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Formation Of Portfolio Analysis Optimal Model With A Single Index (Studies in IDX30 Index Period 2016-2018)

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Abstract

Investors in the capital market will Generally Reviews their funds invest in stocks that have high returns with minimal risk. In order to reduce the level of risk, Reviews These stocks can be formed into a portfolio. The purpose of this study is to find out the stocks of IDX30 Index of members who can form an optimal portfolio and to find out the proportion of each selected stock and the level of return and risk of the portfolio produced. This research was conducted on the Indonesia Stock Exchange. The Data in this study are secondary Data Obtained from IDX, Yahoo Finance, and BI. The number of samples taken was 18 shares, using the purposive sampling method. The analysis technique used is descriptive analysis and processing of data using Microsoft Excel 2010. The method used is to use the Single Index Model approach.

Keywords: IDX30 Index, Single Index Model, Optimal Portfolio

INTRODUCTION

Capital markets have an important role for the economy of a country as the capital markets serve two functions: first as a means of funding for business or as a means for companies to obtain funds from investors (investors). The funds from the capital market can be used for business development, expansion, increase working capital and others, both the stock market becomes a means for people to invest in financial instruments such as stocks, bonds, mutual funds, and others. Thus, the public can put its own funds in accordance with the characteristics of the benefits and risks of each instrument (www.idx.co.id). The goal of a investor in investing is to get the maximum keuntunganyang on shares bought. It motivates investors to invest in the capital market. However, problems arose because the number of shares outstanding investment instruments in the capital markets. The instruments have a risk that into consideration each investor, whereas analytical skills owned by the investor is still relatively limited, so that the limited influence on stock investment decisions. One problem often encountered by investors in the stock investment analysis is the estimation of the risks faced by investors. If the risk of an investment increases, the investor requires a greater level of profit.(Husnan, 2015: 39), Diversification is a stock investors need to do a combination of a number of securities to obtain minimum risk without reducing return that will be earned investors(Tandelilin, 2010: 115),

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Determination of the optimal portfolio is something that is very important to investors both institutional and individual investors. The optimal portfolio will generate optimal returns with minimum risk to be accounted for. A common issue is the investor faced with uncertainty when choosing stocks to be formed into a portfolio of his choice. Surely the answer is dependent risk preferences of each investor itself. Investors faced with many combinations of stocks in a portfolio. In the end, the portfolio should take a decision which will be chosen by the investor. A rational investor, would choose the optimal portfolio (Hartono, 2016: 367). A rational investor would choose investments that would provide the maximum return with minimum risk or provide a certain return with certain risk in accordance with the preferences of each investor. Optimal portfolio is a portfolio selected someone investors of the many options that exist on the set of efficient portfolios (Tandelilin, 2010: 157).*return*expectation (expected retrun) is a return that is used for making investment decisions. Return is important because the return ekpektasian is the expected return of investment to be made. Single Index Model assumes that the rate of return between two or more effects will be correlated, which will move together and have the same reaction to a single factor or a single index that is included in the model. As the process of calculating the rate of return, an index model seeks to cover the major economic powers can systematically move the stock price of all securities. Analysis of securities is done by comparing the excess return to beta (ERB) with a cut-off rate is (Ci) of each stock. ERB stocks that have greater than Ci be a candidate portfolio,(Hartono, 2016: 429).

Previous research conducted by Ratna (2018) states that Markowitz model only considers the expected return and risk, are not considered risk-free assets. In contrast to the single index model is selected because the calculation is much simpler than the calculation Markowitz, in addition to the Single index models can also be used to calculate the expected return and risk of the portfolio. Based on the theory and previous research, the researchers will use the Single Index Model Method to determine the optimal portfolio. A single index method is a relatively simple method and reduce the variables are calculated, with a longer period of time and samples are more, you will get more accurate results and may address the issue on the uncertainty of the stock investment. This will assist investors in determining investment decisions stock.

Based on this phenomenon, researchers wanted to examine the problem on the company's stock portfolio IDX30 index listed in Indonesia Stock Exchange period 2016 to 2018. The approach can be made by investors by performing calculations in determining the optimal portfolio and behavioral patterns of investors in the capital market share purchase transaction. Step or this way is referred to as an active investment strategy. Single index model is used as the primary method to determine the optimal portfolio of stocks. Then the problem examined in this study is the use of a single index model in forming the optimal stock portfolio consisting of shares efficiently provide the maximum return with limited risk, or certain returns with minimal risk. As for the shares that were analyzed only the index of stocks listed on the Stock Exchange IDX30 the period 2016 to 2018. The purpose of this study is (a.) To determine the index of leading shares IDX30 which fall into the category for inclusion in the portfolio. (B.) To determine the proportion of each stock in order to obtain an optimal portfolio by using single index model. (C.) To determine the level of profit (return) is expected and the risk of the portfolio is formed.

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METHODS

The analysis used in this research is descriptive data analysis. This research is quantitative descriptive research that illustrates the determination of the optimal portfolio model with the data obtained will be processed by using formulas that has been getting from some of the theories are then analyzed and described to then be used as a conclusion. The type of data used by the author in this research is secondary data such as stock price data lockouts IDX30 index (closing price) on each end of the transaction during the period from 2016 to 2018 obtained from the website www.yahoofinance.com, www.idx.co.id and www.bi.go.id, The necessary data in this study are as follows: (1) Data companies listed in the index IDX30 in the period from 2016 to 2018, (2) the current monthly closing share price (close price), (3) JCI, (4) BI Rate. In this study using external data sources obtained from all companies included in the IDX 30 listed in Indonesia Stock Exchange during the period 2016-2018. While the originating data source www.yahoofinance.com which form the closing share price per month during the period February 2016 to August 2018.

The population in this study are all companies included in the index IDX30 listed in Indonesia Stock Exchange period August 2016- February 2018. This study sampled by purposive sampling method. Sampling is purposive sampling based on the consideration or certain criteria in accordance with the purpose of research. Companies that were sampled in this study must meet the following criteria: (1) The company is listed on the Stock Exchange as an issuer until the end of 2018, (2) Companies listed on the Stock Exchange in the index IDX30, (3) The company's shares active traded during the observation period, (4) this study uses active criteria based on capitalization and the largest transaction value in the regular market value during the period 2016-2018. Have been listed on the Stock Exchange for at least three months, and has a financial condition and prospects of high growth. So, from a population of 180 companies during the observation period February 2016 - August 2018 acquired 18 companies to be sampled in this study. The method used in the determination of the optimal portfolio of 18 shares of this company is the Single Index Model.

Data analysis techniques in the research done using Single Index Model. While the calculation is done using Ms.Excel program. Analysis of the formation of the optimal portfolio can be done with the following steps:

Collect the stock data included in the Index IDX30 in the period 2016-2018, ie the data closing price at the end of the month.

Realisasian calculate the total return of each stock. (R_i)

With the formula:

$$(R_i) = \frac{\text{Pt} - \text{Pt} - 1}{\text{Pt} - 1}$$

Information :

R_i : *return*of stock i
Pt : The price of the current period
Pt - 1 : The price of the previous period

Calculate *expected Return* each stock

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expected Return is the return expected by investors will be generated by its investments, calculated using the formula (Zubir, 2011: 5)

$$\text{E (Ri)} = \sum \frac{Ri}{n}$$

Information :
E (Ri) : *expected return*
Ri : *return* the realization of the stock i
n : Number of periods *Tirrenus return* stock i

Calculating the market return and the expected return of the market on the basis of JCI.

a) *return* market is the rate of return earned by investing in all shares on the exchange where the research market return reflected in *return* IDX30 index, the market return can be calculated using the formula (Hartono, 2016: 408):
With the formula

$$R_M = \frac{IHSG_{t-} \; IHSG_{t-1}}{IHSG_{t-1}}$$

Information :
R_M : Return market
$IHSG_t$: Market indexes observation period
$IHSG_{t-1}$: Market index in the previous period

b) *expected return* market is the return expected by investors can be generated by the market and can be calculated using the formula (Hartono, 2016: 410):

$$\text{E } (R_M) = \frac{\sum_{t-1}^{n} R_M}{n}$$

Information:
E (R_M) : Expected Return Market
R_M : Return market in period t
n : Number of the observation period

Calculating Beta and Alpha each stock

beta is the coefficient which measures the effect of the market return to changes in stock returns. Alpha is used to calculate the error variance (ei). With the formula:

$$\beta i = \frac{(\sigma m)}{(\sigma^2 m)} \qquad \alpha_i = E(R_i) - \beta_i \times E(R_m)$$

Information:
βi : Beta stock i
(σm) : Covariance between stocks i and Return Return market
$(\sigma^2 m)$: Return Variance market
α_i Alpha stock i

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$E(R_i)$: Expected Return stock i
β_i : *beta* stock i
$E(R_m)$: Expected Return Market

Calculating Risk invetasi

a) Calculates variance of the residual error and calculate market return variants

$$\sigma_{ei}{}^2 = \frac{\sum_{i=1}^{n}(R_i - \alpha_i - \beta_i . R_M)^2}{n} \qquad \sigma_m{}^2 = \sum_{t-1}^{n} \frac{[(R_{Mt} - E(R_M))]2}{n} \qquad \sigma_i{}^2 =. + \beta_i{}^2 \sigma_m{}^2 \sigma_{ei}{}^2$$

Information :

$\sigma_{ei}{}^2$: Variants of residual error
R_i : *return*stock i
α_i : *Alpha* stock i
β_i : *beta* stock i
R_M : *return* market
n : Number of the observation period
$\sigma_m{}^2$: Variance market return
R_M : Return market
$E(R_M)$: Expected market return
$\sigma_i{}^2$: share risk
$\beta_i{}^2$: The sum of squares *beta* stock i
$\sigma_{ei}{}^2$: Variants of residual error

Determining the risk-free rate of return (C)

*return*risk-free assets () can be determined by the level of monthly SBI rate during the study period, ie during the years 2016-2018. The amount of () is the average of the interest rate during the study period. Stocks that have$R_{BR} R_{BR} E(Ri) > R_{BR}$ will be included in subsequent analyzes because it will produce a positive ERB.

Determining the excess return to beta (ERB) of each stock.

Excess return to beta means the measure of excess return relative to one unit of the risks that can not be diversified as measured by beta. Exess level Return to Beta (ERB) can be calculated by the formula. The formula used is (Hartono, 2016: 430):

$$ERBi = \frac{E\ (Ri) - \ R_{BR}}{\beta i}$$

Information :

ERBi : Excess returns to beta stock i
E (Ri) : *expected return*
R_{BR} : *return* risk free
βi : *beta* stock i

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Determining Cut Off Point (C *)

Cut off rate (Ci) is the cut-off point used to determine whether a stock can be included in the portfolio or not. Preferred Shares are rated Ci <ERB. Before calculating Ci must calculate Ai and Bi formula (Hartono, 2016: 431):

$$Ai = \frac{(E\ (Ri) - \ R_{BR}).\beta\ i}{\sigma ei^2} \qquad Bi = \frac{\beta i^2}{\sigma ei^2}$$

Information :
E (Ri) : *expected return*
RBR : *return*risk free
$\beta\ i$: Beta stock i
σei^2 :Variants of residual error

After obtaining the value of Ai and Bi, then Ci can be calculated by the formula formula (Hartono, 2016: 431):

$$Ci = \frac{{\sigma_M}^2 \sum_{j=1}^{i} \frac{(E\ (Ri) - \ R_{BR}).\beta\ i}{\sigma ei^2}}{1 + \ {\sigma_M}^2 \sum_{j=1}^{i} \frac{\beta i^2}{\sigma ei^2}}$$

Information :
Ci : Cut-off rate
E (Ri) : *expected return*
RBR : *return*risk free
σei^2 :Variants of residual error
${\sigma_M}^2$: *variance return* market (JCI)
β i2 : The number of squares stock Beta

The amount of the cut off point is the largest value Ci (Hartono, 2016: 435)

Determining the optimal portfolio candidates with the criteria if ERB stock ≥ Ci
Determining the optimal portfolio by Elton and Gruber (1995): (a) When the ratio ERB = Ci, then the shares entered into an optimal portfolio, (b) When the ratio ERB <Ci, then these stocks out of the optimal portfolio.≥

Specifies the unique-cut-off point (C *) by Elton and Gruber (1995): To find C *, observe the value of Ci at the time the shares are still included in the optimal portfolio and then turn into out of the optimal portfolio. Ci value which is an optimal value that is a C *. The C * is a Ci highest value in the group of stocks included in the optimal portfolio.

Calculate the proportion of each stock
Calculating the proportion of funds is done after portfolios are formed, calculated by the formula (Hartono, 2016: 434):

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$$Wi = \frac{Zi}{\sum_{i}^{k} = 1^{zi}} \qquad Zi = \frac{\beta\, i}{\sigma ei^2}\ (\ ERBi - C^*)$$

Information:

Wi Proportion of securities to-i
k : Number of securities in the optimal portfolio
β i : Beta securities to i
σei^2 :Variants of residual error securities to i
ERBi : Excess returns to beta securities to i
C * : The value of rate cut-off point which is the largest value Ci
Zi The scale weighting of each stock

Calculating Expected Return and Variance which can then be used to measure portfolio risk, Expected Return portfolios can be calculated using the formula (Hartono, 2016: 424):

$$E(Rp) = \ ap + \ \beta p\ .E\ (Rm)$$

Information :

E (Rp) : *expected return* portfolio
αp : The value of the portfolio securities expectations of returns that are independent of *return* market
βp : *beta* securities portfolio
E (Rm) : *expected return* market

With the formula alpha portfolio and beta portfolio as follows:

$\boldsymbol{\alpha_p}$=. $\sum_{i=1}^{n} W_i\ \alpha_i$ $\qquad \beta_p$=. $\sum_{i=1}^{n} W_i\ \beta_i$

Information :

αp : Expectation value of the securities portfolio returns independent of market return
βp : Beta securities portfolio
Wi Proportion of securities to-i
α_i Alpha stock i
β_i : *beta* stock i

While the portfolio risk can be calculated using the formula (Hartono, 2016: 425):

$$\sigma_P{}^2 =. + (.\beta_P{}^2 \sigma_M{}^2 \sum_{i=1}^{n} W_i\ \sigma_{ei})^2$$

Information :

$\sigma_P{}^2$: *variance* portfolio
$\beta_P{}^2$: *beta* squared portfolio
$\sigma_M{}^2$: *variance* market
W_i : The proportion of securities to-i
σ_{ei} : Varian stock residual error to i

Comparing changes in portfolio risk against the risk of each stock.
Conclusions stocks that are components forming the optimal portfolio.(Hartono, 2016: 407-436)

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RESULTS AND DISCUSSION

The method used in the formation of the optimal portfolio is a model single index. Determination of Single index model portfolio that is based on the value of the ERB and the cut-off rate. If the ERB value greater than or equal to the cut-off rate, then the shares are inserted Into the optimal portfolio candidates. If the value of the ERB is smaller than the cut-off rate, the stock is not added to the candidate optimal portfolio of stocks. Use of the ERB value and cut-off rate has the advantage that consider the systematic risk (beta). Systematic risk can not be avoided but investors can pick stocks with high ERB value. Beta and ERB value can be used to consider alternatives and optimize your investment portfolio. Unsystematic risk can be avoided by diversifying itself.

Based on the calculation of eighteen sample, obtained fifteen stocks that are candidates optimal portfolio of stocks. Fifteen of these stocks have a high return rate and is positive compared to stocks that are not included in the optimal portfolio candidates. This gives investors more choice in selecting stocks that will be used as an alternative to investing. Fifteen shares are included in the candidate optimal stock portfolio is ADRO, ASII, BBCA, BBNI, BBRI, BMRI, GGRM, ICBP, INDF, INTP, KLBF, PGN, TLKM, UNTR, and UNVR. There are three stocks that have negative expected return value is stock BSDE, LPPF and SMGR. Thus the three stock is not included in the subsequent calculations in the formation of the optimal portfolio.

The first step in calculating the optimal portfolio of stocks that is to know in advance the composition of shares that would be candidates optimal portfolio of stocks. The shares have a value ERB> Ci will be added to the candidate optimal portfolio of stocks, shares that have value otherwise ERB <Ci is not added to the candidate optimal portfolio of stocks. To determine the composition, it should take several steps, as follows:

a) Calculating Expected Return, Variance, Standard Deviation
   Variance calculation results expected return and standard deviation. Of the twenty-one samples of the study, shares that provide the greatest level of expected return is INTP that is equal to0.248381, While stocks are on the lowest expected return is LPPF shares that is equal to -0.019342, There are fifteen shares that have a positive expected return and three stocks that have a negative expected return. From the variance calculation of individual stocks, shares that have the greatest variance is INTP amounted1.76661, While shares which has the lowest variance is PGAS shares amounted 0.956737, investor rational course will select stocks with the lowest risk, but it also depending on the risk preferences of each investor.
b) Calculating Market Return, according to these calculations, the data JCI used to obtain the expected return on the market for 0.00733 per month and standard deviation 0.998694, While market risk is borne by0.997390, Expected returns are positive market proves that investing in the stock market returns for investors.
c) Calculating Risk Free Rate. This data is taken from the official website of Bank Indonesia,www.bi.go.id,*Risk free rate* which is used in calculating the optimal portfolio of index stocks with a single method that is risk free rate (RBR) monthly by 0.004703. Risk free rate is chosen monthly in order to obtain a more accurate calculation results.
d) Calculating Beta, Alpha, Residual Error Variance Stocks, Excess Return to Beta. Based on calculations derived beta stocks have a beta of its highest BBNI0.002112, which means that the systematic risk of the stock BBNI will be small when compared with the systematic risk of the market. Furthermore,stock company that has the lowest beta value is the INTP of -0.023829, This

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means that the risk of systematic equal INTP also smaller in comparison with the systematic risk of the market. Based on the calculation of the residual error variance is known that the INTP has a systematic risk, or the risk of uncontrollable biggest that0.00049758 or by percentage (0.049%). Furthermore, for the unsystematic risk or the risk that they could be controlled by a company owned by the INTP of 1.76611242 (176%). The smallest systematic risk that can not be avoided contained in ADRO shares amounting to 0.00000213 (0.000213%), next to the smallest systematic risk is not present in PGN shares, amounting to 0.95673527 (95%). Based on calculations derived Ci Ci highest value and worth positive that amounted GGRM 0.00000468 while for the other stocks that are fourteen ADRO shares, UNTR, TLKM, BBCA, ICBP, BMRI, ASII, UNVR, INDF, BBRI, BBNI, PGN, KLBF, and INTP has a negative Ci value.After stocks sorted by score ERB from highest to lowest. Then to obtain candidate optimal stock portfolio, the value of the ERB should be compared with the cut-off rate. There are fourteen shares that are not included in the optimal stock portfolio are stocks that have ERB value that is less than the cut-off rate and negative values such asADRO, UNTR, TLKM, BBCA, ICBP, BMRI, ASII, UNVR, INDF, BBRI, BBNI, PGN, KLBF, and INTP.

In this study, one share of portfolio candidates. The shares of the funds required calculating the proportion of each stock to get the maximum return with limited risk or otherwise of certain returns with minimal risk.

a) Shares Forming the Portfolio Optimal, after making a comparison Excess Return To Beta (ERB) to Cut Of Rate (Ci) of the fifteen stocks studied, there is one stock that values ERB her show greater than Ci, so that the stock meets the criteria for admission into the formation of optimal portfolios. The stock is GGRM (Gudang Garam Tbk.)
b) The proportion of the shares included in the formation of the optimal portfolio, we then calculating the proportion of funds (Wi) for each share. To obtain the value of Wi, then have to do a weighted scale calculations of each stock (Zi) Given that the largest proportion of funds that the company shares GGRM Table 3 shows the proportion of funds that form the optimal portfolio of stocks, which amounted to 0.095212 shares GGRM or 9, 52%. Stocks with the highest proportion of funds is an alternative investment that should have a rational investor. In addition, also have the highest share ERB value greater than Ci.
c) That the calculation results show that the return of portfolio of shares amounting GGRM0.0003762 and the risk of a portfolio of 0.89831395 while the value of the portfolio return INTP of 0.0000175 and to the risk of a portfolio of 307,951.103 means that where the value of the stock portfolio return GGRM promised rate of return (expected return) in an investment amounting to 0.0045%. With the value of the portfolio risk showed a loss that must be faced in an investment of 97.5%.

CONCLUSIONS

There are fifteen stocks listed candidates optimal portfolio shares with single index model. Five of these shares is ADRO, ASII, BBCA, BBNI, BBRI, BMRI, GGRM, ICBP, INDF, INTP, KLBF, PGN, TLKM, UNTR, and UNVR. There is one stock that is capable of forming an optimal portfolio is stock GGRM (Gudang Garam Tbk. With a large proportion of funds that can be invested in one stock amounted to 0.095212 or 9.52%. The amount of return and risk of an optimal portfolio of stocks. The stock is GGRM form the optimal portfolio with the hope of having a return of 0.0000450, or 0.0045%, monthly and risks faced by investors on their investment in one stock amounted GGRM0.975182 or

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97.5%. Risks inherent in the optimal portfolio is smaller than the risk when investing in individual stocks. Formation of optimal portfolio diversification is one way to reduce risk.

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