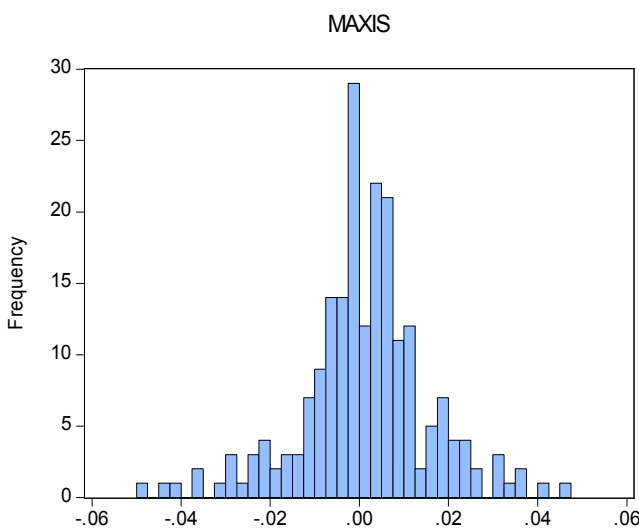


Figure 2. Histogram for the Return of MAXIS Company.

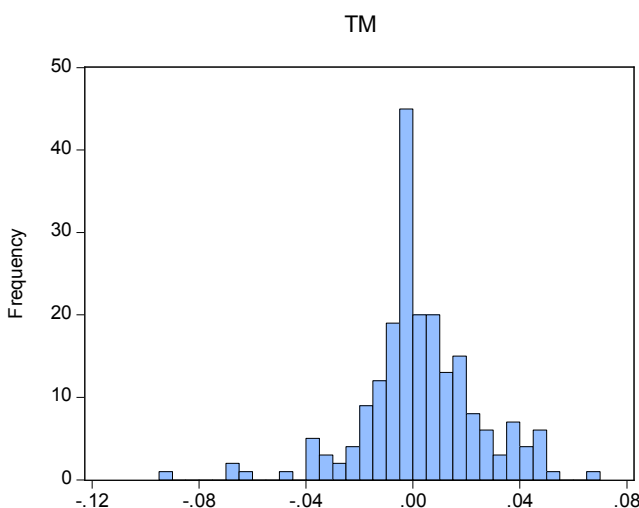


Figure 3. Histogram for the Return of TM Company.

As reported in Table 1, TM (0.0032) gives the highest mean return followed by AXIATA (0.0019) and MAXIS (0.0013). For the comparison of standard deviation, TM (0.0218) gives

the highest standard deviation followed by AXIATA (0.0201) and MAXIS (0.0146). On the other hand, AXIATA (0.1551) gives the highest skewness followed by MAXIS (-0.2480) and TM (-0.4644). As for the kurtosis of the return distribution, TM (5.4544) gives the highest kurtosis followed by AXIATA (5.3338) and MAXIS (4.4718). Figure 1, 2 and 3 show the histogram for the return of AXIATA, MAXIS as well as TM respectively. Based on Table 1, the result indicates that the three mobile network companies exhibit positive and negative return.

As shown in Figure 1 to Figure 3, AXIATA, MAXIS and TM companies exhibit different return distribution in terms of mean, standard deviation, skewness and kurtosis. This implies that the return distribution for these three mobile network companies are different. Table 2 displays the optimal portfolio composition of mobile network companies which is constructed using mean-absolute deviation model.

Table 2. Optimal Portfolio Composition of Mean-Absolute Deviation Model.

Company	Weights (%)
AXIATA	19.10
MAXIS	69.86
TM	11.04

As reported in Table 2, the constructed optimal portfolio of the mean-absolute deviation model consists of different weights in percentage for each mobile network companies. The optimal portfolio consists of AXIATA (19.10%), MAXIS (69.86%) and TM (11.04%). MAXIS is the largest component whereas TM is the smallest component in the optimal portfolio. Table 3 shows the mean return and risk of the optimal portfolio which is constructed using the mean-absolute deviation model.

Table 3. Mean Return and Risk of the Optimal Portfolio.

	Optimal Portfolio
Mean Return	0.0016
Risk	0.0099

As shown in Table 3, the optimal portfolio of the mean-absolute model gives the mean return (0.0016) at the minimum risk of 0.0099. This implies that the investors can achieve the expected rate of return at the minimum risk through the investment of these mobile network companies in Malaysia stock market by using the mean-absolute deviation model.

5. Conclusion

This study discusses about the characteristic of the return distribution of the three mobile network companies which are AXIATA, MAXIS and TM that listed in Malaysia stock market. The optimal portfolio is then constructed from these

mobile network companies by using the mean-absolute deviation model. The results of this study show that the return distribution of the three mobile network companies exhibit skewness and kurtosis. The return distribution for these mobile network companies are different in terms of mean, standard deviation, skewness and kurtosis. Besides that, the results show that all the mobile network companies give different weights in the optimal portfolio. This study is significant because the investors can minimize the risk of loss and achieve the target rate of return through the investment of the optimal portfolio constructed using mean-absolute deviation model. The future research of this study should be extended to other sectors for the investment other than mobile network companies for diversification.

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