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OPTIMAL ANALYSIS OF THE LQ-45 STOCK PORTFOLIO ON THE INDONESIAN STOCK EXCHANGE USING THE DISCOUNTED DIVIDEND METHOD MODEL AND PRICE BOOK VALUE (YEAR 2018-2020)

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Abstract

The aim of this research is to analyze stock prices that are undervalued (cheap) and overvalued (expensive) from the intrinsic value obtained when compared with the prices formed on the stock market, to analyze the optimal portfolio of shares resulting from the formation of LQ-45 shares, to analyze the large proportion of funds in each each stock that forms an optimal portfolio of LQ-45 shares, analyzing the expected level of return from the risk of the portfolio formed of LQ-45 shares. The results of the analysis show that there are 20 (twenty) sample companies that are undervalued and to analyze the stock portfolio using the Single Index Model approach, which can form an optimal portfolio, namely ICBP (Indofood CBP Sukses Makmur Tbk.) shares of 0.7739 (77.39). %), BBRI (Bank Rakyat Indonesia (Persero)) Tbk., amounting to 0.2154 (21.54%) and SMGR (Semen Indonesia (Persero) Tbk) amounting to 0.0107 (1.07%). The results of this research show that there is investor rationality in selecting shares and forming an optimal portfolio using a single index model on the Indonesia Stock Exchange for LQ45 shares for the period February 2018 - January 2020.

Keywords: ***LQ 45 Index, Price Book Value, Dividend Discounted Model, Single Index Model, Optimal Portfolio***

INTRODUCTION

Capital markets have a very important role in the global era, especially for a country's economy. The capital market is a meeting between parties who have excess funds and parties who need funds by buying and selling securities (Tandelilin, 2001:13). One of the capital market instruments that is quite popular with investors is shares, where investment is related to postponing current consumption in the hope that it will provide better results in the future. Investments in general will face a future that contains uncertainty, meaning it contains an element of risk for investors. The desire to make a profit is a hope for all investors. The higher the risk faced by an investor, the higher the investor's hope of making a profit (expected return). The market capitalization value of LQ-45 shares can be calculated by multiplying the total number of company shares by the market price formed on the Stock Exchange where the company lists its shares. Thus, the market capitalization value will change if there is a change in the number of shares listed or a change in the share price on the secondary market. Even though it is filled with shares of companies that have many advantages compared to shares of other companies, LQ-45 is not immune to the ups and downs of returns. This can be seen from the LQ-45 index returns over the last 3 years:

Table 1.1
LQ-45 Stock Returns 2017-2019

Year	*Return*(Return Rate) LQ-45 YoY
2017	22.0 %
2018	-9.0 %
2019	3.2 %

Source: idx.co.id data processed

From Table 1 above it can be seen that the movement of the rate of return on LQ-45 shares is quite volatile, it can be seen from the movement of shares from 2017 to 2018 which experienced a quite significant decline, namely -9.0% from 2017 because on March 21 2018 the The Fed (Federal Reverse System) decided to increase short-term interest rates by 25 basis points from the range of 1.5% to 1.75% and recorded an increase in interest rates throughout 2018, in addition to the effects of the trade war between the United States and China as well. effect on the decline in the Composite Stock Price Index (IHSG) and LQ-45 shares. This is because Bank Indonesia decided to increase interest rates so that investor funds in Indonesia do not flow out of the country. It can be seen from the following table:

Table 1.2
BI Rate

2018	%		2019	%
January	4.25		January	6.00
February	4.25		February	6.00
March	4.25		March	6.00
April	4.25		April	6.00
May	4.75		May	6.00
June	5.25		June	6.00
July	5.25		July	5.75
August	5.50		August	5.50
September	5.75		September	5.25
October	5.75		October	5.00
November	6.00		November	5.00
December	6.00		December	5.00
Average	5,10		Average	5.63

Source: Central Statistics Agency, data processed

It can be seen from the table above that the 2018 BI Rate has an average rate of return of 5.10%, which is greater than the rate of return for placing investor funds in LQ-45 shares. This also happened in 2019, where the average rate of return was 5.63% greater than the rate of return on placements of investor funds in LQ-45 shares. This shows that, even though investors have invested in liquid shares such as those listed in LQ-45 shares, investors must still be careful about various risks that could arise in the stock market. The results of this research are similar to previous research which stated that interest rates and inflation simultaneously influence the share prices of Banking Subsector companies (Ginting, et al, 2016). So investors need knowledge to know what kind of stock composition can provide a good level of return to investors. Share price movements are also one of the things that investors must pay attention to, to know when an investor should buy shares and when they should sell shares. There are two techniques for analyzing stock prices, namely technical analysis and fundamental analysis. Technical analysis attempts to identify market prices based on past information, but this analysis is used for the short term. Fundamental analysis assumes that each stock has intrinsic value. Intrinsic value (NI) is the value that should occur, this value will later be compared with the market price.

The Single Index Model is a model developed by William Sharpe in 1963 which is a simplification of the Markowitz model calculations and can be used to calculate portfolio risk and the rate of return of the portfolio. Portfolio formation using the Single Index Model can be done by selecting the shares that will be included in the optimal portfolio, namely by comparing the Excess Return to Beta (ERB) with the cut off point as the limit. ERB is the ratio between excess return (the difference between the expected rate of return and the return on risk-free assets) and Beta. The optimal portfolio will contain assets that have a high ERB value. Assets with a low ERB ratio value will not be included in the optimal portfolio. Thus, a cut-off point is needed that determines the ERB value that can be said to be high (Hartono, 2014).

RESEARCH METHOD

Types of research

This research is descriptive research with a quantitative approach. This research uses secondary data in the form of a time series for the 2018 - 2020 period consisting of the LQ-45 share list, monthly and quarterly share prices (close price), cash dividends paid by sample companies, financial reports of sample companies.

Research sites

This research was conducted through the official website to obtain various sources of accurate and supporting data, including: the Indonesian Stock Exchange (www.idx.co.id), Bank Indonesia (www.bi.go.id), and the Indonesian Central Securities Depository (www.ksei.co.id).

Population and Sample

The population for this research was taken from the Indonesia Stock Exchange (BEI) for the period February

2018 – January 2020. The population in this study were LQ-45 stock companies listed on the BEI in that year's period. Based on the criteria, there were 28 (two eight shares) included in the research sample.

RESULTS AND DISCUSSION

This research is to determine the optimal portfolio Single Index Model. Where the sample of research companies that will be used is the shares of companies that were undervalued in 2018 and 2019, in this case we will use a sample of research companies that were undervalued in both research years (2018 and 2019) so that we get 16 samples. namely: ADRO, ASII, BBNI, BBRI, BBTN, BMRI, GGRM, ICBP, INDF, INTP, KLBF, PTPP, SCMA, SMGR, SRIL, WIKA.

a. Calculate the Realized Return (Ri) and Expected Return (E(Ri)) for each stock.

Realized stock returns are calculated by subtracting the share price in the current period from the share price in the previous period and dividing by the share price in the previous period. And Expected Return is calculated by adding up the realized returns and then dividing by the number of research periods.

Table 1
Realized Return and Expected Return Table

No	Code	Ri	E(Ri)
1	ADRO	-0.5059	-0.0211
2	ASII	-0.1962	-0.0082
3	BBNI	-0.2272	-0.0095
4	BBRI	0.2057	0.0086
5	BBTN	-0.5365	-0.0224
6	BMRI	-0.0701	-0.0029
7	GGRM	-0.2828	-0.0118
8	ICBP	0.2661	0.0111
9	INDF	0.0780	0.0032
10	INTP	-0.1270	-0.0053
11	KLBF	-0.0599	-0.0025
12	PTPP	-0.5045	-0.0210
13	SCMA	-0.5609	-0.0234
14	SMGR	0.2268	0.0095
15	SRIL	-0.3853	-0.0161
16	WIKA	0.1933	0.0081
Maximum		0.2661	0.0111
Minimum		-0.5609	-0.0234

Source: Processed Data (Appendix 15 to Attachment 30)

Based on the table above, of the 16 (twenty) research samples, the one that gave the largest expected return was ICBP shares, namely 0.0111, while the stock that gave the lowest expected return in the year was SCMA shares, namely -0.0234.

b. Calculating market return (RM), expected market return (E(RM)).

Market returns are calculated using LQ-45 stock data. This is because the research uses LQ-45 shares as the research object. The results of the LQ-45 index calculation show a stock market return of -0.12318 and an expected market return of -0.00513. The expected return was -0.50% due to a decrease in the investment price of LQ-45 shares in the year of the study (Appendix 34).

c. Calculating market return variance (RM)

From the LQ-45 calculation it is known that the expected market return E(RM) is -0.0051 and (RM-E(RM))2 is 0.0311 for a period of 24 months, so the return variance from the market is 0.0012 or amounting to 0.12% per month (Appendix 34).

d. Calculate the beta and alpha of each stock.

Beta is a coefficient that measures the influence of market returns on changes that occur in stock returns, while Alpha is a variable that is not influenced by market returns.

Table 2
Beta and Alpha Table for Each Stock

No	Code	βi	Ai
1	ADRO	1.5654	-0.0130
2	ASII	1.3338	-0.0013
3	BBNI	1.7968	-0.0002
4	BBRI	1.3458	0.0155
5	BBTN	1.7255	-0.0135
6	BMRI	1.0445	0.0024
7	GGRM	0.9017	-0.0072
8	ICBP	0.1876	0.0120
9	INDF	0.5745	0.0062
10	INTP	2.0025	0.0050
11	KLBF	1,2017	0.0037
12	PTPP	3.6690	-0.0022
13	SCMA	1.5474	-0.0154
14	SMGR	2,1959	0.0207
15	SRIL	0.0830	-0.0156
16	WIKA	3.3978	0.0255
Maximum		3.6690	0.0255
Minimum		0.0830	-0.0199

Source: Processed Data (Appendix 32)

Positive beta indicates that market returns run in the same direction as stock returns. And conversely, if beta is negative, it indicates that market returns result in a decrease in stock returns. Based on table 21 above, it can be seen that PTPP has the largest beta value, namely 3.6690. This beta value is considered an aggressive beta because the value is greater than 1, meaning the stock has high sensitivity to market conditions. Meanwhile, SRIL has the smallest beta value, namely 0.08300. The normal magnitude of the beta coefficient (β) is 1. If β < 1, it is said to be a weak stock condition, which means that if there is an increase in market returns of x%, stock returns will increase by less than x%, and vice versa. From the table above, it can be seen that there are 12 (twelve) shares that have a β value > 1, namely ADRO, ASII. BBNI, BBRI, BBTN, BMRI, INTP, KLBF, PTPP, SCMA, SMGR, WIKA. These shares are shares that are aggressive towards market conditions in the event of an increase or decrease. If there is an increase or decrease in the portfolio by X%, then the level of profit on the shares changes in the same direction.

e. Look for variance or residual error.
This is the unique or unsystematic risk of a stock.

Table 2
Table of Variance Error Calculation Results

No	Code	σi2	βi	βi2	σm2	σei2= σi2-βi2.σm2
1	ADRO	0.011869	1.5654	2.4503	0.00136	0.00975
2	ASII	0.003632	1.3338	1.7790	0.00136	0.00182
3	BBNI	0.006111	1.7968	3.2284	0.00136	0.00368
4	BBRI	0.003495	1.3458	1.8110	0.00136	0.00167
5	BBTN	0.012677	1.7255	2.9772	0.00136	0.01034
6	BMRI	0.002129	1.0445	1.0909	0.00136	0.00071
7	GGRM	0.005859	0.9017	0.8130	0.00136	0.00464
8	ICBP	0.002458	0.1876	0.0352	0.00136	0.00220
9	INDF	0.004026	0.5745	0.3301	0.00136	0.00325
10	INTP	0.013264	2.0025	4.0097	0.00136	0.01055
11	KLBF	0.004537	1,2017	1.4439	0.00136	0.00291
12	PTPP	0.026463	3.6690	13.4607	0.00136	0.02149
13	SCMA	0.009757	1.5474	2.3943	0.00136	0.00766
14	SMGR	0.014349	2,1959	4.8217	0.00136	0.01137
15	SRIL	0.002809	0.0830	0.0069	0.00136	0.00270

No	Code	σi2	βi	βi2	σm2	σei2= σi2-βi2.σm2
16	WIKA	0.019251	3.3978	11.5441	0.00136	0.01465

Source: Processed Data (Attachment)

The error variance or variance of the residual error is a variable that shows the magnitude of the unique unsystematic risk that occurs within the company. Where the error variance for each company can be reduced by diversifying. The more shares included in the portfolio, the less systematic risk will be. The highest unique risk is in PTPP shares, while the lowest unique risk is in BMRI.

f. Calculating Excess Return to Beta (ERB).

Excess return is defined as the difference between expected returns and risk-free asset returns (RBR). Where in this research the return on risk-free assets such as Bank Indonesia Certificates (SBI) has zero risk and the returns obtained by investors are certain. The RBR in this study uses the BI Rate from the research period from February 2018 to January 2020. The RBR is calculated from the average BI Rate during the research period divided by the number of research periods. Based on data that has been processed using this formula, an RBR of 0.00449 is obtained.

Table 3
Table of Calculation of Excess Return to Beta Results

No	Code	E(Ri)	Rf	βi	ERB
1	ICBP	0.0352	0.00449	0.1876	0.0352
2	BBRI	0.0030	0.00449	1.3457	0.0030
3	INDF	0.0023	0.00449	0.5745	0.0023
4	SMGR	0.0010	0.00449	2,1958	0.0010
5	WIKA	-0.0022	0.00449	3.3977	-0.0022
6	KLBF	-0.0049	0.00449	1,2016	-0.0049
7	INTP	-0.0058	0.00449	2.0024	-0.0058
8	BMRI	-0.0070	0.00449	1.0444	-0.0070
9	BBNI	-0.0071	0.00449	1.7968	-0.0071
10	PTPP	-0.0078	0.00449	3.6689	-0.0078
11	ASII	-0.0095	0.00449	1.3338	-0.0095
12	BBTN	-0.0156	0.00449	1.7255	-0.0156
13	GGRM	-0.0163	0.00449	0.9016	-0.0163
14	ADRO	-0.0180	0.00449	1.5653	-0.0180
15	SCMA	-0.0181	0.00449	1.5473	-0.0181
16	SRIL	-0.2475	0.00449	0.0830	-0.2475
				Maximum	0.0352
				Minimum	-0.2475

Source: Processed Data (Appendix 32)

Based on the calculation table above, it can be seen that the highest ERB value is ICBP shares, which is 0.0352. And after that sorted from largest to smallest. The stocks selected in the optimal portfolio are stocks that have a high ERB. Stocks with a low ERB will not be included in the optimal portfolio, so a limiting point is needed that determines the ERB.

g. Calculate the values of Ai, Bi, and cut off rate

The cut off rate limiting point (C*) is obtained from the largest value (Ci), where Ci is the value (C) for shares calculated by accumulating the values (A1) to (Ai) and also the values (B1) to with (Bi). The shares that form the optimal portfolio are those that have a value (ERB) greater than or equal to the limiting point (C*), shares whose value (ERB) is less than the limiting point (C*) will not be included in the optimal portfolio.

Table 4
Comparison of ERB and Cut off rate

No	Code	ERB	Ai	Ms	Ci	C*	INFORMATION
1	ICBP	0.03515	0.56136	15.9695	0.0021	0.0021	PORTFOLIO ENTRY
2	BBRI	0.00303	3.2838	1083.4562	0.0016	0.0021	PORTFOLIO ENTRY

No	Code	ERB	Ai	Ms	Ci	C*	INFORMATION
3	INDF	-0.00217	-0.2201	101.6473	0.0006	0.0021	NOT IN PORTFOLIO
4	SMGR	0.00226	0.95718	423.9533	0.0009	0.0021	PORTFOLIO ENTRY
5	WIKA	0.00105	0.82644	788.2126	-0.0010	0.0021	NOT IN PORTFOLIO
6	KLBF	-0.00582	-2.8881	496.5229	-0.0033	0.0021	NOT IN PORTFOLIO
7	INTP	-0.00489	-1.8568	380.0738	-0.0047	0.0021	NOT IN PORTFOLIO
8	BMRI	-0.00710	-10,846	1528.4086	-0.0056	0.0021	NOT IN PORTFOLIO
9	BBNI	-0.00777	-6.8183	877.7480	-0.0049	0.0021	NOT IN PORTFOLIO
10	PTPP	-0.00695	-4,356	626.3685	-0.0057	0.0021	NOT IN PORTFOLIO
11	ASII	-0.00950	-9.2593	974.9279	-0.0059	0.0021	NOT IN PORTFOLIO
12	BBTN	-0.01556	-4.4803	287.9655	-0.0062	0.0021	NOT IN PORTFOLIO
13	GGRM	-0.01805	-3.1646	175.3043	-0.0059	0.0021	NOT IN PORTFOLIO
14	ADRO	-0.01634	-4,106	251.3615	-0.0073	0.0021	NOT IN PORTFOLIO
15	SCMA	-0.01801	-5.6292	312.5888	-0.0072	0.0021	NOT IN PORTFOLIO
16	SRIL	-0.24752	-0.6324	2.5548	-0.0008	0.0021	NOT IN PORTFOLIO

Source : data processed (Appendix 34)

In table 24 above, it can be seen that shares are sorted based on the highest ERB value to the lowest. Then, to obtain the optimal stock portfolio candidate, the ERB value must be compared with the cut off rate value. There are 3 (three) shares included in the optimal portfolio candidates, namely ICBP (Indofood CBP Sukses Makmur Tbk.), BBRI (Bank Rakyat Indonesia (Persero)) Tbk., and SMGR (Semen Indonesia (Persero) Tbk).

h. Calculate the proportion of funds for each share (Xi)

Before calculating the proportion of funds for each share (Xi). The following table is the result of calculating Xi and Wi. The complete calculation method is in the attachment.

Table 5
Xi and Wi Calculation Results

No	Code	βi/σei2	ERB	C*	Xi	Wi
1	ICBP	85.1272	0.0352	0.0021	2.8173	0.7739
2	BBRI	805.1255	0.0030	0.0021	0.7841	0.2154
3	SMGR	193.0779	0.0023	0.0021	0.0388	0.0107
				Amount	**3.6402**	**1,0000**

Source: Appendix (Secondary data processed)

Based on the calculation table above, the composition obtained for each share is ICBP (Indofood CBP Sukses Makmur Tbk.) of 0.7739 (77.39%), BBRI (Bank Rakyat Indonesia (Persero)) Tbk., of 0.2154 (21.54%) and SMGR (Semen Indonesia (Persero) Tbk) of 0.0107 (1.07%). It can be seen that the largest percentage of funds is in the ICBP company. The largest percentage of funds is a good investment alternative because according to calculations it has an ERB above Ci.

i. Calculating the portfolio's expected return.

The expected return portfolio functions to determine the level of return that will be obtained from the portfolio formed. Meanwhile, portfolio risk can be determined by first calculating the variance of the portfolio by multiplying the portfolio beta squared by the market variance, and adding the unsystematic risk of the portfolio formed. The following table is the result of calculating expected return, variance and portfolio risk:

Table 6
Expected Return, Variance, and Portfolio Risk

No	Code	αp	βp	E(Rp)	σp2
1	ICBP	0.0129	0.4585	0.0102	0.0025
2	BBRI				
3	SMGR				

Source: Appendix (Secondary data processed)

From the calculation results above, the expected portfolio return of the 3 (three) company shares included in

the candidate portfolio is 0.0102 or 1.02% per month. This return is higher compared to the expected market return, namely -0.00470 or -0.50% per month, and also higher compared to the risk-free return, namely 0.00449 or 0.45% per month. Meanwhile, the portfolio variance formed is 0.0025 or 0.25% smaller than all stock variants included in the portfolio candidate. It can be concluded that the risk obtained after forming this optimal portfolio is smaller compared to investing in each individual stock. Therefore, it can be said that this portfolio is an optimal portfolio and worthy of consideration by investors.

CONCLUSION

Based on the results of the discussion and analysis of the optimal analysis of the LQ-45 share portfolio on the Indonesia Stock Exchange using the Dividend Discounted Model and Price Book Value method for the 2018-2020 research year, it was concluded:

1. The share prices of the research sample companies which were assessed using the Dividend Discounted Model (DDM) and Price Book Value (PBV) resulted in slightly different conditions in the two research years, namely in 2018 there were 18 shares of the research sample companies which were in an undervalued condition where the average intrinsic value was the average is greater than the market value. The 18 companies are: ADRO, ASII, BBNI, BBRI, BBTN, BMRI, GGRM, ICBP, INDF, INTP, JSMR, KLBF, MNCN, PTPP, SCMA, SMGR, SRIL, WIKA. And in the market value of the research sample companies in 2019, there were 18 shares of the research sample companies which were in an undervalued condition where the average intrinsic value was greater than the market value. The 18 companies are AKRA, ASII, BBNI, BBRI, BBTN, BMRI, GGRM, ICBP, INDF, INTP, JSMR, PGAS, PTPP, SCMA, SMGR, SRIL, UNTR, WIKA. Where for these shares a decision can be made to buy (purchase) or hold (hold shares that are already owned).
2. The share prices of research sample companies assessed using the Dividend Discounted Model (DDM) and Price Book Value (PBV) resulted in slightly different conditions in the two research years where in 2018 there were 10 research sample companies in overvalued conditions, namely AKRA, ANTM, BBCA, HMSP, INDY, LPPF, PGAS, TLKM, TPIA, UNTR. Meanwhile, for 2019 there are 10 research sample companies, namely: ADRO, ANTM, BBCA, HMSP, INDY, KLBF, LPPF, MNCN, TLKM, TPIA. Where the decision that can be taken for this condition is not to buy the shares or sell if you already own the overvalued shares.
3. Analysis of optimal portfolio formation using the Single Index Model is able to produce 3 (three) candidate shares as components of an optimal portfolio from company shares that in 2018 and 2019 were undervalued. These candidate shares are shares that have an ERB value $\geq C^*$ ($C^* = 0.0021$). The 3 (three) candidates for optimal portfolio composition are ICBP shares (Indofood CBP Sukses Makmur Tbk.), BBRI (Bank Rakyat Indonesia (Persero)) Tbk., and SMGR (Semen Indonesia (Persero) Tbk).
4. The proportion of funds allocated to each stock forming the optimal portfolio based on the Single Index Model, namely ICBP (Indofood CBP Sukses Makmur Tbk.) shares is 0.7739 (77.39%), BBRI (Bank Rakyat Indonesia (Persero)) Tbk. , amounting to 0.2154 (21.54%) and SMGR (Semen Indonesia (Persero) Tbk) amounting to 0.0107 (1.07%).
5. Of the three stock combinations, the portfolio is expected to have a return of 0.0102 or 1.02% per month and the portfolio risk that must be faced by investing in the combination of the three shares is 0.0025 or 0.25%. The risk contained in this optimal portfolio is smaller than the risk when investing in individual shares. Forming an optimal portfolio is one way of diversification to reduce risk.

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