Journal of Economics, Finance and Management Studies

ISSN (print): 2644-0490, ISSN (online): 2644-050

Volume 07 Issue 06 June 2024

Article DOI: 10.47191/jefms/v7-i6-31, Impact Factor: 8.044

Page No: 3366-3372

Optimal Portfolio Analysis on Stocks Listed in Lq45

Erwin Dyah Astawinetu[1], Istiono[2], Estik Hari Prastiwi[3], Rudy Santoso[4]

[1,2,3,4]Faculty of Economics and Business – Universitas 17 Agustus 1945 Surabaya

ABSTRACT: The purpose of this study is to determine the optimal portfolio of stocks that are listed in the LQ-45 period (January 2023 – January 2024) and compare the return and risk in stocks that are included in the LQ-45 but not included in the optimal portfolio. The method used is the Single Index Method, which uses the ERB (Excess Return to Beta) assessment reference. The results showed that out of 45 stocks there were 10 stocks that had large ERB, which were included in the optimal portfolio were GGRM, BBTN, KLBF, EXCL, ICBP, MAPI, UNVR, CPIN, INDF, and TBIG, which provided a return of 6.61% per year and a risk of 0.08% per year. Meanwhile, the remaining thirty-five stocks were made up as well as 10 other portfolios. Each of these portfolios consists of 10 randomly selected stocks. These ten portfolios yield higher returns than optimal portfolios. However, they also have a higher risk. The results of the comparison of the coefficient of variation between the optimal portfolio and the other 10 portfolios show that the optimal portfolio is the best portfolio.

KEYWORDS: optimal portfolio, stocks, LQ-45, Single Index model

INTRODUCTION

All investors, whether individuals or institutions, want to increase their prosperity on their investments (Brigham and Houston, 2019). There are several choices of instruments (media) for investment, one of which is investment in common stocks. Investments in common stock, in general, are made through long positions. This position is done by buying shares first to hold for some period and selling them in the period thereafter. The return obtained on investing in (common) stocks comes from two sources, namely dividends and capital gains (Gitman and Zutter, 2015).

Dividend is the distribution of profits earned by a corporation to shareholders or owners of the corporation (Undang-Undang nomor 40 Tahun 2007, Pasal 71, ayat 3). This dividend must be taken from the current profit or retained earnings balance. Corporations that do not generate profits or do not have retained earnings balances are not allowed to distribute dividends. This dividend distribution is uncertain, meaning that shareholders do not necessarily receive dividends every year.

The second source of return is capital gains. Capital gain is the positive difference between the selling price of the stock and its purchase price. Capital gain is obtained when the selling price of a stock is higher than its purchase price. Conversely, when the selling price of shares is lower than the purchase price, investors suffer capital loss. This capital gain will be enjoyed by investors if the shares are sold. However, when the selling price of the stock is higher than the purchase price and the investor does not sell their shares, then they get capital appreciation.

In addition to promising returns, investing in stocks carries risks. Broadly speaking, this risk can be divided into two, namely systematic risk and unsystematic risk (Husnan, 2015: 1441). Systematic risk or market risk is the risk of stock price fluctuations caused by changes in overall capital market conditions. Capital market conditions often change along with changes in macroeconomic conditions. This systematic risk is experienced by all corporations. A corporation cannot avoid this risk.

The second risk is unsystematic risk. Unsystematic risk is the risk faced by each corporation. This risk is specific according to the conditions of each corporation. Thus, every different corporation faces different unsystematic risks (Husnan, 2015:175).

Most investors are risk aversers (Husnan, 2015: 142). These investors think logically about the balance between the expected return and risk of each of their investments. They try to choose investment alternatives that are lower risk among investment options that provide the same return. Or, they choose the investment alternative with the highest return among investment choices that have the same risk. These investors seek to lower the risk on their investments. One way, investors can reduce risk is to form a portfolio of their investments.

Optimal Portfolio Analysis on Stocks Listed in Lq45

Portfolio is a mix of several selected investment instruments (Husnan, 2015: 41). This instrument can be in the form of various shares traded in a particular capital market. The purpose of portfolio formation or diversification is to lower risk. The risk that can be lowered through the portfolio is unsystematic risk. If the portfolio has a correlation between low stock returns, the portfolio risk will be low as well. An efficient portfolio is one that provides a higher level of profit with lower risk or one that provides the same level of return with lower risk. Or it can be explained that an efficient portfolio has only one of the best factors, namely the expected return factor or risk factor. While the portfolio is a portfolio that has the best combination of expected return and risk.

There are two approaches to forming an efficient portfolio: the Markowitz model and the single index model. The Markowitz model is a portfolio model developed by Harry Markowitz. Harry Markowitz developed this model in 1952 (Markowitz, 1952) (Mainik, et all, 2015). This model became the basis in modern investment approaches. Nevertheless, the Markowitz model has some drawbacks. The weaknesses of this model are (1) assumptions about variance and ovarianism, (2) sensitivity to parameter estimation, (3) asymmetry and kurtosis, (4) deviations from market reality, (5) not taking subjective preferences into account, and (6) limitations in time periods.

Along with the weaknesses of the Markowitz model, in 1963, William Sharpe developed a portfolio model known as the single index model (Sharpe, 1963). This model bases that the price of a security changes according to the direction of change of the market index. The model developed by Sharpe is known as the capital asset pricing model or CAPM.

The capital market trades a variety of common shares from various corporations listed in the capital market. In addition to trading common shares, the Indonesian capital market (Indonesian Exchange = IDX) also makes some stock price indices. One of several price indices formed by the capital market is the LQ45 Index. Trading using stock indices has many benefits and advantages that cannot be provided by stocks and some other investment instruments. These advantages include performance, diversification, short selling opportunities and leverage.

The LQ45 index is an index that displays the stock price changes of 45 selected corporations. The requirements for company stocks that can be included in this index are stocks that have high liquidity, large market capitalization, good company fundamentals. Thus, the stocks analyzed in the study are stocks that have good performance.

Although, the shares of companies included in the LQ45 index are stocks that have good performance, but it needs to be analyzed whether all stocks can form an optimal portfolio or not. So, the purpose of this study is to form an optimal portfolio based on LQ45 index stocks.

LITERATURE REVIEW

Stock Return

Return is the result obtained by investors on their investment. Investing in common stock promises two kinds of returns, namely dividends and capital gains. Dividend is the distribution of company profits to shareholders or company owners. This dividend must be taken from the company's retained earnings, either from the current year's profit or from retained earnings. When the company does not have a profit balance, the company is not allowed to distribute dividends.

Capital gain is the positive difference between the selling price of the stock and the purchase price of the stock. When an investor takes a long position, that investor buys the stock first and holds it for some period. Then, he or she sells the shares back in other time periods. If the selling price of the stock is higher than the purchase price, then the sale of the stock results in capital gains. Conversely, if the selling price of the stock is lower than its purchase price, then the investor receives a capital loss.

In this research, the return discussed is the return derived from capital gains (capital loss). Return can be divided into two, namely realized return and expected return. Realized return is a return that has already been realized. This return has already occurred and can be enjoyed by investors. This return is calculated based on historical data. Thus, investors know whether they are receiving capital gains or suffering capital losses on their investments.

However, when investors will invest, they will usually estimate the expected return that may be obtained on their investment. This expected return has not been received or enjoyed by investors. This return is the result of investor predictions by considering various factors that influence it.

Most investors form a portfolio of their investments. Investors buy some shares of several companies listed on the capital market. Investors invest their funds in several different stocks as part of the investment diversification. The purpose of this diversification is to form an optimal portfolio. An optimal portfolio is one that provides the highest return at a particular risk or a portfolio that produces a specific return at the lowest risk (Husnan, 2015:61).

Expected Return portfolio according to Hartono (2015: 424) is a weighted average of the expected return of individual securities based on a single index model. The expected return on a stock portfolio can be calculated by the following formula:

$$\mathbf{E(Rp) = \sum_{t=1}^{n} Wi.\, E(Ri)}$$

where, E(Rp) is the expected return; Wi is the proportion of investments in i-th securities; E(Ri) is the expected of the i-th security. Meanwhile, the value of E(Ri) is:

$$\mathbf{E(Ri) = \alpha i + \beta i.E(Rm)}$$

where, αi is the alpha of the i-th stock, βi is the i-th beta securities, and E(Rm) is the expected market return. By entering the formula E(Ri) into the formula E(Rp), the following formula is obtained:

$$\mathbf{E(Rp) = \sum_{t=1}^{n} Wi.\, \alpha i + \sum_{t=1}^{n} Wi.\, \beta i.\, E(Rm)}$$

or:

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

where, αp is the portfolio's alpha, which shows the expected return when the market return equals zero; βp is beta protofolio.

Portfolio Risk

In addition to promising returns, every investment carries risks. Similarly, investing in the form of a portfolio also carries risks. Although the purpose of forming a portfolio is to reduce investment risk. The risk that cannot be avoided with a portfolio is systematic risk. Portfolio risk **(**σp^2), is the variant of a security calculated based on a single index model aas follow:

$$\mathbf{\sigma p^2 = \beta p^2.\sigma m^2 + \sum_{t=1}^{n} Wi^2.\, \sigma ei^2}$$

where, βp^2 is the risk-weighted average of the stocks that make up the portfolio; σm^2 is stock market risk; and σei^2 is a variant of a stock's residual risk.

Optimal Portfolio Based on Single Index Model

As stated earlier, the purpose of this study is to form an optimal portfolio. Determining the optimal portfolio using the Single Index model is very easy, based on only one number, namely ERB (Excess Return to Beta ratio) (Hartono, 2015: 430). ERB can be calculated by the following formula:

$$\mathbf{ERBi = \frac{E(Ri) - R_{BR}}{\beta i}}$$

where, ERBi is the Excess Return to beta securities i; E(Ri) is the i-th security's Expected Return, based on the Single Index model; RBR is Return on risk-free assets ERB measures the excess return relative to one unit of risk that cannot be eliminated by dediversification. ERB shows the relationship between two determinants of investment, namely return and risk.

The optimal portfolio will contain stocks with a high ERB, and stocks with a low ERB are not included in the optimal portfolio. For that, a limiting point is needed (cut-of point = C*) which specifies the limit of ERB values that are still higher than C* (Hartono, 2015:430).

The value of this limiting point can be determined by the following steps:

1. Calculates the ERB of each stock, then sorts stocks with the largest ERB up to the smallest. Securities with the largest ERB value will be included in the optimal portfolio.
2. Calculates Ai and Bi for each i-th stock, using the formula:

$$Ai = \frac{[E(Ri) - R_{BR}].\beta i}{\sigma ei^2}$$

$$Bi = \frac{\beta i^2}{\sigma ei^2}$$

where, σei^2 is a variant of residual error of the i-th security which is a unique risk or unsystematic risk.

3. Calculating the value of Ci, which is the value of C for the i-th security, which is calculated from the cumulative value of Ai to Ai and the value of Bi to Bi, for example for C3 indicates the value of C for the 3rd security calculated by the cumulation of A1, A2, A3, and B1, B2 and B3:

$$Ci = \frac{\sigma ei^2 \sum_{t=1}^{n} Ai}{1+ \sigma M^2 \sum_{t=1}^{n} Bi}$$

$$Ci = \frac{\sigma M^2 \sum_{t=1}^{n} \frac{[E(Ri)-R_{BR}]\beta i}{\sigma ei^2}}{1+ \sigma M^2 \sum_{t=1}^{n} \frac{\beta i^2}{\sigma ei^2}}$$

The size of the cut-off point (C*) is the value of Ci where the value of ERB last time is still greater than the value of Ci. Stocks that have an ERB value greater than or equal to the ERB value at the point C* excluded from the formation of an optimal portfolio.

4. After the stocks that make up the optimal portfolio have been determined, the next step is to calculate the proportion of each of these securities in the optimal portfolio. The proportion for the i-th stock is:

$$Wi = \frac{Z_i}{\sum_{j=1}^{k}(ERB-C*)}$$

$$Zi = \frac{\beta i}{\sigma ei^2} (ERBi - C*)$$

where, Wi is the i-th share proportion; K is the optimal number of securities in the portfolio; βi is the i-th beta securities; σei^2 is a variant of the error; $ERBi$ is the excess return to beta of the i-th stock; and C* is the cut-off point value which is the largest Ci value.

Hypothesis

The hypothesis proposed in this study is: Risk and return of stocks included in the optimal portfolio are better than risk and return of stocks that are not included in the optimal portfolio for stocks included in LQ45 for the period January 2023 to January 2024.

RESEARCH METHODS

This study aims to form an optimal portfolio of stocks included in LQ45 and compare the risk and return of portfolios of stocks that are included in the optimal portfolio and those that are not included in the optimal portfolio with a single index method. This type of research is descriptive quantitative. The population consists of all stocks included in LQ45 for the period January 2023 to January 2024 (45 shares). Data is taken from kontan.co.id. The calculation of return and risk as well as the formation of an optimal portfolio using the Single Index Model.

Sampling Techniques and Sample Size

The population of this study is all stocks listed in the LQ45 index. Index of LQ45 is an index formed by the Indonesia Stock Exchange (IDX) which contains 45 shares of companies that have high liquidity and market capitalization. In this study the sample is a saturated sample, meaning that all members of the population are taken as samples. The list of company codes listed in the LQ45 Index is shown in Table 1.

Table 1: List of LQ-45 Stocks period January 2023 – January 2024

No	Code	No	Code	No	Code
1	ACES	16	CPIN	31	MAPI
2	ADRO	17	EMTK	32	MDKA
3	AKRA	18	ESSA	33	MEDC
4	AMRT	19	EXCL	34	PGAS
5	ANTM	20	GGRM	35	PTBA
6	ARTO	21	GOTO	36	SCMA
7	ASII	22	HRUM	37	SIDO

8	BBCA	23	ICBP	38	SMGR
9	BBNI	24	INCO	39	SRTG
10	BBRI	25	INDF	40	TBIG
11	BBTN	26	INDY	41	TLKM
12	BMRI	27	INKP	42	TOWR
13	BRIS	28	INTP	43	TPIA
14	BRPT	29	ITMG	44	UNTR
15	BUKA	30	KLBF	45	UNVR

Source: kontan.co.id.

RESULTS AND DISCUSSION

The data needed in this study is the price of stocks included in LQ45 for the period January 2023 to January 2024. Data is taken from the web of kontan.co.id. The second data needed is the Jakarta composite index (JCI) which will later be used in calculating market return (Rm) and the third data is risk free rate of return (Rf) data, in this case using the monthly BI rate.

Based on the collected data, calculation analysis is carried out with the help of MS Excel software. The calculation results show that the average monthly BI rate is 0.005 or 0.5 percent, this interest rate is used as a risk-free interest rate (Rf) per month. While E(Rm) per month is 0.0055 or 0.55 percent.

Based on the ERB calculation results of the 45 stocks, then the ERB is sorted from the largest ERB to the smallest. After that, Ci (cut-off point) of each stock is calculated, and it turns out that there are 10 stocks that have an ERB greater than Ci, namely stocks: (1) GGRM ERB = 34.54 > Ci = 0.0001; (2) BBTN ERB = 3.76 > Ci = 0.0012; (3) KLBF ERB = 2.89 > Ci =0.004; (4) EXCL ERB = 1.477 > Ci = 0.007; (5) ICBC ERB = 1.016 > Ci = 0.012; (6) MAPI ERB = 0.58 > Ci = 0.014; (7) UNVR ERB = 0.49 > Ci = 0.58; (8) CPIN ERB = 0.38 > Ci = 0.126; (9) INDF ERB = 0.36 > Ci = 1.7; and (10) TBIG ERB = 0.296 > Ci = 0.224.

After that, calculate the investment weight in each stock and obtain the investment weight in each stock and the α and portfolio β as shown in Table 2.

Table 2: Values of Wi, α, β, and σei^2

No	Code	Wi	α	β	σei^2
1	GGRM	0.13947	0.005	-0.002	0.00072
2	BBTN	0.13254	0.006	-0.016	0.00064
3	KLBF	0.16858	0.005	-0.028	0.00067
4	EXCL	0.11087	0.006	-0.038	0.00066
5	ICBC	0.09556	0.006	-0.049	0.00062
6	MAPI	0.03529	0.007	-0.043	0.00066
7	UNVR	0.11734	0.001	-0.173	0.00060
8	CPIN	0.09581	0.002	-0.202	0.00049
9	INDF	0.06557	0.005	-0.176	0.00057
10	TBIG	0.03896	0.006	-0.199	0.00056

Source: processed data

As for the calculation results using excel software, values of α and β portfolio are found as follows:

α portfolio = $\sum_{i=1}^{n} Wi \,.\, \alpha i = 0.0058775$

β portfolio = $\sum_{i=1}^{n} Wi.\, \beta\, i = -0.06786$

Next calculate the expected portfolio return or E(Rp) and the results are as follows:

E(Rp) = αp + βp x E(RM) = 000.58775 + 0.06786(0,0055) = 0,55 percent per month or 6,61 percent per year.

Based on the calculation results with MS Excel obtained values of σm^2 is 0.00059 and $\sum Xi^2.\sigma ei^2$ is 7.49613E-05; so that, $\sigma p^2 = bp^2.\, \sigma m^2 + \sum Xi^2.\sigma ei^2 = (-0.076430)^2\, (0.00059) + 7.49613E\text{-}05 = 0.0001 = 0.01\%$

For LQ-45 stocks that are not included in the optimal portfolio shown in Table 3.

Table 3: Values of Wi, α, β, and σei²

No	Kode	Wi	α	β	σei²
1	ADRO	0.029	0.006	0.110	0.00136
2	AKRA	0.029	0.004	0.080	0.00081
3	AMRT	0.029	0.006	0.314	0.00085
4	ANTM	0.029	0.011	0.220	0.00086
5	ARTO	0.029	0.005	0.021	0.00317
6	ASII	0.029	0.006	0.168	0.00083
7	BBCA	0.029	0.001	0.442	0.00069
8	BBNI	0.029	0.003	0.132	0.00076
9	BBRI	0.029	0.002	0.163	0.00076
10	BMRI	0.029	-0.004	0.404	0.00080
.11	BRIS	0.029	0.003	0.081	0.00080
12	BRPT	0.029	0.004	0.066	0.00141
13	BUKA	0.029	0.014	0.283	0.00092
14	EMTK	0.029	0.009	0.070	0.00139
15	ESSA	0.029	0.006	0.034	0.00156
16	GOTO	0.029	0.005	0.010	0.00195
17	HRUM	0.029	0.006	0.056	0.00100
18	INCO	0.029	0.014	0.180	0.00099
19	INDY	0.029	0.007	0.068	0.00131
20	INKP	0.029	0.005	0.043	0.00099
21	INTP	0.029	0.006	0.177	0.00098
22	ITMG	0.029	0.007	0.104	0.00137
23	MDKA	0.029	0.014	0.191	0.00172
24	MEDC	0.029	0.005	0.034	0.00153
25	PGAS	0.029	0.007	0.078	0.00080
26	PTBA	0.029	0.007	0.078	0.00118
27	SCMA	0.029	0.008	0.112	0.00108
28	SIDO	0.029	0.007	0.052	0.00089
29	SMGR	0.029	0.008	0.203	0.00097
30	SRTG	0.029	0.013	0.154	0.00141
31	TBIG	0.029	0.006	-0.199	0.00056
32	TLKM	0.029	0.005	0.294	0.00079
33	TOWR	0.029	0.0067	0.156	0.00092
34	TPIA	0.029	0.003	0.039	0.00228
35	UNTR	0.029	0.007	0.060	0.00101

Source: processed data

From these 35 stocks, a portfolio consisting of 10 stocks was created. These ten companies were randomly selected and the results are shown in Table 4.

Table 4: Return and Risk calculation results of 10 stock portfolios

PORTFOLIO	RETURN	RISK	CV
1	10.39%	128.40%	12.35804
2	8.91%	0.15%	0.016835
3	9.83%	0.15%	0.015259
4	7.83%	0.14%	0.017880
5	10.49%	0.14%	0.013346
6	10.19%	0.15%	0.014720

7	7.58%	0.16%	0.021108
8	7.99%	0.14%	0.017522
9	10.74%	0.17%	0.015829
10	9.08%	0.14%	0.015419
OPTIMAL	6.61%	0.08%	0.012103

Source: processed data

Table 4 shows the return and risk per year of 10 randomly selected portfolios. The highest return was obtained by portfolio 9, which was 10.74 percent. Meanwhile, the lowest return was 7.58 percent in portfolio 7. Meanwhile, the highest risk is portfolio 1, which is 128.40 percent. And the lowest risk is in portfolio 4 and portfolio 5, which is 0.14 percent. From Table 4 it is able to be seen that 10 stock portfolios of stocks that are not included in the optimal portfolio, provide a higher return than risk and return on the optimal portfolio, but the risk is much greater.

In addition, Table 4 also shows the value of the coefficient of variation (CV) for each portfolio formed. CV is a comparison of risk with return. CV shows the price of one unit risk over one unit of return. The smaller the CV value of a portfolio, the better the portfolio will be, and vice versa. The smallest value of CV is 0.012103, which is in the optimal portfolio. This shows that the single index model can produce an optimal prototype.

As is well known that in investing two parameters that must always be considered are Risk and Return. From the results of this study, it was found that the optimal portfolio which is the best combination of risk and return produces returns from 10 stocks included in the optimal portfolio are GGRM, BBTN, KLBF, EXCL, ICBP, MAPI, UNVR, CPIN, INDF, and TBIG, with a return of 6.61% per year and a risk of 0.08%. As for the 35 stocks that were not included in the optimal portfolio after being randomly created a portfolio consisting of 10 stocks for each portfolio, it produced a return much higher than the optimal portfolio return, but with risk also very much higher than optimal portfolio risk.

From the findings of this study, it can be known what is the best combination of risk and optimal return. However, it all comes back to investors' choices for the returns and risks they are willing to bear.

CONCLUSION

The previous discussion shows that the single index model proposed by William Sharpe can produce optimal portfolios. Although other ways can be used to form a portfolio, it is not optimal. A portfolio that is not optimal is a portfolio that produces a combination of risk and return is not the best.

This study only discusses the formation of a stock portfolio using a single index model. Meanwhile, another model to form a portfolio is also available, namely the Markowitz model. The next researcher, therefore, would do well to compare these two models. In addition, the study only used a sample of 45 stocks listed in the LQ45 index. Preferably, researchers can also take other samples that still have many choices.

REFERENCES

1) Brigham, Eugene F. and Joel F. Houston. (2019). Fundamentals of Financial Management, 15e. Cengage Learning Inc, Australia.
2) Gitman, Lawrence J. and Chad J. Zutter. (2015). Principles of Managerial Finance, Fourteenth Edition. Pearson Education Limited, England.
3) Hartono, Jogiyanto. (2015). Teori Portofolio dan Analisis Investasi, Edisi Kesepuluh. BPFE, Yogyakarta.
4) Husnan, Suad. (2015). Dasar-Dasar Teori Portofolio Dan Analisis Sekuritas.UPP STIM YKPN.Yogyakarta.
5) Mainik, Georg; Georgi Mitov; and Ludger Ruschendorf. (2015). Portfolio optimization for heavy-tailed assets: Extreme Risk Index vs. Markowitz. Journal of Empirical Finance, Volume 32, 115-134.
6) Markowitz, H. (1952). Portfolio Selection. The Journal of Finance, 7(1): 77-91.
7) Sharpe, William. (1963). A Simplified Model for Portfolio Analysis, Management Science 9 (January 1963): 277-293.
8) Undang-Undang Republik Indonesia, Nomor 40 Tahun 2007, Tentang Perseroan Terbatas.