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Research Article

Comparative Analysis of Sharia Stock Portfolio Optimization Using Single Index Method and Constant Correlation Method (on Jakarta Islamic Index 2012-2018)

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Abstract: A portfolio deals with how one allocates several shares in different types of investments to achieve an optimal profit. By diversifying, investors might reduce the risk level and optimize the expected rate of return at the same time. Based on that, this study raises a problem of how to design an optimal portfolio simulation, namely a combination of liquid JII shares listed on the Indonesia Stock Exchange in the period 2012-2018 by using the Single Index Method and the Constant Correlation Method. The result of the Single Index Method Research attained a combination of 4 shares: TLKM, INDF, ICBP, and AKRA. Meanwhile, the optimal portfolio mixture obtained by the Constant Correlation Method comprises eight shares by weighting as follows: TLKM, INDF, ASII, AKRA, ICBP, SMGR, and PGAS as much as 0.052451 or 0.54%. The results showed that the formation of an optimum portfolio with the Single Index Method is superior to the Constant Correlation Method. It is consistent with the consideration that the return and risk levels in the Single Index Method are more significant than the Constant Correlation Method, that is 13 percent of the return level in the Single Index Method compared to 5 percent in the Constant Correlation Method.
Keywords: Investment, Optimal Portfolio, Single Index Method, Constant Correlation Method.

INTRODUCTION

Investors have the main goal in instilling funds into the company, namely to look for income or rate of change investment (return) in the form of dividend yield and income from the difference in selling price of shares to the purchase price (capital gains) (Firdaus, I., & Sediaz, S.R.B. 2017) . When an investment in one asset loses, there is still a possibility of investing in other providential assets. Therefore, investing by forming a portfolio could reduce the loss suffered by investors (Azizah, S., & Sugito. 2014). An investment in the form of shares itself might be an alternative investment promising considerable income with sizable risk (Auruma, T. 2013). Compared to bonds, stocks bear a more significant expected return. However, stocks have a noticeable risk compared to bonds (Harwaningrum, M. 2016).

However, a problem that often occurs is that investors face uncertainty when they have to opt for stocks to assemble into a portfolio of their choice. Thus, there is a necessity to design an optimal portfolio simulation to tackle the above-mentioned issue. To formulate the design as the main problem in this study, the author will employ a set of data comprises combination of stocks listed on the Indonesia Stock Exchange (IDX). Arguably, the answer depends on the risk preference of the investor itself. Investors are dealing with many combinations of stocks in portfolios, which in the end, should take the decision which portfolio to select. A rational investor will undoubtedly pick an optimal portfolio by Jogianto (2010) that could minimize the risk at a certain profit level or get a maximum return on a certain level of risk.

According to Zubir (2011), investment diversification is one of the strategies to lower risk in the sense that investors invest their money in various

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investment instruments. Information obtained by investors and prospective investors regarding price variability shares during the trading period on the exchange are useful for investment decisions is running or going to run (Pulungan, N.A.F., Murni, Y., & Mansyur, H. 2016).

The optimal portfolio of investor options is one which provides the maximum expected return at a particular risk level or a certain expected return at a minimum risk level. Optimal portfolio performance assessment requires the use of relevant variables, i.e., profit and risk level (Husnan, S. 2012).

To form an optimal portfolio, the models that can be employed are the Single Index Model and the Constant Correlation Model (2010). Sharpe *et al* (1997) developed the Single Index Model with ERB (excess return to beta) as the reference number. While the Constant Correlation Model essentially uses an assumption that the correlation coefficient (ρ) is constant from each pair of stocks. The assumptions used in the Constant Correlation Model include the correlation coefficient between constant assets, available risk-free assets, and short selling is not permitted. Constant Correlation Model utilizes ERS value (*excess return to standard deviation*). The ERS value describes the slope of a line linking risky stocks to risk-free interest.

Recently, one of the stocks that have been appealing many investors is the stocks which are assimilated in the Jakarta Islamic Index (JII) or also frequently termed as Sharia index. The stocks which are incorporated into the Jakarta Islamic Index (JII) must fulfill the same element as the other indices except for the Haram element based on the National Sharia Council (DSN) of the Indonesian Ulama Council (MUI) view. The factors which are viewed as haram are generally associated with: alcohol, gambling, pig-derived raw materials, pornography, and conventional financial services and insurance (Darmadji, T. Fakhruddin. 2012.). For Muslim investors[1], these should be considered to the extent to which the investment is not contrary to the sharia aspect. There are six fatwas of the DSN-MUI at 2004 specifically regulate the stocks that have entered the criteria JII are whose operations do not contain the Ribawi elements. In addition, the capital of the company should not be obtained primarily from debts.

The focus of this research is to design an optimal portfolio of the liquid stocks of the JII listed on the IDX. The period of the observation ranged between 2010 to 2015 using monthly stock price data. The difference of this research lies in 1) the observation period, 2) the underlying reason for the selection of stocks, 3) methods used in the formation of an optimal portfolio, in this research focuses more on the use of the ERB method (on a Single Index Method) in determining the stocks that meet the optimal criteria, and 4) assessment of the performance of portfolios formed using a Single Index Method. This research is also inclined by the inconsistencies of previous research results. The results of the study conducted by Suryanti (Suryanti. 2014) concluded that the diversification of six shares of LQ-45 could reduce the risk,

MATERIALS AND METHOD

Optimal Portfolio

An optimal portfolio is an investor-selected portfolio of many selections available in an efficient portfolio set (Tandelilin, E. 2010). The investor's chosen portfolio is a portfolio that matches the preference of the investor's return and the risk he is willing to bear. Lawrence J. Gitman (2009) argued that an efficient portfolio is a portfolio that maximizes return for a given level of risk or minimizes risk for a given level of return. While Jogiyanto (2010) mentioned that an efficient portfolio is a portfolio that has a maximum return with a certain level of risk or that has a minimum risk at a particular return level.

Investors face optimal portfolio selection activities in the formation of stock portfolios. According to Bodie, Kane, and Marcus in Zubir (2011) these activities include allocating funds, calculating the return and risk of various portfolios, and choosing the preferable portfolio. How many stocks will be included in the portfolio and what percent allocation of each stock are the things that the investor needs to consider as the capital owner.

Single Index Model

The Tandelillin (2010) mentioned that Sharpe developed a model called a Single Index Model. This model is based on observations that the price of a security fluctuates in a common direction with the market price index. Stock prices will tend to rise when the market price index rises, vice versa. Therefore, the relationship of the return of the securities and the return of the market according to Jogiyanto (2010), is: $R_i = \alpha_i + \beta_i . R_M + e_i$ Where:

Ri	=	return of security i-th
αi	=	a random variable that shows component from security i-th return which are independent of the market performance
βi	=	beta which is the coefficient which measures the change of Ri due to the shift in RM
RM	=	return level of the market index, also is a random variable
ei	=	a residual error which is a random variable with an expectant value equals to zero

A random variable that shows a return which is independent of the market performance (α) only relates to micro-events affecting a particular company only, instead of the industry as a whole. Such micro-events are strikes, fires, and issues related to the company.

The Single Index Model uses its inherent assumptions. The first assumption is the residual fault of the i-th securities is not covariant with the error of the j-th securities (Jogiyanto. 2010). The next assumption is that the ei is not covariant with the market index return, and short-selling is not allowed. The assumptions of the Single Index Model have implications that securities move simultaneously since they have a typical relationship to the market index.

The calculations to determine the optimal portfolio will be simplified if based on a number that could determine whether a security can be included in the optimal portfolio (Jogiyanto. 2010). The number is the ratio between ERB. The optimal portfolio will contain securities which have considerable ERB. Securities which posses negative ERB will not be incorporated into the optimal portfolio. Determination of the upper or lower limit of the ERB value depends on the barrier point (cut-off point/C*) (Jogiyanto. 2010). Securities with the value of ERB $\geq$ C* are securities that make up the optimal portfolio. While securities which have a value of ERB < C* will not be included in the optimal portfolio candidate.

Constant Correlation Model

The Constant Correlation Model has the assumption that the correlation coefficient between pairs of shares is constant; thus the value of the correlation coefficient is the average of the value of the correlation coefficient of stocks which are considered in the optimal portfolio (Elton, G. 2001). This model does not allow short-selling, that is selling stocks that are not in possession (Zubir, Z. 2011).

The correlation coefficient is a statistical measure which demonstrates relative concurrent movements (relative comovements) between two variables (Tandelilin, E. 2010). This measure will explain the extent to which the *return* of a security relates to one another in a diversified context. The size is usually symbolized by (ρi,j) and the value is between +1.0 to -1.0 where

a. ρi,j = +1.0; means a perfect positive correlation. This correlation will not provide any risk reduction benefits. The portfolio risk resulting from this fusion is an average of the risks of individual securities.
b. ρi, j = 0; means no correlation. This correlation reduces the risk significantly. The more securities are included in the portfolio, the larger the risk reduction benefits gained.
c. ρi, j = -1.0; means a perfect negative correlation. This form of correlation will eliminate the risk of both securities.

The optimal portfolio preparation procedure with the Constant Correlation Model is similar to the Single Index Model. The difference is the Constant Correlation Model uses an excess return to standard (ERS) deviation as the reference number.

The optimal portfolio will contain securities with high ERS (Elton and Gruber, 2009:196). Securities that have negative ERS are not incorporated into the optimal portfolio candidate. Determination of the upper or lower limit of the ERS depends on the barrier point (cut-off point/C*). Securities with a value of ERS greater than or equal to C* are securities that make up the optimal portfolio. While the securities that have ERS value less than C* will be excluded from the optimal portfolio candidate.

Data Collection Techniques

The data used in this research is secondary data, that is data obtained from other parties who have been collected or curated them. The secondary data used by the author are the data that relates directly to the research and are sourced from the issue of idx.co.id.

The population in this research is the entire company listed in the JII during the 2012-2018 observation period of 30 companies. The selection of sample data is made by performing a purposive sampling, which is data selection based on specific criteria or judgment sampling (Cooper, D. R. et al 1996). The sample criteria in this study were shares of the company which consistently were in JII during the year 2012-2018.

Based on these criteria, there are eight which are considered as the sample data in this study, namely: AKRA, ASII, ICBP, INDF, PGAS, SMGR, TLKM, and UNVR.

Data Analysis

Optimal Portfolio Data Analysis Based on Single Index Method

Data analysis is performed using a Single Index Method to determine an optimal portfolio. The steps performed are as follows:

1. Describing the stock price data, Jakarta Composite Index (JCI), and Bank Indonesia Certificate (SBI).
2. Calculating the expected return, standard deviation, and the variant of each individual stock, JCI, and SBI.
3. Calculating the beta, alpha, and variance errors of each individual stock.
4. Calculates the ERB value of each stock.
   The ERB value is compulsory as the basis for determining the portfolio candidate. The obtained ERB value is sorted from the most significant value to the smallest value. Stocks with ERB values greater than or equal to the ERB value in point C* are optimal portfolio candidates.

5. Calculating the C_i value
   The value of A_i is calculated to get the value of A_i. The value of B_i is calculated to get the value of B_i. Both of which are required to calculate C_i.
6. Looking for the value of C*
   The value of C* is the most considerable Ci value. Stocks that make up an optimal portfolio are stocks that have ERB greater than or equal to ERB in point C*.
7. Determining the proportion of funds to be invested in optimal portfolios.
8. Calculating the optimal return portfolio level formed by the Single Index Method.
9. Calculating the portfolio risk level formed by the Single Index Method.
10. Describing the formation of an optimal portfolio of Single Index Methods.

Optimal Portfolio Data Analysis Based On Constant Correlation Method

Data analysis is done using the Constant Correlation Method to determine the optimal portfolio. The steps performed are as follows:

- Describing the stock price data, JCI, and SBI.
- Calculating the expected return, standard deviation, and the variant of each individual stock, JCI, and SBI.
- Calculating the standard deviation and variance errors of each individual stock.
- Calculating the value of ERS of each stock.
- Calculating the C_i value
- The value of A_i is calculated to get the value of A_i. The value of B_i is calculated to get the value of B_i. Both of which are required to calculate C_i.
- Looking for value C *
- The value of C* is the most considerable Ci value. Stocks that make up an optimal portfolio are stocks that have ERB greater than or equal to ERB in point C*.
- Determine the proportion of funds to be invested in optimal portfolios.
- Calculating the optimal return portfolio level formed by Constant Correlation Method.
- Calculating the risk level of the portfolio formed by Constant Correlation Method.
- Describing the results of the formation of the optimal portfolio Constant Correlation Method.

RESULTS AND DISCUSSION

1. Single Index Model

The Single Index Model is based on price movements of a security which fluctuates in the direction of the market price. A Beta of a security demonstrates the extent to which the effect of market returns towards the securities return. Optimal portfolio formation based on the Single Index Model uses the reference number of ERB. ERB is formulated as the average return of shares with a mean risk-free against the stock beta.

The average return of shares is derived from fluctuations and changes in the stock price each month during the observation period. Standard deviation is used to measure the total risk of a security, that is the systematic risk and not systematic risk. The market return is indicated by a change in the JCI prices. The following shows the standard stock returns and deviations, which are sampled as well as the market standard returns and deviations.

The Average Return and Standard Deviation of JCI:

- Mean Return Market: 0.64%
- Standard deviation: 3.47%

In addition, the value of ERB is also based on the average interest rate of risk-free investments and beta. The author uses the interest rate of SBI as a reference for risk-free investment interest rate. SBI is considered by many investors as *risk-free* (Fahmi, 2011:173). The average SBI rate used for the forming and measuring the optimal portfolio performance of the research sample during January 2012-December 2018 is 0.67%.

A stock beta is a number that reflects the extent of market fluctuations (JCI) influence on the shares. Beta also shows the systematic risk of a security which could not be diversified anymore. The higher the return a security generate, the higher the security beta will be.

Table 1: Beta Stocks Period January 2012 – December 2018

No	Stock Code	Stock Beta
1	AKRA	1.11821
2	ASII	1.213923
3	ICBP	0.910178
4	INDF	0.956006
5	PGAS	1.086532
6	SMGR	1.393975
7	TLKM	0.810378
8	UNVR	0.670372

Source: Data processed, (2019)

Stocks that are candidates in the formation of an optimal portfolio with the Single Index Model are stocks that have a high and positive ERB value. Low ERB and negative value are excluded from optimal portfolio candidates. ERB also shows the relationship between return and risk. The following table presents the ERB shares ranking from the largest to the least small that will be the optimal portfolio candidate.

Table 2: Stock Rank Based On ERB

No	Stock Code	ERB
1.	ICBP	0.019523
2.	UNVR	0.017115
3.	TLKM	0.015628
4.	INDF	0.007184
5.	AKRA	0.006421
6.	ASII	0.002002
7.	SMGR	0.001925
8.	PGAS	0.000621

From the results of ERB calculations, it is acknowledged that all issuers are positively valued, namely AKRA, ICBP, ASSI, INDF, PGAS, SMGR, TLKM, and UNVR. If there is an issuer with a negative ERB, the issuer will automatically be removed from the optimal portfolio candidate list.

Table 3: Stock Rank Based On ERB

No	Stock Code	ERB	Ci	C*	Portfolio Candidates
1	ICBP	0.019523	0.000889053	0.003041889	Included
2	TLKM	0.015628	0.003041889		Included
3	INDF	0.007184	0.00182693		Included
4	AKRA	0.006421	0.001214644		Included
5	ASII	0.002002	0.000914022		Excluded
6	SMGR	0.001925	0.000666998		Excluded
7	PGAS	0.000621	0.0000648		Excluded
8.	UNVR	0.017115	0.0022815		Excluded

According to the table above, from those eight shares, the candidate's optimal portfolio shows that there are four stocks that will form the optimal portfolio using the Single Index Model. The other four stocks are not included in the optimal portfolio formation because of its ERB value < C*.

The most considerable Ci value, as presented on the table, is 0.0030418. This value plays a role as C* (cut off point) which will be used as the limitation of a stock entry in the portfolio. The issuers, whose ERB value is higher than the value of C* will be included in the optimal portfolio component. From the table above, it is identified that there are four stocks that meet the criteria to enter into optimal portfolio formation because it has an ERB value higher than the C* value of AKRA, ICBP, INDF, and TLKM.

The Proportion of Funds Determination

The optimal portfolio will be formed when the stocks that have been taken up are allocated according to their respective weights. The weighted stocks require data on stock beta values, stock residue variants, shares ERB, and cut-off point (C*) values. The calculation result of the four shares of the stock with a Single Index Model can be seen in the following table:

Table 4: The Result of The Proportion of Funds Determination: A Single Index Method

Issuer	Xi	Wi
AKRA	0.585075	10.37%
ICBP	0.716964	12.70%
INDF	1.226252	21.73%
TLKM	3.115084	55.20%

From the proportion of the allocation of funds in the table above, it is known that the TLKM shares have the highest proportion of 3.115084 and the lowest proportion of funds held by AKRA of 0,585075. It indicates that if the investor has 100% of funds, then 55.20% will be invested in the TLKM share, 21.73% will be invested in INDF stock, 12.70% will be invested in ICBP stock, and 10.37% will be invested in AKRA share.

Expected Return Calculation and Portfolio Risk

After determining the proportion of funds of each portfolio-forming stock, the expected return portfolio can be calculated with the equation (Rp), and the risk of the portfolio also can be calculated with the equation (Beta p). The expected return calculation results are shown in the table below:

Table 5: The Results of Expected Return and Portfolio Risk Calculations Based on Single Index Method

Issuer	ER (P)
AKRA	0.02%
ICBP	0.20%
INDF	0.08%
TLKM	0.84%
Portfolio	1.12%
	13.49%
Stdev P	0.050045124

The table above shows that the portfolio formed from the four sharia stocks provide a level of development (expected return) of 1.12% per month or 13.49% per year. The return generated in the table above is an average return realized with the proportion of funds instilled in the portfolio. The Portfolio deviation standard is obtained by the standard deviation or risk value of the portfolio amounting to 0.050045124 or 5.0%.

2. Constant Correlation Model

a. Calculation of Excess Return to Standard Deviation (ERS)

The optimal portfolio formation using the Constant Correlation Model is based on the assumption that the correlation coefficient between shares is constant. This measure explains the extent to which return of a security relates to one another in a diversified context.

The optimal portfolio preparation procedure with the Constant Correlation Model uses the ERS reference number. The ERS value is the average return of the shares with the average risk-free investment rate against the standard deviation of the stock. Standard deviation reflects the total risk of a security, that is, a systematic risk and not systematic risk. ERS, which will become the optimal portfolio candidate, should have a high and positive value. Stocks that have negative ERS value will not be included in the optimal portfolio formation.

There are eight stocks which have positive ERS value and make these stocks an optimal portfolio candidate. These stocks are AKRA, ASII, ICBP, INDF, PGAS, SMGR, TLKM, and UNVR.

The stock correlation coefficient shows concurrent movements between two variables. The value of this coefficient is between +1.0 to -1.0. A correlation coefficient value of +1.0 means a perfect positive correlation, which is a form of correlation that does not reduce risk. A correlation coefficient value of 0 means there is no correlation, which is a form of correlation that will significantly reduce the risk. A -1.0 value correlation coefficient means a perfect negative correlation, which is a form of correlation that eliminates the risk of both securities.

Table 6: ERS Calculation Result

No.	Stock code	Correlation Coefficient
1.	AKRA	0.079639
2.	ASII	0.037426
3.	ICBP	0.120282
4.	INDF	0.104976
5.	PGAS	0.005754
6.	SMGR	0.031054
7.	TLKM	0.20302
8.	UNVR	0.185424

From the calculation of ERS, it is obtained that all the issuer have positive value: AKRA, ICBP, INDF, ASII, PGAS, SMGR, TLKM, and UNVR. If an issuer has a negative ERS value, the issuer is removed from the list of optimal portfolio candidates.

b. Calculation of Cut Off Rate (Ci)

After obtaining ERB values that are positive, then a cut off rate (Ci) value is examined using equation (Ci). Cut-Off Point is an ERS value limiting point. Stocks which form an optimal portfolio have ERS value > ERS value in cut-off point (C*). Stocks That Have ERS value < ERS value in Point C* will not be included in the formation of an optimal portfolio. Cut-off point value (C*) is the most considerable Ci value.

Table 7: Result of Cut off Rate Determination (Ci) Based on ERS

No	Stock code	ERS	Ci	C*	Portfolio Candidates
1.	AKRA	0.079639	0.000120599	0.000290331	Included
2.	ASII	0.037426	0.0000898		Included
3.	ICBP	0.120282	0.000150999		Included
4.	INDF	0.104976	0.000167402		Included
5.	PGAS	0.005754	0.00000780		Included
6.	SMGR	0.031054	0.00006314		Included
7.	TLKM	0.203027	0.000290331		Included
8.	UNVR	0.185424	0.000242663		Excluded

From the table above, it is acknowledged that the most substantial Ci value is 0.000290331. This value represents C* which will be used as the limitation of a stock selection in the portfolio. Issuers whose value is higher than the value of C* will be included in the optimal portfolio component. From the table above, it can be noted that there are seven stocks that meet the criteria to enter the optimal portfolio formation because it has a value of ERS higher than the value C*. They are: AKRA, ASII, ICBP, INDF, PGAS, SMGR and TLKM.

c. Proportion of Funds Determination

The optimal portfolio will be formed when the selected shares are allocated according to their respective weights. This weighing process needs stock standard deviation value data, average share correlation coefficient in pairs, shares ERS, and the value of the cut-off point (C*). The calculation result of the weighted eight stocks with a constant correlation Model can be seen in the following table.

Table 8: Result Proportion Determination of Funds Based On Constant Correlation Method

Issuer	Xi	Wi
AKRA	1.107698	11.38%
ASII	1.141002	11.72%
ICBP	0.847241	8.70%
INDF	2.120816	21.79%
PGAS	0.052451	0.54%
SMGR	0.601956	6.18%
TLKM	3.862396	39.68%

From the calculation above, the amount of percentage of funds for each share in the portfolio is TLKM for 39.68%, INDF amounted to 21.79%., ASII at 11.72%, AKRA at 11.38%, ICBP amounted to 8.70%, SMGR at 6.18%, and PGAS amounted to 0.54%.

d. Expected Return and Portfolio Risk Calculation

After determining the proportion of funds of each portfolio-forming stock, it can be calculated the expected return portfolio with the equation (Rp) and can also be calculated the risk of the portfolio with the equation (Beta p). The expected return calculation results are shown in the table below:

Table 9: Calculation Results of Expected Return and Portfolio Risk Based On Constant Correlation Method

Issuer	ER (P)
AKRA	0.008
ASII	-0059%
ICBP	0117%
INDF	0043%
PGAS	0.003
SMGR	-0040%
TLKM	0373%
Portfolio	0440%
	5,275%
Stdev p	0.031052517

The table above shows that the portfolio formed from seven Sharia stocks provide a level of development (expected return) of 0.44% per month or 5.27% per year. The return generated in the table above is an average return realized with the proportion of funds instilled in the portfolio. Meanwhile, the Portfolio deviation standard is obtained by the standard deviation or risk value of the portfolio of 0.03105 or 3.1%.

3. Portfolio Performance Assessment

The author tried to find the optimal performance simulation of portfolios using the Single Index Method and the Constant Correlation Method**.** Based on these simulations, the author assesses that the optimum portfolio formation with Single Index Models is better than the Constant Correlation Model. It is in accordance with the consideration that the return and risk level on the Single Index Method is higher (at 13%) than the Constant Correlation Model (at 5%),. Whereas the risk level of the Single Index Model is five percent, two percent more than of the Constant Correlation Model.

The high level of risk in the Single Index of this model corresponds to the return level in the larger Single Index Model. It is in line with the investment principle that is high-risk, high return. The considerable level of risk on the Single Index Model than of the Constant Correlation Model is assumed caused by the issuer diversification, which is less than the diversification on the Constant Correlation Model.

This assessment is in line with the results of statistic on the table above, which explains that the value of the prob > the value of significance is 5%. Since the prob value is 0.162, which higher than the value of significance, thus H_0 is rejected. Therefore, based on the result of statistic calculation, it can be concluded that the optimum level of return portfolio using Single Index Method does not differ significantly with the return of optimal portfolio formed by Constant Correlation Model.

Table 10: Group Statistics

RETURN_GROUP		N	Mean	Std. Deviation	Std. Error Mean
RETURN_SIM_CM	1.0000000	6	0.003520	0.003951	0.001613
	2.0000000	9	0.001247	0.001995	0.000665

Table 11: Independent Samples Test

		Levene's Test for Equality of Variances		T-Test for Equality of Means						
		F	Sig.	Q	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
RETURN_SIM_CM	Equal Variances assumed	2.382	0.147	1.484	13	0.162	0.002273	0.001532	-0.001037	0.005583
	Equal variances not assumed			1.303	6.722	0.235	0.002273	0.001744	-0.001886	0.006433

H_0: X1 ≠ X2: The optimal return portfolio levels formed using a Single Index Method differ significantly with the optimal return portfolio level established using the Constan Correlation Method.
H_1: X1 = X2: The optimal portfolio return rate established using a Single Index Method does not differ significantly with the optimal return portfolio level set using the Constan Correlation Method.
The underlying reason for decision making:
The significance level used is 5%

- If the value of Prob > 0.05 then H_1 is accepted
- If the value of Prob < 0.05 then H_0 is accepted

Based on the table above, it is acknowledged that the value of Prob (sig 2-tailed) is 0.162 > significance value of 0.05. As a consequence, H_0 is rejected. Therefore, based on the result of statistic calculation, it can be concluded that the optimal return of the portfolio by using a Single Index Method does not differ significantly with the optimal level return of the portfolio established by Constant Correlation Method.

CONCLUSION

- Based on the calculation of optimal portfolio formation with the Single Index Model, of 8 JII shares in the selection, obtained a combination of 4 shares. These shares are TLKM with the highest proportion of funds amounting to 3.115084 or 55.20%, then Shares of INDF with a proportion of 1.226251 or 21.73%, ICBP with a proportion of 0.716964 or 12.70%, and the lowest of AKRA shares with a proportion of 0.585075 or 10.37%.
- Based on the calculation of optimal portfolio formation with the Constant Correlation Model, there are 8 JII stocks in the selection. These shares and their weighted proportion are as follows: TLKM as much as 3.862396 or 39.68%, INDF as much as 2.120816 or 21.79%, ASII as much as 1.107698 or amounting to 11.72%, AKRA as much as 1.107698 or 11.38%, ICBP as much as 0.847241 or 8.70%, SMGR as much as 0.601956 or 6.19% and PGAS as much as 0.052451 or at 0.54%.
- Based on these simulation results, the author assesses that at the formation of an optimum portfolio with the Single Index Method is more reliable than the Constant Correlation Method. It corresponds to the consideration that the return and risk levels in the Single Index Method are higher than the Constant Correlation Method. The return rate of the Single Index Method is 13 percent, considerably higher than the return rate generated by the Constant Correlation Method, which is only at 5 percent. Whereas at risk level, the Single Index Method is 5 percent, while the Constant Correlation Method is 3 percent. The high level of risk in the Single Index Method corresponds to the return level of the more significant Single Index Method. It is consistent with the investment principle of high-risk, high return. The magnitude of the risk at the Single Index Method compared to the risk at the Constant Correlation Method presumably caused by a fewer issuer diversification than of the Constant Correlation Method.

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