The Analysis of Optimal Stock-Bond Portfolio Strategy: Empirical Study in LQ 45 Index Companies and Government Bonds Listed on Indonesia Stock Exchange

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ABSTRACT :

Purpose - This study aims to analyze the strategy in determining the optimal stocks portfolio performance through Single Index Model technique from LQ 45 Index stocks and optimal bonds portfolio performance of bonds through Buy and Hold technique from government bonds in Indonesia Stock Exchange in the 2014-2018 period. The strategy generates performance which generally consists of optimal return (yield), risk and portfolio proportion.

Design/methodology/approach - The population used in the study are companies stock in LQ 45 Index which produced 23 samples and government bonds produced 7 samples. The methodology research in this study is descriptive analysis. The type of data used in this study is quantitative and data sources of this study is secondary data. Purposive sampling method used as the sampling method.

Finding - This research found that optimal stock portfolio performance with expected return and optimal portfolio risk values at 0.01497 and 0.006395 while optimal bonds portfolio performance showed optimal portfolio yields and risk with values at 0.090063991 and -0.003063991. The proportions of fund that invested in the optimal stock portfolio are BBCA (27%), GGRM (12%), TLKM (11%), ICBP (14%), PTBA (5%), UNVR (10%), BBRI (9%), BBNI (6%), BMRI (5%) and UNTR (2%) while the optimal bonds portofolio proportions are FR0073 (90%) and FR0072 (10%).

Research limitations/implications – This study only analyzes optimal portfolio performance on LQ 45 Index stocks and government bonds by observing the value of the expected return, yield and optimal portfolio risk as the main components for this study. For further research, it can use another stock indexes and bonds type in finding the optimal portfolio and use other methods such as the Markowitz method and the Immunization method in finding the optimal portfolio of stocks and bonds. This study also focuses on determining the proportion of the allocation of funds to be invested in stocks and bonds that meet optimal criteria.

Originality/value – This study contributes to literacy in analyzing optimal portfolio performance by using a Single Index Model & Buy and Hold techniques. This analysis gives the results that the value of the expected return on shares exceeds the value of the expected market return. The yield generated from the bond portfolio is also more optimal when it is compared to the yield of one bond. This study provides a clear view to researchers or investors that combining a security asset with other security assets can increase the return and minimize the risk.

Keywords : Single Index Model, Buy and Hold, LQ 45 Index, Government Bonds and Optimal Portfolio Performance

INTRODUCTION

The development of stock and bond investment products in Indonesia cannot be separated from the role of the government and the public (investors) that involved in the capital market both in terms of stock investment, bonds, sukuk, mutual funds and other types of securities. The movement of the stock and bond indices from 2014 to 2018 experienced an unstable trend. This phenomenon makes investment players (investors/bondholders) have to determine the right strategy in overcoming capital loss and increasing the possibility of capital gains on their securities. The highest JCI annual closing price occurred in 2017 with a figure of 6,355,654, while the lowest IHSG occurred in 2015 with a figure of 4,593,008. There was a drastic drop in the 2015 JCI as a result of foreign funds that had previously entered in 2014 being withdrawn by foreign investors resulting in a decrease of 12% which was one of the years for the lowest JCI to fall as in 2008, which fell to 49% and in 2013 it fell up to 3,4%. This is because stock market exchanges around the world tend to pace with the policy of the US Central Bank (The Federal Reserve), which raises the interest rate (Fed rate) around 25 basis points from 0.25 to 0.50. In the same period, the development of government bonds has an increasing trend from year to year, except in 2018 which decreased by 2 point. This is due to the decline in performance in terms of government bonds which also decreased by -1.60% YTD from 240.1978 to 236.3497. According to the summary table from the Financial Services Authority report (2015), the performance of government bonds is less than corporate bonds due to the phenomenon of the United States monetary policy against the trade war with China, yet the increasing of outstanding trend and volume of government bonds traded on the Indonesia Stock Exchange still increase.

The types of securities traded on the Indonesia Stock Exchange are consist of various types such as LQ 45 Index and INDOBex Government Total Return. The LQ 45 Index shares aim to be a complementary index of the JCI which provides a special tool that is objective and has a high level of confidence for financial analysts, investors, investment managers and market analysts in controlling price movements of liquid tradable stock assets (Isnurhadi, 2014). INDOBex Government Total Return is an index that describes the movement of returns obtained from government bonds contained in the capital market, which consists of Government Securities with a fixed rate coupon and Sharia Securities with an ijarah contract (Hartono, 2016). The limitation of this research focuses on descriptive analysis of 2 strategies consisting of an active strategy using Single Index Model in determining the optimal portfolio of LQ 45 Index stocks and a passive strategy using Buy and Hold techniques in calculating coupon income in the optimal portfolio of government bonds by paying attention to the market index of bonds, coupon interest, coupon interest payment time, coupon interest type and maturity date (Tandelilin, 2010). Research conducted by Partono et al. (2017) regarding optimal portfolio analysis using the Single Index Model in the most trusted companies in Indonesia as a research sample resulting in the expected return portfolio composition value higher than the expected market return and the ERB value of stocks that include to the portfolio exceed the value of C* (limit point of the highest cut-off point value). The existence of the SBI interest rate as a factor in determining the rate of excess return to beta (ERB) affects the return of shares that will be gained by investors. The results of research conducted by Taufik (2009) who used manufacturing sector stocks on the Jakarta Stock Exchange stated that fundamental factors such as SBI or interest rates have a significant effect on stock returns. Long-term investments such as bonds are also studied by Adam, Gasharma and Nuary (2015) in determining bond yields using yield to maturity (YTM) on corporate bonds listed on the Indonesia Stock Exchange shows the results that the SBI interest rate has a positive and significant effect on bond yields.

The formulation of the problem in this study aims to calculate and determine the form of composition and percentage proportions resulting from the optimal portfolio performance produced by LQ 45 Index company shares using an active strategy Single Index Model and government bonds use a passive Buy and Hold strategy on the Indonesia Stock Exchange for the 2014-2018 period. The objectives of this research is to know optimal portfolio performance of

stocks and bonds according to the method used for each of these securities assets. Therefore, this research is important as literacy for further research in finding and determining the optimal portfolio composition of stocks and bonds. This research can also be used by investors or bondholders as a reference for allocating their funds to the composition of stocks and bonds produced by this study.

LITERATURE REVIEW
Investment Theory

Stock investment in the capital market provides fast-moving returns with the level of risk. Investment is the activity of delaying current consumption to be transferred to one or more investment assets for a certain time which can provide future benefits (Partono et al., 2017). The existence of investments with portfolio diversification in stocks and bonds will reduce the losses that will be gained by investors. If stock investment experiences the decreasing, then bond investment will support and balance the return thus the investors don't experience higher risk (Oktafiani, Maruddani and Suparti, 2017).

Portfolio Theory

The portfolio theory states that there is a linear relationship between returns and risks obtained from an investment in the future. The higher the return obtained, the higher the risk to be faced. The development of portfolios in the investment world was first pioneered by Harry Markowitz in his theory, namely portfolio theory which discusses the combination of portfolios that are in the efficient set line. The optimal portfolio using the Single Index Model assumes that the price level of a security product moves positively along with the existing market price index (Partono et al., 2017). Meanwhile, the optimal portfolio using Buy and Hold focuses on the assumption of investors that securities that are held for a long time will minimize additional costs and raise the possibility of increased risks to be faced (Sanderson and Sowers, 2018).

Liquidity Preference Theory

The theory of liquidity preference was first introduced by Jhon Maynard Keynes who expressed his first opinion about the foundation in understanding the money market and the formation of the LM (Liquidity Preference) curve. According to Fabozzi (2000), the theory of liquidity preference reflects the amount of the current interest rate against the short-term interest rate expected by investors added to the liquidity premium given by the bond issuer. This theory assumes that investors have their preferences for the number of maturity preferences of an asset and it will transfer their funds to other assets if the maturity of these assets provides more benefits. The yield curve formation in this theory is also determined by the calculation of future interest yields and the risk premium are gained by investors (Tandelilin, 2010).

Malkiel's Theory

Malkiel's theory was introduced by Malkiel G. Burton (1962). This theory states that there is a relationship between bond prices and changes in interest rates, coupons and maturity which directly affects changes in bond yield levels (Sari and Abundanti, 2015). Research conducted by Hamzah (2014) regarding changes in bond yields is also caused and influenced by changes in reference interest rates. Based on research conducted by Aisah (2014) there are 5 theorems that explain Malkiel's theory to this research, namely:

1. Bond price movements to market yield are negative.
2. If the maturity of security is constant, it will cause a decrease in interest rates and increase the bond price with a larger portion than an increase in the interest rate of the same amount will reduce the price of the bond.
3. Changes in bond prices are positively related to the maturity time of a bond. If the bond maturity is too long, it will make a big change in the price of the bond.
4. Bond prices can change due to the relationship between bond maturity and price volatility.

5. The percentage change in bond prices can also be affected by changes in interest rates.

Optimal Portfolio Investment Strategy

The active strategy in stocks is a strategy that is carried out by investors to determine aggresively the optimal portfolio of shares that they own in order to get higher expected return and reduce the risk. Meanwhile, the passive strategy in bonds is a strategy carried out by bondholders who have a defensive nature with the aim of gaining the highest yields and minimizing the risks faced by investing in a portfolio that they have for a long time to avoid capital loss (Gudono, 2018).

Stock-Bonds

Stock is evidence of the ownership rights of a company in the form of securities owned by investors by investing their funds in the company through the capital market. Shares are consist of various types and grouped into several indices in the capital market, one of which is the LQ 45 Index. LQ 45 Index shares are stocks classified based on stocks that have the highest level of liquidity among other stocks during the specified period (Partono et al., 2017).

Bonds are term debt securities that are traded on the capital market, both on a national and international scale (Selmi et al., 2019). The Indonesia Stock Exchange provides many types of bonds, one of which is government bonds. Government bonds are debt securities issued by the government (government institutions) and guaranteed by law and rewarded with interest until the maturity period ends. Government bonds are protected by the law which guarantees the standard of living of the bonds so that they can be settled until maturity (Hartono, 2018).

Table 1. Differences and Similarities of Stock-Bonds

Differences	Instrument	
	Stock	**Bond**
Due date	✖	✔
Coupons	✖	✔
Dividend	✔	✖
State Guarantee (for SBN)	✖	✔
Stand by Buyer in Secondary Market	✖	✔
Similarities		
Potential Capital Gains	✔	✔
Trading in Secondary Markets	✔	✔

Source : www.idx.co.id processed by researchers

Single Index Model

Single Index Model can be defined as a method used in the formation of an optimal portfolio that is related to the market index and it has a relationship that can be used in finding returns on stocks. Investors can predict the return by analyzing the movement of stock market index (Poornima and Remesh, 2016). In the use of this model, the optimal portfolio is emphasized on finding the excess return to beta (ERB) rate and the cut-off point in determining the securities into the portfolio. A high ERB that reaches the limitation point value will be used as a candidate in the optimal portfolio combination of stocks, while stocks that have an ERB level below the limitation point value will be excluded from the optimal stock portfolio candidate. The Single Index Model is also used in simplifying calculations from the Modern Markowitz Portfolio Model if the portfolio has many securities in it and to estimate the covariance matrix calculation (Giri and Parhi, 2017). The equation for Single Index Model formula is as follows :

$$\mathbf{ERB_i} = \frac{\mathbf{E(R_i)} - \mathbf{R_{\beta R}}}{\mathbf{\beta_i}}$$

Source: (Partono et al., 2017)

$$C^* = \frac{\sigma_m^2 \sum_{j=1}^i \frac{\left[E(R_i) - R_{\beta R}\right] \cdot \beta_i}{\sigma_{ej}^2}}{1 + \sigma_m^2 \sum_{j=1}^i \frac{\beta_j^2}{\sigma_{ej}^2}}$$

Source: (Partono et al., 2017)

Description:

ERBi   = The excess return to beta value on the individual security
σej2   = The variant of the residual error of the individual security which is the risk of not systematic
σm2   = Variant of the market index return (IHSG)
E(Ri)   = The value of the expected return based on the Single Index Model on i-securities
RβR   = Risk-free asset return value
βi   = The beta value of the individual security

Buy and Hold

The Buy and Hold method for bonds focuses on bond investment and holding the funds in that asset for a certain time. This technique is used when capital market is in a bullish condition, in which the condition of the capital market tends to strengthen and causes the increasing price of capital market product. If market conditions begin to decline, bondholders can sell their assets to avoid greater losses (Putra, Murhadi and Mahadwartha, 2013).

Research Framework

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                        ┌──────────────┐
                        │  Investment  │
                        └──────┬───────┘
              ┌────────────────┴────────────────┐
              ▼                                  ▼
   ┌────────────────────┐          ┌────────────────────┐
   │  LQ 45 Index Company│          │  Government Bonds   │
   │  Shares 2014 to 2018│          │   2014 to 2018      │
   └─────────┬──────────┘          └─────────┬──────────┘
             ▼                                ▼
   ┌────────────────────┐          ┌────────────────────┐
   │  Single Index Model │          │  Passive Buy and    │
   │  Active Strategy (X1)│          │  Hold Strategy (X2) │
   └─────────┬──────────┘          └─────────┬──────────┘
             └───────────────┬──────────────┘
                             ▼
                  ┌────────────────────┐    ┌──────────────┐
                  │ Optimal Portfolio (Y)│    │  Descriptive │
                  └─────────┬──────────┘    │   Analysis   │
                            │               └──────────────┘
                  ┌─────────┴─────────────────────────────┐
                  │ Optimal Portfolio Performance Results  │
                  │        of Shares and Bonds             │
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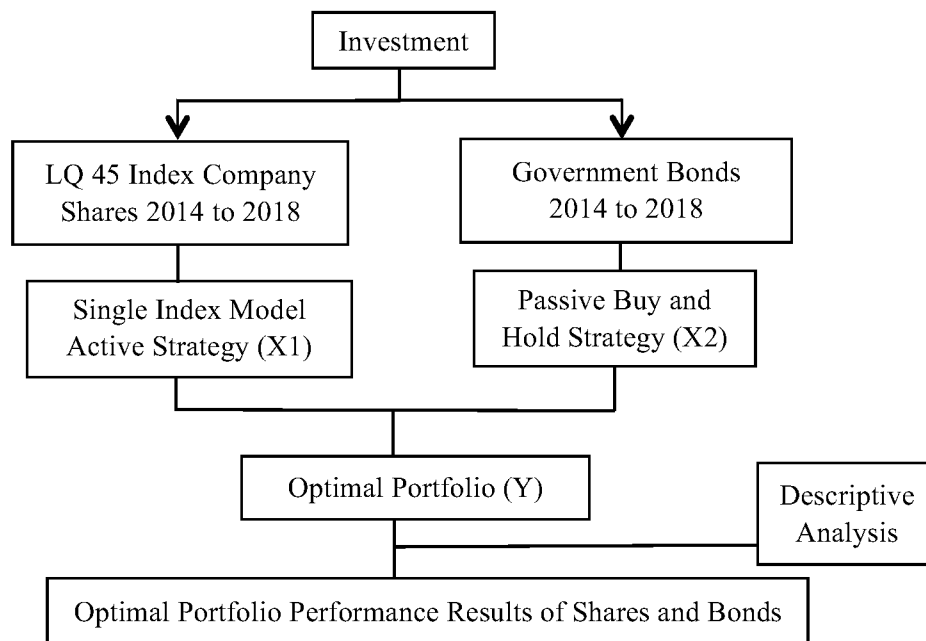
Figure 1. Research Framework

RESEARCH METHODOLOGY
Research Design

The design of the research consisted of 2 things, namely analyzing the results of the optimal portfolio performance of LQ 45 Index company stocks and government bonds on the

Indonesia Stock Exchange for the period 2014 to 2018. The analysis in this study is a descriptive analysis using 2 strategies to find the optimal portfolio. The optimal portfolio formation strategy used is the active Single Index Model strategy for stocks and the passive Buy and Hold strategy for bonds. This study uses secondary quantitative data obtained from various websites of financial institutions and securities reporting service providers on the capital market, both state-owned and private. The research design used an active strategy of the Single Index Model (X1) and the passive strategy of Buy and Hold (X2) as the independent variable. Meanwhile, the optimal portfolio (Y) as the dependent variable.

Population and Sampling

The population used in this study consists of 2 types of population, namely company stocks that are included in the LQ 45 Index and government bonds that are traded on the Indonesia Stock Exchange and have listed dates during the period 2014 to 2018. The method used in sampling uses a non-random sampling technique, is a sampling that is done by not all members of the population have the opportunity to be selected as the research sample. One of the non-random sampling techniques is the purposive sampling method which focuses on taking samples carried out on populations that have certain criteria (Isnurhadi, 2014).

The selection of the LQ 45 Index stock population which consists of 45 stocks per period for 5 years from 2014 to 2018 with a total of 73 company shares resulting in 23 samples of listed companies that meet the criteria as the research object sample for the stock category while 50 other companies were excluded from the sample candidates because those stocks do not have a consistently high level of liquidity and were not included in the LQ 45 Index during the study period respectively. For the bond population consisting of 15 government bonds, 7 samples met the criteria as the research samples in the category of bonds and 8 other bonds were exclude from the sample candidates because the maturity period was less than 5 years, the nature of the interest coupon was not fixed, the coupon was not semi-annual. and had no the character of Rupiah currency.

Data Analysis Method
Shares Portfolio Optimization Analysis

Partono et al. (2017) describe the variables needed in the formation of an optimal portfolio analysis using an active strategy of the Single Index Model. The analysis is calculated using Microsoft Excel 2010 by applying the formula according to the variables used in finding the optimal portfolio of stocks using the Single Index Model. First, the researcher collected data on the development of the company's closing stock price in the LQ 45 Index, BI rate and IHSG obtained from sources that provide information related to this study. Second, researcher calculates individual returns, market returns, expected returns and variants of individual stocks. Third, the author calculates the alpha, beta and covariance of individual stocks based on previous calculations.

Fourth, after obtaining this, the researchers calculated the values of A_i, B_i and C_i to determine the cut-off point value. Fifth, the researcher calculates the excess return to beta (ERB) value and the cut-off point based on the C_i value of the individual stock which will be used in determining the highest boundary point to sort stocks that have the highest to lowest ERB value. Sixth, the researcher then ranks the stocks according to the highest to lowest ERB and the cut-off point value and determines which stocks will be included in the optimal portfolio. Seventh, the researcher determines the value of Z_i, W_i (the proportion of funds), portfolio alpha and portfolio beta as benchmarks in obtaining the expected return and the optimal portfolio variance of stocks. Eighth, researchers calculated the value of the expected return and the optimal portfolio variance of stocks.

Bond Portfolio Optimization Analysis

Putra, Murhadi and Mahadwartha (2013) explain the optimal portfolio formation process using a passive Buy and Hold strategy on stocks which can also be used in bonds, such as research conducted by (Snorrason and Yusupov, 2009). The tools used in calculating the optimal bond portfolio in this study is Microsoft Excel 2010. First, the researcher collects data on the profile of bonds that will be included in the optimal portfolio such as name, issuer, series, coupon properties, coupon percentage rate per year, maturity period and coupon payment date.

Then, the researcher calculates the yield to maturity (YTM) of the bonds at the time of purchase to maturity using the YIELD formula and the risk value. After the yield and risk are obtained, the researcher calculates the time to maturity (TTM) value of the bond using the YEARFRAC formula. The acquisition of these three variables can determine the optimal portfolio of bonds. Next, the researcher determines the proportion of the allocation of funds in bonds that have optimal yield, risk and TTM values.

RESULT AND DISCUSSION

The discussion in this study is a descriptive analysis that explains the variables studied such as a description of information from the research variable data (Sekaran and Bougie, 2017). The analysis was calculated using Microsoft Excel 2010 as a research analysis tool.

Descriptive Statistic

Tabel 2. Descriptive Statistic

N (150)	Variable Components	Max	Min
Active Strategy Single Index Model (X1)	Expected Return	0,020493	-0,01658
	Variant	0,017829	0,002274
	Beta	1,947657	0,565307
	Excess Return To Beta	0,012229	-0,02114
	Cut-Off Point	0,002875	-0,00193
Passive Strategy Buy and Hold (X2)	Time To Maturity	3,4770705 Years	0,257534247 Years
	Yield	0,096975235	0,086111371
	Risk	-0,002942	-0,015725235
Optimal Portfolio (Y)	Optimal Portfolio Yield (Yield)	0,090064	0,01497
	Optimal Portfolio Risk	0,006395	-0,00306
	Share Proportion	27%	2%
	Bond Proportion	90%	10%

Source : the results of data calculations processed by the researcher

Based on the results of the calculations in table 2, the active strategy of the Single Index Model as the independent variable (X1) resulted in the highest and lowest expected return values of 0.020493 and -0.01658. While the variant (risk) has the highest and lowest values of 0.017829 and 0.002274. The beta value of each stock resulted in the highest and lowest values of 1.947657 and 0.565307. The results of these three variables produce the excess return to beta and the cut-off point which determines the Single Index Model technique. The highest ERB value is obtained with a value of 0.012229 which is then limited by the highest cut-off point value of 0.002875. The results obtained from the passive strategy of Buy and Hold as an independent variable (X2) resulted in the highest time to maturity value for 3.4770705 years and the lowest for 0.257534247 years. The highest yield obtained was 0.096975235 while the highest risk was -0.002942. The optimal portfolio as the dependent variable (Y) results in the expected return (yield) and optimal portfolio risk. The 2 assets used as research samples resulted in the highest value of the expected return (yield) of the optimal portfolio, which was 0.090064

and the lowest was 0.01497. Meanwhile, the highest optimal portfolio risk obtained a value of 0.006395 and the lowest was -0.00306. The result of the highest proportion of funds to be invested in shares is 27%, while the lowest is 2%. The highest proportion of bond funds to be invested is 90% while the lowest is 10%.

Research Discussion
Optimal Portfolio Performance of Shares and Proportion of Equity Funds

The optimal portfolio performance of stocks is observed from various factors such as the value of the expected return, variance, beta, excess return to beta and the cut-off point which will produce the expected return and the optimal portfolio risk of stocks. Based on the results of the calculations in table 2 on the previously page about value descriptive statistic, PTBA shares have the highest expected return with a value of 0.02049. This value indicates that PTBA shares have a greater return than their actual return in the future and have a greater chance of being included in the optimal stock portfolio candidate. Meanwhile, LPKR shares have the lowest expected return with a value of -0.0166. This value means that LPKR's return on the stock has a smaller return and does not exceed its actual return in the future because the value obtained shows a minus number and it is very unlikely that the stock will be included in the optimal stock portfolio. This indicates that the value of the expected return determines whether the stock can be included in the optimal portfolio or not. Research conducted by Giri and Parhi (2017) states the same thing as this research that if the value of the Expected Return of a stock is high, there is a big chance to be included in the optimal portfolio and vice versa.

Table 3. Expected Return and Varian (σ)

No	Stock Code	Expected Return	Variant (σ)
1	ADRO	0,007516	0,011863
2	AKRA	0,002792	0,006219
3	ASII	0,005277	0,004097
4	BBCA	0,017856	0,002274
5	BBNI	0,016735	0,006419
6	BBRI	0,018062	0,00503
7	BMRI	0,012217	0,003269
8	BSDE	0,002713	0,006307
9	GGRM	0,013572	0,004168
10	ICBP	0,01361	0,003222
11	INDF	0,004196	0,00443
12	INTP	0,003533	0,009547
13	JSMR	0,000944	0,005124
14	KLBF	0,005028	0,003447
15	LPKR	-0,01658	0,00876
16	MNCN	-0,01338	0,017829
17	PGAS	-0,00484	0,016071
18	PTBA	0,020493	0,016452
19	SMGR	0,000176	0,007564
20	TLKM	0,010989	0,003312
21	UNTR	0,008837	0,005591
22	UNVR	0,010726	0,002891
23	WIKA	0,009035	0,01471
24	IHSG	0,0066	0,0009
25	Rf	0,0051	1,25E-06

Source : the results of data calculations processed by the researcher

The highest variant (risk) is obtained by MNCN shares with a value of 0.01783. This value indicates that the risk had by MNCN shares is too large compared to the risks of other stocks and it makes these shares unable to be included in the optimal portfolio of stocks because the higher risk will make the lower profit gained in the optimal portfolio. The lowest variant is owned by BBCA shares with a value of 0.00227. This value shows that BBCA shares have a lower risk compared to other stock risks and makes these stocks safer if they are included in the optimal portfolio of stocks because the lower risk will minimize the optimal portfolio risk gain. Research conducted by Poornima and Remesh (2016) states the same thing that stocks that have a high variance, the possibility of these shares being included in the optimal portfolio is very small because investors have to accept higher risks. If the risk of the stock is low, investors will be able to reduce the risk of the portfolio that will be accepted. Table 3 on the previously page describes the information obtained from the calculation of the expected return by looking at the weighted average of actual returns. Furthermore, the researchers calculated the varians of each stock, IHSG and risk-free assets. Based on the results of these calculations, 20 stocks have a positive expected return value, while 3 other stocks have a negative number. The varians obtained by 23 stocks in the research sample are positive, which indicates that each share has its risks. This is different from risk-free assets, which have a very low-risk value that is closer to 0 compared to stocks or market risk.

Table 4. Alpha (A), Beta (B), *Unsystematic Risk*, A1 and B1

No	Stock Code	A	B	Unsystematic Risk	A1	B1
1	BBCA	0,010904	1,041639	0,003283142	4,04148	330,48
2	GGRM	0,008308	0,788594	0,004746425	1,40451	131,021
3	TLKM	0,007086	0,584903	0,00363041	0,94594	94,2349
4	ICBP	0,007753	0,877625	0,003938766	1,8922	195,55
5	PTBA	0,008962	1,727702	0,019227505	1,38156	155,244
6	UNVR	0,006081	0,696049	0,003342009	1,16803	144,968
7	BBRI	0,006557	1,723833	0,007793964	2,86296	381,269
8	BBNI	0,003945	1,916341	0,009834527	2,26363	373,415
9	BMRI	0,00234	1,47988	0,00530563	1,98001	412,778
10	UNTR	0,003247	0,837583	0,0062435	0,49897	112,364
11	WIKA	-0,00396	1,947657	0,018237221	0,41835	208,001
12	ADRO	-0,0028	1,54583	0,014084794	0,26323	169,657
13	ASII	-0,00504	1,545739	0,00631899	0,0388	378,116
14	KLBF	-0,0029	1,187587	0,004759038	-0,0225	296,355
15	INDF	-0,00362	1,170824	0,005704474	-0,1893	240,308
16	INTP	-0,00776	1,692042	0,012209852	-0,2197	234,483
17	BSDE	-0,00852	1,682866	0,008940461	-0,4527	316,767
18	SMGR	-0,01014	1,546026	0,00978698	-0,7807	244,222
19	JSMR	-0,00709	1,203591	0,006470776	-0,7765	223,873
20	AKRA	-0,00098	0,565307	0,006516182	-0,2018	49,0429
21	PGAS	-0,01658	1,759748	0,018950586	-0,9246	163,41
22	MNCN	-0,02616	1,915236	0,021240679	-1,6677	172,694
23	LPKR	-0,02343	1,026169	0,009739385	-2,2862	108,12

Source : the results of data calculations processed by the researcher

After the results of the calculation of the expected return value and the variance of each stock, JCI and risk-free assets are obtained, the researcher then calculates the alpha, beta,

covariance (Unsystematic Risk), A1 and B1 values of these stocks. Based on the results of the calculations in table 4 above there are 10 stocks have a positive alpha value and 17 stocks have a beta value more than 1. WIKA stock beta is the highest beta value compared to other stocks. This value is also in line with the expected return and variance obtained by WIKA shares. The acquisition of WIKA stock beta value is the highest compared to other stocks that resulted in a more sensitive stock price movement which was influenced by market conditions. Beta indicates that if there is an increase of 1%, it will cause an increase in WIKA stock return of 1.947657 and vice versa. When applying investment in the capital market, it is very difficult for investors to reduce this value because various factors affect beta value such as market conditions. This condition is also found in the research conducted by Wibowo, Rahayu and Endang (2014) which states that there is a unidirectional influence between stock returns and market returns such as the conditions that occur in this study.

The results of the calculations in table 5, show that BBCA shares determine the cut-off point (C*) value because they have the largest Ci value compared to other stocks with the number 0.002875. Excess return to beta is the excess of the expected return value from stocks against a unit of risk that cannot be diversified as measured by the beta value. Excess return to beta owned by a stock must exceed the cut-off point value if it is to be included in the optimal portfolio. This has to become the main criterion in forming an optimal portfolio of stocks using the Single Index Model. Among 23 stocks that were the research sample, only 10 stocks met the applicable criteria. The highest ERB is owned by BBCA shares with a value of 0.01223. This means that ERB BBCA shares have the opportunity to become shares with a greater percentage level of the proportion of funds compared to other stocks. The stock is also a determinant of the cut-off point (C*) value because it has the highest Ci value with a value of 0.00287 which is the reference in the process of selecting stocks to be included in the optimal portfolio. This condition also occurred in the study of Partono et al. (2017) which states that if the share value is not less than the cut-off point value, then it cannot be included in the optimal portfolio.

Table 5. ERB, Ci, C *, Stock Decisions

No	Stock Code	ERB	Ci	C*	Decision
1	BBCA	0,012229	0,002875	0,002875	Optimal
2	GGRM	0,01072	0,001164	0,002875	Optimal
3	TLKM	0,010038	0,000809	0,002875	Optimal
4	ICBP	0,009676	0,001489	0,002875	Optimal
5	PTBA	0,008899	0,001123	0,002875	Optimal
6	UNVR	0,008057	0,000957	0,002875	Optimal
7	BBRI	0,007509	0,001966	0,002875	Optimal
8	BBNI	0,006062	0,001562	0,002875	Optimal
9	BMRI	0,004797	0,001331	0,002875	Optimal
10	UNTR	0,004441	0,00042	0,002875	Optimal
11	WIKA	0,002011	0,000326	0,002875	Not Optimal
12	ADRO	0,001552	0,000211	0,002875	Not Optimal
13	ASII	0,000103	2,67E-05	0,002875	Not Optimal
14	KLBF	-7,6E-05	-1,6E-05	0,002875	Not Optimal
15	INDF	-0,00079	-0,00014	0,002875	Not Optimal
16	INTP	-0,00094	-0,00017	0,002875	Not Optimal
17	BSDE	-0,00143	-0,00033	0,002875	Not Optimal
18	SMGR	-0,0032	-0,00059	0,002875	Not Optimal
19	JSMR	-0,00347	-0,0006	0,002875	Not Optimal
20	AKRA	-0,00411	-0,00018	0,002875	Not Optimal
21	PGAS	-0,00566	-0,00075	0,002875	Not Optimal
22	MNCN	-0,00966	-0,00134	0,002875	Not Optimal

| 23 | LPKR | -0,02114 | -0,00193 | 0,002875 | Not Optimal |

Source : the results of data calculations processed by the researcher

Based on the results of the portfolio calculation for each stock in table 6 on the next page, the value of the expected return and the optimal portfolio risk of shares is 0.01497 and 0.006395. These 2 components are at the core of optimal stock portfolio performance required by investors in investing their funds in the types of stocks in the capital market, especially LQ 45 Index company shares. These results were also experienced by previous research researched by Giri and Parhi (2017) by obtaining 2 values expected return and optimal portfolio risk using the Single Index Model technique. This optimal portfolio formation was declared successful because the expected return obtained from the portfolio formation effort was greater than the expected return generated by market movements with a value of 0.01497 > 0.006674. These results indicate that the active strategy of the Single Index Model can be used by investors as an alternative means of finding the expected return and portfolio variants by selecting the best stocks among the good stocks and then refining those stocks with the criteria of stocks having an ERB value exceeding limitation point value. Limitation point value or C* so that the resulting expected return on the portfolio will be more optimal than the expected market return. These results were also experienced by previous research researched by Oktafiani, Maruddani and Suparti (2017) and Partono et al. (2017) which show expected return and optimal portofolio risk of shares by using Single Index Model.

Table 6. Zi, Wi, αp, βp, Unsystematic Risk, Percentage, E (Rm), E (Rp), Market Variance and σp Optimal Stock

No	Stock Code	Zi	Wi	αp	βp	Unsystematic Risk	Percentage
1	BBCA	2,967	0,270946	0,0029	0,2822	0,0008	27%
2	GGRM	1,303	0,118992	0,0009	0,0938	0,0005	12%
3	TLKM	1,154	0,105361	0,0007	0,0616	0,0003	11%
4	ICBP	1,515	0,138355	0,0010	0,1214	0,0005	14%
5	PTBA	0,541	0,049421	0,0004	0,0853	0,0009	5%
6	UNVR	1,079	0,098537	0,000599	0,0685	0,0003	10%
7	BBRI	1,024	0,093574	0,0006	0,1613	0,0007	9%
8	BBNI	0,621	0,056697	0,0002	0,1086	0,0005	6%
9	BMRI	0,536	0,04894	0,0001	0,0724	0,0002	5%
10	UNTR	0,210	0,019177	6,23E-05	0,0160	0,0001	2%
Total		10,95	1	0,0078	1,0715	0,0053	100%

	E(Rm)	0,006674	
Optimal Stock Portfolio Results	**E(Rp)**	0,01497	
	Varians Market	0,00093	
	Σp	0,006395	

Source : the results of data calculations processed by the researcher

The proportion of stock funds reflects the proportion of funds that will be allocated to stocks and bonds that are included in the optimal portfolio. The amount of the proportion of funds is influenced by the calculation that has been done previously of each security asset. The proportion of share funds is only given to stocks whose ERB value exceeds the value of C*. The discussion regarding the calculation results from Appendix 12 shows that the value of the proportion of funds in the optimal portfolio of shares is divided into 10 stocks that are selected in the optimal portfolio with details of shares BBCA (27%), GGRM (12%), TLKM (11%), ICBP (14%), PTBA (5%), UNVR (10%), BBRI (9%), BBNI (6%), BMRI (5%) and UNTR

(2%). BBCA shares have the highest percentage of fund proportion because these shares have the highest ERB value compared to other stocks and the cut-off point value of these shares determines other shares.

Optimal Bond Portfolio Performance and Proportion of Bond Funds

The optimal portfolio performance of bonds in this study is calculated based on the length of the research period from January 2014 to December 2018. This performance is determined by 3 main factors, namely the value of yield, risk and time to maturity (TTM) owned by each bond and supported by supplementary factors in the calculation process. The higher the bond yield, the higher the benefits you get. Based on the calculation results in table 2 the highest yield is obtained by FR0077 bonds with a value of 0.096975235 and it has the smallest risk compared to other bonds with a value of -0.015725235. This condition shows that the yield generated by the FR0077 bond is greater than that of other bonds in term of yield perspective. Previous research conducted by Nanda and Peters (2006) stated that bond yields reflect the benefits that bondholders will get if they invest their funds in these bonds.

Time to maturity (TTM) is the time spent by bondholders in investing their funds in bonds. The highest TTM was obtained by the FR0072 bond with a value of 3.4770705 years and not much different from the TTM acquisition for the FR0073 bond with a value of 3,400410678 years. Although the FR0077 bond has the highest yield value and the lowest risk compared to other bonds, it still cannot be included in the optimal portfolio because the TTM owned is smaller than other bonds which will affect the profitability of the bond coupon value. Previous research conducted by Caldeira, Moura and Santos (2016) show the same condition in the acquisition of bond TTM.

The optimal portfolio yield is the combination of yields generated by several bonds, while the optimal portfolio risk is the difference between the value generated by the yield with a price of 100 points and the point price that occurs at the time of the initial bond purchase. These 2 components are the core of optimal bond portfolio performance required by bondholders in investing their funds in types of bonds in the capital market, especially government bonds. This result was also experienced by previous research researched by Xinyi and Hua (2016) observed the yield, risk and time to maturity (TTM) values in considering the formation of an optimal bond portfolio. The optimal bond portfolio formation was declared successful because the yield generated by the passive Buy and Hold strategy was following the movement of the bond index, the reference interest rate (BI rate) and depending on the length of the bond investment period. This shows that the passive Buy and Hold strategy can be used as an alternative means of finding the optimal bond yield and portfolio risk. Research conducted by Sanderson and Sowers (2018) experienced the same condition. Based on the calculations that have been done on each bond in table 7, the optimal yield and portfolio risk values for bonds are 0.090063991 and -0.00306399.

Table 7. Yield, Risk, Time to Maturity, Bond Decision and Total Return

	Yield	Risk	TTM (Time to Maturity)	Bond Decisions	Total Return
FR0072	0,08666	-0,0042	3,4770705 Years	Optimal	149.500.000
FR0073	0,09044	-0,0029	3,400410678 Years	Optimal	152.500.000
FR0074	0,08769	-0,0127	2,135036496 Years	-	130.000.000
FR0075	0,08708	-0,0121	1,389041096 Years	-	115.000.000
FR0076	0,08611	-0,0124	1,265753425 Years	-	114.750.000
FR0077	0,09698	-0,0157	0,257534247 Years	-	108.125.000
FR0078	0,08675	-0,0043	0,257534247 Years	-	108.250.000

Source : the results of data calculations processed by the researcher

Based on the results in table 8 on the next page, the proportion of bond funds reflects how much the proportion of funds that will be allocated to stocks and bonds is included in the optimal portfolio. The proportion of bond funds is determined by bonds which have a balanced yield value, time to maturity and bond risk. Balance meant is the yield and risk value received in line with the number of TTM that will be carried out by the bondholder. Previous research conducted by Xinyi and Hua (2016) argued that a high yield value with high risk and low TTM, this will affect the interest income from coupons and prevailing interest rates. The greater the proportion of funds, indicating that the stock or bond provides a high potential return and lower risk. This is also similar with research conducted by Larasati, Irwanto and Permanasari (2013) which states the same thing. The percentage of the proportion of bond funds FR0073 has the highest percentage because, at the time of determining the proportion of funds, the combination of the optimal yield value and portfolio risk for the bond having the highest portfolio yield value lies in the combination with the weight of 90% of FR0073 bonds and 10% of FR0072 bonds with higher accepted portfolio risk compared to another combinations.

Table 8. Calculation of the Optimal Proportion of Bonds

W1 (FR0073)	W2 (FR0072)	Optimal Portfolio Yield	Optimal Portfolio Risk
10%	90%	0,087039916	-0,00403992
20%	80%	0,087417925	-0,00391793
30%	70%	0,087795935	-0,00379594
40%	60%	0,088173944	-0,00367394
50%	50%	0,088551953	-0,00355195
60%	40%	0,088929963	-0,00342996
70%	30%	0,089307972	-0,00330797
80%	20%	0,089685982	-0,00318598
90%	**10%**	**0,090063991**	**-0,00306399**

Source : the results of data calculations processed by the researcher

CONCLUSIONS AND SUGGESTIONS
Conclusions

The optimal portfolio performance of stocks results in a portfolio expected return value that is superior to the market expected return with a value of 0.01497 > 0.006674 and a greater portfolio risk than the market risk with a value of 0.006395 > 0.00093. These results indicate that by implementing an active strategy the Single Index Model ranks stocks based on the highest ERB value and cut-off point value to keep the expected return and risk more stable. This policy makes stocks that are included in the optimal portfolio candidate to provide better-expected return results and in line with the increase in portfolio risk over market risk. Meanwhile, the optimal portfolio performance of bonds resulted in yield and portfolio risk values with a value of 0.090063991 and -0.003063991 which exceeded the yield and risk of individual bonds from each bond in the study sample. The yield is based on individual bonds that have balanced yield, risk and TTM values. The use of a passive Buy and Hold strategy by holding bond investments for a certain time gives different yields and risks between holding the bonds until the research period and holding the bonds until the maturity expires.

The optimal portfolio performance of stocks results in 10 stocks as an allocation of the optimal share proportion with the details of shares of BBCA (27%), GGRM (12%), TLKM (11%), ICBP (14%), PTBA (5%), UNVR (10%), BBRI (9%), BBNI (6%), BMRI (5%) and UNTR (2%). Meanwhile, government bonds that can be categorized as bonds that form an optimal portfolio are formed from 2 bonds with details of bonds FR0073 (90%) and FR0072 (10%).

Suggestions

Suggestions from the results of this study are related to the research topic thus investors or bondholders conduct the investment in LQ 45 Index stocks and government bonds by using the Single Index Model and Buy and Hold. The performance results in this study prove that the method used is successful in finding the optimal portfolio of stocks and bonds.

Investors and bondholders who will invest their funds in the capital market should divide their investment into several types of security assets such as stocks and bonds to increase the profits and to minimize the risk.

Research Implications

The theoretical implications contained in this study have an impact on the use of investment theory and portfolio theory in shaping the results of optimal stock portfolio performance which can be seen from the success of the researcher in obtaining a value of expected portfolio return that is greater than the market expected return and obtaining a greater portfolio risk than with market risk. Meanwhile, the use of investment theory, portfolio theory, liquidity preference theory and Malkiel's theory affect the results of optimal bond portfolio performance which can be seen from the balance of yield, risk and time to maturity value for individual bonds which can be used to form a bond portfolio consisting of several bonds and produce The value of portfolio yield is higher than the yield on individual bonds and the value of portfolio risk is lower than that of individual bonds.

The practical implications contained in this research can be used as a basis in determining investment policies with strategies that are accordance with active or passive character of each investor. This strategy will result in optimal stock and bond portfolio performance by diversifying the portfolio of each invested stock and bond asset. diversification is meant to invest funds in several types of sector stocks and types of bonds both government and corporate bonds.

RESEARCH LIMITATIONS AND FUTURE RESEARCH
Research Limitations

The period of the study only uses 5 years and other techniques that are not used in this study and that can be used by further researchers are the Markowitz technique and the Immunization technique. The Markowitz technique is a technique that can also be used in carrying out a stock portfolio by choosing one of the variables between return or risk that must be optimized, while the Immunization technique can also be used in forming a bond portfolio by combining several bonds in increasing the yield of bond portfolio yield.

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