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RESEARCH ARTICLE

ANALYSIS OF RETURN AND RISK AND FEASIBILITY OF INVESTMENT IN SECURITIES IN FORMING AN OPTIMAL PORTFOLIO IN COMPANIES THAT INCLUDED IN THE LQ 45 INDEX OF THE INDONESIA STOCK EXCHANGE

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Abstract

Investment is the placement of a number of funds made at the present time to obtain profits in the future. This optimal portfolio research aims to determine the return and risk of the portfolio, as well as to determine the proportion of funds invested. The period used in this study is January 2018 to December 2020. The number of research samples is 29 samples. The data obtained are secondary data using the documentation method. The data analysis technique in this study uses a single index model to determine the stocks that make up the optimal portfolio. Stocks that are candidates for the optimal portfolio are stocks that have an ERB greater than or equal to the cut-off rate his. The optimal portfolio is formed by stocks that have an excess return to beta (ERB) of 0.0344 and a unique cut-off point (C*) of 0.0185. Based on the results of this study, there were 13 stocks that became the optimal portfolio. The expected return of the portfolio is 1.49% per month with a risk of 0.73%. The conclusion obtained is that rational investors will invest their funds into an optimal portfolio consisting of 13 stocks.

Key words: Optimal portfolio, single index model, expected return, excess return to beta, unique cut-off point, cut-off rate

1 | INTRODUCTION

The capital market in Indonesia has been the focus of the e-business community in recent years. This is due to capital market activities that are growing from year to year. Investing in the capital market requires sufficient knowledge, experience, and business sense to analyze which securities to buy, which securities to sell, and which securities to keep. Securities can be interpreted as a form of ownership of the assets or wealth of companies that issue securities, but now the use of the term securities refers more to stocks, bonds, and other investment products.

Stock investment is one of the investment instruments that has a very large average return on investment but also carries a very large risk. This is in accordance with the nature of the best known stocks, namely ”High Risk, High Return”. This means that investing in stocks has a high risk but also has a high rate of return. This is due to the stock value rising quickly but at any time it can drop drastically and even plummet. The capital market in Indonesia is an alternative source of external funds for companies, as well as an alternative investment for investors.

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Source : Yahoo Finance

Figure 1 Stock Price Fluctuations on JCI and LQ 45 Index (period 2018 - 2020)

Based on Figure 1, it can be explained that share prices on the Indonesia Stock Exchange may change at any time, as illustrated in the JCI chart. But it seems more minimal changes occur in stock price chart indicated by LQ 45. This is because the LQ 45 is one stock featured on the exchange effect Indonesia. The LQ 45 index is an index that contains 45 selected stocks that have high liquidity so they are easy to trade.

During the period 2018 - 2020, changes in stock prices at the beginning of 2018 tended to decrease. However, at the end of 2018 it tends to increase, so this year it can be concluded that stock price fluctuations tend to be stable. In 2019, stock price fluctuations tended to be stable, although it was seen that in the middle of the year there were several quite significant declines. In 2020, changes in stock prices experienced a very significant decline, which peaked in March and gradually increased by the end of 2020. This is due to unexpected risks in investing, one of which is the COVID-19 attack that is engulfing various countries. In Indonesia, the COVID-19 pandemic began on March 2, 2020, when two people were confirmed to have contracted the virus from A Japanese citizen. As of June 3, 2020, Indonesia has reported 28,233 positive cases of COVID-19. The impact of COVID-19 that attacks the world, especially Indonesia, is certainly very influential on the economic system, including stock investment. Dewi and Masithoh (2020) stated that the results of the JCI experienced a significant difference, namely a sharp downward trend during the COVID-19 pandemic compared to before the pandemic, so it is better for reserves if diversification is carried out in real assets other than financial assets.

The authors formulate the problems in this study are: how to know the level of stock return in companies listed on the Indonesia Stock Exchange?, how to know the level of risk shares in companies listed on the Indonesia Stock Exchange?, how to determine the feasibility of investing in shares in companies listed on the Indonesia Stock Exchange?, 4) What determines the shares were entered in the portfolio?, How to determine the proportion of a portfolio of stocks that is optimal?

The authors formulate the problem d nature of this research are: to know the level of stock returns in companies listed on the Indonesia Stock Exchange; to know the level of stock risk in companies listed on the Indonesia Stock Exchange; to determine the feasibility of investing in shares in companies listed on the Indonesia Stock Exchange; to determine the stocks that are included in the portfolio; to determine the optimal proportion of the stock portfolio.

2 | LITERATURE REVIEW

2.1 | Investment

Investment is the commitment of time is over money or sources of power more in the hope of going to reap the benefits of future ahead (Kane & Marcus, 2013). Investment also means the attribution sources in the term long to get the results of earnings in the future that will come (Mulyadi, 2010). Investment also means a commitment on a number of funds or source of funds other the do currently have, with the purpose of obtaining a number of advantages in the future to come (Tandelilin, 2003). According to Husnan (2001) investment is every user of funds with

the intention of earning income. Meanwhile, according to Halim (2014) investment is the placement of a number of funds at the moment is with the purpose to obtain profit in the future that will come. Investment is the postponement of consumption now to be used in the production that is efficient over a period of time that is specified (Jogiyanto, 2010). From some understanding of the investment can be concluded that the investment is an activity in the field of finance that is intended to obtain the result that the maximum of wealth or assets were planted.

2.2 | Step Investors in Taking Decision to Invest

Investors are rational will invest funds to choose stocks that efficient, provide returns up to the risk of certain or return specific to the risk is minimal. Measures investors are rational can be seen from the average frequency of trades stocks that entered into the portfolio optimal (portfolios that provide returns up to the risk of certain or return specific to the risk at a minimum) has an average frequency of trades are quite high when compared with average -rata frequency trading stocks that are not entered into the portfolio optimally.

2.3 | Return

The purpose of investors in investing is to maximize returns, without forgetting the risk factors that must be faced. Return is one of the factors that motivate investors to invest and also a reward on the courage of investors to bear risk or investment that it does (Tandelilin, 2003). The sources of investment return consist of two main components, namely yield and capital gain (loss). Yield is a component of the return that reflects the flow of cash or income that is derived by periodically from an investment. If we invest in a bond, for example, the yield is shown on the interest the bonds are paid. Likewise also the case when buying stocks, yield is intended by the amount of dividends that we have acquired. Meanwhile, capital gain (loss) as a component of both of the return is the increase (decrease) in the price of a mailing cost (can share and letter of debt term in length), which can provide gains (losses) for investors. In other words, capital gains (losses) can also be interpreted as changes in security prices (Tandelilin, 2003).

2.4 | Risk

Investors are not only quite compute return only for each investment. The risk of investment also needs to be taken into account. Return and risk are two things that do not separate, because consideration of an investment is the trade-off of the two factors is. Return and risk have a positive relationship, the greater the risk that must be borne, the greater the return that must be compensated (Jogiyanto, 2010). According to (Kamarudin 2004) risk can be defined as the possibility to be injured, damaged, or lost. In the investment risk is always associated with the variability of returns that can be obtained by mailing valuable.

2.5 | Relationship between return and portfolio risk

Portfolio is an investment in various financial instruments or also called diversification. Portfolio is intended to reduce the risk of investment by way of spreading the funds to the various assets that are different, so if an asset suffers a loss while the assets of the other does not suffer a loss, then the value of the investment we are not going to disappear all. Proverb is already there before the theoretical portfolio of modern developed by Harry Markowitz, namely: “Do not put all your egg in one basket”, or do not put all the eggs into the one basket. The lesson is very valuable because if basket is fall, then eggs are there in it will shatter all and we lose total. This means that the investment should be divided there are in stocks, bonds, SBI, deposit futures and mutual funds (Mohammed, 2006). Return realization and return expectations of the portfolio is the average - average weighted return of return - return the entire security single. Will however, the risk of the portfolio does not have to equal the average weighted risks of the entire securities only, the risk of the portfolio even can be smaller than the average weighted risk of each security single (Jogiyanto, 2010).

2.6 | Capital market

The capital market according to Samsul (2006: 43) is a place or means of meeting between demand and supply for long-term financial instruments, generally more than one year. Law defines the market capital

as an activity that is concerned with offers general and trading securities, company public which relates to the effect of the issuance, as well as institutions and professions which relates to the effect.

2.7 | Stock price

Index Price Shares (IHS) is a summary of the effects of simultaneous and complex of various kinds of variables that influence, especially on the events of the economy. IHS can be used as a barometer of a country's economy and as a basis for statistical analysis of the latest market conditions (current market). Shares are proof of ownership of the company which is in the form of securities or letters of value that issued the company are listed on exchanges (go public). If profits are acquired companies is relatively high then the dividends are paid is also relatively high. When dividends are paid high will impact positively on the price of shares in the stock exchange and investors will be keen to buy it. As a result, demand will be stocks that rose, so the price of the stock that will increase. The increase in the price of the stock is going to give rise to a capital gain for the holder.

2.8 | Portfolio

In forming a portfolio, investors always want to maximize the expected return with a certain level of risk that they are willing to bear or look for a portfolio that offers the lowest risk with a certain level of return. Portfolio is a combination or a combination of asset groups, either in the form of assets in real are in the form of purchase of assets productive, the establishment of the factory, the opening of the mines, the opening of the estate and assets of financial are carried at market money either in the form of certificates of deposit, commercial paper, and letter valuable market money which is owned by the investor.

The essence of portfolio formation is to reduce risk by means of diversification, namely allocating a number of funds to various investment alternatives that are negatively correlated . In theory the portfolio is how to do the selection portfolios of so many assets, to maximize the returns are expected at the level of risk a particular who are willing borne by the investor.

3. RESEARCH METHODOLOGY

The research design in this study uses a method with a quantitative research approach to analyze returns and risks as well as the feasibility of securities in forming an optimal portfolio. The method used is a single index model method. Sharpe (1963) developed a Single Index Model to simplify the input parameters required in the calculation of the Makrowitz Model. Model Index Single is based on the observation that the price of a securities fluctuate in the same direction with the index price of the market. In particular, it can be observed that most stocks tend to increase in price when the stock price index rises. It is suggested that the returns of securities may be correlated because of their reaction to the general (common response) to changes in the value of the market.

3.1 | Research sites

Location of research that is used in research this is a company that is listed as an index of LQ 45 in the Stock Exchange Indonesia is consistently in the period of 2018 until by 2020. Capturing the object of data on the web site Stock Exchange Indonesia, namely www.idx.co.id.

3.2 | Population and Sample

The population is the whole of the object under study. The population of the research this is the whole company which shares are listed on the Stock Exchange Indonesia. There is a part of the population that will be in careful and considered to describe the population. Companies that are taken as a sample of research this is a company whose shares are listed as an index of LQ 45 in the Stock Exchange Indonesia is consistently in the period of 2018 sapai by 2020.

3.3 | Data type and sources

Data type in the research is the data of secondary that is in the form of notes reports written that was published by the Stock Exchange Indonesia were obtained from media electronic namely internet (w ww.yahoofinance.com and www.idx.co.id) and by reading literature-literature, in the form of books

about research that as well as the journals are associated with the research. The data are obtained there was the stock price data for two years during the period January 2018- December 2020.

3.4 | Data collection method

The collection of data is done by way do download the report in writing which was published by the Stock Exchange Indonesia were obtained from media electronic namely internet (www.yahoofinance.com and www.idx.co.id) and by reading literature-literature, such as books about research and journals are associated with the research. The data that is obtained is the data the price of the stock for two years in the period January 2018- December 2020.

4 | RESEARCH RESULT

4.1 | Calculation results of expected return, variance, standard deviation and stock covariance

Calculate the expected return, variance, standard deviation and covariance of each stock individually using the program Ms.excel. Realized returns are calculated by way of price period is now reduced price in the period before, then divided by the price in the period before. Having obtained realized return then sought Expected return is calculated by way of dividing the number of returns realized by the period of the study. Variance is calculated by way of squaring the standard deviation or by way Tirrenus return minus the expected return then squared and divided by the number of periods of the study. The standard deviation is calculated by means of the root of the variance. Covariance is calculated by way of comparing the calculation of the return stock with a return market. The result of the calculation expected return, variance, standard deviation and covariance of each respective stock individually can be seen in the table following this:

Table 1
Calculation Results of Expected Return, Variance, Standard Deviation and Stock Covariance

No.	Stock code	E(Ri)	Variance (σi^2)	STDev (σi)	Covariance (σim)
1	ADRO	-0.0035	0.0111	0.1051	0.0013
2	AKRA	-0.0085	0.0101	0.1006	0.0021
3	ANTM	0.0384	0.0181	0.1345	0.0022
4	ASII	-0.0346	0.0044	0.0662	0.0009
5	BBCA	0.0143	0.0018	0.0419	0.0009
6	BBNI	-0.0011	0.0061	0.0779	0.0016
7	BBRI	0.0102	0.0036	0.0603	0.0014
8	BBTN	-0.0031	0.0125	0.1120	0.0013
9	BMRI	0.0007	0.0021	0.0461	0.0008
10	BSDE	-0.0045	0.0070	0.0836	0.0011
11	EXCL	0.0047	0.0110	0.1050	0.0005
12	GGRM	-0.0139	0.0055	0.0745	0.0013
13	HMSP	-0.0254	0.0043	0.0658	0.0013
14	ICBP	0.0071	0.0026	0.0509	0.0005
15	INCO	0.0177	0.0170	0.1303	0.0021
16	INDF	0.0027	0.0040	0.0633	0.0008
17	INTP	-0.0027	0.0116	0.1077	0.0016
18	KLBF	0.0007	0.0042	0.0646	0.0011
19	MNCN	0.0041	0.0234	0.1529	0.0015
20	PGAS	0.0051	0.0113	0.1061	0.0015
21	PTBA	0.0098	0.0110	0.1047	0.0007
22	PTPP	0.0096	0.0265	0.1628	0.0037
23	SCMA	0.0070	0.0109	0.1045	0.0018
24	SMGR	0.0121	0.0143	0.1196	0.0023
25	SRIL	-0.0040	0.0026	0.0512	0.0000
26	TLKM	-0.0010	0.0024	0.0488	0.0001
27	UNTR	-0.0024	0.0060	0.0776	0.0003
28	UNVR	-0.0075	0.0032	0.0565	0.0007
29	WIKA	0.0172	0.0193	0.1389	0.0031

Source: Data processed.

Of the 29 companies sampled for the study, the stock that provides the highest level of expected return is PT Aneka Tambang, Tbk. (ANTM.JK) which is 0.0384. Meanwhile, the stock that gives the lowest expected return is PT Astra International, Tbk. (ASII.JK) which is -0.0346. Based on the calculation of expected returns, there are 13 stocks that have negative returns, namely ADRO, AKRA, ASII, BBNI, BBTN, BSDE, GGRM, HMSP, INTP, SRIL, TLKM, UNTR and UNVR stocks. Shares that have a negative value will not be included in the next calculation. This is based on the fact that the stocks that are included in the optimal portfolio candidate are stocks that have a positive expected return. Furthermore, only 16 shares are used in the calculation to the next stage. Rational investors will definitely choose to invest in stocks that have a positive expected return.

It is necessary to calculate the variance of individual stocks to determine the risk of the expected return of the stock. From the calculation of individual stock variance , the stock that has the largest variance is PT. PP (Persero), Tbk, stock, which is 0.0265. While the

stock that has the smallest variance is the stock of PT. Bank Central Asia, Tbk, which is 0.0018. Rational investors will prefer low risk in investing their capital. Covariance is calculated to compare the returns of individual stock to return market. How to calculate that reducing the return realization stocks with the return expectations of its shares then multiplied by the result of the return of the realization of the market reduced the return expected market. Covariance is used to calculate the beta of individual stocks.

4.2 | Calculation of return market and return free risk

Return market is calculated by way of measuring the JCI in now reduced by JCI months before then divided by JCI previous month.

Table 2
Calculation of Market Return

No.	Stock code	E(Rm)	Variance (σm^2)	STDev (σm)
1	JCI	-0.0016	0.0008	0.0285

Source: Data processed.

Based on the table above, the JCI data used to represent market data has an expected market return of -0.0016 or -0.16% per month and a standard deviation of 0.0285 or 2.85%. Meanwhile, the market risk borne is 0.0008 or 0.08%. This negative expected market return indicates that investment in the capital market tends to cause losses for investors. This is due to unexpected risks in investing, one of which is the outbreak of the COVID-19 virus in the 2020 period which is hitting various countries. The impact of COVID-19 that attacks the world, especially Indonesia, is certainly very influential on the economic system, and stock investment is no exception. So that the JCI experienced a significant difference, namely a sharp downward trend during the pandemic.

Calculating risk free or risk free return (Rbr) is used BI rate data. The Bank Indonesia interest rate is used to obtain a risk-free interest rate. The BI rate for the period January 2018 to December 2020 has an average of 2.75%. This data is taken from Bank Indonesia website which can be accessed through www.bi.go.id . Nominal 2.75 % is the BI rate per annual (per annum). While 0.23 % was obtained from the BI rate per year divided by 12 months, then earned a return free risk per month of 0.23 %. Based on the above results, it can be interpreted that if an investor invests in SBI, the expected profit for the investor is 0.23% per month with 0% risk. The profits obtained will certainly be accepted by investors because investing in SBI does not contain risks. The risk-free return of 0.23% per month proves that investment in the Indonesia Stock Exchange capital market provides a smaller return of -0.16% per month.

4.3 | Calculation of alpha, beta, residual error variance and excess return to beta

Alpha is calculated using the intercept formula. Beta is calculated by the slope formula. The residual variance error is the unique risk or unsystematic risk of a stock. While the ERB is the excess returns on the return free risk to other assets. Alpha is the value of expected stock return which is independent of market return. If there is a change in market return in the form of an increase or decrease, it will not affect individual stock returns. Alpha is the portion of the individual stock's profit rate that is not affected by market changes. Alpha is used to calculate the stock residual error variance.

Variance error residual is unsystematic risk that can be eliminated by diversification. Unsystematic risk only exists in the company or industry in question. Therefore this risk can be diversified. Beta is a unique risk of stocks, beta is the sensitivity of the return of the stock to return market . Positive beta means that if the market return increases, the stock return will also increase. An increase in market return will result in an increase in stock returns in the LQ 45 Index. On the other hand, beta is negative, if market returns increase, stock returns decrease.

Table 2
Calculation of Alpha, Beta, Residual Error Variance and Excess Return to Beta

No.	Stock code	i = im/σm	i = E(Ri) - (βi.E(Rm))	ei2	ERB = E(Ri)-Rbr / i
1	ANTM	0.0769	0.0385	0.0180	0.4696
2	BBCA	0.0302	0.0144	0.0017	0.3977
3	ICBP	0.0160	0.0071	0.0026	0.3019
4	PTBA	0.0263	0.0098	0.0109	0.2833
5	INCO	0.0733	0.0178	0.0169	0.2101
6	BBRI	0.0483	0.0103	0.0036	0.1630
7	EXCL	0.0166	0.0047	0.0110	0.1445
8	WIKA	0.1082	0.0173	0.0192	0.1374
9	SMGR	0.0792	0.0122	0.0142	0.1234
10	SCMA	0.0619	0.0071	0.0109	0.0760
11	PTPP	0.1303	0.0098	0.0264	0.0561
12	PGAS	0.0538	0.0052	0.0112	0.0528
13	MNCN	0.0509	0.0041	0.0234	0.0344
14	INDF	0.0277	0.0027	0.0040	0.0137
15	KLBF	0.0387	0.0008	0.0041	-0.0410
16	BMRI	0.0294	0.0007	0.0021	-0.0554

Source: Data processed.

Table 3
Determine the Unique Cut-Off Point

No.	Stock code	Ai=(E(Ri)-Rbr).βi/ ei ²	Bi=βi2/σei2	Ci =(σm2.∑(E(Ri)-Rbr).βi/ ei2) /(1+σm2.∑βi2/σei2)
1	ANTM	0.0772	0.3279	0.0094
2	BBCA	0.0993	0.5254	0.0151
3	ICBP	0.0134	0.0990	0.0028
4	PTBA	0.0067	0.0632	0.0018
5	INCO	0.0162	0.3174	0.0091
6	BBRI	0.0224	0.6489	0.0185
7	EXCL	0.0010	0.0252	0.0007
8	WIKA	0.0134	0.6101	0.0174
9	SMGR	0.0084	0.4406	0.0126
10	SCMA	0.0031	0.3531	0.0101
11	PTPP	0.0027	0.6434	0.0183
12	PGAS	0.0013	0.2585	0.0074
13	MNCN	0.0003	0.1110	0.0032
14	INDF	0.0003	0.120	0.0055
15	KLBF	-0.0003	0.3622	0.0103
16	BMRI	-0.0006	0.4108	0.0117

Source: Data processed.

Based on the calculation results, the company that has the highest beta is PT PP (Persero), Tbk. (PTPP) of 0.1303. This can be interpreted if there is an increase in market return by one unit, then there will be an increase in stock returns of 0.1303 units. To obtain the candidate's portfolio of index LQ 45 period January 2018 to December 2020 it required the calculation of excess return to beta (ERB). ERB is the excess return over risk- free returns on other assets. The ERB ratio reflects the relationship between return and risk in investing. Based on the calculation of excess return to beta of the 16 shares of the company, acquired shares with ERB highest, namely PT PP (Persero), Tbk (PTPP) of 0.2780. Meanwhile, the company's stock with the lowest ERB is PT Kalbe Farma Tbk. (KLBF) of -0.0574. Portfolio optimal contains a collection of stocks that have a ratio of ERB are high.

Determining Unique Cut-Off Point

The unique cut-off point (C*) is the maximum Ci value from a series of stock Ci values. The value of C * is used to determine the point of limiting stock man a course that is entered as a candidate portfolio optimal. The optimal portfolio is formed from stocks that have an ERB greater than or equal to the cut-off rate.

In the model index of single steps that do that sort stocks that have the ERB highest to tere ndah. In this study, there are 16 stocks that are candidates for the optimal portfolio, sorted from the highest ERB value to the lowest. Comparison of ERB Value with the cut-off rate of each stock. The calculation result of the Unique Cut-Off Point value in this study is 0.0185. From these calculations, 13 stocks were selected to be the optimal portfolio. Stocks that become the optimal portfolio are stocks that have an ERB greater than or equal to the cut-off rate. Meanwhile, stocks that have an ERB smaller than the cut-off rate are not included in the optimal portfolio candidate.

Table 4
Comparison of ERB with Unique Cut-Off Point

No.	Stock code	ERB	:	Unique Cut-Off Point
1	ANTM	0.4696	>	0.0185
2	BBCA	0.3977	>	0.0185
3	ICBP	0.3019	>	0.0185
4	PTBA	0.2833	>	0.0185
5	INCO	0.2101	>	0.0185
6	BBRI	0.1630	>	0.0185
7	EXCL	0.1445	>	0.0185
8	WIKA	0.1374	>	0.0185
9	SMGR	0.1234	>	0.0185
10	SCMA	0.0760	>	0.0185
11	PTPP	0.0561	>	0.0185
12	PGAS	0.0528	>	0.0185
13	MNCN	0.0344	>	0.0185
14	INDF	0.0137	<	0.0185
15	KLBF	-0.0410	<	0.0185
16	BMRI	-0.0554	<	0.0185

Source: Data processed.

4.4 | Calculaon of Weighted Scale and Proporon of Funds

Once you know there are 13 stocks are selected for entry into the establishment of a portfolio of optimized, it can be calculated the amount of the proportion (Wi) which is well worth invested in stocks that elected them. Moreover, first determine the scale weighted on each stock (Zi).

Table 5
Calculation of Weighted Scale and Proportion of Funds

No.	Stock code	Zi=βi/σei2(ERB-C*)	Wi=Zi/∑Zi
1	ANTM	1.9237	0.1214
2	BBCA	6.5987	0.4165
3	ICBP	1.7572	0.1109
4	PTBA	0.6360	0.0401
5	INCO	0.8299	0.0524
6	BBRI	1.9404	0.1225
7	EXCL	0.1906	0.0120
8	WIKA	0.6699	0.0423
9	SMGR	0.5834	0.0368
10	SCMA	0.3280	0.0207
11	PTPP	0.1857	0.0117
12	PGAS	0.1649	0.0104
13	MNCN	0.0347	0.0022

Source: Data processed.

Based on these calculations, it can be seen that the proportion of funds (Wi) to form an optimal portfolio is ANTM at 12.14%, BBCA at 41.65%, ICBP at 11.09%, PTBA at 4.01%, INCO at 5.24 %, BBRI 12.25%, EXCL by 1.20%, WIKA 4.23%, SMGR amounted to 3.68%, SCMA amounted to 2.07%, PTPP amounted to 1.17%, PGAS 1.04 % and MNCN by 0.22%. The largest percentage of funds is in the company Bank Central Asia Tbk (BBCA) of 41.65%. While the smallest percentage of funds is in the company PT. Media Nusantara Citra Tbk (MNCN) is 0.22%. The largest percentage of funds is a good investment alternative because according to calculations it has an ERB that is above Ci. Optimal portfolio-forming stocks are stocks that have an ERB greater than or equal to Ci.

4.5 | Portfolio Return and Risk Calculation Results

After knowing the selected stocks in the formation of the portfolio along with the proportion of funds, the expected return of the portfolio can be calculated. To calculate the return portfolio, especially first calculate alpha and beta of the portfolio. Alpha portfolio is obtained from the weighted average of the alpha of each individual stock. While the beta of the portfolio is obtained from the weighted average of the beta of each individual stock. To determine the risk of the portfolio, especially in advance must be known to the beta of the portfolio (systematic risk) are squared, the variance market, as well as unsystematic of the portfolio.

Table 6
Portfolio Risk and Return Calculation Results

No.	Stock code	p=∑Wi.αi	p=∑Wi.βi	ep2=∑Wi.σei2
1	ANTM	0.0047	0.0398	0.0022
2	BBCA	0.0060	0.2188	0.0007
3	ICBP	0.0008	0.0110	0.0003
4	PTBA	0.0004	0.0025	0.0004
5	INCO	0.0009	0.0166	0.0009
6	BBRI	0.0013	0.0795	0.0004
7	EXCL	0.0001	0.0003	0.0001
8	WIKA	0.0007	0.0258	0.0008
9	SMGR	0.0004	0.0162	0.0005
10	SCMA	0.0001	0.0073	0.0002
11	PTPP	0.0001	0.0075	0.0003
12	PGAS	0.0001	0.0027	0.0001
13	MNCN	0.0000	0.0002	0.0001
	Amount	**0.0156**	**0.4284**	**0.0071**
	$E(Rp) = p+(\beta p.E(Rm)$			**0.0149**
	$(\sigma p^2) = p2.\sigma m^2+\sigma p^2$			**0.0073**
	$\sigma p = \sqrt{\sigma p^2}$			**0.0854**

Source: Data processed.

The calculation results show that the portfolio return is 0.0149 or 1.49% per month. The portfolio variance is 0.0073 or 0.73%. Meanwhile, the standard deviation was 0.0854 or 8.54%. Making decisions in investing cannot be separated from various assumptions. Investors will choose risk averse, namely avoiding risk and expecting a high rate of return. The portfolio return calculated from the 13 stocks that become the optimal portfolio candidates is 1.49%. The portfolio return is quite promising because the portfolio return is above the market rate of return E(Rm) of -0.16 % and above the risk-free rate of return of 0.23 % per month.

5 | CONCLUSIONS AND SUGGESTIONS

5.1 | Conclusion

Based on the analysis and discussion, it can be concluded that after the calculation using the Single Index Model method, the period January 2018 to

December 2020 is as follows: Based on the population of companies in the Indonesia Stock Exchange, there are 39 companies that are settled recorded as index LQ 45 period January 2018 to December 2020. The company is used as a sample to get the optimal candidate portfolio; From the sample, there are 13 stocks that meet the criteria to form an optimal portfolio, namely ANTM BBCA, ICBP, PTBA, INCO, BBRI , EXCL , WIKA, SMGR, SCMA, PTPP, PGAS and MNCN; The amount of the composition of the proportion of funds that is worthy invested in 13 stocks that is ANTM amounted to 12.14%, BBCA amounted to 41.65%, ICBP amounted to 11.09%, PTBA amounted to 4.01%, INCO amounted to 5.24%, BBRI of 12 , 25%, excl amounted to 1.20%, WIKA amounted to 4.23%, SMGR amounted to 3.68%, SCMA amounted to 2.07%, PTPP amounted to 1.17%, PGN was 1.04% and MNCN amounted to 0, 22%; Portfolios that optimally are expected to have the rate of return of 1.49% per month and a risk that must be faced from the results of investing in a portfolio that is by 0.73%. Risks were obtained after the formation of a portfolio of optimal is much smaller compared with investing in stocks individually. As well as the return of the portfolio which generated quite promising because it returns the portfolio are at the top level of return on the market E (Rm) amounted to -0.16% and above the rate of return risk-free 0.23% per month.

5.2 | Suggestions

After analyzing and discussing the problems that occur, namely the optimal portfolio analysis on the LQ 45 Index stocks for the January 2018 - December 2020 period with the Single Index Model on the Indonesia Stock Exchange, the suggestions that can be given are as follows: The research observation period is quite short, only 36 months, namely from January 2018 - December 2020. Therefore, it is necessary to extend the observation time so that the research results are more accurate; Data price of stocks and Index Price Stock Composite that is used is the price adj. close monthly and the rate of interest SBI are used is rate of interest SBI yearly so that less reflects the situation on daily observations. The study further should use price adj. close daily because it can provide results that much better; For a period of time that will come, an investor can invest in 13 stocks mentioned; For companies whose shares are not yet fulfill the requirements for entry into the portfolio optimally, can do the repair performance of the company that its shares rise.

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