

# Optimization Of Return and Minimize of Portfolio Risk on The LQ-45 Index Using a Single Index Model

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## ABSTRACT

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This purpose of this research is to analyze the optimal portfolio by using single index model as the basic of investment decision in some companies which are included in LQ-45 index and listed in Indonesia Stock Exchange. The data is the annual individual stock prize, the annual dividend share, the interest of Bank Indonesia Certificate (SBI) and the movement of LQ-45. The companies which have been studied are included in LQ-45. Optimal portfolio is portfolio which has excess return to beta (ERB) value which is larger than the value in which the value is the border point (cut-off point C\*) which has the last ERB value and it is larger than the value. The result of this research shows that 2 as optimal stocks which has been combined the proportion of fund, portfolio 2 and portfolio 4 are most optimal.

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## 1. Introduction

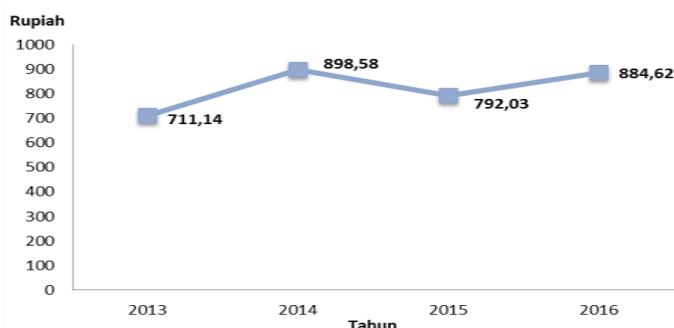
Investment for Indonesian people is no longer a foreign thing. An activity that is a commitment to sacrifice current consumption with the aim of increasing future consumption. Investment according to Tandelilin (2010:1) is a commitment to invest a certain amount of funds at this time with the aim of obtaining profits in the future. Basically, investment actors or investors make investments with the aim that the value of the funds that have been sacrificed will increase in value in the future. In other words, investors hope to gain profit from their investment activities. Investors can invest their funds in assets *real* such as land, gold, machinery and buildings or financial assets such as deposits, capital markets and bonds.

One option if investors want to invest in financial assets is the capital market. The capital market acts as a link between investors and companies or government institutions through trading long-term financial instruments, such as bonds, stocks, warrants, *right*, mutual funds, and various derivative instruments, such as *option*, *futures*, and others (Malinda, 2011:3). One of the investment products traded on the IDX is stocks. Stocks can be defined as a sign or ownership of a person or body in a company or limited liability company. Stocks are in the form of a piece of paper stating that the owner of the paper is the owner of the company that issued the securities.

The large number of issuers registered on the IDX and the number of registered issuers that increases every year will make it difficult for investors to observe the price movements of

securities in it. Therefore, an index is needed to observe the price movements of its securities. On April 1, 1983, the IDX introduced the Composite Stock Price Index (IHSG) to make it easier for investors to know the movement of the stock exchange.

According to Hartono (2015:156), the Composite Stock Price Index (IHSG) which covers all listed stocks is considered less appropriate as an indicator of capital market activity because of the many stocks whose movements are less active. There are even stocks that do not experience any price movements at all because there is no buying and selling activity in them. These stocks can be said to be dead stocks. With the phenomenon of less active stocks and dead stocks, the Indonesia Stock Exchange (IDX) formed the Liquid 45 Index (ILQ-45) in February 1997. The LQ-45 Index contains 45 stocks that have high liquidity and large market capitalization. High liquidity means that the stocks are widely traded by investors. To enter the LQ-45 Index, stocks must pass the selection according to several selection criteria. Furthermore, the IDX will routinely monitor the performance of each stock included in the LQ-45 Index. However, the price movement of the LQ-45 Index fluctuates, like the price movement of the IHSG.



Source: processed secondary data (2018)

The price of the LQ-45 Index at the end of 2013 was Rp711.14 or down 3% from the price in 2012. At the end of 2014, the price of the LQ-45 Index increased to Rp898.58 or up 26% from the price in 2013. However, at the end of 2015, the price of the LQ-45 Index decreased again to Rp792.03 or down 12%. In 2016, the price of the LQ-45 Index increased again to Rp884.62 or up 12% from the price in 2015. Fluctuating prices as shown in Figure 1.3 are normal. Because the price indicated by the LQ-45 Index is influenced by the prices of the stocks included in it. In the capital market, rising and falling prices are normal, but this can cause the level of *return* and the risks that will fluctuate. Year 2013 LQ-45 Index has *return* of -3.25% and a risk of 0.27%. In 2014 *return* and the risk of the LQ-45 Index rising, *return* increased to 26.36% and the risk increased to 1.42%. However, in 2015 *return* and the risk of the LQ-45 Index falling, *return* down to 11.86% and has a risk of 1.03%. In 2016 *return* and the risk of the LQ-45 Index increasing again. *Return from* The LQ-45 index is 11.69% and the risk is 0.12%. Figure 1.4 also reinforces the term *high risk high return*, that is, the higher the risk borne by the investor, the higher the return. *Return* which will be received by investors.



Source: processed secondary data (2018)

However, in economics in general and investment science in particular, there is an assumption that investors are rational beings. Rational investors certainly do not like uncertainty or risk (Tandelilin, 2015:10). Investors will have difficulty choosing which stocks have *return* maximum and minimal risk. According to Tandelilin (2015:115), to reduce investment risk, investors need to diversify. Diversification can mean that investors need to form a portfolio by selecting a combination of a number of assets in such a way that risk can be minimized without reducing *return* expectations. Reducing risk without reducing *return* is the goal of all investors in investing. In forming a portfolio, every investor wants to maximize *return* expectations with a level of risk that investors are willing to bear, or a low level of risk with a high level of return.

One of the models used to compile an optimal portfolio is the single index model. The single index model is a model for compiling an optimal portfolio by determining the level of return influenced by systematic risk. This method is widely used by investors to compile a portfolio because the process is easier and simpler compared to other methods. In the process of forming a portfolio, the single index model selects stocks that have good performance. The indicator of good stock performance is the Excess Return to Beta Ratio (ERB) value. Stocks that can be included in the portfolio are stocks that have an ERB value that is greater or at least equal to the cut off point value. Cut Off Point (C\*) is the maximum return limit determined by investors from the level of price fluctuations of each stock. The selected stocks will form a portfolio that is expected to provide maximum returns and limited risk.

This study also aims to strengthen Tandelilin theory (2010:9) that the basis of investment decisions consists of the expected return level, risk level and the relationship between return and risk. Investor will consider the level of return and risk that will be borne before making an investment decision. Return and risk are two important things that investors must know. The relationship between investment decisions and return and risk can be described as follows. From this background, researchers assume that there needs to be a reference for investors in compiling their stock portfolios. So that investors get steps systematically to allocate funds for investment. This researcher will conduct research on **optimization return and minimizing portfolio risk on the LQ-45 index using a single index model**.

Investors' difficulties in determining which stocks to include in a portfolio, diversification, and estimation *return* risk can be overcome by compiling a portfolio using a single index model. This research also aims to strengthen Tandelilin theory (2010:9) that the basis for investment decisions consists of the level of *return* expectations, risk levels and the relationship between *return* and risk. One person investor will take into account the level *return* and the risks to be borne before making an investment decision. *Return* and risk are two important things that investors should know.

## 2. Literature Review

“Analysis of Optimal Portfolio Selection with Markowitz Portfolio Model and Development”. Using the BISNIS-27 Index as the research object and sourced from secondary data that has been published by the Indonesia Stock Exchange in 2011-2013. The sample used was 10 stocks with the technique *purposive sampling*. The results of this study explain that the model *Mean Absolute Deviation* is an optimal portfolio model that is able to provide *return* high and optimal performance, making it suitable for investors with preferences *risk seeker*. Model *Downside Deviation* is an optimal portfolio model that is able to provide the smallest risk, so this model is suitable for investors with preferences *risk averse*.

Natalia et al (2014) conducted a study on "Determining the Optimal Stock Portfolio Using the Markowitz Model as a Basis for Determining Stock Investment (Study on Companies) *Food and Beverage* listed on the Indonesia Stock Exchange in 2012)". Of the 9 companies that were the samples studied, it turned out that all of them were included in the optimal portfolio. These companies are AISA, DLTA, ICBP, INDF, MLBI, MYOR, ROTI, SKLT, and ULTJ.

### Financial management

According to Riyanto (2001:4), all company activities related to efforts to obtain the necessary funds with minimal costs and the most favorable conditions along with efforts to use the funds as efficiently as possible. The purpose of financial management is to maximize the value of the company. The purpose of the company is to maximize the welfare of the company's owners.

### Investment

Tandelilin (2010:2) states that investment is a commitment to a certain amount of funds or other resources made at this time, with the aim of obtaining a certain amount of profit in the future. An investor buys a number of shares at this time in the hope of obtaining profit from the increase in share prices or a number of dividends in the future, as a reward for the time and risk associated with the investment.

### Capital Market

The capital market is a meeting between parties who have excess funds with parties who need funds by trading securities, according to Tandelilin (2010:26). Thus, the capital market can also be interpreted as a market for trading securities that generally have a lifespan of more than one year, such as stocks and bonds.

### Shares

Shares (*stock*) can be defined as a sign of participation or ownership of a person or business entity in a company or Limited Liability Company according to Darmadji and Fakruddin (2011:5).

### Single Index Model

The single index model is based on the observation that the price of a security fluctuates in the same direction as the market index. This suggests that *return - return* of securities may be correlated due to a common reaction (*common response*) to changes in market value according to Hartono (2015:407).

### Return Single Securities

According to Hartono (2015:424), *return* is the result obtained from investment. *Return* has two parts, among others:

1. *Return* realization (*realized return*), namely the rate of return that has occurred.
2. *Return* expectation (*expected return*), that is *return* which investors expect to obtain in the

future. The single index model can also be expressed in the form *return* expectation.

### Single Security Risk

Risk is often associated with deviations or deviations from the outcomes received and those expected (Van Horne and Wachowics, in Hartono, 2015:285). According to Tadelilin (2010:102), risk is the possibility of a difference between *return* actual received. The security risk calculated based on this model consists of two parts, namely:

1. Systematic risk is a risk that cannot be eliminated by diversification.
2. Unsystematic risk is the risk that can be eliminated by diversification or forming a portfolio.

### Return Portfolio Expectations

Index model single can be used to calculate input parameters for analysis portfolio using the Markowitz model. *Return* portfolio expectations is a weighted average of *return* individual securities expectations (Hartono, 2015:424). In the single index model *return* Portfolio expectations can be expressed in the equation:

$$E(R_p) = \alpha_p + \beta_p \cdot E(R_m), \text{ Where:}$$

$$\alpha_p = \sum_{i=1}^n W_i \cdot \alpha_i$$

$$\beta_p = \sum_{i=1}^n W_i \cdot \beta_i$$

$$E(R_m) = \frac{\sum_{i=1}^n W_i \cdot E(R_i)}{n}$$

$$\alpha_p = \text{alpha portofolio}$$

$$\beta_p = \text{beta portofolio}$$

$$E(R_m) = \text{expected return market}$$

$$W_i = \text{bobot saham i}$$

$$\alpha_i = \text{alpha saham i}$$

$$\beta_i = \text{beta saham i}$$

$$R_m = \text{return market}$$

### Portfolio Risk

According to Hartono (2015:425) the portfolio risk variance can be written as follows:

$$\sigma_p^2 = \beta_p^2 \cdot \sigma_m^2 + [\sum^n W_i \cdot \sigma_{ei}]^2,$$

Where:

$$\sigma_p^2 = \text{portfolio risk}$$

$$\beta_p = \text{beta portofolio}$$

$$\sigma_m^2 = \text{variance of market returns}$$

$$W_i = \text{proportion of the } i\text{-th stock}$$

$$\sigma_{ei}^2 = \text{unique risk}$$

### Optimal Portfolio

In making investments such as stocks, investors can choose to invest in a portfolio. A portfolio is a combination of various investment instruments (Zubir,2011:1). The essence of forming a portfolio is to reduce risk by means of diversification, namely allocating a certain amount of funds to various investment alternatives that are negatively correlated. Portfolio theory emphasizes efforts to find the optimal investment combination that provides *rate of return* maximum with the lowest risk level.

The optimal portfolio is a portfolio that investors will choose, it cannot be said which is optimal. In addition, to form an optimal portfolio we must offer expected returns. *return* and

the risk that suits his preferences. An efficient portfolio is a good portfolio, but it is not the best because there is only one good factor in its combination, namely the risk factor. *return* only or the risk alone. However, the optimal portfolio is the best portfolio, with a combination *return* best and best risk, according to Hartono (2015:367). An optimal portfolio is part of an efficient portfolio, but an efficient portfolio is not necessarily an optimal portfolio. Based on the explanation above, it can be said that a portfolio is a combination of various investment instruments, either in an unintentional form or decided through planning supported by rational calculations and considerations to maximize profits and minimize investment risks.

### Conceptual Framework

Based on the research objectives, this research will use the following conceptual framework.:

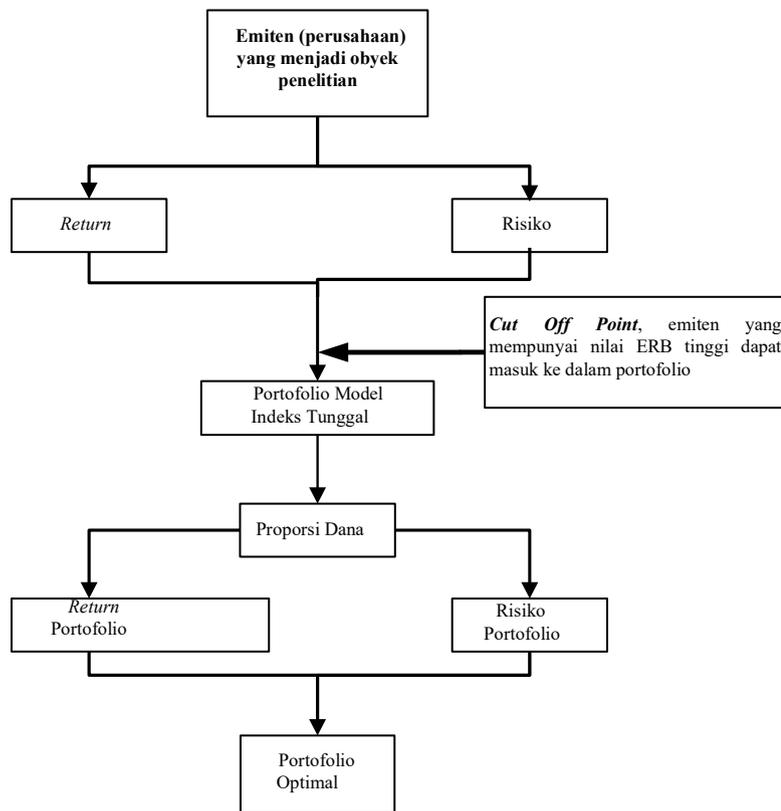


Figure 1 Conceptual. Framework

### 3. Methodology

The research approach used is descriptive research. The research objects are stocks included in the LQ-45 Index. The research takes data through [www.idx.co.id](http://www.idx.co.id). The population of this study is all companies that are continuously included in the LQ-45 index for the period August 2013 to July 2016, which are listed on the Indonesia Stock Exchange, totaling 27 companies. This study uses panel data, namely a combination of *time series* (inter-time) and *data cross section* (between individuals). This study uses *sampling* saturated. So the entire population of 27 companies that were continuously included in the LQ-45 Index in the period August 2013 to July 2016 were used as samples. The technique used in this study is to use the Single Index model. The data analysis technique used in this study is a formula taken from Hartono (2015:429).

1. Calculating how many stocks can be included in a portfolio.
2. Calculating the proportion of each security ( $W_i$ )
3. Count *return* portfolio
4. Calculating portfolio risk

#### 4. Results and Discussion

##### 1. Overview of Research Object

The LQ-45 index is one of the indices on the Indonesia Stock Exchange (IDX) which consists of 45 stocks with high market value and liquidity. This index was first launched on July 13, 1994. The purpose of launching the LQ-45 index is to complement the IHSG and sectoral indices. To be eligible for the LQ-45 index selection, a stock must meet certain criteria through the main selection, including being ranked in the top sixty (60) of total stock transactions on the regular market (average transaction value over the last twelve (12) months), ranking based on market capitalization (average market capitalization over the last twelve (12) months), having been listed on the IDX for a minimum of three months, the company's financial condition and growth prospects, frequency and number of trading days of regular market transactions.

In addition, to determine stocks that can enter the BEI LQ45, two groups of selection criteria are used. For the first selection, an issuer must be in the top 95% of the total average annual value of stock transactions in the regular market, in the top 90% of the average annual market capitalization, listed on the Jakarta Stock Exchange for a minimum of 30 trading days. After passing the first selection, shares must go through a second selection process where an issuer is the highest ranking representing its sector in the IDX industry classification according to its market capitalization, has the same portion as other sectors, and is the highest ranking based on transaction frequency.

##### 2. Research Data Description

In this study, data was obtained through documentation taken directly from the Indonesia Stock Exchange (IDX) website. that is [www.idx.co.id](http://www.idx.co.id). The researcher first collected a list of stocks included in the LQ-45 index from August 2013 to July 2016. The list of stocks can be seen in appendix 2 to appendix 7 in this study. The stocks used as the object of the study were stocks that continuously entered the LQ-45 Index in the period from August 2013 to July 2016. The object of this study never left the LQ-45 Index. The stocks that met these criteria were 27 stocks, namely AALI, ADRO, AKRA, ASII, ASRI, BBKA, BBNI, BBRI, BMRI, BSDE, CPIN, GGRM, ICBP, INDF, INTP, JSMR, KLBF, LSIP, MNCN, PGAS, PTBA, PWON, SMGR, TLKM, UNTR, UNVR, and WIKA.

##### 3. Data Analysis

###### a. Stock Selection

The first step to form a portfolio is to select stocks that have been sampled. There are 27 stocks that are sampled and will be simplified. The steps used are:

1. Calculating the profit level of each share ( $R_i$ ).

Table 4.1 Respective Benefits Shares ( $R_i$ )

No	Code	$R_i$			
		2013	2014	2015	2016
1	AALI	0,3069	-0,0088	-0,3260	0,1173
2	ADRO	-0,2579	-0,1186	-0,4723	2,3410
3	SHARP	0,0723	-0,0434	0,7731	-0,1512
4	ASIA	-0,0771	0,1237	-0,1628	0,4072
5	ASRI	-0,2590	0,3186	-0,3750	0,0262

6	BBCA	0,0677	0,3802	0,0250	0,1786
7	BNI	0,0982	0,6125	-0,1583	0,1318
8	BBRI	0,2052	0,7844	0,1072	0,1583
9	BMRI	0,0184	0,4322	-0,1020	0,3079
10	BSDE	0,1757	0,4109	0,0055	-0,0222
11	CPIN	-0,0627	0,1336	-0,3074	0,1996
12	GGRM	-0,2398	0,4643	-0,0807	0,2091
13	ICBP	0,3554	0,3216	0,0625	0,3107
14	INC	0,1598	0,0442	-0,2007	0,5639
15	INTP	-0,0891	0,2950	-0,0530	-0,2916
16	JSMR	0,0402	0,6588	-0,1562	-0,0885
17	KLBF	0,2000	0,4776	-0,2683	0,1621
18	LSIP	-0,1322	0,0031	-0,2735	0,3462
19	MNCN	0,0820	-0,0190	-0,2449	-0,0313
20	PGAS	0,0169	0,4278	-0,5184	0,0169
21	PTBA	-0,0858	0,4519	-0,5082	2,0826
22	COMMITMENT	0,2156	0,9241	-0,0282	0,1482
23	SMGR	-0,0841	0,1737	-0,2731	-0,1684
24	TLKM	0,3918	0,6881	0,1098	0,3134
25	UNTR	-0,0058	-0,0587	0,0511	0,2881
26	UNVR	0,2788	0,2695	0,1690	0,0702
27	LANGUAGE	0,0844	1,6815	-0,2238	-0,0264

2. Calculating the Market Return Index ( $R_m$ ).

Table 4.2 Price *Closing* LQ-45 Index Each Period

Table 4.3 Market Profits Each Period ( $R_m$ ).

Year	( $R_m$ )
2013	-0,0325
2014	0,2636
2015	-0,1186
2016	0,1169

Source: processed (2018)

3. Count  $\beta$  and  $\alpha$

Table 4.4 Values  $\alpha$  And  $\beta$

No	Code	$\alpha$	$\beta$
1	AALI	-0,0012	0,4105
2	ADRO	0,2240	2,5994
3	SHARP	0,2708	-1,8855
4	Asia	0,0152	1,0027
5	ASRI	-0,1778	1,8391
6	BBCA	0,1099	0,9232
7	BNI	0,0678	1,8001
8	BBRI	0,2235	1,5732
9	BMRI	0,0807	1,4544
10	BSDE	0,0976	0,7831
11	CPIN	-0,0760	1,1652

12	GGRM	-0,0088	1,6915
13	ICBP	0,2343	0,4922
14	INC	0,0989	0,7480
15	INTP	-0,0756	0,7145
16	JSMR	0,0095	1,8149
17	KLBF	0,0503	1,6143
18	LSIP	-0,0689	0,9549
19	MNCN	-0,0735	0,3516
20	PGAS	-0,1348	2,1021
21	PTBA	0,2733	3,6938
22	COMMITMENT	0,1903	2,1736
23	SMGR	-0,1428	0,9564
24	TLKM	0,3043	1,2461
25	UNTR	0,0710	-0,0400
26	UNVR	0,1935	0,0585
27	LANGUAGE	0,1249	4,4301

*Source: processed data (2018)*

4. Count level *return* stock expectations [ $E(R_i)$ ]

Table 4.5  
Mark *Return* Expectations for Each Stock  $E(R_i)$

No	Code	$E(R_i)$
1	AALI	0,0223
2	ADRO	0,3731
3	SHARP	0,1627
4	Asia	0,0727
5	ASRI	-0,0723
6	BBCA	0,1629
7	BNI	0,1711
8	BBRI	0,3138
9	BMRI	0,1641
10	BSDE	0,1425
11	CPIN	-0,0092
12	GGRM	0,0882
13	ICBP	0,2625
14	INC	0,1418
15	INTP	-0,0347
16	JSMR	0,1136
17	KLBF	0,1429
18	LSIP	-0,0141
19	MNCN	-0,0533
20	PGAS	-0,0142
21	PTBA	0,4851
22	COMMITMENT	0,3149
23	SMGR	-0,0880
24	TLKM	0,3758
25	UNTR	0,0687
26	UNVR	0,1969
27	LANGUAGE	0,3789

*Source: processed data (2018)*

Table 4.5 shows that not all shares can generate *return* positive expectations. Value *return* the lowest expectations are held by BMTR shares, while the value *return* The highest expectations are held by PTBA shares.

5. Count Level Securities Risk ( $\sigma_i^2$ )

Table 4.6 Market Risk Calculation Results ( $\sigma_m^2$ ), Unique Company Risks ( $\sigma_{ei}^2$ ), and the Risks of Each Securities ( $\sigma_i^2$ )

No	Code	$\sigma_m^2$	$\sigma_{ei}^2$	$\sigma_i^2$
1	AALI	0,0284	0,0660	0,0708
2	ADRO	0,0284	1,5508	1,7424
3	SHARP	0,0284	0,0731	0,1739
4	Asia	0,0284	0,0356	0,0641
5	ASRI	0,0284	0,0004	0,0963
6	BBCA	0,0284	0,0010	0,0252
7	BNI	0,0284	0,0115	0,1034
8	BBRI	0,0284	0,0298	0,1000
9	BMRI	0,0284	0,0015	0,0615
10	BSDE	0,0284	0,0223	0,0397
11	CPIN	0,0284	0,0134	0,0519
12	GGRM	0,0284	0,0162	0,0974
13	ICBP	0,0284	0,0113	0,0181
14	INC	0,0284	0,0859	0,1018
15	INTP	0,0284	0,0449	0,0593
16	JSMR	0,0284	0,0453	0,1388
17	KLBF	0,0284	0,0210	0,0949
18	LSIP	0,0284	0,0446	0,0705
19	MNCN	0,0284	0,0154	0,0189
20	PGAS	0,0284	0,0251	0,1505
21	PTBA	0,0284	0,9015	1,2885
22	COMMITMENT	0,0284	0,0415	0,1755
23	SMGR	0,0284	0,0105	0,0364
24	TLKM	0,0284	0,0134	0,0575
25	UNTR	0,0284	0,0234	0,0234
26	UNVR	0,0284	0,0095	0,0096
27	LANGUAGE	0,0284	0,2137	0,7704

Source: processed data (2018)

The largest unique risk value is ADRO shares at 1.5508. Unique risk can be overcome by diversification. The risk of each security ( $\sigma_i^2$ ) is the result of calculating market risk and unique risk. The highest security risk is ADRO shares with a value of 1.5792.

#### 6. Count Return Risk Free ( $R_{BR}$ )

Table 4.7  
 Bank Indonesia Certificate Value

Year	Mark (%)
2013	5,83
2014	7,07
2015	6,94
2016	6,34
Total	26,18

*Source: processed data (2018)*

7. Count *Excess Return to Beta* (ERB)

Table 4.8 ERB Values Each Share

No	Code	ERB
1	AALI	-0,1050
2	ADRO	0,1183
3	SHARP	-0,0516
4	Asia	0,0073
5	ASRI	-0,0749
6	BBCA	0,1055
7	BNI	0,0587
8	BBRI	0,1578
9	BMRI	0,0678
10	BSDE	0,0983
11	CPIN	-0,0641
12	GGRM	0,0135
13	ICBP	0,4005
14	INC	0,1021
15	INTP	-0,1401
16	JSMR	0,0265
17	KLBF	0,0480
18	LSIP	-0,0833
19	MNCN	-0,3377
20	PGAS	-0,0379
21	PTBA	0,1136
22	COMMITMENT	0,1148
23	SMGR	-0,1604
24	TLKM	0,2490
25	UNTR	-0,0804
26	UNVR	2,2476
27	LANGUAGE	0,0708

*Source: processed data (2018)*

8. Count *Cutt Off Point* ( $C^*$ )

Table 4.10 Selection of Stocks That Enter Optimal Portfolio

No	Code	ERB	$c_i$	Information
1	UNVR	2,2476	0,0227	Optimal
2	ICBP	0,4005	0,1659	Optimal
3	TLKM	0,2490	0,2532	Not Optimal
4	BBRI	0,1578	0,4341	Not Optimal
5	ADRO	0,1183	1,3089	Not Optimal
6	COMMITMENT	0,1148	0,4351	Not Optimal

7	PTBA	0,1136	1,3227	Not Optimal
8	BBCA	0,1055	1,9055	Not Optimal
9	INC	0,1021	3,7507	Not Optimal
10	BSDE	0,0983	2,5380	Not Optimal
11	LANGUAGE	0,0708	1,3049	Not Optimal
12	BMRI	0,0678	1,5152	Not Optimal
13	BNI	0,0587	1,5833	Not Optimal
14	KLBF	0,0480	1,2030	Not Optimal
15	JSMR	0,0265	1,7944	Not Optimal
16	GGRM	0,0135	0,9264	Not Optimal
17	Asia	0,0073	3,0914	Not Optimal
18	PGAS	-0,0379	0,8981	Not Optimal
19	SHARP	-0,0516	2,2298	Not Optimal
20	CPIN	-0,0641	1,3235	Not Optimal
21	ASRI	-0,0749	1,9481	Not Optimal
22	UNTR	-0,0804	3,3866	Not Optimal
23	LSIP	-0,0833	2,1170	Not Optimal
24	AALI	-0,1050	3,1118	Not Optimal
25	INTP	-0,1401	2,4886	Not Optimal
26	SMGR	-0,1604	0,8318	Not Optimal
27	MNCN	-0,3377	2,2942	Not Optimal

*Source: processed data (2018)*

In Table 4.10, the stocks included in the optimal portfolio are UNVR and ICBP. To determine the value  $C^*$  is the value  $C_i$  the last one which is still bigger than ERB. This means the value  $C^*$  is 0.1659.

**a. Proportion of Each Securities**

Table 4.11  
Results of Calculation of Securities Proportion in Portfolio

No	Code	$w_i$	$Z_i$
1	UNVR	12,8079	0,5557
2	ICBP	10,2406	0,4443

*Source: processed data (2018)*

In Table 4.11, the proportion for UNVR and ICBP shares is 55.57% and 44.43%. To obtain the optimal portfolio composition, the author will try several proportion compositions as follows:

Table 4.12 Optimal Portfolio Composition

No	Information	Code	Proportion (%)
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1	Portfolio 1	UNVR	56
		ICBP	44
2	Portfolio 2	UNVR	50
		ICBP	50
3	Portfolio 3	UNVR	60
		ICBP	40
4	Portfolio 4	UNVR	70
		ICBP	30

*Source: processed data (2018)*

### b. Count Return Portfolio

To find out *return* portfolio expectations, it is necessary to know the alpha value of the portfolio ( $\alpha_p$ ) and portfolio beta ( $\beta_p$ ) first.

#### i. Calculating Portfolio Beta

Table 4.13 Results of Portfolio Beta Calculation

Portfolio	Code	Proportion (%)	$\beta_i$	$\beta_p$
1	UNVR	56	0,0585	24,9325
	ICBP	44	0,4922	
2	UNVR	50	0,0585	27,5349
	ICBP	50	0,4922	
3	UNVR	60	0,0585	23,1976
	ICBP	40	0,4922	
4	UNVR	70	0,0585	18,8603
	ICBP	30	0,4922	

*Source: processed data (2018)*

#### ii. Calculating Portfolio Alpha

Table 4.14 Results of Portfolio Alpha Calculation

Portfolio	Code	Proportion (%)	$\alpha_i$	$\alpha_p$
1	UNVR	56	0,1935	21,1483
	ICBP	44	0,2343	
2	UNVR	50	0,1935	21,3930
	ICBP	50	0,2343	
3	UNVR	60	0,1935	20,9852
	ICBP	40	0,2343	
4	UNVR	70	0,1935	20,5774
	ICBP	30	0,2343	

*Source: processed data (2018)*

#### iii. Count Return Portfolio Expectations

*Return* Portfolio expectations are the profits expected by investors on a portfolio that has been formed. The profit in question is the profit that investors will get in the future.

Table 4.15  
Mark *Return* Portfolio Expectations

Portfolio	Code	Proportion	$E(R_m)$	$\beta_p$	$\alpha_p$	$E(R_p)$
1	UNVR	56	0,0573	0,2493	0,2115	0,2258
	ICBP	44				
2	UNVR	50	0,0573	0,2753	0,2139	0,2297
	ICBP	50				
3	UNVR	60	0,0573	0,2320	0,2099	0,2232
	ICBP	40				
4	UNVR	70	0,0573	0,1886	0,2058	0,2166
	ICBP	30				

Source: processed data (2018)

d) Calculating Portfolio Risk

Table 4.16  
Mark *Risk* Portfolio

Portfolio	Code	Proportion (%)	$\sigma_m^2$	$\sigma_{ei}^2$	$\beta_p$	$\sigma_p^2$
1	UNVR	56	0,0284	0,0095	0,2493	0,0087
	ICBP	44	0,0284	0,0113		
2	UNVR	50	0,0284	0,0095	0,2753	0,0095
	ICBP	50	0,0284	0,0113		
3	UNVR	60	0,0284	0,0095	0,2320	0,0083
	ICBP	40	0,0284	0,0113		
4	UNVR	70	0,0284	0,0095	0,1886	0,0077
	ICBP	30	0,0284	0,0113		

Source: processed data (2018)

## 5. Discussion

The formation of a portfolio consisting of UNVR and ICBP shares has been proven to reduce risk and optimize returns compared to allocating all funds to one share (UNVR or ICBP) alone.

Table 4.17 Comparison *return* and stock risk individual with portfolio

No	Information	Code	Proportion (%)	Return	Risk
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1	Individual	UNVR	100	19,69	0,96
2	Individual	ICBP	100	26,25	1,81
3	Portfolio 1	UNVR	56	22,61	0,87
		ICBP	44		
4	Portfolio 2	UNVR	50	22,97	0,95
		ICBP	50		
5	Portfolio 3	UNVR	60	22,32	0,83
		ICBP	40		
6	Portfolio 4	UNVR	70	21,66	0,77
		ICBP	30		

*Source: processed data (2018)*

From Table 4.17, the risk of UNVR and ICBP shares individually is still greater than the risk of the 4 portfolios that have been formed. while the return of UNVR individually is also still smaller than the return generated by the 4 portfolios. for ICBP shares, it can generate a greater return than the 4 portfolios formed with a return of 26.25%, but investor who allocate their funds to buy ICBP shares must bear a risk of 1.81%. The risk value is 2 times higher than the risk of portfolio 2. Portfolio 2 has the highest risk value when compared to the risk values of portfolio 1, portfolio 3, and portfolio 4. Diversification by forming an optimal portfolio can produce *return* optimal with low risk. After forming a portfolio, investors should get returns according to expectations (*expected return*). The selection of UNVR and ICBP shares into the optimal portfolio is in accordance with the performance of the movement of each share price.

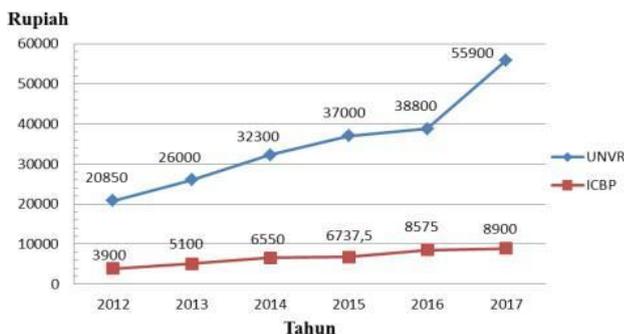


Figure 4.1 Stock Price Movement UNVR and ICBP 2012 – 2017

On Figure 4.1 shows that the stock prices of UNVR and ICBP increased after the research period. The stock price of UNVR in 2017 was Rp55,900 or increased by 44.07% from 2016 which was worth Rp38,800. Likewise with the stock price of ICBP, in 2017 the stock price of ICBP increased by 3.79% to Rp8,900 compared to the stock price in 2016 which was worth Rp8,575. The stock prices of UNVR and ICBP have continued to increase since 2012 until 2017. Thus, UNVR and ICBP shares are the right choice for investors to include both shares in their portfolio.

## 6. Conclusion

### 1. Conclusion

The research was conducted on 27 selected stock samples and included in the LQ-45 Index in the period August 2013 to July 2016 has produced 4 optimal portfolio choices. The portfolio is

filled by 2 stock combinations, namely UNVR shares and ICBP shares which have different fund proportion compositions. The portfolio choices are:

1. Portfolio 1 with fund proportion 0.56% and 0.44% which results in *return* 22.61% and risk 0.87%.
2. Portfolio 2 with a fund proportion of 50% each which produces *return* 22.97% and risk 0.95%.
3. Portfolio 3 with fund proportions 60% and 40% which produce *return* 22.32% and risk 0.83%.
4. Portfolio 4 with fund proportions 70% and 30% which produces *return* 21.66% and risk 0.77%.

## 7. Recommendation

### 1. For Investors

When investors want *return* the highest then the investor will choose portfolio 2. However *return* which is high will be accompanied by high risk as well. Investors who are willing to bear high risk are referred to as *risk seeker* (risk-loving attitude). However, if investors want to avoid high risks, then investors will choose portfolio 4. This attitude is called *risk averter* namely the attitude of investors who do not like risk.

### 2. For Further Researchers

Further researchers who wish to follow up on this research by taking up the same problem can form a portfolio with investment products. others, such as mutual funds and bonds. Further research is expected to provide significant differences qualitatively, both socially and comparatively.

## Appendix

### Research Limitations

1. The research period needs to be updated with the current time.
2. The corporate sector can be replaced with another sector with a larger number of issuers.

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