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FORMATION OF OPTIMAL STOCK PORTFOLIO USING THE SINGLE INDEX MODEL IN THE COVID-19 PANDEMIC

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ABSTRACT

This study examines and analyzes how the impact of Covid-19 on the formation of an optimal portfolio using the Single Index Model and measuring optimal portfolio performance using the Sharpe index, Treynor index and Jensen index. The sample data of this study uses stocks listed on the Indonesia Stock Exchange, especially those listed on the LQ45, MNC36, IDX30 and Bisnis27 indexes for the period 1 March 2020 - 31 May 2022. This study aims to analyze portfolio composition, analyze portfolio returns and risks, and analyze portfolio performance formed during the Covid-19 pandemic. The results obtained that the optimal portfolio formed in the LQ45 index is 20 stocks, the MNC36 index is 12 stocks, the IDX30 index is 11 stocks and the Bisnis27 index is 14 stocks. The optimal portfolios that are formed all produce an expected portfolio return that is greater than the level of risk, and is higher than the market's expected return and also higher than the risk-free return. The results of the analysis of the most optimal portfolio performance during the Covid-19 pandemic, namely a portfolio formed from LQ45 index shares, this index deserves to be an investment choice for investors. Evaluation of the optimal portfolio formed results in realized returns greater than expected returns and also greater than risk-free returns. This study shows that the formation of an optimal portfolio during the Covid-19 pandemic using the Single Index Model provides positive returns.

KEYWORDS: ***single index model, portfolio formation, optimal portfolio, portfolio evaluation, Covid-19***

INTRODUCTION

The Covid-19 pandemic has hit all over the world, this is reinforced by the announcement from the World Health Organization (WHO) on Wednesday, March 11, 2020, as a global pandemic, and previously on March 2, 2020, for the first time, the Indonesian government announced two cases. Covid-19 positive patient. The Covid-19 pandemic has made economic conditions full of uncertainty which can increase financial market volatility.

The phenomenon that occurred during the Covid-19 pandemic was the decline in the JCI and trading volume on the IDX in March 2020. Corrected stock prices could be considered as an opportunity to earn big profits. This of course requires good financial knowledge and also the courage to take risks. The current downturn in the stock market is seen as a massive discount, thus giving investors the opportunity to build their portfolios for profit.

This research will focus on forming an optimal portfolio using a single index model, evaluating the formed portfolio, and measuring optimal portfolio performance using the Sharpe index, Treynor index and Jensen index.

This research will also be very useful for investors to choose to determine in forming an optimal portfolio during the Covid-19 period, when the situation of global investor confidence is declining due to uncertainty in investment returns. Investors are still doubtful and worried that the portfolio formed cannot provide a positive return, however, investors must make the right choice and consider the opportunities that exist for investment in this Covid-19 period.

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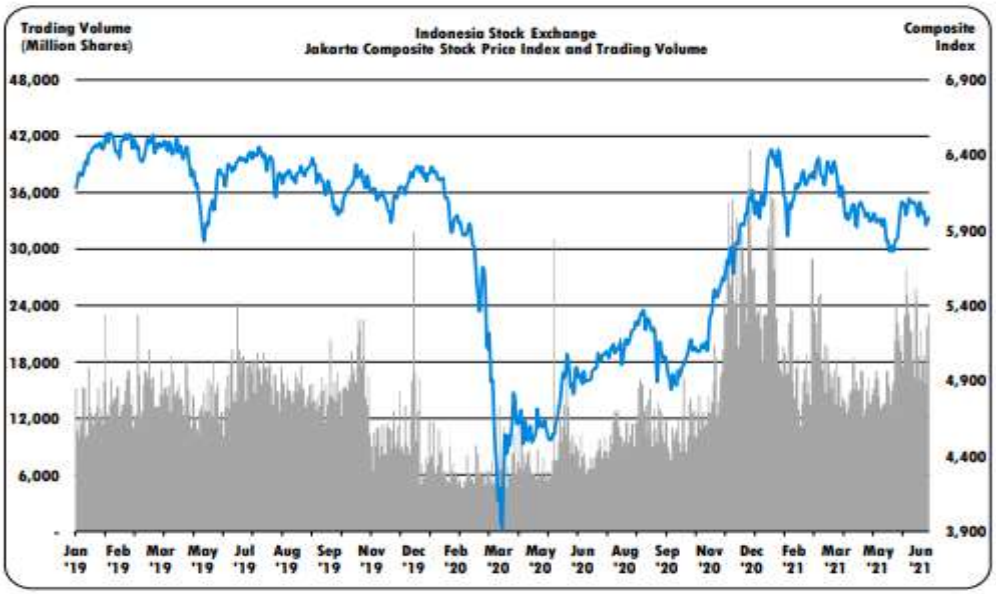
Figure 1.1. HSG and Trading Volume on IDX



Source: IDX Quarterly Statistics, Quarter 2 2021

1. LITERATURE REVIEW

1.1. Portfolio Theory

Harry M. Markowitz developed a theory in the 1950s called Markowitz Portfolio Theory. Markowitz theory uses several basic statistical measurements to develop a portfolio plan, including the expected return, the standard deviation of both securities and portfolios, and the correlation between returns. This theory formulates the existence of elements of return and risk in an investment, where the element of risk can be minimized through diversification and combining various investment instruments into a portfolio. In 1959 the theory was widely published in the Journal of Finance.

William Sharpe (1963) developed a model called the Single Index Model. This model can be used to simplify calculations, besides that the single index model can also be used to calculate expected return and portfolio risk (Jogiyanto, 2014). The single index model is based on the observation that securities fluctuate in the direction of the market price index, in particular it can be observed that most stocks tend to experience price increases if the stock price index rises and vice versa (Jogiyanto, 2014).

1.2. Portfolio Return

Return is the result obtained from the investment. Returns can be in the form of realized returns that have occurred or expected returns that have not occurred but are expected to occur in the future (Jogiyanto, 2014). Realized return is a return that has occurred using historical data. Return realization is important because it is used as a measure of company performance. Realization returns or historical returns are also useful as a basis for determining expected returns and future risks (Jogiyanto, 2014).

1.3. Portfolio Risk

Risk is the loss faced by investors (Fabozzi, 1995). Risk is the possibility of an unfavorable event occurring. Risk is also defined as the possibility of deviation or variability of the actual return of an investment with the expected return (Elton & Gruber, 1995). Meanwhile, according to Jogiyanto (2017) risk is often associated with deviations or deviations from the results received with the expected ones.

1.4. Efficient and Optimal Portfolio.

An efficient portfolio can be defined as a portfolio that provides the largest expected return with a certain risk or provides the smallest risk with a certain expected return (Jogiyanto, 2014). Efficient portfolios do not mean optimal portfolios. An efficient portfolio is a good portfolio but not the best. An efficient portfolio only has 1 (one) good factor, namely the expected return and the risk is not yet the best. The optimal portfolio is the portfolio with the best combination of expected return and risk (Jogiyanto, 2014).

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1.5. Portofolio Single Index Model in Portfolio Formation

William Sharpe (1963) developed a model called the Single Index Model. This model can be used to simplify calculations, besides that the single index model can also be used to calculate the expected return and portfolio risk (Jogiyanto, 2014). The single index model is based on the observation that securities fluctuate in the direction of the market price index, in particular it can be observed that most stocks tend to experience price increases if the stock price index rises and vice versa (Jogiyanto, 2014).

1.6. Portfolio Performance

The final stage of the investment process in stocks is the Portfolio Performance Assessment. The purpose of portfolio performance assessment is to find out and analyze whether the formed portfolio has been able to increase the likelihood of achieving investment objectives, and also to assess aspects of the level of profit earned and the risks borne. Portfolios that have a higher rate of return are not necessarily better than other portfolios if risk factors are not considered. Portfolio performance can be calculated based on return and risk, a calculation involving both factors is called risk-adjusted return.

2. METHODOLOGY

The methods used in the research include research design, definition and operational variables, population and samples, data collection methods and data analysis methods. The design of this research is descriptive research based on a survey of the research object. The object of this research are shares registered in PT. The Indonesia Stock Exchange (IDX), especially stocks listed on the LQ45 Index, Bisnis27 Index, IDX30 Index and MNC36 Index during the period March 2020 – May 2022. The method used in the formation of the optimal portfolio is by using a single index model.

The data collected in this study is secondary data, the type of data is time series by using documentation techniques, namely by recording or copying stock data listed in PT. Indonesia Stock Exchange, especially stocks listed in the LQ-45 Index, MNC-36 Index, IDX-30 Index and the Bisnis-27 Index. Sources of data are downloaded through the website www.idx.co.id, the website www.finance.yahoo.com, as well as various literatures used in collecting data. The data used in this study are stock prices, JCI and the Indonesian Interest Rate (SBI).

The research object is divided into 2 periods, namely:

1. Period March 2020 – December 2021, this period is used for the formation of a stock portfolio.
2. The period January 2022 – May 2022 is used to evaluate the results of the formation of a stock portfolio.

The following is an operational definition and variable measurement of several things related to optimal portfolio analysis, namely:

1. Realized Return (Rt) is the percentage change in the closing price of share A on week t minus the closing price of share A on day t-1 and the result is divided by the closing price of share A on day t-1

$$R_{t(i)} = \frac{P_{t(i)} - P_{t-1(i)}}{P_{t-1(i)}}$$

Rt(i) = Stock realization return i
Pt = Closing price of stock i on day
Pt-1 = Closing price of stock i on day t-1

2. The level of expected profit or expected return of each individual share is the average percentage of realized return of shares i divided by the number of realized returns of shares i. It is calculated using the Excel program using the Average formula or using the formula:

$$E(R_i) = \frac{\Sigma R_{t(i)}}{n}$$

E(Ri) = Expected return
Rt = Stock realization return i
n = Number of realized stock returns i

3. Standard Deviation (SD) is used to measure the risk of realized return, which can be calculated using the Excel program using the STDEV formula.

$$SD = \sqrt{\sum_{i=1}^{n} \frac{(x_i - \bar{x})^2}{n-1}}$$

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SD = Standard Deviation
X_i = Realized return i stock i
X = Average realized return of shares i
n = Number of realized stock returns i

4. Variance (σ2i) is used to measure the risk of expected return on stock i. Variance can be calculated by squaring the standard deviation or calculated using the Excel program using the VAR formula or using the formula:

$$Var = \sigma^2_i$$

or

$$\sigma^2_i = \sum_{i=1}^{n} \frac{(x_i - \bar{x})^2}{n-1}$$

5. Beta (βi) is the unique risk of individual shares, calculating the realized return slope of a share with the market realized return (JCI) within a certain period. Beta is used to calculate Excess Return to Beta (ERB) and Bj is needed to calculate Cut-Off Point (Ci). Beta can be calculated with the Excel program using the Slope formula :

$$\beta_i = \left(\frac{\sigma_i}{\sigma_m} \right) r_{im}$$

β_i = Beta of stock i
σ_i = Stock standard deviation i
σ_m = Market standarddeviation
r_{im} = Correlation of realized return of stock i with realized return of market

6. Alpha (αi) is the intercept of realized return of shares i with market realized returns (IHSG), comparing the calculation of realized returns of shares i with market realized returns (IHSG) within a certain period of time. Alpha is used to calculate the error variance (ei). Alpha is calculated with the Excel program using the Intercept formula or using the formula:

$$\alpha i = Ri - \beta i * Rm$$

α_i = Alpha stock i
β_i = Beta of stock i
R_m = Market return

7. Variance (σei) is the variance of the residual error stock i which is also a unique or unsystematic risk, calculated by the Excel program using the formula:

$$\sigma^2_{ei}(i) = \sigma^2_i - (\sigma^2_m * (\alpha_i)^2)$$

8. Excess Return to Beta (ERB) is used to measure the stock premium return relative to one unit of risk that cannot be diversified as measured by Beta. ERB shows the relationship between return and risk which is a determinant of investment.

$$ERB_i = \frac{E(Ri) - Rf}{\beta i}$$

9. The value of Ai is calculated to get the value of Ai and Bi is calculated to get the value of Bi, both of which are needed to calculate Ci. The determination of the values of Ai and Bi for each of the i-th shares is as follows:

And

$$A_i = \frac{[E(Ri) - Rf]\beta i}{\sigma ei^2}$$
$$B_i = \frac{\beta i^2}{\sigma ei^2}$$

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$E(R_i)$ = Expected stock return i
R_f = Risk free rate of return
βi = Stock beta i
σ_{ei} = Stock variance i (unique risk)

10. The Limiting Point (Ci) is the C value for the i-th share which is calculated from the accumulated values of A_1 to Ai and values of B1 to Bi. The value of Ci is the quotient of market variance and return premium to stock variance error with market variance and individual stock sensitivity to stock variance error.

$$C_i = \frac{\sigma_m^2 \sum_{j=1}^{i} \frac{(Ri - Rf)\beta i}{\sigma ei^2}}{1 + \sigma_m^2 \sum_{j=i}^{i} \left[\frac{\beta i^2}{\sigma ei^2} \right]}$$

Or

$$C_i = \frac{\sigma_m^2 \sum_{j=1}^{i} A_{\beta j}}{1 + \sigma_m^2 \sum_{j=i}^{i} B_j}$$

σ^2_m = variance realized return market (IHSG)

11. Cut-Off Point (C*) is the largest Ci value of a series of stock Ci values, calculated by the Excel program using the MAX formula.

12. The proportion of funds (Xi) of each stock in the optimal portfolio is calculated using the Excel program using the IF formula or using the formula:

$$Xi = \frac{\beta_i}{\sigma^2_{ei}} (ERB - C^*)$$

X_i = Share fund proportion i
βi = Beta of stock i
ERB = Excess Return to Beta stock i
C* = Cut-Off-Point

13. The percentage of the proportion of funds (Wi) for each stock that makes up the optimal portfolio is calculated using the formula:

$$W_i = \frac{X_i}{\Sigma X_i}$$

W_i = Percentage of stock funds i
X_i = Proportion of stock funds i
Σx_i = Sum of Xi

14. Covariance is the average deviation of each data, which is a comparison of the calculation of realized return of shares A with realized returns of shares B. Covariance is calculated using the Excel program using the Covar formula.

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15. Correlation or correlation coefficient between shares is a comparison of the calculation of realized return of share A with the calculation of realized return of share B in a certain period. The correlation coefficient between the two groups of data is calculated by
using the Excel program using the Correl formula or by the formula:

$$r_{(AB)} = \frac{\delta_{(AB)}}{\sigma_{(A)}.\sigma_{(B)}}$$

(AB) = Stock correlation coefficient A and B
δAB = Covariance of stocks A and B
αA = Stock covariance A
αB = Stock covariance B

16. Expected return portfolio E(Rp) is the weighted average of the individual returns of each stock making up the portfolio, calculated using the formula:

$$\mathbf{E(R_p) = \sum_{i=1}^{n} Xi.E(R_i)}$$

$E(R_p)$ = Expected return portfolio
X_i = Proportion of stock funds i
$E(R_i)$ = Expected return of stock i

17. The risk or standard deviation of the portfolio (σp) is the weighted average of the individual standard deviations of each stock making up the portfolio, calculated using the formula:

$$\boldsymbol{\sigma_p = \sum_{i=1}^{n} Xi.\sigma_i}$$

σ_p = Portfolio standard deviation
X_i = Proportion of stock funds i
σ_i = Stock standard deviation i

18. Portfolio beta (βp) is the weighted average of the individual betas of each stock making up the portfolio, calculated using the formula:

$$\boldsymbol{\beta_p = \sum_{i=1}^{n} Xi.\beta_i}$$

β_p = Portfolio beta
X_i = Proportion of stock funds i
β_i = Beta of stock i

19. Covariance (σp) portfolio is calculated by the formula:

$$\sigma p = \beta p \ .\sigma m$$

σ_p = Portfolio covariance;
β_p = Portfolio beta
σ_m = Market covariance

20. Portfolio performance is calculated using three methods, namely:
a. Sharpe Ratio Method
Sharpe index is calculated by the following equation:

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$$Sp = \frac{R_p - R_f}{\sigma_p}$$

S_p = Sharpe index of portfolio
R_p = Average return of the portfolio during the observation period
R_p = Return on average risk free assets during the observation period
σp = Standard deviation of return over the portfolio in the observation period

b. Treynor Ratio Method
Treynor index is calculated by the following equation:

$$Tp = \frac{R_p - R_f}{\beta_p}$$

T_p = Treynor index portfolio
R_p = Average return of the portfolio during the observation period
R_f = Return on average risk free assets during the observation period
Bp = Beta return over the portfolio in the observation period

c. Jensen Ratio Method
Mathematically the Jensen Index can be formulated in the following equation:

$$J_p = R_p - [\ R_f + (R_m - R_f)\ \beta_p\ ]$$

J_p = Jensen Portfolio Index
R_p = Average return of the portfolio during the observation period
R_m= Average return from the market during the observation period
R_f = Return on average risk free assets during the observation period
βp = Beta return portfolio during the observation period.

3. EMPIRICAL RESULT AND DISCUSSION

In this research, the optimal portfolio formation uses data from the LQ45 index, MNC36 index, IDX30 index and Bisnis27 index. The JCI data used to represent market data in this study resulted in the expected market return E(Rm) of 1.01%, standard deviation of market risk (σm) of 5.43% and market variance of 0.28%. Meanwhile, the SBI-1 month data used as a proxy for risk-free asset return shows an expected return E(Rf) of 0.32%. During the research period the shares listed in the LQ45, MNC36, IDX30 and Bisnis27 indexes issued by the Indonesia Stock Exchange each period of the portfolio formed changed the list of shares, as well as changes in the price for each share listed on the stock index.

The following are the results of optimal portfolio formation, for stocks that are not included in the optimal portfolio candidates are not shown in the table.

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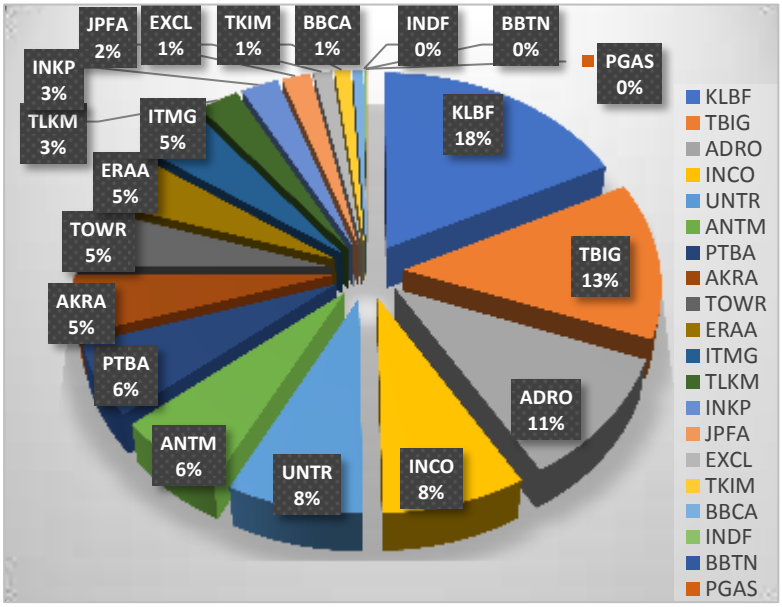
TABLE 3.1
Optimal Portfolio Calculation On LQ45 Index

No	Stock	$E(R_i)$	STD	Var	σ^2_{ei}	ERB	Ci	Wi
1	TBIG	0,0576	0,1533	0,0224	0,0238	0,0791	0,0042	13,09%
2	ADRO	0,0478	0,1490	0,0212	0,0229	0,0577	0,0040	10,73%
3	KLBF	0,0164	0,0646	0,0040	0,0041	0,0568	0,0020	17,61%
4	UNTR	0,0229	0,1135	0,0123	0,0130	0,0407	0,0020	7,88%
5	ANTM	0,0820	0,2093	0,0418	0,0593	0,0316	0,0072	6,45%
6	INCO	0,0373	0,1187	0,0134	0,0185	0,0254	0,0055	8,31%
7	PTBA	0,0224	0,1138	0,0124	0,0141	0,0249	0,0027	6,11%
8	ITMG	0,0488	0,1833	0,0321	0,0427	0,0235	0,0047	4,67%
9	TOWR	0,0256	0,1315	0,0165	0,0194	0,0221	0,0029	4,89%
10	ERAA	0,0437	0,1669	0,0266	0,0361	0,0220	0,0046	4,74%
11	AKRA	0,0297	0,1093	0,0114	0,0189	0,0162	0,0046	4,90%
12	INKP	0,0288	0,1690	0,0273	0,0345	0,0160	0,0028	2,57%
13	JPFA	0,0228	0,1570	0,0235	0,0294	0,0136	0,0023	1,97%
14	TLKM	0,0143	0,0819	0,0064	0,0091	0,0113	0,0026	2,79%
15	TKIM	0,0300	0,2027	0,0392	0,0554	0,0112	0,0025	1,09%
16	EXCL	0,0176	0,1232	0,0145	0,0202	0,0101	0,0022	1,27%
17	BBCA	0,0108	0,0692	0,0046	0,0071	0,0081	0,0021	0,73%
18	INDF	0,0049	0,0699	0,0047	0,0048	0,0076	0,0002	0,12%
19	BBTN	0,0260	0,2278	0,0495	0,0766	0,0074	0,0019	0,05%
20	PGAS	0,0240	0,1793	0,0307	0,0536	0,0073	0,0022	0,04%
				Cut Off Point (C*)				0,0072
				Expected Return Market E(Rm)				1,01%
				Expected Return Portfolio E(Rp)				3,64%
				Market variance (σ2m)				0,28%
				Portfolio variance (σ2p)				2,48%

Source: Calculation data processed

PICTURE 3.1
Graph of Optimal Portfolio Fund Proportion From Index-LQ45



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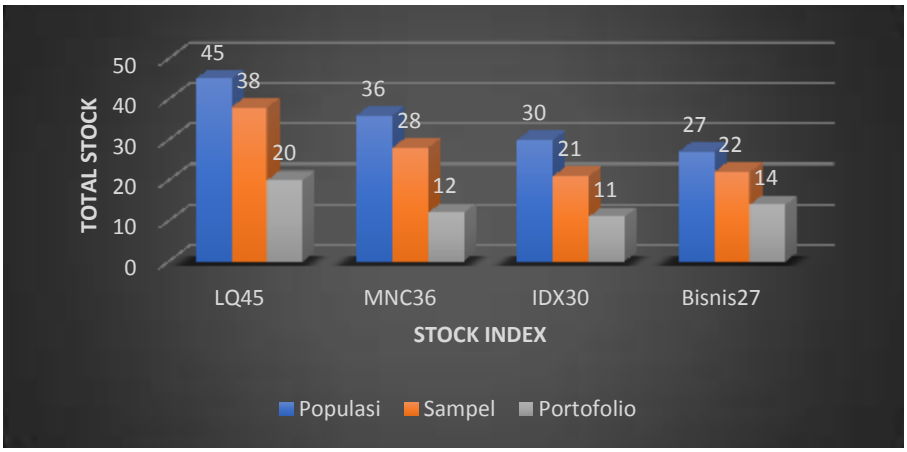
Based on table 3.1 shows that the portfolio formed from LQ45 Index stocks consists of 20 stocks with the proportion of placement of funds, namely TBIG proportion 13.09%, ADRO proportion 10.73%, KLBF proportion 17.61%, UNTR proportion 7.88%, ANTM proportion 6.45%, INCO proportion 8.31%, PTBA proportion 6.11%, ITMG proportion 4.67%, TOWR proportion 4.89%, ERAA proportion 4.74%, AKRA proportion 4.90%, INKP proportion 2.57%, JPFA 1.97%, TLKM 2.79%, TKIM 1.09%, EXCL 1.27%, BBCA 0.73%, INDF 0.12%, BBTN 0 0.05% and PGAS the proportion of 0.04%. The result of the calculation of the Expected return portfolio is 3.64% with a portfolio risk level of 2.48%. And the Expected return market is 1.01% with a risk level of 0.28%.

Furthermore, the portfolio formed from MNC36 Index shares consists of 12 stocks with the proportion of placement of funds, namely ADRO proportion 19.70%, KLBF proportion 32.34%, ANTM proportion 11.84%, PTBA proportion 11.21%, AKRA proportion 8, 99%, BNGA 6.10%, TLKM 5.12%, EXCL 2.34%, DMAS 0.74%, BBCA 1.34%, INDF 0.22% and PGAS 0.07 %. The result of calculating the expected portfolio profit is 3.24% with a portfolio risk level of 2.11%. And the expected market profit is 1.01% with a risk level of 0.28%.

Then the portfolio results formed from the IDX30 Index stocks consist of 11 stocks with the proportion of placement of funds, namely ADRO the proportion is 19.48%, KLBF is 31.98%, UNTR is 14.31%, ANTM is 11.71%, PTBA is 11, 09%, INKP the proportion is 4.67%, TLKM is 5.07%, BBCA is 1.32%, INDF is 0.22%, BBTN is 0.08% and PGAS is 0.06%. The result of calculating the expected portfolio profit is 3.22% with a portfolio risk level of 2.03%. And the expected market profit is 1.01% with a risk level of 0.28%.

And the portfolio results formed from shares of the Bisnis27 Index consist of 14 stocks with the proportion of fund placements, namely ADRO the proportion is 14.61%, KLBF is 24.01%, UNTR is 11.06%, MYOR is 10.95%, PTBA is 9, 25%, TOWN the proportion is 7.63%, INKP is 4.51%, TLKM is 6.38%, EXCL is 3.47%, BBCA is 4.43%, INDF is 1.43%, ASII is 1.53 %, the proportion of CPIN is 1.12% and BBNI the proportion is 0.001%. The result of calculating the expected portfolio profit is 2.21% with a portfolio risk level of 1.37%. And the expected market profit is 1.01% with a risk level of 0.28%.

PICTURE 3.2
STOCK OPTIMAL PORTFOLIO CHART



Source: IDX data processed

Based on table 3.2, it shows that the LQ45 index produces 84% more optimal portfolio candidates when compared to the MNC36 index, IDX30 index and the Bisnis27 index. With so many candidates becoming the optimal portfolio, it shows that the stocks included in the LQ45 index have gone through a rigorous selection, so that the results of the portfolio performance that are formed can also provide maximum results.

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TABLE 3.2
RESULTS FOR FORMING PORTFOLIO

Description	LQ45	MNC36	IDX30	Bisnis27
Total Population (Company)	45	36	30	27
Total Sample (Company)	38	28	21	22
Total Sample to population (%)	84%	78%	70%	81%
Total Portfolio Formed (Stock)	20	12	11	14
Total Portfolio to Sample (%)	53%	43%	52%	64%
Standard Deviation of Market Risk (σm)	5,43%	5,43%	5,43%	5,43%
SBI-1 Month Expected Return E(Rf)	0,32%	0,32%	0,32%	0,32%
Expected Return Market E(Rm)	1,01%	1,01%	1,01%	1,01%
Expected Return Portfolio E(Rp)	3,64%	3,24%	3,22%	2,21%
Market Variance (σ2m)	0,28%	0,28%	0,28%	0,28%
Portfolio Variance (σ2p)	2,48%	2,11%	2,03%	1,37%

Source: Calculation data processed

Furthermore, the results of the analysis in the formation of an optimal portfolio on the LQ45 index stock which consists of 20 stocks that are included in the portfolio produce an expected portfolio profit of 3.64% with a risk level of 2.48%. This profit is higher than the expected market profit of 1.01% and also higher than the risk-free return of 0.32%. The expected portfolio profit E(Rp) on the MNC36 index stock which consists of 12 stocks included in the portfolio is 3.24% with a risk level of 2.11%. This profit is higher than the expected market profit of 1.01% and also higher than the risk-free return of 0.32%.

Next for the expected portfolio profit E(Rp) on the IDX30 index stock which consists of 11 stocks that are included in the portfolio, which is 3.22% with a risk level of 2.03%. This profit is higher than the expected market profit E(Rm) of 1.01% and also higher than the risk-free return of 0.32%. And for the expected portfolio profit, E(Rp) Bisnis27 index shares which consist of 14 stocks that are included in the portfolio, which is 2.21% with a risk level of 1.37%. This profit is higher than the expected market profit E(Rm) of 1.01% and also higher than the risk-free return of 0.32%.

From the results of the portfolio analysis formed from the four stock indexes, it shows that the expected portfolio profit for the LQ45 index shares is 3.64% greater than the expected portfolio profit for the MNC36 index stock of 3.24%, the IDX30 index of 3.22% and the Bisnis27 index of 2.21%. Overall, the expected portfolio gains from the LQ45 index shares are 3.64%, the MNC36 index is 3.24%, the IDX30 index is 3.22% and the Bisnis27 index is 2.21% larger than the expected market profit. which is only 1.01%. Thus, the four portfolios formed from index stocks are the optimal portfolios. This is in accordance with the statement of Tandelilin (2010), that the optimal portfolio contains a set of securities selected by investors that have a certain level of return and risk (Octavian, 2017).

Markowitz (1959) emphasizes the importance of diversification in a portfolio that can maximize expected returns and minimize risk in order to select and develop an optimal portfolio. This is in accordance with the results of research conducted by Hanif et al. (2021) sample data was taken during the covid-19 pandemic era which stated that the expected portfolio profit of 6 stocks formed from the LQ45 index stock was 0.74% higher than the expected market profit of -0.1564 and also higher when compared to with a risk-free return of 0.27%.

Salam & Kurniasih (2021) research results with sample data before the covid-19 pandemic, in their research, it is stated that there are 3 stocks that make up the optimal portfolio of LQ45 index stocks with an expected portfolio return of 2.6% higher than the market's expected return, namely 0.1%, and also higher when compared to the 0.43% risk-free return.

Portfolio performance is calculated based on return and risk and a calculation involving both factors is called risk-adjusted return. In this study, the portfolio performance will be calculated using three methods, namely the Sharpe index, Treynor index and Jensen index. The following are the results of the optimal portfolio performance measurement, see table 3.3.

Based on table 3.3, it shows that using the Sharpe index method the portfolio performance results for the LQ45 index are 0.1970, MNC36 are 0.1932, IDX30 are 0.1835 and Bisnis27 are 0.1372. The LQ45 index has a better performance than the MNC36 index, the IDX30 index and the Bisnis27 index because the higher the index value of the portfolio, the better the portfolio's performance. The results of calculations using the Treynor index are for the LQ45 index of 0.0267, the MNC36 index of 0.0171, the IDX30 index of 0.0183 and the business27 index of 0.0159.

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TABLE 3.3
Optimal Portfolio Performance Results

Stock Index	Sharpe Index	Treynor Index	Jensen Index
LQ45	0.1970	0.0267	0.0260
MNC36	0.1932	0.0171	0.0126
IDX30	0.1835	0.0183	0.0189
BISNIS27	0.1372	0.0159	0.0086

Source: Calculation data processed

The calculation results show that the LQ45 index has a better performance than the MNC36 index, the IDX30 index and the Bisnis27 index. And the results of calculations using the Jensen index are the results for the LQ45 index of 0.0260, the MNC36 index of 0.0126, the IDX30 index of 0.0189 and the Bisnis27 index of 0.0086. The calculation results show that the LQ45 index has a better performance than the MNC36 index, the IDX30 index and the Bisnis27 index.

Based on the analysis of portfolio performance measurement of the four indices studied using the Sharpe index, it shows that the best index is the portfolio performance formed from the LQ45 portfolio, which is 0.1970, which is greater in value than the MNC36 index, IDX30 index and the Bisnis27 index. The Sharpe index value indicates that the higher the Sharpe index value, the higher the portfolio performance results.

The results of subsequent calculations using the Treynor index show that the portfolio performance result of the LQ45 index of 0.0267 is the index that has the best performance because the index value is greater than the MNC30 index, IDX30 index and the Bisnis27 index. And based on the results of calculations with the Jensen index, it shows that the portfolio performance results for the LQ45 index, which is 0.0260, is the best index of performance because the index value is greater than the MNC30 index, IDX30 index and the Bisnis27 index.

From the results of the analysis of portfolio performance calculations for each LQ45 Index, MNC36 Index, IDX30 Index and Bisnis27 Index through the Sharpe index method, the Treynor index method and the Jensen index method, it shows that the most optimal stock portfolio performance during the Covid-19 pandemic is the portfolio. which is formed from LQ45 index stocks with a Sharpe index value of 0.1970, a Treynor index value of 0.0267 and a Jensen index of 0.0260. The index value in the calculation of portfolio performance both the Sharpe index, Treynor index and Jensen index shows that the higher the index value, the higher the portfolio performance results, this means that it is good and feasible to be an investment choice because it can provide excess returns that can be enjoyed by investors, and so with on the contrary.

Evaluation of the formed portfolio aims to find out and ascertain whether the stocks selected into the portfolio can actually generate positive returns, and also to ascertain whether the Single Index Model is appropriate as a method for forming the most optimal portfolio. Market Price is the price of a share in the ongoing market or if the market is closed (closing price), then this market price states the ups and downs of a stock and is announced every day in newspapers / other media. To calculate the market value, the market price is multiplied by the total shares outstanding (Ang, R. 1991).

In testing the optimal portfolio of shares, the assumption of the invested funds placed is Rp. 1 billion,-. The purchase of shares is carried out at the beginning of January 2022, and then the shares are resold at the end of May 2022. The placement of investment funds is adjusted to the proportion of the results of the formation of an optimal portfolio of shares. The determination of the purchase price of shares is taken from the Adj close price on the date the shares are purchased, as well as when selling shares using the Adj close price. In this evaluation or test, to calculate the purchase price of shares, the number of shares is multiplied by the Adj close price, and to calculate the selling price of the shares, the number of shares is multiplied by the Adj close price. The results of the evaluation of the optimal portfolio see table 3.4.

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Tabel 3.4
Evaluation Results of Optimal Stock Portfolio

Description	LQ45	MNC36	IDX30	Bisnis27
Portfolio Formation (March 2020 - December 2021)				
SBI-1 month *Expected Return* E(Rf)	0,32%	0,32%	0,32%	0,32%
Expected Return Market E(Rm)	1,01%	1,01%	1,01%	1,01%
Expected Return Portofolio E(Rp)	3,64%	3,24%	3,22%	2,21%
Variance (Deviasi) Market (σ2m)	0,28%	0,28%	0,28%	0,28%
Variance (Deviasi) Portofolio (σ2p)	2,48%	2,11%	2,03%	1,37%
Evaluation result (January 2022 - May 2022)				
Realized Return 5 month	19,64%	17,54%	21,73%	13,18%
Realized Return per month	3,93%	3,51%	4,35%	2,64%
Rate SBI Mei 2022 1 year	3,50%	3,50%	3,50%	3,50%
Rate SBI Mei 2022 1 month	0,29%	0,29%	0,29%	0,29%
Realized Return > Expected return	Yes	Yes	Yes	Yes
Realized Return > SBI	Yes	Yes	Yes	Yes

Source: Calculation data processed

Based on table 3.4, it shows that the optimal portfolio stock formed from the LQ45 index produces a realized return (profit) of 3.93% a month, which is greater than the expected return of the portfolio of 3.64%. And it is even bigger when compared to the Indonesian Interest Rate (SBI) of 0.29%. The existence of a positive excess return of 0.29% from (3.93% - 3.64%) indicates that the portfolio performance of the LQ45 index is improving. The evaluation results from the MNC36 index resulted in a month realized return of 3.51%, which was greater than the expected return of the portfolio of 3.24%. When compared to the Indonesian Interest Rate (SBI) = 0.29%, it is still higher. The existence of a positive excess return of 0.27% from (3.51% - 3.24%) indicates that the portfolio performance of the MNC index is improving.

The results of the evaluation / testing of the optimal portfolio formed from the IDX30 index resulted in a realized return of 4.35% a month, which was greater than the expected return of the portfolio of 3.22%. And it is also bigger when compared to SBI of 0.29%. The existence of a positive excess return of 1.13% from (4.35% - 3.22%) indicates that the portfolio performance of the IDX30 index is working well. And the subsequent evaluation results from the Bisnis27 index resulted in a month realized return of 2.64%, which was greater than the expected return of the portfolio of 2.64%. And it is also bigger when compared to SBI of 0.29%. The existence of a positive excess return of 0.43% from (2.64% - 2.21%) indicates that the portfolio performance of the Business index is improving.

The evaluation results show that the portfolio formed through the Single Index Model can produce realized returns that are greater than the expected return of the portfolio, and greater than the expected market return, and also greater than the risk-free return. High returns will also be influenced by the high risk that will occur, but with the formation of an optimal stock portfolio through the Single Index Model, it will be able to minimize the risks that will occur. This study shows that the formation of an optimal portfolio using the Single Index Model provides positive results during the Covid-19 period.

CONCLUSIONS

Based on the results of calculations using the Single Index Model of the stocks listed in the LQ45 index, MNC36 index, IDX30 index and the Bisnis27 index during the observation period that has been discussed and analyzed, it can be concluded that :

1. The optimal composition of the stock portfolio formed using the Single Index Model method in the period March 2020 - December 2021 for the LQ45 index of 20 shares, the MNC36 index of 12 shares, the IDX30 index of 11 and the Bisnis27 index of 14 shares. During the research period the shares listed in the stock index issued by the IDX each period the portfolio formed changes the list of stock and changes in the price for each stock.

2. The results of the analysis for investments placed in the optimal portfolio of LQ45 index stocks yielded the expected return on the portfolio of 3.64% with a risk level of 2.48%, the MNC36 index yielded the expected return on the portfolio of 3.24% with a risk level of 2.11 %, the IDX30 index yielded an expected portfolio return of 3.22% with a risk level of 2.03%, and the Bisnis27 index yielded an expected portfolio return of 2.21% with a risk level of 1.37%. Of the four index stocks studied, all of them produce the expected return on the portfolio which is greater than the risk of the portfolio.
3. The results of the analysis of portfolio performance calculations for each LQ45 Index, MNC36 Index, IDX30 Index and Bisnis27 Index through the Sharpe index method, the Treynor index method and the Jensen index method, show that the most optimal stock portfolio performance during the Covid-19 pandemic is the portfolio that is formed from LQ45 index stocks with a Sharpe index value of 0.1970, a Treynor index value of 0.0267 and a Jensen index of 0.0260. The index value in the calculation of portfolio performance has good results so that it is worthy of being an option for investors.

From the results of the evaluation of the optimal portfolio formed for the period January 2022 – May 2022, it shows that the optimal portfolio formed through the Single Index Model can produce realized returns that are greater than the expected return of the portfolio, and greater than the expected return of the market, and also higher. greater than the risk-free return. This study shows that the formation of an optimal portfolio using the Single Index Model provides positive results during the Covid-19 era.

SUGGESTION

The suggestions that can be conveyed from the results of this study are:

1. To obtain a better return from market returns, investors should form an optimal portfolio of a number of stocks traded on the Indonesia Stock Exchange (IDX), especially stocks listed on the LQ45 index by using the Single Index Model and by considering the value of Excess Return to Beta (ERB).
2. This study only uses one model of optimal portfolio formation, namely the Single Index Model. We recommend that to produce a truly optimal portfolio composition, it is necessary to compare the existing optimal portfolio formation models.
3. The data used in this study is historical information data and although it can be used to estimate stock betas, it always has the disadvantage that it can change if market conditions change. Therefore, in the formation of an optimal portfolio, periodic analyzes must be carried out in accordance with changes in market conditions.

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