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Optimalization Stock Portfolio Based on Single Index Model over Bullish and Bearish Market: Case Study on LQ45 Manufacturing Company

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This study aimed to determine the optimalization stock portfolio as a basis of investment inside company stocks in LQ45 on Indonesia Stock Exchange. In this research, we use data observation from January 2013 to December 2017 with quantitative method to obtain population over 11 manufacturing companies based single index model. The results showed 5 stocks became to portfolio candidates from the 11 candidate stocks studied which is 5 optimal portfolio shares had a return of 0.019 or equal 1.98% per month. Here, the 5 optimal portfolio have a risk and must be faced by investors shares around 0.007 or equal to 0.07%. The 5 optimal portfolio namely UNVR, ICBP, GGRM, KLBF, and INDF to share over investors. The fund proportion can be invested by 5 shares such as UNVR, ICBP, GGRM, KLBF, and INDF are equal 56.06%, 16.14%, 7.86%, 16.42% and 3.52%, respectively. The Return on bullish conditions shows that the portfolio returns is calculated from selected five stocks to obtain optimal portfolio formation reached 0.021. Furthermore, the return on bearish conditions have risk value more than 0.008. Thus, the optimal portfolio in bullish conditions can reduced investment risk more than 0.011 poins. Thus, the optimal portfolio can be reduced risk value over low level in bearish conditions in LQ45 manufacturing company in near future.

Keywords: Bullish, Bearish Market, Optimal Portfolio, and Single Index Model.

1. INTRODUCTION

Stock trading in Indonesia is increasing prevalent from domestic investors into the IDX especially with smaller deposit rates and great deposit interest tax. The depositors divert their money to capital markets with invest over capital markets to get the best return from investment by opening from different method to reduce a risk investment from losing money and increasing the opportunity to achieve large profits. Indonesian Stock Exchange have several stock indices with reference of prospective investors. The stock index is a one method to measure the stock movement (overall stock) collection with certain criteria which is owned by investors. Here, the stock movements have a benchmark for assessing the investment performance namely CSPI and LQ45 index. The increasing and decrasing phenomenon from stock prices shows the supply and demand for shares offered by company in the trading floor. The fluctuations level of stock movements can be influence by investor decisions due to the stocks is looking at bearish and bullish conditions. The stocks pattern are commonly used by capital market players to anticipating the occurrence of decreasing phenomenon of bearish economic setbacks and bullish economic in capital market.

The optimalization analysis of portfolio formation was proposed in this study to describing bullish or bearish market conditions during portfolio compiler with considering the stock candidate returns. Thus, the bullish or bearish market have two different portfolios it can be

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arranged namely highest positive return in market condition. The possibility stocks give a high return when the bullish market will become to opposite loses while the market status in bearish condition. All stocks produce have a positive return in determining the stock candidate to entering the easier portfolio. However, in market conditions the bearish have a negative return due to difficulty to choose stocks candidates from portfolio. Thus, the portfolio candidate must be analyze to maintain a portfolio return and develop a new portfolio. The manufacturing industry requires additional funding from internal and external parties to support company performance. Here, the investors will be certainly interested in investing for capital in manufacturing companies to seeing significant growth. Thus, the information and financial analysis to assess company performance must be obtained during operational activities [1, 2].

Furthermore, the manufacturing companies have many main pillars with positive developments to become as a part of optimal portfolio in industries over country. The manufacturing development in industry can be used to see industrial development in the country. Thus, the industrial development can be assessed from quality product and industrial performance [3, 4]. Manufacturing companies in Indonesia is satisfactory development so that the investors are interested to invest in manufacturing companies. Here, the manufacturing companies are listed in the Indonesia Stock Exchange have three main sectors which is included the twenty sub-sectors. The fluctuations market index values is described in market conditions namely capital market investment. Here, the capital market will be profitable and followed by rising stock prices called bullish markets. The investors perceive of market in unfavorable condition with higher supply of demand, then the stock price will be decreased which in the turn of market index value while the downturn market conditions is often referred as a bearish market. For rational investors, the fluctuations market condition must be faced with the right investment strategy to obtain optimal profits at the certain risk level. Thus, the stock portfolios are intended to eliminate unsystematic risks to obtain maximum returns at a certain risk level. However, the information from generated portfolio analysis is a short-term with requires analysis to obtain relevant information. In other hand, the expression of suggestion a portfolio analysis is carried out continuously by considering market conditions. In accordance with the rational investors, the market condition must be decreased at risk averse level or called avoiding risk in investing.

2. METHODOLOGY

In order to achieve portfolio company, the letters or a set of investment opportunities must be equal by portfolio theory with leader risk concept related to assets in a portfolio risk leader from independent assets [5, 6]. The financial theory states that the incrasing investment risk from investors is a require a greater profit level. To avoid a risk investment, the diversification of shares by forming a portfolio must be assesed with analyze a number of accounting procedures data as input on portfolio structure. Here, the analyze procedure portfolio can be assesed use Markowitz model or with a single index model. In order to determine the optimal portfolio, the single index model needed to determine as an efficient portfolio. The optimal portfolios is assesed based on are efficient portfolios from investor who prefer high risk with a high return [7].

The development theory in 1950s called Markowitz Portfolio Theory uses a several basic statistical measurements to develop portfolio plan including expected return with standard deviation of both securities and portfolios also the correlation between returns [8]. This theory formulates the existence of return elements and investment risk where the risk element can be minimized through the diversification and combining various investment instruments over portfolio [9]. Here, the diversification is very important for portfolio optimization with the agree diversification and correlation between risky assets [10]. By combining stocks from different sectors, the price movements are mutually complementary among these stocks also more risky with portfolio in the higher return. Thus, bullish market as a trend to upward in the capital market to indicate tendency value over stock prices in the market index which is calculated from penetrate value index from previous market price while the decrease stock prices does not exceed at lowest price index. The term of bearish market namely trend of downward movement is a trend that occurs in the capital market with indication from the new index fails price to break previous highs in the price index over the lower limit of index price. Furthermore, the broader limits from market conditions is occured during bearish markets over economic conditions is decline in many companies from the lowest cash flow, small business opportunities, and uncertain future returns [11]. Thus, the bullish market conditions is occured in growing economy which is characterized a number of business opportunities from the company and business target.

2.1 Relationship Stock Returns and Market Condition

The alpha and beta portfolios is using a single index model to estimating stock beta [12]. Here, the beta turns out to unstable both of bearish and bullish market conditions returns and alpha portfolio in stable bearish and bullish market conditions [12]. The portfolio is related to determine stocks into various types from investments produce in optimal profits [13]. By using diversification mechanism, investors can be reduce the risk level at the same time optimize the level in expected returns. Thus, the optimal portfolio used to determine

bearish and bullish conditions by using a single index model to obtain single index models for a better performance in forming optimal portfolios and differences in stock returns with a single index model over bullish and bearish conditions.

2.2 Risk Relationship of Shares with Market Condition

The beta portfolio is increase and decrease market from bearish and bullish. Here, the estimation value cross-sectional relationship model over beta-return index shows that risk is very influential and significant for ordinary market beta while the extreme market conditions are not statistically significant. The strength of the relationship seems to be enhanced and compared in single factor beta-return model. Figure 1 showed the proposed method to described research framework model in this study.

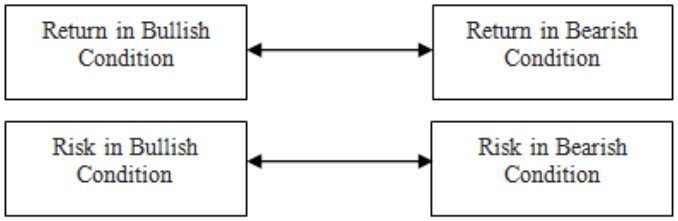

Figure 1. Conceptual Framework Model

As can be seen in Figure 1, all parameter from both return have a significant performance. Thus, in this research the quantitative descriptive research is proposed to assess independent variables with comparisons or connecting with other variables. The description related to stocks portfolio over manufacturing companies is listed in Indonesian Stock Exchange over 2013 to 2017 LQ45 using a single index model. The single index model to determine efficient set of portfolios is described by Elton er. Al [14]. The description of stock development in the stock prices over Manufacturing Companies, CSPI and SBI can be calculate as a realized return, expected return, standard deviation, and variance of each individual stock and SBI as follows:

$$R_{t(i)} = \frac{P_{t\ i} - P_{t-1(i)}}{P_{t-1(i)}} \quad (1)$$

$$E(R_i) = \frac{R_{t(1)}}{n} \quad (2)$$

$$\sigma i = \sum_{i=1}^{n} \frac{Ri - E(Ri)^2}{n-1} \quad (3)$$

$$Var = \sigma i^2 \text{ atau } Var = \sum_{n-1}^{n} \frac{Ri - E(Ri)^2}{n-1} \quad (4)$$

The stock calculation with a market is reflected by relationship between stock returns and market returns. Here, the covariance average deviation from of each data parameter based on ratio of realized stock returns over realized return market as follow:

$$\sigma im = \frac{\{Ri - E(Ri)\}.\{Rm - E(Rm)\}}{n-1} \quad (5)$$

where, Ri, Rm and n stand for Calculating beta, alpha, and variance error of each individual stock, respectively. The beta portfolio is a unique due to risk of individual stocks is calculated based on slope of realized returns by realizing stock market returns in a certain period. The beta portfolio is used to calculate the ERB and βi index to calculate Cut-Off Point (Ci). Thus, Beta portfolio index can be calculated by formula [15]:

$$\beta i = \frac{\sigma_{im}}{\sigma^2 m} \quad (6)$$

$$\beta i = \frac{Ri - E\ Ri\ .\ \{Rm - E\ Rm\}}{\{E\ Rm - Rm\}^2} \quad (7)$$

Alpha (αi) is the realized to intercept of stock returns with realized market returns and compares realized calculations of stock returns by realizing market returns in certain period time. Thus, the Alpha parameter can be calculated by:

$$\alpha i = E(Ri) - \beta i\ .\ E(Rm) \quad (8)$$

The residual error variance (σei) is a non-systemic risk. To calculate σei, expressed by:

$$\sigma ei^2 = \sigma^2 i - (\sigma m^2 .\ \alpha i)^2 \quad (9)$$

Furthermore, the calculation of value Excess Return to Beta (ERB) needed the basis for determining all candidates over portfolio. The ERB value is obtained from sorted by largest to smallest value. ERB is used to measure premium stock returns relative to the one non-diversified risk unit measured by Beta parameter. Thus, ERB shows the relationship between returns and risks which are determinants of investment expressed by [16]:

$$ERBi = \frac{E\ Ri\ - Rf}{\beta_i} \quad (10)$$

The *Ci* value is a second stock from calculated A_1 values up to Ai and B_1 through Bi. *Ci* value is market variance over excess returns from greater Rf value over stock error variance with market variance on individual stock sensitivity inside stock error variance. The value of αi is calculated to obtain Ai and βi value which is calculated from Bi and Ci value. The determination of all values (Ai and Bi) is

expressed by:

$$A_i = \frac{E\ Ri\ - Rf\ \beta i}{\sigma ei^2} \qquad B_i = \frac{\beta i^2}{\sigma ei^2} \qquad (11)$$

The determining of Cut-Off Rate and Limiting point over market result is a variance premium return in stock error variance while market variance and sensitivity of individual stocks namely variance errors.

$$C_i = \frac{\sigma m^2 . Aj}{1 + \sigma m^2 Bj} \qquad (12)$$

Thus, the determine optimal portfolio can be described as follows:

a. If the ERB> = Ci ratio, the shares enter into the optimal portfolio.
b. If the ERB ratio <= Ci, then the shares come out of the optimal portfolio.

The amounts of Ci value from portfolio are stocks from ERB or equal to ERB at point Ci. The determine in weighted scale of shares and proportions for optimal portfolios is expresed [17]:

$$Zi = \frac{\beta i}{\sigma ei^2}\ (ERBi - C^*) \qquad Wi = \frac{zi}{\sum_{j=1}^{k} zj} \qquad (13)$$

The optimal calculation from portfolio is expected to return at Portfolio Expected Return (PER) while the weighted average of individual return for each stock forming by portfolio is calculated using the formula:

$$E(Rp) = \alpha p + \beta p\ .\ E(Rm) \qquad (14)$$

Calculating the optimal portfolio variance or risk, calculated using the formula:

$$\sigma p^2 = \beta p^2\ .\ \sigma m^2 + \sigma ep^2 \qquad (15)$$

In this study, the qualitative method in independent variable have a in two categories. Therefore, testing method of average with difference test for paired sample t-test is used to evaluate certain treatments in the same sample in two different observation periods. The pairing sample from t-test is used over normally distribution. The paired sample t-test over testing methods are used to assess the effectiveness treatment which is indicated by differences in mean before and after treatment. The basis for making a decision to accept or reject in this test is as described follows:

a. If t count> t table and probability <0.05, then Ho is rejected and Ha is accepted.
b. If t count <t table and probability> 0.05, then Ho is accepted and Ha is rejected.

Thus, the Z test can be used over population standard deviation is known as a the number of samples (more than 30 point). If the two conditions doest not match, the type of test is used to obtain two samples t-test. The dependent sample t-test from Paired Sample t-test is used statistical test to compare average result from two groups. The expression formula to calculated paired samples is given to [18]:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} - 2r\left(\frac{s_1}{\sqrt{n_1}}\right)\left(\frac{s_2}{\sqrt{n_2}}\right)}} \qquad (16)$$

The independent t-test sample based on statistical test to compare the average of two groups and not paired or interrelated. The variance homogeneity is tested based on the formula:

$$F = \frac{S_1^2}{S_2^2} \qquad (17)$$

The paired data is stated to have a variant F-Count < F-Table and vice versa. The data variant is declared as an unequal variance if F-Calculate > F-Table then the form of data variance over two data groups will be affected with standard error value which is have distinguish a test formula. The t test is same like variant F-Count over Polled Variance formula as follow [19]:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} \qquad (18)$$

Furthermore, the T-tests value from different variants is used formula Separated Variance and expressed over equation 19 as follows [20, 21]:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \qquad (19)$$

3. RESULT AND DISCUSSION

In order to achieve the result, we calculate amount of return and risk from optimal stock portfolio return over portfolio calculation results. Table 1 shows the calculation result from optimal stock portfolio.

Table I. Calculation result from optimal stock portfolio

No.	Code	Wi	βi	αi	αp=Wi.αi	βp=Wi.βi
1	UNVR	0.560626	0.582409	0.011833	0.0066339	0.3265138
2	ICBP	0.161444	1.165729	0.010409	0.0016805	0.1882000
3	GGRM	0.078597	0.650920	0.005068	0.0003983	0.0511606
4	KLBF	0.164177	1.091045	0.004012	0.0006588	0.1791248
5	INDF	0.035155	1.029332	0.000861	0.0000303	0.0361865
					0.0094019	0.7811857

E(Rp) = αp + { βp . E(Rm)}
E(Rp) = 0,0094019+ (0,7811857. 0,006544)
E(Rp) = 0,019867

As can be seen in Table I, the calculation results shows that the portfolio return calculated from the five stocks from selected in optimal formation of portfolio or equal 0.019867. The investor decision to invest in manufactures

Company is included over this portfolio due to the higher expected return market from 0.006544 to 0.00535 expected return risks free. Furthermore, in this study we calculate Optimal Portfolio Risk in Table II.

Table II. Calculation result from Optimal Portfolio Risk

No.	Code	Wi	σei²	σep²=Wi.σei²	βp²	σm²
1	UNVR	0.5606262	0.004156	0.0023298	0,610251	0,001181
2	ICBP	0.1614440	0.012688	0.0020484		
3	GGRM	0.0785974	0.012688	0.0009973		
4	KLBF	0.1641772	0.004804	0.0007887		
5	INDF	0.0351553	0.004785	0.0001682		
				0.0063323		

Variance Portfolio $\sigma p^2 = \beta p^2 . \sigma m^2 + \sigma ep^2 = 0.007053$
Risk Portfolio $= 0.000761$

As can be seen in calculation portfolio variance and portfolio risk, we obtain 0.007053 and 0.000761, respectively. The comparison result between individual returns stock and portfolio stock returns shows individual stocks provide a higher return than portfolio returns. However, the risk of individual stocks is also higher than portfolio risk by forming over optimal portfolio with reducement risk. Based calculation result, we suggest to calculate Amount of Return and Risk from Optimal Stock Portfolio in the Bullish Month Period in Table III.

Table III. Calculation result from Amount of Return and Risk from Optimal Stock Portfolio in the Bullish Month Period

No.	Code	Wi	βi	αi	αp=Wi.αi	βp=Wi.βi
1	GGRM	0,0190724	1,1741027	0,0112278	0,0002141	0,0223930
2	ICBP	-0,0000002	1,0446361	0,0171687	0,0000000	-0,0000002
3	INDF	0,0000000	0,8706505	0,0030881	0,0000000	0,0000000
4	KLBF	0,9779347	1,3701936	0,0083299	0,0081461	1,3399599
5	UNVR	0,0029931	0,7212621	0,0195381	0,0000585	0,0021588
					0,0084187	**1,3645115**

$E(Rp) = \alpha p + \{ \beta p . E(Rm)\} = 0,0213207$

As can be seen in calculation above shows that the portfolio return is calculated from selected five stocks in the optimal portfolio formation over bullish month condition reached 0.0213207. This return will be influenced the investor's decision to invest inside the company shares included in this portfolio because it has a higher expected return than the expected return market of 0.009455 and expected return risk free reached 0.00528. Therefore, this proves in a bullish condition over investor can be performed in optimal shares and can get the great profit in average stock. Thus, the investor need to money invest over money market. Furthermore, the variance portfolio from money market can be calculate optimalization of portfolio risk over five stocks with highest priority from money invest.

Table IV shows the Calculation of Optimal Portfolio Risk.

Table IV. Calculation result from Optimal Portfolio Risk money invest

No.	Code	Wi	σei²	σep²=Wi.σei²	βp²	σm²
1	GGRM	0,0190724	0,000000	-0,00000000102		
2	ICBP	-0,0000002	0,009734	-0,00000000156		
3	INDF	0,0000000	0,006614	-0,00000000028	1,8618915	0,0018322
4	KLBF	0,9779347	0,000000	-0,00000000076		
5	UNVR	0,0029931	-0,000001	-0,00000000178		
				-0,00000000539		

Variance Portfolio $\sigma p^2 = \beta p^2 . \sigma m^2 + \sigma ep^2 = 0,0034113$
Risk Portfolio $= \beta p^2 . \sigma m^2 + (\sigma ep^2)^2$
$= 0,00341132$

As can be seen in calculation above, the portfolio variance in the monthly bullish conditions reached 0.0034113 while the risk of portfolio in bullish month conditions is 0.00341132. The comparison between individual risk stocks and portfolio risk shares provide the higher risk than portfolio risk. However, the individual risk stocks are also higher than portfolio risk. Thus, the optimal portfolios in bullish month conditions it can be diversify of reduce risk. So thst, the investors will be obtained the benefit from optimal portfolios in bullish conditions while investors can minimize risks portfolios. In order to obtain minimum mothtly bearish from Optimal Stock Portfolio, we assessed the Calculation of Optimal Portfolio Returns in the Bearish Month Period in Table V.

Table V. Calculation result from Portfolio Returns in the Bearish Month Period

No.	Code	Wi	βi	αi	αp=Wi.αi	βp=Wi.βi
1	UNVR	0,1165404	0,6838524	0,0273926	0,0031923	0,0796964
2	ICBP	-0,0000058	0,6870360	0,0166561	-0,0000001	-0,0000040
3	GGRM	0,5484754	1,7837670	0,0308750	0,0169342	0,9783524
4	KLBF	0,3349934	1,3599138	0,0067389	0,0022575	0,4555621
5	INDF	-0,0000034	0,9247731	0,0027335	0,0000000	-0,0000032
					0,0223839	**1,5136038**

$E(Rp) = \alpha p + \{ \beta p . E(Rm)\} = 0,0083579$

As can be seen in calculation above shows that the portfolio return is calculated from the five stocks selected in optimal formation portfolio with monthly bearish is reached 0.00835789. The return will be affected in investor decision to invest over company shares included in this portfolio. The higher expected return over return market and risk free equal 0.0048134 and 0.00551, respectively. This proves that the conditions of bearish stock on optimal portfolio with higher profits than average stock in general (money market investment). In order to obtain average stocks in minimum mothtly bearish from Optimal Stock Portfolio, we assessed the Optimal Portfolio Risk for the Bearish Month Period in Table VI.

Table VI. Calculation of Optimal Portfolio Risk

No.	Code	Wi	σei²	σep²=Wi.σei²	βp²	σm²
1	UNVR	0,1165404	-0,000003	-0,0000003		
2	ICBP	-0,0000058	0,031937	-0,0000002		
3	GGRM	0,5484754	-0,000001	-0,0000003	2,2909964	0,0048134
4	KLBF	0,3349934	0,000000	-0,0000001		
5	INDF	-0,0000034	0,008757	0,0000000		
				-0,0000009		

Variance Portfolio $\sigma p^2 = \beta p^2 . \sigma m^2 + \sigma ep^2 = 0{,}0110265$
Risk Portfolio $= \beta p^2 . \sigma m^2 + (\sigma ep^2)^2$
$= 0{,}01102746$

As can be seen in calculation above, it is known that the portfolio variance in month condition is bearish at 0.0110265 while portfolio risk in the bearish month condition is 0.01102746. The comparison between individual risk and risk of portfolio shares shows the individual stocks is provide higher risk on portfolio. However, the individual risk stocks are also higher than portfolio risk. This proves that the optimal portfolio in bearish month conditions it can diversify or reduced. Thus, the optimal portfolio risk has the lowest risk level in bearish conditions. In order to obtain Different Return Test on Bullish and Bearish Conditions, we use statistical method to assess Paired Two Sample over t-Test in Table VII.

Table VII. Calculation of Optimal Portfolio Risk

	Return Bullish	*Return Bearish*
Mean	14,107078	8,318355
Variance	73,008878	32,631397
Observations	60	60
Pearson Correlation	0,848349	
Hypothesized Mean Difference	0	
Df	59	
t Stat	4,846602	
P (T<=t) one-tail	0,000106	
t Critical one-tail	1,753050	
P(T<=t) two-tail	0,000213	
t Critical two-tail	2,131450	

Source: Secondary data that has been processed

As can be seen in calculation results, the calculations it turns out if the observations were made in 60 months due to the performance over stock portfolio is compiled by distinguishes bullish market conditions with differential significant compared to the performance of stock portfolios. Thus, the prepared account with bearish market conditions, is acceptable. Even the one-way of difference test shows that the returns in bullish conditions, is measured in single index with return performance in bearish conditions. The single index average return on bearish conditions is calculated for 60 months reached 8.318 with variance 32.631. The single index return average of bullish conditions is related 14.107 with a variance of 73.008. Furthermore, the relationship between performance of two stock portfolios is indicated by the Pearson Correlation value reached 0.848. This condition indicate that the relationship between performance measures have two stock portfolios relatively closely. These results indicate that the t−count is outside over reception area on a normal curve. It can be interpreted that normal curve as an alternative solution due to the t-count value is greater than the t-table value from significant single index return average in bullish conditions over bearish condition. The testing of two-tail shows significant differences between returns in bullish conditions with a returns in bearish conditions be able to show that returns in a bullish condition while a good performance in bearish conditions are made in the 60 month period from 42 bullish and 18 bearish, respectively. In order to obtain Different Risk Tests in Bullish and Bearish Conditions, we use statistical method to assess Paired Two Sample over t-Test for mean in Table VIII.

Table VIII. Calculation of Different Risk Tests in Bullish and Bearish Conditions

	Risk Bullish	*Risk Bearish*
Mean	8,728222	6,488991
Variance	30,310702	39,440699
Observations	60	60
Pearson Correlation	0,912390	
Hypothesized Mean Difference	0	
Df	59	
t Stat	2,846518	
P (T<=t) one-tail	0,006123	
t Critical one-tail	1,753059	
P(T<=t) two-tail	0,012256	
t Critical two-tail	2,031459	

Source: Secondary data that has been processed

Based on calculation results, we proved that the significant difference in performance aspect between risk in bullish conditions and bearish risk conditions has made over 60 months. The Single average Index in bullish risk conditions reached 8.728 with a variance 30.310 while Single risk Index average of bearish condition is 6.489 with variance of 39.444. The relationship performance between two stock portfolios is similiar with 0.912 from Pearson Correlation. The t-count (t-Stat) is 2.846 and greater value from t-table (t-Critical) value reached 1.753 (one-tail) and 2.031 (two-tail).

This result is indicating that the significant difference between average single indexes of risk in bullish conditions with a single index over average risk in bearish conditions. Thus, the 60 months observation states that there are significant differences between stock portfolios are arranged without differentiating market conditions from stock portfolios by considering bullish and bearish market conditions. These results can be interpreted that risk in bullish conditions has a good performance stock than conditions risk in bearish over 60 month's observations. Based on calculations results from eleven research samples, the five stocks were selected as optimal stock portfolio candidates. These five stocks have a high return rate compared by optimal portfolio candidate. These investors give more choices in choosing stocks as an alternative investment. The following five stocks included in the optimal shares portfolio are UNVR, ICBP, GGRM, KLBF, and INDF while non optimal shares

portfolio are ASII, INTP, CPIN, SMGR, SMCB, and MAIN.

4. CONCLUSION

The optimalization of stock portfolio in determination with single index model over LQ45 companies Index in Indonesian Stock Exchange from January 2013 to December 2017 has been successful. The optimal portfolio formation in single index model over LQ45 Index during bullish market conditions and bearish has five stocks composition in accordance with optimal portfolio formation with a single index model. The five stocks such as UNVR, ICBP, GGRM, KLBF, and INDF have funds proportion to give over five stocks is UNVR of 56.06%, ICBP of 16.14%, GGRM of 7.86%, KLBF of 16.42% and INDF of 3.52%. The five optimal portfolio in shared over expected return is reached 0.019 or equal by 1.98% per month while the investment risk have eleven stocks in 0.007 or 0.07%. The investment risk in optimal portfolio is smaller than the individual risk stocks from average return on bearish conditions calculated in 60 months reached 8.318 with variance value in 32.631 while the average return for bullish conditions is 14.107 with variance value 73.008. The relationship between two stock portfolios performances is indicated by the Pearson Correlation value in 0.848 with relatively closely. The average risk in bullish conditions amounting to 8.728 with variance value 30.310 is reached 6.489 with variance value 39.441. The relationship between the performances of the two stock portfolios is quite close over 0.912 on Pearson Correlation. The t-count value with 2.846 and is greater than the value of t-table of 1.753. Thus, the formation of optimal portfolio is one way to diversify to reduce risk in manufacturing company in near future.

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