Optimal Portfolio Formation Using the Single Index Model on the LQ45 Index on the Indonesia Stock Exchange

by - -

Submission date: 25-Jan-2024 09:13AM (UTC+0530)
Submission ID: 2277934764
File name: 4._IJRR_Juli_2023.pdf (399.82K)
Word count: 5422
Character count: 28135

International Journal of Research and Review
Vol. 10; Issue: 7; July 2023
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Optimal Portfolio Formation Using the Single Index Model on the LQ45 Index on the Indonesia Stock Exchange

Elita Melinia[1], Subagyo [2], Moch. Wahyu Widodo[3]

[1,2,3]Program Study of Management, Faculty of Economics and Business, Nusantara PGRI University, Kediri, Indonesia

Corresponding Author: Elita Melinia

DOI: https://doi.org/10.52403/ijrr.20230753

ABSTRACT

The purpose of this research is to identify stocks that can form an optimal portfolio on the LQ45 Index on the IDX for the period August 2022 – January 2023 and find out the proportion of funds from each stock that makes up the optimal portfolio, as well as find out the level of expected return and risk of the optimal portfolio that is formed. This study uses a quantitative approach and descriptive research type. The population in this study totaled 45 LQ45 Index stocks for the period August 2022 – January 2023 with a sample of 44 stocks selected using purposive sampling. The data collection technique in this study is the documentation technique obtained from the websites www.idx.co.id, www.finance.yahoo.com, and www.bi.go.id. The data analysis technique used in this study is the Single Index Model. The results of this study indicate that the optimal portfolio is formed from 3 (three) stocks, namely UNVR, BBRI, and ICBP with the proportion of funds per share respectively 63.51%, 28.16%, and 8.33%, and the amount expected return of the optimal portfolio is 0.84% and the risk level is 0.14%.

Keywords: *Optimal Portfolio, Single Index Model, LQ45 Index*

INTRODUCTION

The Indonesian capital market is currently growing very rapidly. This is evidenced by the increasing number of companies that are listed on the Indonesia Stock Exchange (IDX) from 766 companies to 810 companies as of October 7, 2022. The increase in the number of companies resulted in the market capitalization value increasing by 11.9% from IDR 8,256 Trillion to IDR 9,235 Trillion (Investor.id). This phenomenon states that the capital market in Indonesia is starting to be looked at as a means of investment.

According to Handini & Astawinetu (2020), the main reason people invest is to earn a return (yield). This reason makes perfect sense, because investors always demand a return on their invested capital. Every investor certainly wants to return a high return on investment. To get a return a high level can invest in capital market instruments such as stocks. However, stock investing does just that return high, but some risks must be faced by investors.

Return and risks have a bond that is directly proportional. It means getting higher the return achieved, the higher the risk that must be faced and vice versa (Tandelilin, 2016). But everyone who invests always expects a return high with the lowest possible level of risk. Because in general, investors tend to avoid risk (risk averse) in all decisions. However, in reality, the risks faced by investors when investing in stocks are very high, and comparable returns are expected. With this in mind, diversification into an optimal portfolio can minimize risks from

investment activities without having to lower the rates of return which are expected. Diversification to form a portfolio is carried out by combining selected stocks and allocating funds for investment (Tandelilin, 2016). However, many investors still have difficulty identifying the right stocks to form an optimal portfolio. This is due to the lack of investor knowledge due to the large number of company shares listed on the Indonesia Stock Exchange (IDX), thus making investors confused about choosing the right stock to choose from. In addition, investors often experience inaccuracies in allocating their funds for investing which causes investors to suffer losses or not get returns that are expected. This can also be caused by a lack of knowledge in selecting and combining inappropriate stocks. Therefore, it is necessary to combine the right choice of stocks and allocate funds in the right proportions to form an optimal portfolio that can provide an expected return high level with minimal risk.

Formation of an optimal portfolio can be done using the Markowitz Model and the Single Index Model. According to Tandelilin (2016), there are fundamental calculation differences between the Markowitz Model and the Single Index Model. The Markowitz model requires more complex calculations because it requires risk calculations using the covariance through the variance-covariance relationship matrix. On the other hand, in the Single Index Model, the complex risk calculation from the Markowitz Model is simplified into two components, namely market risk and company-specific/unique risk. This simplification makes the calculation of Markowitz's portfolio risk simpler. This is the reference for this study to choose the Single Index Model as an analysis method for forming an optimal portfolio.

Several previous studies regarding optimal formation using the Single Index Model showed different results. Previous research conducted by Pratama & Akbar (2019) on the LQ45 Index using the Single Index Model, shows that the optimal portfolio formed consists of 8 stocks with the proportion of funds for each share, namely WSKT 33.18%, PTPP 22.74%, AKRA 7 .51%, GGRM 9.57%, TLKM 19.63%, UNVR 4.65%, PWON 2.42% and ADRO 0.31%. Which is the expected portfolio return rate of 3.64% and portfolio risk of 0.10%. Previous research conducted by Silalahi et al. (2021) on the JII Index using the Single Index Model, shows that 5 stocks form an optimal portfolio with the proportion of funds for each share, namely INCO 29.9%, ADRO 29.60%, UNTR 16.25%, INDF 12, 26% and ICBP 11.98%, and the expected portfolio return rate is 1.61% and portfolio risk is 1.23%. In addition, previous research conducted by Adiputra et al. (2022) on IDX BUMN 20 using the Single Index Model, shows that 4 stocks form an optimal portfolio with the proportion of funds per share, namely ANTM 65%, TINS 25%, PTBA 2% and BBRI 0.5%, as well as the expected portfolio return rate is 4.39% and portfolio risk is 0%. The previous research became the basis for this research to apply optimal portfolio formation to the LQ45 Index.

The application of the LQ45 Index to form an optimal portfolio using the Single Index Model in this study is because the LQ45 Index is an index that measures the price movements of 45 stocks with high liquidity and large market capitalization that are supported by good company fundamentals and are the most actively traded (Yuwono et al., 2019).

Based on the description above, the researcher intends to identify stocks that can form an optimal portfolio and the proportion of funds allocated to each share, as well as the level of expected return and optimal portfolio risk formed. Thus, the title of this study is "Optimal Portfolio Formation Using the Single Index Model on the LQ45 Index on the Indonesian Stock Exchange".

LITERATURE REVIEW

Capital Market

Capital Market Law No. 8 of 1995 defines market capital as activities related to public offerings and trading securities, public companies related to the securities they issue, as well as institutions and professions related to securities (Zulfikar, 2016). A capital market is a meeting place between parties who have an advantage in funds (investors/savers) and parties who need to obtain funds through securities buying and selling transactions (Tandelilin, 2016). Various types of instruments are traded in the capital market, such as stocks, bonds, right, warrants, mutual funds, and others (Halim, 2015).

Investment

Investment is defined as deferring funds to be channeled into the form of productive assets within a predetermined period, to get profits or returns in the future (Hartono, 2019). Investments can be made in real assets and financial assets. Real asset invesstment, namely investment in tangible assets such as land, buildings, or gold. Meanwhile, investment in financial assets, namely investment in various securities issuer assets, such as mutual funds, bonds, stocks, and derivative securities (Bodie et al., 2014).

Return

Return is intrepreted as a return or gain on investment (Halim, 2015). Return can be interpreted as income expressed in the form of a percentage of the initial investment capital (Samsul, 2015). Meanwhile, according to (Fahmi, 2013), return is the profit that companies, individuals, and institutions get from the results of their investment policies.

The source of return consists of 2 (two) components, namely capital gain (loss) and yield (current income) (Hartono, 2014). Capital gain (loss) is the difference between the current investment price compared to the price in the previous period, while the yield (current income) is income received periodically against the investment value during the investment period. According to Hartono (2019), returns are dividen into 2 types viz return realization and return expectations. Return realization is the return on investment that has occured, temporarily return expected return on investment is expected in the future.

Shares

Shares are a symbol of ownership of investment in several funds owned by individual investors, institutional investors, or traders invested in a company (Aziz et al., 2015). Meanwhile, according to Fahmi (2015), shares are defined as proof of ownership of company capital/funds that shows nominal value, company name, and clear rights and obligations to each owner. According to Tandelilin (2016), shares are divided into 2 (two), namely ordinary shares and preferred shares. Ordinary shares are securities that state that the owner of these shares has ownership rights over the company's assets, while preferred shares are shares that combine the characteristics of bonds with ordinary shares because preferred shares offer stable income like traditional bonds and have ownership rights like ordinary shares.

Risk

Risk is defined as the difference between the expected results and the results obtained (Tandelilin, 2016). Risk is often associated with deviations or deviations from the results received and expected (Hartono, 2019). Tandelilin (2016) states that risk can be calculated using the concept of variance and standard deviation. The greater the deviation of the results from the average value, the greater the standard deviation of a stock, and vice versa (Zubir, 2013).

According to Halim (2015), risk is classified into 2 (two), namely systematic risk and unsystematic risk. Systematic risk is a risk that is influenced by macro factors that affect the market as a whole and this risk cannot be overcome through diversification (undiversificable risk). Meanwhile,

unsystematic risk is a risk that is influenced by the company's micro factors so that it does not affect the entire market, but only certain companies, and this risk can be overcome through diversification (diversificable risk).

Portfolio

A portfolio is a set of assets placed in an investment with the aim that investment in the form of a portfolio can minimize risk without reducing the desired rate of return (Tandelilin, 2016). Hartono (2019), explains that there are 2 (two) types of portfolios, including efficient portfolios and optimal portfolios. An efficient portfolio is a portfolio that offers expected returns and certain risks. An efficient portfolio has only one good factor, namely factor expected return or risk factors, but not both. While the optimal portfolio is a portfolio that offers an expected return maximum with the lowest level of risk. The optimal portfolio is a portfolio that has a combination of expected return and best risk. The optimal portfolio also includes an efficient portfolio, but an efficient portfolio is not necessarily an optimal portfolio.

Single Index Model

Hartono (2019), explains that the theory of the Single Index Model is a simplified form of the Markowitz Model which contains the required input parameters for calculating the Markowitz Model. The calculation of the Single Index Model is based on observing stock prices that have a direct relationship with the market price index. If the stock price index rises, then the stock price will also rise and vice versa. This indicates that it is possible return-return of correlated stocks due to a general reaction (common response) to changes in market value. In addition, Hartono (2019) also states that the Single Index Model is an analytical method for determining the optimal portfolio which is carried out by comparing Excess Return to Beta (ERB) with the cut-off point (C^*). When the ERB value is greater than C^* (ERB $\geq C^*$), then include candidates in the formation of the optimal portfolio. However, if the ERB value is less than C^* (ERB $< C^*$), then it does not include the optimal portfolio formation candidate.

MATERIALS & METHODS

This research method uses a quantitative approach to the type of descriptive research. The population used is 45 stocks listed on the LQ45 Index on the IDX for the period August 2022 - January 2023 with a sample of 44 stocks selected using purposive sampling. This study uses secondary data collected using documentation techniques from the websites www.idx.co.id, www.finance.yahoo.com, and www.bi.go.id. The data needed in this study include stock data on the LQ45 Index for the period August 2022 - January 2023 and data closing price per month, data closing price per month on IHSG (Composite Stock Price Index), and BI-7 interest rate data Day Reserve Repo Rate. The data needed is data that existed during the research period, namely August 2022 - January 2023. The data analysis technique in this study is the Single Index Model using the program Microsoft Excel in his calculations. The stages of data analysis in this study using the Single Index Model are as follows:

1. Count realized return shares (Ri), expected return stock (E(Ri)), and stock risk

Realized return shares	:	$R_i = \frac{P_t - P_{t-1}}{P_{t-1}}$ (Hartono, 2019)
Expected return stock	:	$E(R_i) = \frac{\Sigma R_i}{n}$ (Hartono, 2019)

Stock risk can be calculated using variance (σ_i^2) and standard deviation (σ_i)

Stock variance	:	$\sigma_i^2 = \frac{\sum_{t=1}^{n}(R_i - E(R_i))^2}{n}$ (Hartono, 2019)
Stock standard deviation	:	$\sigma_i = \sqrt{\frac{\sum_{t=1}^{n}(R_i - E(R_i))^2}{n}}$ (Hartono, 2019)

2. Count realized return market (R_M), expected return market ($E(R_M)$), and market risk

Realized Return market	:	$R_M = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$ (Hartono, 2019)
Expected return market	:	$E(R_M) = \frac{\sum_{i=1}^{n} R_M}{n}$ (Hartono, 2019)

Market risk can be calculated using the variance (σ_M^2) and standard deviation (σ_M)

Market variance	:	$\sigma_M^2 = \frac{\sum_{t=1}^{n}(R_M - E(R_M))^2}{n}$ (Hartono, 2019)
Market standard deviation	:	$\sigma_M = \sqrt{\frac{\sum_{t=1}^{n}(R_M - E(R_M))^2}{n}}$ (Hartono, 2019)

3. Calculate covariance return to stock with the market (σ_{iM}).

$$\sigma_{iM} = \sum_{t=1}^{n} \frac{(R_i - E(R_i)).(R_M - E(R_M))}{n}$$

(Hartono, 2019)

4. Count beta shares (β_i) and alpha shares (α_i)

Beta shares	:	$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2}$ (Hartono, 2019)
Alpha Shares	:	$\alpha_i = E(R_i) - \beta.E(R_M)$ (Hartono, 2019)

5. Count variance residual error (σ_{ei}^2)

$$\sigma_{ei}^2 = \sigma_i^2 - \beta_i^2.\sigma_M^2$$

(Hartono, 2019)

6. Count return risk-free (R_{BR})

Return risk-free is determined by the BI-7 rate Day Reserve Repo Rate (BI7DRR) monthly. The magnitude return risk-free is the average interest rate during the study period, namely August 2022 – January 2023.

7. Count Excess Return to Beta (ERB)

$$ERB = \frac{E(R_i) - R_{BR}}{\beta_i}$$

(Hartono, 2019)

8. Calculating Ai and Bi values

$$A_i = \frac{E(R_i) - R_{BR}.\beta_i}{\sigma_{ei}^2}$$

(Hartono, 2019)

$$B_i = \frac{\beta_i^2}{\sigma_{ei}^2}$$

(Hartono, 2019)

9. Calculate value cut-off rate (Ci)

$$C_i = \frac{\sigma_M^2 \sum_{j=1}^{i} Ai}{1 + \sigma_M^2 \sum_{j=1}^{i} Bi}$$

(Hartono, 2019)

10. Determine the optimal portfolio

The optimal portfolio is determined by comparing values Excess Return to Beta (ERB) with the cut-off point (C^*). When the ERB value is greater than C^* (ERB $\geq C^*$), then include candidates for optimal portfolio formation. But, when the ERB value is smaller than C* (ERB $< C^*$), then it does not include the optimal portfolio formation candidate.

11. Calculating the proportion of funds (Wi)

Weighted scale	:	$Z_i = \frac{\beta i}{\sigma ei^2}(ERB - C*)$ (Hartono, 2019)
Proportion of funds	:	$W_i = \frac{Z_i}{\sum_{i=1}^{n} Z_j}$ (Hartono, 2019)

12. Count alpha portfolio (α_p) and beta portfolio (β_p)

Alpha portofolio	:	$\alpha p = \sum_{t=1}^{n} Wi.\alpha i$ (Hartono, 2019)
Beta portofolio	:	$\beta p = \sum_{t=1}^{n} Wi.\beta i$ (Hartono, 2019)

13. Count expected return portfolio ($E(R_p)$) and portfolio risk ($\sigma_p{}^2$)

Expected return portofolio	:	$E(R_p) = \alpha_p + \beta_p . E(R_M)$ (Hartono, 2019)
Risk portfolio	:	$\sigma_p{}^2 = \beta_p{}^2 . \sigma M^2 + (\sum_{i-1}^{n} W_i . \sigma_{ei})^2$ (Hartono, 2019)

RESULT

Calculation results of the Single Index Model in the formation of an optimal portfolio on the LQ45 Index on the IDX for the period August 2022 - January 2023 with the help of the program Microsoft Excel namely as follows:

Calculation of Realized Stock Return (Ri), Expected Stock Return (E(Ri)) and Stock Risk ($\sigma_i{}^2$)

The following is a summary of the calculation results realized *return* and expected *return*, as well as the stock risk of the 44 stock samples in this study:

Table 1. Summary of Calculation Results from Ri, E(Ri), $\sigma_i{}^2$ and σ_i

No.	Stock Code	R_i	$E(R_i)$	$\sigma_i{}^2$	σ_i
1	ADRO	-0,051050	-0,008508	0,012643	0,112442
2	AMRT	0,460188	0,076698	0,011145	0,105571
3	ANTM	0,183417	0,030569	0,005051	0,071072
4	ARTO	-1,073839	-0,178973	0,002074	0,045542
5	ASII	-0,039084	-0,006514	0,004516	0,067201
6	BBCA	0,154970	0,025828	0,003643	0,060356
7	BBNI	0,163007	0,027168	0,002590	0,050889
8	BBRI	0,055671	0,009278	0,002063	0,045425
9	BBTN	-0,068662	-0,011444	0,002702	0,051981
10	BFIN	-0,007909	-0,001318	0,004498	0,067066
11	BMRI	0,196964	0,032827	0,003349	0,057870
12	BRIS	-0,196103	-0,032684	0,001066	0,032650
13	BRPT	-0,071634	-0,011939	0,003570	0,059747
14	BUKA	0,000967	0,000161	0,004853	0,069665
15	CPIN	0,042158	0,007026	0,000883	0,029713
16	EMTK	-0,487130	-0,081188	0,012164	0,110290
17	ERAA	-0,151940	-0,025323	0,005075	0,071239
18	EXCL	-0,008491	-0,001415	0,006978	0,083534
19	GOTO	-0,763816	-0,127303	0,040600	0,201494
20	HMSP	0,074270	0,012378	0,009106	0,095423
21	HRUM	-0,045997	-0,007666	0,005966	0,077243
22	ICBP	0,145615	0,024269	0,003152	0,056144
23	INCO	0,207907	0,034651	0,002844	0,053332
24	INDF	-0,003512	-0,000585	0,002496	0,049957
25	INDY	-0,079397	-0,013233	0,007249	0,085141
26	INKP	0,111577	0,018596	0,006399	0,079997
27	INTP	0,075588	0,012598	0,000887	0,029778
28	ITMG	-0,076908	-0,012818	0,004087	0,063926
29	JPFA	-0,056643	-0,009440	0,003706	0,060881
30	KLBF	0,251605	0,041934	0,002273	0,047679
31	MDKA	0,170799	0,028466	0,006278	0,079233
32	MEDC	0,985598	0,164266	0,037899	0,194676
33	MIKA	0,199752	0,033292	0,004740	0,068849
34	MNCN	-0,398127	-0,066354	0,001563	0,039540
35	PGAS	-0,059692	-0,009949	0,007939	0,089102
36	PTBA	-0,228473	-0,038079	0,000581	0,024094
37	SMGR	0,154197	0,025699	0,008943	0,094565
38	TBIG	-0,361117	-0,060186	0,002146	0,046328
39	TINS	-0,140532	-0,023422	0,004143	0,064365
40	TLKM	-0,084453	-0,014075	0,002974	0,054536
41	TOWR	-0,043502	-0,007250	0,001410	0,037552
42	UNTR	-0,256621	-0,042770	0,003602	0,060016
43	UNVR	0,035827	0,005971	0,001013	0,031827
44	WIKA	-0,262652	-0,043775	0,011151	0,105598

Source: Processed data, 2023.

Based on table 1 of the calculation of the 44 stocks that became the sample of this study, 25 stocks owned realized return and expected to return a negative value, and 19 stocks that have realized return and expected return positive value. Stocks that

are expected to return positive values will be included in the next calculation, while shares that are expected to return negative values are not included. Because of expected return a positive value indicates an increase in stock prices which indicates that if invested it will provide benefits for investors. Whereas an expected return a negative value indicates a decline in stock prices which indicates that the investment does not provide benefits for investors.

The stock with the highest expected return was MEDC stock of 0.985598 with a risk level measured using a variance of 0.037899 and a standard deviation of 0.194676, while the stock with the lowest expected return was ARTO stock of -1.073839 with a lower risk level. measured using a variance of 0.002074 and using a standard deviation of 0.045542.

Calculation of Realized Market Return (R_M), Market Expected Return ($E(R_M)$) and Market Risk (σ_M^2)

Calculating realized return market and expected *return* market risk, as well as market risk in this study using IHSG (Composite Stock Price Index) data for the period August 2022 – January 2023, in the calculations the results obtained realized return market of -0.014920 and expected return market by -0.002487, and market risk by 0.000260.

Calculation of Covariance (σ_{iM}), Stock Beta (β_i), Stock Alpha (α_i) and Variance Residual Error (σ_{ei}^2)

Based on the calculation of the Single Index Model, the covariance value is obtained, beta and alpha shares, as well as variance residual error which are summarized in the following table:

Table 2. Summary of Calculation Results from σ_{iM}, β_i, α_i, dan α_i

No.	Stock Code	σ_{iM}	β_i	α_i	σ_{ei}^2
1	AMRT	0,001732	7,990584	0,096568	-0,002696
2	ANTM	0,000110	0,509593	0,031837	0,004995
3	BBCA	0,001015	4,684411	0,037477	-0,001114
4	BBNI	0,000783	3,613279	0,036153	-0,000240
5	BBRI	-0,000029	-0,134677	0,008944	0,002059
6	BMRI	0,000727	3,352397	0,041163	0,000913
7	BUKA	0,000842	3,883671	0,009818	0,001584
8	CPIN	0,000419	1,934958	0,011838	0,000071
9	HMSP	0,000733	3,380019	0,020783	0,006629
10	ICBP	-0,000193	-0,890401	0,022055	0,00298
11	INCO	0,000085	0,390581	0,035622	0,002811
12	INKP	0,001059	4,886003	0,030746	0,001224
13	INTP	0,000064	0,296532	0,013335	0,000868
14	KLBF	0,000133	0,615419	0,043465	0,002191
15	MDKA	0,000519	2,393414	0,034418	0,005036
16	MEDC	0,002984	13,766325	0,198498	-0,003182
17	MIKA	-0,000564	-2,600807	0,026825	0,003274
18	SMGR	0,000506	2,333675	0,031502	0,007762
19	UNVR	-0,000009	-0,039456	0,005873	0,001013

Source: Processed data, 2023.

The results of the covariance calculation in table 2 state that there are 15 stocks that have a positive value and 4 stocks that have a negative value. According to Hartono (2019), a positive covariance value indicates value return shares and returns the market moves in the same direction, while a negative covariance value indicates value return shares and returns the market moves in the opposite direction. The highest covariance value lies in MEDC shares of 0.002984 and the lowest covariance value lies in MIKA shares of -0.000564.

The results of the stock beta calculation show that there are stocks that have negative and positive beta values. According to Huda et al. (2022), stocks that have a positive beta value state that if market returns increase, stock returns will also increase, while betas that have a negative value state that if market returns decrease, then stock returns will also decrease. The stock with the largest stock beta value is MEDC stock of 13.766325 and the stock with the smallest beta is MIKA stock of -2.600807. While the results of the calculation of stock alpha show that MEDC shares have the largest alpha, which is equal to 0.198498, and UNVR shares, which have the smallest alpha, which is equal to 0.005873. In addition, Table 2 also shows that the stock that has the highest residual error variance value is SMGR stock of 0.007762 and the stock that has the lowest residual error variance value is MEDC stock of -0.003182.

Calculation of Risk Free Return (RBR)

Calculation return risk-free in this study using BI-7 data Day Reserve Repo Rate for the period August 2022 - January 2023 which is divided by the number of studies of 6 months to obtain a calculation result of 0.04875.

Calculation of Excess Return To Beta (ERB), Ai Value, Bi Value and Cut-Off Rate (Ci)

The following is a summary of the calculation results of Excess Return to Beta, the values of Ai and Bi, as well as the cut-off rate in this research:

Table 3. Summary of Calculation Results from ERB, Ai and Bi Values, and Ci

No.	Stock Code	ERB	Ai	Bi	Ci
1	AMRT	0,003498	-82,84464	-23686,077	0,004344
2	ANTM	-0,035677	-1,854801	51,989311	-0,000398
3	BBCA	-0,004893	96,389053	-19698,657	-0,006389
4	BBNI	-0,005973	324,31576	-54296,642	-0,006528
5	BBRI	0,293082	2,581186	8,807038	0,000558
6	BMRI	-0,00475	-58,487903	12314,139	-0,003455
7	BUKA	-0,012511	-119,1542	9523,902	-0,008429
8	CPIN	-0,021563	-1132,9359	52540,532	-0,019823
9	HMSP	-0,010761	-18,545091	1723,3941	-0,002927
10	ICBP	0,027494	7,313865	266,01594	0,001499
11	INCO	-0,036097	-1,958848	54,266208	-0,000420
12	INKP	-0,006171	-120,32533	19496,989	-0,004991
13	INTP	-0,121916	-12,354921	101,3395	-0,002621
14	KLBF	-0,011075	-1,914268	172,84491	-0,000400
15	MDKA	-0,008475	-9,639887	1137,4847	-0,001676
16	MEDC	0,008391	-499,7065	-59551,038	0,009096
17	MIKA	0,005944	12,27997	2066,0995	0,001839
18	SMGR	-0,009877	-6,930219	701,62738	-0,001304
19	UNVR	1,084211	1,666873	1,537407	0,000361

Source: Processed data, 2023.

Based on table 3 it is known that 6 stocks have positive ERB values and 13 stocks have negative ERB values. The stock that has the highest ERB value is UNVR stock at 1.084211 and the stock that has the lowest ERB value is INTP stock at -0.121916. In addition, it is also known that the highest Ci value is in MEDC shares, namely 0.009096 and the lowest Ci value is in CPIN shares, namely -0.019823. The highest Ci value will be used as a limiting point to determine which stocks are included in the formation of the optimal portfolio which is commonly called cut-off point (C^*).

Optimal Portfolio Determination

The optimal portfolio is determined by comparing the ERB value with the C^* value. To make it easier in the comparison process, the ERB values are first sorted from the largest to the smallest. Comparison results of ERB and C^* values can be shown in the following table:

Table 4. Comparison Results of ERB and C^* Values

No.	Stock Code	ERB		C^*	Information
1	UNVR	1,084211	>	0,009096	Enter
2	BBRI	0,293082	>	0,009096	Enter
3	ICBP	0,027494	>	0,009096	Enter
4	MEDC	0,008391	<	0,009096	Not Entered
5	MIKA	0,005944	<	0,009096	Not Entered
6	AMRT	0,003498	<	0,009096	Not Entered
7	BMRI	-0,004750	<	0,009096	Not Entered
8	BBCA	-0,004893	<	0,009096	Not Entered
9	BBNI	-0,005973	<	0,009096	Not Entered
10	INKP	-0,006171	<	0,009096	Not Entered
11	MDKA	-0,008475	<	0,009096	Not Entered
12	SMGR	-0,009877	<	0,009096	Not Entered
13	HMSP	-0,010761	<	0,009096	Not Entered
14	KLBF	-0,011075	<	0,009096	Not Entered
15	BUKA	-0,012511	<	0,009096	Not Entered
16	CPIN	-0,021563	<	0,009096	Not Entered
17	ANTM	-0,035677	<	0,009096	Not Entered
18	INCO	-0,036097	<	0,009096	Not Entered
19	INTP	-0,121916	<	0,009096	Not Entered

Source: Processed data, 2023.

Based on the comparison results in table 4 it states that 3 stocks have an ERB value greater than C^* and 16 stocks that have an ERB value lower than C^*. Stocks that have an ERB value greater than C^* show that the stock meets the criteria as a candidate for forming an optimal portfolio, while stocks that have an ERB value smaller than C^* indicate that the stock does not meet the criteria as a candidate for forming an optimal portfolio. Stocks that have an ERB value greater than C^* are used as candidates for forming an optimal portfolio, namely UNVR, BBRI, and ICBP.

Calculation of the Proportion of Funds in Shares (Wi) Forming the Optimal Portfolio

Table 5. Results of calculating the proportion of funds (Wi)

No.	Stock Code	Zi	Wi	Percentage
1	UNVR	-34,909824	0,635115	63,51%
2	BBRI	-15,475749	0,281551	28,16%
3	ICBP	-4,580547	0,083334	8,33%
Amount		-54,966119	1	100%

Source: processed data, 2023.

Based on table 5 it is known that the composition of the proportion of funds to form an optimal portfolio is 63.51% for UNVR shares, 28.16% for BBRI shares and 8.33% for ICBP shares. To facilitate observation of the results of the percentage of the proportion of funds in each stock forming an optimal portfolio, the percentage of the proportion of funds can be presented in the form of a pie chart below:

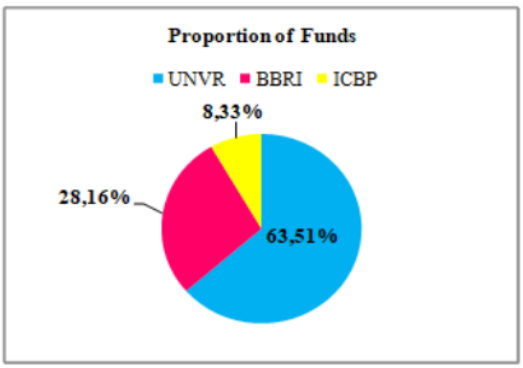

Figure 1. Percentage of the proportion of each fund optimal portfolio forming stocks
Source: Processed data, 2023.

Calculation of Expected Return Portfolio (E(RP) and Portfolio Risk (σ_p^2)

The calculation results of the 3 (three) optimal portfolio-forming stocks, namely UNVR, BBRI, and ICBP, can provide levels expected return portfolio of 0.008427 or 0.84% , and the level of risk the portfolio must bear is 0.001413 or 0.14%.

DISCUSSION

Based on the calculation results of the Single Index Model in forming an optimal portfolio on the LQ45 Index on the IDX for the period August 2022 - January 2023 it can provide information according to the intent of this research which can be explained as follows:

Stocks that can Form the Optimal Portfolio on the LQ45 Index

The formation of the optimal portfolio in this study uses the Single Index Model which is based on value comparisons Excess Return to Beta (ERB) with cut-off point (C^*). Shares that have a value Excess Return to Beta (ERB) greater than or equal to the value cut-off point (C^*), then the stock is included in the optimal portfolio formation. While stocks that have value Excess Return to Beta (ERB) are smaller than the value cut-off point (C^*), then the stock is not included in the optimal portfolio formation.

Based on the analysis of the 44 samples in this study, 3 (three) stocks were obtained that could form an optimal portfolio, which has a value Excess Return to Beta (ERB) greater than the value cut-off point (C^*). These shares are UNVR shares (Unilever Indonesia Tbk.), BBRI shares (Bank Rakyat Indonesia (Persero) Tbk.), and ICBP shares (Indofood CBP Sukses Makmur Tbk.).

The Proportion of Funds from Shares Forming the Optimal Portfolio

The formation of an optimal portfolio requires the allocation of funds from each portfolio-forming stock. Because in essence the formation of an optimal portfolio is to get a return and the best risk is carried out by diversification, namely allocating a number of funds to various investment alternatives (Tandelilin, 2016). From the results of calculating the proportion of funds in the 3 (three) stocks that make up the optimal portfolio on the LQ45 Index for the period August 2022 - January 2023, it can be obtained that the proportion of funds in UNVR shares is 63.51%, BBRI shares are 28,16% and ICBP shares are 8.33%.

The combination of the percentage of the proportion of funds from these shares amounts to 100%, and the proportion of funds from each share has a positive value. This is in accordance with the theory put forward by Hartono (2019), that the proportion of funds to form an optimal portfolio must be 100% and each has a positive value. So that the percentage of funds from the 3 shares can be used as a basis for investors to invest in stocks in forming an optimal portfolio to obtain maximum returns.

Expected Return and Risks of the Formed Optimal Portfolio

Based on the analysis of the Single Index Model, there are 3 (three) stocks that are included in the formation of an optimal portfolio that can provide a level expected return portfolio of 0.84% and portfolio risk of 0.14%. It can be concluded that the optimal portfolio that is formed has a rate of return greater than 0.70% of the risk borne so that the optimal portfolio that is formed can be taken into consideration by investors to invest in the stocks that make up the portfolio.

When compared between expected return individual shares with expected return portfolio, there are individual stocks that give expected return higher in comparison to expected *return* portfolio, for example in BBRI and ICBP stocks. However, the risk on the individual stocks is higher than the portfolio risk. This proves that forming an optimal portfolio can reduce the risks borne when investing.

CONCLUSION

Research using the Single Index Model method to form an optimal portfolio of 44 samples on LQ45 Index shares on the IDX for the period August 2022 - January 2023 obtained 3 (three) constituent stocks, including Unilever Indonesia Tbk shares. (UNVR), shares of Bank Rakyat Indonesia Tbk. (BBRI) and shares of Indofood CBP Sukses Makmur Tbk. (ICBP), with the proportion of funds allocated from each share being UNVR shares at 63.51%, BBRI shares at 28.16%, and ICBP at 8.33%. As for the rate of expected return, the portfolio formed is 0.84% and the portfolio risk is 0.14%. The results of this study can be used as an alternative investment decision to form an optimal portfolio. The practical implication of this research is that it can be used as a reference for making investment decisions to form an optimal portfolio, while the theoretical implication of this research is that it can be used as a reference to increase the reader's knowledge regarding the formation of an optimal portfolio as well as a reference for the preparation of further similar research.

Declaration by Authors

Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Adiputra, A. K., Endrayanto, P., Christmawan, E., & Meilaretasya, N. E. (2022). Analisis portofolio optimal saham yang terdaftar di IDX BUMN 20 Bursa Efek Indonesia. *Proceeding Of Nstionsl Conference On Accounting & Finance*, *4*, 377–383. https://doi.org/10.20885/ncaf.vol4.art47
2. Aziz, M., Mintarti, S., & Nadir, M. (2015). *Manajemen Investasi Fundamental, Teknikal, Perilaku Investor, dan Return Saham* (Ed. 1, Cet; U. P. Hastanto & R. Selvasari, Eds.). Yogyakarta: Deepublish.
3. Bodie, Z., Kane, A., & Marcus, A. J. (2014). *Manajemen Portofolio dan Investasi* (Edisi 9). Makassar: Salemba Empat.
4. Fahmi, I. (2013). *Pengantar Manajemen Keuangan* (Edisi 2; M. A. Djalil, Ed.). Bandung: Alfabeta.
5. Fahmi, I. (2015). *Teori Portofolio dan Analisis Investasi* (Edisi 1; S. Indris, Ed.). Bandung: Alfabeta.
6. Halim, A. (2015). *Analisis Investasi di Aset Keuangan* (1st ed.). Jakarta Pusat: Mitra Wacana Media.
7. Handini, S., & Astawinetu, E. D. (2020). *Teori Portofolio dan Pasar Modal Indonesia*. Surabaya: Scopindo Media Pustaka.
8. Hartono, J. (2014). *Teori Portofolio dan Analisis Investasi* (Edisi 9). Yogyakarta: BPFE.
9. Hartono, J. (2019). *Teori Portofolio dan Analisis Investasi* (Edisi 11). Yogyakarta: BPFE.
10. Huda, M., Abdullah, S., Chasanah, S. I. U., Mursyidah, H., Ikhsan, F., Susilo, S., & Sukandar, R. S. (2022). Analisis Pembentukan Portofolio Optimal Saham-Saham JII30 Dengan Model Indeks Tunggal Periode New-Normal. *Jurnal Derivat: Jurnal Matematika Dan Pendidikan Matematika*, *9*(1), 32–46. https://doi.org/10.31316/j.derivat.v9i1.2758
11. Investor.id. (2022). Salah Satu Terbaik di Dunia, Pasar Modal RI Jadi Tujuan Investasi. Retrieved October 27, 2022, from https://investor.id/market-and-corporate/309574/salah-satu-terbaik-di-dunia-pasar-modal-ri-jadi-tujuan-investasi
12. Pratama, W. H., & Akbar, T. (2019). Analisis Pembentukan Portofolio Optimal dengan Menggunakan Model Indeks Tunggal (Studi pada Saham LQ45 Periode 2014-2016). *JMK (Jurnal Manajemen Dan Kewirausahaan)*, *4*(2), 153. https://doi.org/10.32503/jmk.v4i2.489
13. Samsul, M. (2015). *Pasar Modal dan Manajemen Portoflio* (Edisi 2). Jakarta: Erlangga.
14. Silalahi, I. V., Ningrum, H. F., & Helia, S. (2021). Single Index Model Dalam Membentuk Portofolio Optimal Pada Saham Perusahaan Jakarta Islamic Index. *Jurnal Administrasi Kantor*, *9*(2), 273–286.
15. Tandelilin, E. (2016). *Manajemen Investasi* (Edisi 1). Tangerang Selatan: Universitas Terbuka.
16. Yuwono, T., Subagyo, & Gideon, A. (2019). Pengaruh Earning Per Share dan Dividen Per Share terhadap Harga Saham

Perusahaan yang Terdaftar di Bursa Efek Indonesia (Studi pada Perusahaan yang Terdaftar di Indeks LQ45 Periode 2013-2016). *Cahaya Aktiva : Journal of Business, Economic and Accounting*, *9*(1). https://doi.org/https://doi.org/10.47047/ca.v9i1.77

17. Zubir. (2013). *Manajemen Portofolio : Penerapannya dalam Investasi Saham*. Jakarta: Salemba Empat.
18. Zulfikar. (2016). *Pengantar Pasar Modal dengan Pedekatan Statistika* (Edisi 1). Yogyakarta: Deepublish.

How to cite this article: Elita Melinia, Subagyo, Moch. Wahyu Widodo. Optimal portfolio formation using the single index model on the LQ45 index on the Indonesia Stock Exchange. *International Journal of Research and Review*. 2023; 10(7): 428-439.
DOI: *https://doi.org/10.52403/ijrr.20230753*

******

Optimal Portfolio Formation Using the Single Index Model on the LQ45 Index on the Indonesia Stock Exchange

ORIGINALITY REPORT

19%	16%	11%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

2%

★ ejournal-binainsani.ac.id

Internet Source

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		