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Optimal Portfolio: Case Study in Main Board and Development Board Indonesia Stock Exchange

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ABSTRACT

This study analyzed to obtain optimal portfolio with single index model and then compare this performance use Sharpe Index. The sample in this study is based on purposive sampling method on the basis of certain criteria. There are 26 companies in Main Board and 49 companies in Development Board are selected since forming optimal portfolio with single index model. The result shows that there are differences between optimal portfolio performance of Main Board and market portfolio (performance of Main Board), between optimal portfolio performance of Development Board and market portfolio (performance of Development Board). In addition, the difference also happens between optimal portfolio Main Board and optimal portfolio Development Board.

Keywords: Portfolio, Single Index Model, Main Board, Development Board

Investment prospect of Indonesian Stock Exchange (IDX) will give a good return with level of risk that can be measured. Indonesian Capital Market has become more interesting since the enterprise can issue the stock and then sell it in capital market to get found without the fixed rate interest like banking (Eko, 2008). On the other hand, development capital market is also as influence of the increasing of public awareness for investing or being investors (Eko, 2008). Capital market becomes an alternative for the public to invest besides of real investment.

Realistic investors will choose the stock that gives a maximum expected return or gives a minimum risk (Bilbao et al, 2006). They invest not only in one instrument of investment but also in various instruments of investment. Invest in capital market is not only in one stock but also in several stocks (Bilbao et al, 2006). Investors make diversification strategy by forming portfolio optimization. This form obtains to minimize the risk or maximize the expected return (Brigham and Daves, 2004).

Making investment decision, investor behavior is influenced by an investor preference

about the return and the risk. Generally, the investors are persons who avoid the risk (Jones, 2004). An investor will always invest in an efficient portfolio (Jones, 2004; Pástor, 2000). In one hand, if he wants a certain amount of risk, he aims for the highest possible expected return. On the other hand, if he wants a specific expected return, he likes to achieve it with the minimum possible amount of risk. Investment's alternative that was selected depends on the investor's willingness in getting the risk and the expected return from his investment.

The research on portfolio about return and risk has been conducted in Indonesia. Manupasa (2001), Sudaryanto (2001), Wahyudi (2001), Pamungkas (2001), Budi (2002), Pujiani (2007), Rachmanto (2002), and Sukarno (2007) have conducted to form portfolio optimal using Single Index Model. They have compared the performance portfolio optimal and market portfolio.

Single Index Model is chosen for conducting this study since this model is the simplest model in forming an optimal portfolio. Single index model was developed by Gruber (2005). In this model, stocks which are included into the portfolio candidate are stocks that have value of Excess Return to Beta (ERB) higher than the value of Ci (cut-off rate). Ali (2008) and Wong et al (2008) in his article said that the Single Index Model is one potential solution for simplifying the calculation and examining the effectiveness of the optimal portfolio in different conditions.

Effendi and Muafi (2001) said that the final part of an investment process is to evaluate the investment performance. Based on the Bapeppam criteria, stock index has been divided into Main Board (MB) and Development Board (DB). Bapepam divides the index valuation into some categories of Main Board which their assessment of financial and operational conditions is very good. In addition, the Development Board of which their assessments of financial and operational performance are low but has a good business prospect. Assessment of the MB performance is better than DB performance and market performance.

One thing that can be used as a benchmark in comparing the portfolio performance is the index of each portfolio, which represents the market portfolio. Effendi and Muafi (2001) said that one of the parameters to measure the portfolio performance portfolio is return.

It is very interesting to investigate stocks that forming portfolio optimal from Development Board stocks. This is due to Development Board are categorized as stocks that give less benefits compared to Main Board, but Development Board seems prospect if it is viewed from an average of monthly return, so we can compare between portfolio performance Main Board and Development Board.

According to Sharpe, Alexander and Bailey (1995) if the investor faced two choices, he will choose the rational portfolio or efficient portfolio, which is a portfolio that gives the same benefits with less risk or with same risk level but gives higher return. Efficient or non-efficient portfolio requires a comparison because there is no standard assessment of portfolio performance (Manurung: 2000). There are three indices to measure the portfolio performance, they are Sharpe Index, Treynor Index, and Theta Index. These indices are used as a comparison between the portfolio that can be formed by the investor. Based on these indices, efficient portfolio is a portfolio that has a higher index value than the benchmark portfolio. The using of the Sharpe Index, Treynor Index, and Theta Index is based on the presence of variable risk and return so that the two variables can be a benchmark against market risk and return portfolio that will produce optimum performance.

Research on the portfolio performance and the market portfolio gives different results. This research is interesting to be conducted to confirm the results of previous research on portfolio performance and the market portfolio performance. The groups which are formed in the optimal portfolio have different return and risk, by thus this research is important to compare market portfolio and optimal portfolio performance. There are only few of research

that are conducted on both forming and evaluating portfolio performance together.

Single Index Model

Sharpe (1964) developed the Single Index Model which relates returns on each security to the returns on a common index. Single Index Model can be used for simplifying Markowitz Model with prepare the parameter that are used in calculating Markowitz Model. In the other hand, Single Index Model can be used for calculating portfolio expected return and portfolio risk.

Single index model assumes that the co-movement between stocks is due to the single common influence by market performance (Elton & Gruber, 1997; M. Asai et al, 2008). Hence, the measure of this index can be found by relating the stock return to the return on a stock market index.

The single index model divides a security's return into two components: a unique part, represent by α_i that is independent to market return and a component of return that is related to market represent by $\beta_i R_m$. The unique part is a micro event, affecting an individual company but not to all companies in general. The market part, on the other hand, is a macro event that is broad based and affects all firms. Acc to these values, the error term is different between the left-hand side of the equation, the return on security *i*, and the right-hand side of the equation, the sum of the two components of return. Since the single index model is an equality, therefore the two sides must be the same (Viviani, 2001; Hartono, 2008).

Research Framework and Hypothesis

Harry Markowitz introduced the first modern portfolio theory. In his paper Portfolio Selection, he said that the process of selection portfolio is divided into two stages (Markowitz, 1952). The first stage is started with observation and experience, and ended with beliefs that future performance will be available in securities. The second stage is started with relevant belief that the future performance and ended with the choice of portfolio. Portfolio theory of Markowitz is often called as Mean-Variance (MV) Model. This theory based on the approach of mean and variance and emphasized at the effort to maximize expected return and risk minimization to choose portfolio. The term mean refers to the mean or the expected return of the investment and the variance is the measure of the risk associated with the portfolio.

Empirical research shows that more and more type of stock that are collected in portfolio, then risk of stock loss which one earning can neutralized with gain at other stock. Portfolio theory uses assumption that capital market is efficient or in the other term is efficient market hypothesis. The meaning of efficient capital market is prices of stock represent all information at stock exchange (Reily and Brown, 2003).

There are different results in portfolio research between performance of optimal portfolio and performance of market portfolio. Market efficient assumes that performance of optimal portfolio will be higher than the performance of the market portfolio, but the dynamic market assumes that performance of market portfolio will be higher than the optimal portfolio.
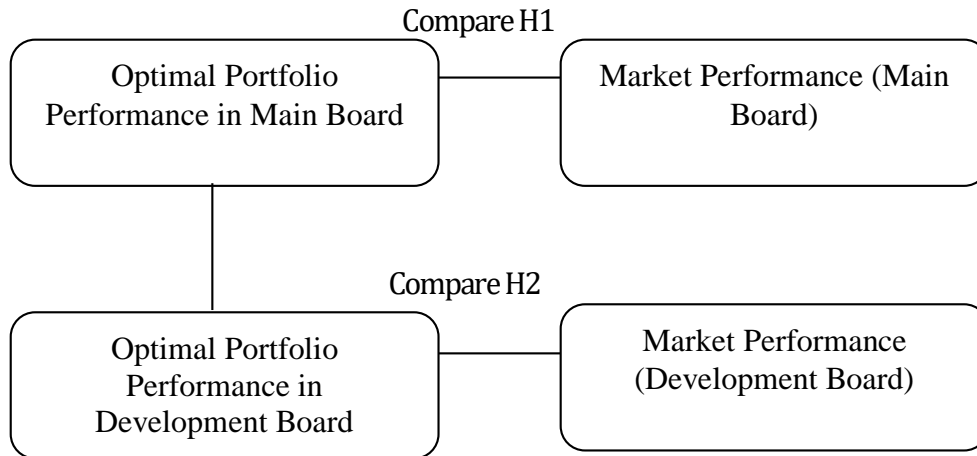
Figure 1. Research Framework

Dutt (2003) conducted a research with 100 stocks listed on indices BSE in India in the period of October 2002-April 2003. Optimal portfolio formation is done by using Single Index Model. From this model, 31 stocks form the optimal portfolio and the 31 all stocks are in the banking sector. Haruman & Hasbi (2005) measured the performance of mutual fund listed in Jakarta Islamic Index. This research found that there are 5 mutual funds Sharia have higher performance and higher return than his market in Jakarta Islamic Index. They used Sharpe Index, Treynor Index, and Jensen Index for measure performance portfolio.

Sudaryanto (2001), Wahyudi (2001), and Purnama (2001) said that Single Index Model is able to select stocks with certain risks that resulted in optimal returns. Pamungkas (2001) compared the optimal portfolio of mutual fund shares with the average mutual fund shares. The results of the study said that the optimal portfolio gives a greater return than the mutual fund shares. This study used the single index model to determine the optimal portfolio.

The result about comparison performance portfolio is debatable. Manupasa (2001) found that there are not differences in stock returns of mutual funds with a return portfolio LQ45 that is formed with Single Index Model, but there are differences in the risk of them both. His research compares the performance of stock in mutual funds and portfolio indices LQ-45 in the period of October 1998 - April 2000. While, Rachmanto (2002) and Budi (2002) found there is significant difference between stocks that included in the candidate optimal portfolio and the stocks that do not forming optimal portfolio. Sukarno (2007) said that the average of stock return for being portfolio candidates is higher than the average of stock return for being non-portfolio candidate.

Based on previous research and framework, therefore hypothesis in this thesis are:

H_{1a}: There is a difference between optimal portfolio performance of Main Board and market portfolio.

H_{1b}: Optimal portfolio performance of Main Board is better than market portfolio.

H_{2a}: There is a difference between optimal portfolio performance of Development Board and market portfolio.

H_{2b}: Optimal portfolio performance of Development Board is better than market portfolio.

H_{3a}: There is a difference between optimal portfolio performance of Main Board and optimal portfolio performance of Development Board.

H_{3b}: Optimal portfolio performance of Main Board is better than optimal portfolio performance of Development Board.

RESEARCH METHOD

Population, Sample, and Sampling Method

The population in this research is companies listed in Indonesian Stock Exchange (IDX) from January 2007 – December 2009. These companies are classified by BAPEPAM on Main Board and Development Board.

The sample in this study is determined by purposive sampling method on the basis of certain criteria. Criteria in this study are: 1) The companies that are listed in Main Board and Development Board continuously from January 2007 – December 2009 in Indonesian Stock Exchange. 2) The companies are traded every month during the period of January 2007 - December 2009. 3) Companies that have a positive return during the study period. Based on these criteria we get 97 companies in Main Board and 125 companies in Development Board.

Data Source

The data used in this analysis is secondary data that are obtained from the Indonesian Stock Exchange, Indonesian Capital Market Directory and Indonesian Stock Exchange monthly statistic. Set of data is obtained from January 2007 – December 2009. The data contains: 1) Company list in Main Board and Development Board in Indonesian Stock Exchange. 2) Closing price of company in Main Board and Development Board Indonesian Stock Exchange for calculating the return and risk individual stock. 3) Closing index Main Board and Development Board that represent market return and risk. 4) Certificate of Bank Indonesia that is used as proxy risk free asset

Data Analysis

The main objective of this research is to compare the performances of Main Board and Development Board in Indonesian Stock Exchange. First step, we form optimal portfolio each board with single index model. Then we use Sharpe Index for comparing this performance.

In obtaining the form of portfolio optimal we need to know the realized return, expected return, the market return (Main Board and Development Board) and the risk-free rate. To calculate the realized return, we need the stock price at the end of monthly period. The calculation of expected return, variance, standard deviation, alpha, beta, and variance error for all stock in Main Board and Development see the appendix.

Based on the calculation beta, alpha and variance error next step is calculating the value of excess return to beta and value the C_i on each stock. Then, we rank the value of ERB from highest to lowest. The value of C_i is accumulative value from A_1 to A_i and B_1 to B_i. This value is the result of divide of market variance with premium return to variance residual error and market variance on sensitivity individual stock to variance residual error. The value of A_j and B_j is obtained from A_i and B_i.

Result of the calculation on the value of ERB and the value of Ci for Main Board and Development Board found in appendix. The value of ERB for stock in Main Board moves from BBNP at level 0,407079 as maximum ERB to SONA at level -9,089818 as minimum ERB. The value of ERB for stock in Development Board moves from YULE at level 15,860000 as maximum ERB to DEFI at level -3,017154 as minimum ERB. Optimal portfolio is portfolio that consists of stocks that have high level of ERB. So, in this analysis stocks that have high level ERB that are chosen in forming the optimal portfolio.

The value cut-off rate is the maximum value of all C_i. This value is used as a point to determine stocks those are included in candidate optimal portfolio and stocks those are not included in optimal portfolio. We can obtain C* in excel program with function MAX. For stock in Main Board, the value of cut-off rate (C*) in this analysis is 0,034780 with the value of excess return to beta (ERB) 0,035204 by PANS company or Panin Sekuritas Tbk. For the stock in Development Board, the value of cut-off rate (C*) in this analysis is 0,068979 with value of

excess return to beta (ERB) 0,070372 by LPPS company or Lippo Securities Tbk.

Determine stocks that include in optimal portfolio

Stocks included in optimal portfolio is stocks those higher or similar with value of excess return to beta (ERB) in the value of cut-off rate (C*). For stocks in Main Board, with value of cut-off rate (C*) 0,034780 and value of excess return to beta (ERB) 0,035204 we obtained 26 stocks those are included in optimal portfolio. For stocks in Development Board, with value of cut-off rate (C*) 0,068979 and value of excess return to beta (ERB) 0,070372 we obtained 49 stocks those are included in optimal portfolio.

Determine fund percentage each stock in optimal portfolio and Calculate expected return, standard deviation and beta optimal portfolio

After determine securities those are included in optimal portfolio, next step is to determine how many percentage of each security included in optimal portfolio. For calculating the percentage, we need to know the value of Zi. And then, calculate Expected return, standard deviation and beta portfolio optimal. Expected return of a portfolio is a weighted average of the expected returns of its component securities that forming portfolio.

Based on calculated data we know the value of w_i in Main Board that represents percentage of each stock in optimal portfolio. With this value, we can calculate expected return, beta, and standard deviation of portfolio. From 26 stocks that forming portfolio, we obtain portfolio expected return E(Rp) 0,044380; beta of portfolio (β_p) 0,614853; portfolio standard deviation 0,203050; and portfolio variance 0,048274.

Based on calculated data we know the value of w_i in Development Board that represents the percentage of each stock in optimal portfolio. By applying this value, we can calculate expected return, beta, and standard deviation of portfolio. From 49 stocks that forming portfolio, we obtain portfolio expected return E(Rp) 0,062995; beta of portfolio (β_p) 0,261558; portfolio standard deviation 0,304173; and portfolio variance 0,628613.

From these data, we know that portfolio expected return is more amount than several expected return individuals each stock. It means that this portfolio increases the expected return. On the other hand, beta of portfolio (β_p) is less than several beta individuals each stock. This means that portfolio can decrease the systematic risk. The systematic risk cannot be lost through diversification, so in forming portfolio investor must consider to the ERB of each stock. The value of portfolio beta that is nearly 1 represent that portfolio has risk that is nearly the market risk.

Hypothesis Testing

In conducting the compares of portfolio performance in this research, we used Sharpe Index (Cvitanic, 2008; Farinelli et al, 2008; Nielsen and Vassalou, 2004; Pilotte and Sterbenz, 2006). Independent samples test is applied in this research for calculating the differet performances. We use SPSS 11.5 for windows programme to calculate. The calculation of different test and portfolio performance can be seen in table 1 and table 2 below:

Table 1. Independent Samples Test

	t	Sig. t
Main Board – Main Board Optimal	2,679	0,008
Development Board – Development Board Optimal	3,172	0,002
Main Board Optimal – Development Board Optimal	2,136	0,036

Source: processed data

Table 2. Portfolio Performance

Portfolio	Sharpe Index
Main Board	0,079
Main Board optimal	0,187
Development Board	0,107
Development Board optimal	0,178

Source: processed data

Compare Optimal Portfolio Main Board and Market Portfolio Main Board

Based on table 1 we know that t value between optimal portfolio and market portfolio Main Board is 2,679 with a significance level 0,008 that is calculated by using independent samples test. Significance value that less than 0.05 indicates that there is a difference portfolio performance between optimal portfolio and market portfolio in Main Board Stock. It means that hypothesis 1a is supported. This result is in line with Manupasa (2001), Rachmanto (2002), and Budi (2002) that said stocks are included in the candidate optimal portfolio with the stock that does not included into optimal portfolio showed a significant difference.

Based on table 2 we know that optimal portfolio performance of Main Board is better than this market portfolio (performance of Main Board) is viewed from Sharper Index value. The value of Sharpe Index in portfolio Main Board is 0,079 and the value of Sharpe Index in portfolio optimal of Main Board are 0,187. This measurement show that optimal portfolio Main Board is better than market portfolio performance (performance of Main Board). This means that hypothesis 1b is supported. This research is in line with Sukarno (2007), Pamungkas (2001) that said the average stock return portfolio candidate is higher than the average stock return of non-candidate portfolio.

Compare Optimal Portfolio Development Board and Market Portfolio Development Board

Based on table 1 we know that t value between optimal portfolio and market portfolio Development Board is 3,172 with a significance level 0,002 that is calculated by using independent samples test. Significance value that less than 0.05 indicates that there is a difference portfolio performance between optimal portfolio and market portfolio in Development Board. It means that hypothesis 2a is supported. This result is in line with Manupasa (2001), Rachmanto (2002), and Budi (2002) that said stocks are included in the candidate optimal portfolio as the stock that does not included into the optimal portfolio showed a significant difference.

Based on table 2 we know that optimal portfolio performance of Development Board showed a better performance than this market portfolio (performance of Development Board). The values of Sharpe Index in portfolio Development Board is 0,107 while the values of Sharpe Index in portfolio optimal of Development Board is 0,178. This measurement show that optimal portfolio Development Board is better than market portfolio performance (performance of Development Board). It means that hypothesis 2b is supported. This research is in line with Sukarno (2007), Pamungkas (2001) that said that the average stock return portfolio candidate is higher than the average stock return of non-candidate portfolio.

Compare Optimal Portfolio Main Board and Optimal Portfolio Development Board

Based on table 1 we know that t value between optimal portfolio and market portfolio Main Board is 2,136 with a significance level 0,036 that is calculated by using independent samples test. Significance value that less than 0.05 indicates that there is a difference portfolio performance between optimal portfolio Main Board and optimal portfolio Development Board. It means that hypothesis 3a is supported. This result is in line with Wahyudi (2001) and Manupasa (2001) that said there is a significant difference in the risk stock in mutual funds and

portfolio indices LQ-45 that is formed with Single Index Model and performance comparison conducted with the method of Sharpe Index. This result is also in line with Purnama (2001) that said there are a significant difference portfolio indices LQ-45 and Top 20 gainers that form the portfolio indices using Single Index Model.

Based on table 2 the values of Sharpe Index in portfolio optimal of Main Board is 0,187 while the values of Sharpe Index in portfolio optimal of Development Board is 0,178. It can be known that based on Sharpe Index, optimal portfolio performance of Development Board is better than the optimal portfolio performance of Main Board. This means that hypothesis 3b is supported. This research is in line with Purnama (2001) that said there is the rationality investor in shares since the trading frequency stock that is more efficient is greater than stock that is not efficient.

CONCLUSION

The stocks of companies used in this analysis are companies that listed in Main Board and Development Board Indonesian Stock Exchange. For Main Board, there are 26 companies which are chosen due to in forming optimal portfolio, the companies apply with single index model. For Main Board, there are 49 companies which are chosen due to in forming the optimal portfolio, these companies apply with single index model.

Meanwhile in the performance of portfolio, there are differences between optimal portfolio performance of Main Board and its market portfolio (the performance of Main Board); between optimal portfolio performance of Development Board and market portfolio (the performance of Development Board). The difference also found between the optimal portfolio Main Board and optimal portfolio Development Board.

In the future research, financial manager or investor can use single index model to form the optimal portfolio from several securities. Since it helps to form optimal portfolio easily and does not need many data. The candidate of stock is important to be considered in conducting this model. It is done to know whether the candidates included in the list of best companies in stock exchange or not. For example, it is shown through the transaction volume, profit, asset, or other based. Moreover, for future research can be conducted to form optimal portfolio in each index in Indonesian Stock Exchange.

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